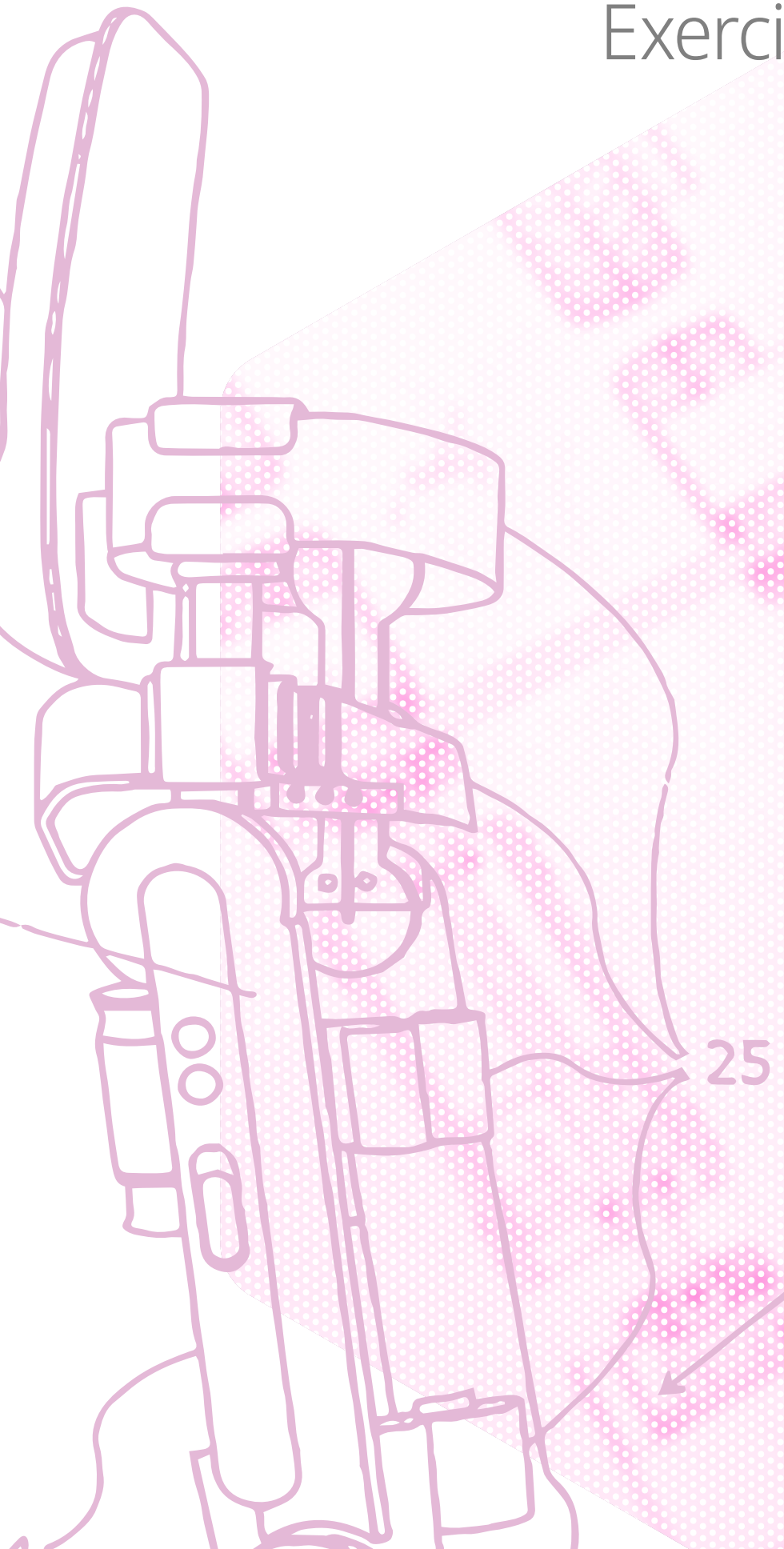
WIPO Patent Drafting Manual

Exercises



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WIPO Patent Drafting Exercise Book

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Acknowledgments

WIPO expresses its highest gratitude to the government of Australia for funding the preparation of *the WIPO Patent Drafting Exercise Book* through the Australia Funds-in-Trust for Intellectual Property (Australia FIT/IP). It also expresses its appreciation to the principal authors of the exercises contained in this Exercise Book: Anton Blijlevens (New Zealand), Emmanuel Jelsch (Switzerland), Isaac Rutenberg (Kenya), Roberto Rios (United States) and James Snaith (United Kingdom). Chapter 1 of this publication is based on earlier work by Thomas Ewing (Sweden), Olga Moreno (Chile), Robert Sayre (United States of America) and Emmanuel Jelsch (Switzerland), to whom special thanks for their contributions.

Introduction

This Exercise Book complements the WIPO Patent Drafting Manual by providing a series of exercises for readers to complete. These exercises have been designed to build readers' capabilities as novice patent drafters. The exercises may also provide support for patent drafters who are attempting to understand more about the unique challenges faced in drafting patents in various technical domains and disciplines.

The *WIPO Patent Drafting Manual* is used as the primary reference material for the WIPO Patent Drafting Workshops organized by the World Intellectual Property Organization (WIPO) in different parts of the world, at the request of WIPO Member States. Typically, during the Workshops several patent drafting exercises are proposed by tutors in order to develop patent drafting skills. This Exercise Book may serve as a complement to the exercises conducted during the Workshops.

The Exercise Book may also be used as additional learning material by participants in WIPO´s International Patent Drafting Training Program, an intensive course intended for drafting professionals from all over the world looking to improve their skills. Alternatively, this Exercise Book may also be used as a self-learning tool to carry out patent drafting exercises.

While the Exercise Book contains some multiple-choice and short answer questions, it mostly focuses on practical patent drafting exercises, such as preparing claims, detailed descriptions and amending patent specifications. It covers various technical fields, such as mechanical, electrical, chemical, pharmacological and biotechnology fields.

The main parts of the Exercise Book are constructed as follows:

- Chapter 1 provides a series of multiple-choice and short answer questions regarding patents in general and basics of the patent drafting theory. As they are not intended to be technology specific, they should be simple enough for any reader with a general science or engineering background, as well as for many readers with no formal technical background at all.
- Chapter 2 provides exercises on claim drafting. The first three exercises guide the reader step-by-step through the process of drafting patent claims. As readers proceed further through this chapter, they are given less guidance to draft a complete set of claims.
- Chapter 3 contains exercises on drafting patent specifications. They are built on the exercises in Chapter 2 so that the readers will prepare a patent application based on the claims drafted in Chapter 2.
- Chapter 4 Exercises address amendments of claims in view of a new piece of prior art. A couple of exercises in this chapter are also based on those in Chapters 2 and 3.
- Chapter 5 comprises patent drafting exercises across a wide range of technical disciplines, including mechanical engineering, chemistry, biotechnology and software-implemented inventions.

Like the *WIPO Patent Drafting Manual*, this Exercise Book pays particular attention to readers seeking development of patent drafting skills, who have fewer opportunities to receive institutional and systematic training from experienced patent drafters in their countries. Thus, the patent drafting exercises in this Exercise Book generally increase in their complexity as one

proceeds in each chapter. Readers are therefore recommended to work through the Exercise Book exercise by exercise. They are also advised to review the corresponding part of the WIPO Patent Drafting Manual before attempting each section. Drafting tips are also provided in the exercises so that readers can review their drafts accordingly.

It should be emphasized that the Exercise Book is a basic introduction to patent drafting methodologies, and it is not intended to be an exhaustive digest of complex patent drafting techniques.

It is hoped that this Exercise Book will serve the larger goal of assisting WIPO Member States to develop and improve national IP institutional capacity, particularly on further enhancement of patent drafting skills, with a view to increased use of the patent system by local inventors, universities, and industry.

Sample answers to the WIPO Patent Drafting Exercise Book are published separately <add link>. The sample answers, however, should be understood as one possible way of drafting patent claims or specifications and not be regarded as a perfect or one-and-only answer for each exercise.

1 Multiple-choice and short answer questions

Note: For the multiple-choice questions, more than one answer may be possible.

1.1 General knowledge on patents

Role of a patent system

Question 1.
Which statement(s) appropriately describe(s) the role of a patent system?

A. A patent system provides incentives to develop new technologies.

B. A patent system guarantees material rewards to inventors for their inventions.

C. A patent system facilitates spreading new technological knowledge.

D. A patent must be obtained before selling new technological products.

Purpose of patent protection

Question 2.
There may be many reasons why an innovative company seeks patent protection on its newly developed inventions. Mark as true (T) or false (F) the following statements:

- A company may seek patent protection so that its competitors will not be able to sell products using the patented invention. .....
- A company may seek patent protection to seek revenue from licensing its patent. .....
- If an R&D company does not have any manufacturing infrastructure, it may sell (assign) its patent to a manufacturing company which is interested in producing a product using the patented invention. .....
- A company may seek patent protection for its own invention and offer a patent license to a competitor, in exchange for a license from the competitor to use the competitor's patented technology. .....
- A company may seek patent protection for its own invention in order to create a defensive shield against competitors entering into a market. .....

Intangible assets

Question 3.
Which statement is correct?

A. Patents are tangible assets, because the products made from inventions are physical.

B. Patents are intangible assets, because they protect inventions, which are products of the human mind and have no physical form themselves.

C. Inventions are intangible assets, because patents have claims.

D. Inventions are tangible assets, because accountants favor this treatment.

Different IP

Question 4.
Rapunzel recently developed a new bowl that can be used in cooking. The overall shape of the bowl is distinctive but serves no technical or functional role. Various competitors have been selling bowls with similar, but not identical, shapes for many years.

Which statement is correct?

A. Rapunzel can seek copyright protection on her distinctive bowl.

B. Competitors are misappropriating Rapunzel's trade secrets.

C. Rapunzel may obtain an industrial design to protect the overall shape of the bowl.

D. Rapunzel may obtain a patent to protect the new shape of her bowl.

Patents and trade secrets

Question 5.
Simon has a patent on a novel method of making boomerangs. However, Simon's patent claims do not cover the aspects of how he treats the wood that he uses in his boomerangs. His method for treating the wood cannot be determined from examination of his boomerang products (i.e. reverse engineering), and he has never told anyone how he does it. Fred starts selling boomerangs that use wood treated in an identical way to that used by Simon. Apart from the treatment of the wood, Simon and Fred use very different methods to produce their boomerangs.

Based on these facts alone:

A. Fred is liable for infringement of Simon's patent.

B. Fred is not liable for infringement of Simon's patent.

C. From these facts alone, whether Fred infringes Simon's patent or not cannot be determined.

D. Fred is liable for misappropriation of Simon's trade secrets.

E. Fred is not liable for misappropriation of Simon's trade secrets.

F. From these facts alone, whether Fred misappropriated Simon's trade secrets or not cannot be determined.

Inventorship and ownership

Question 6.
Mark as true (T) or false (F) the following statements relating to inventorship and ownership of a patent:

– The inventor of an invention is always the owner of the corresponding patent and the inventor will, therefore, always also appear as the applicant. .....

– A company may have the right to file a patent application for an invention devised by an employee, depending on the applicable law. .....

– A patent may have more than one owner. .....

– A PhD student developed a new invention. His/her supervising professor is automatically a co-inventor of the invention. .....

– A patent owner may change during the period when the patent is valid. .....

– An inventor can be a natural person or a legal entity (such as a company). .....

– A patent applicant can be a natural person or a legal entity (such as a company). .....

Exclusive patent rights

Question 7.
Which statement(s) appropriately describe(s) the patent rights?

A. A patent grants a patent owner the right to restrict who can commercially make, use, sell, offer for sale and/or import patented products.

B. A patent grants a patent owner the right to sell patented products.

C. In exceptional cases prescribed under the applicable law, competitors may use a patented invention without obtaining the permission of a patent owner.

D. A patent is granted on a new and inventive process, consisting of steps A, B and C, for manufacturing chemical compound X. The patent owner can prevent its competitors from manufacturing compound X using another method consisting of steps A, B and D.

E. A patent may be withdrawn, revoked or invalidated before the expiration of 20 years from the filing date.

F. Once a patent has expired, anyone can sell an invention covered by that patent, regardless of whether other intellectual property rights over the invention exist.

Priority claim

Question 8.
John, who is a national of the United States of America (US), filed a patent application on his new and inventive life jacket with the United States Patent and Trademark Office on July 1, 2016. Since his life jacket business has been expanding to Canada, he also sought patent protection in Canada and filed a patent application on the same invention with the Canadian Intellectual Property Office on May 20, 2017. He now considers building a factory in Mexico to manufacture his products. John got advice from his friend that he should also file a patent application on the same invention in Mexico. Today is November 22, 2017.

Mark as true (T) or false (F) the following statements.

– When filing a patent application in Canada, John could claim priority under the Paris Convention based on his earlier application filed in the US. .....

– When filing a patent application in Mexico, John can claim priority under the Paris Convention based on his earlier application filed in the US. .....

– When filing a patent application in Mexico, John can claim priority under the Paris Convention based on his earlier application filed in Canada. .....

Question 9.
John filed a patent application on his new and inventive life jacket in the US, Canada and Mexico, claiming, if possible, priority under the Paris Convention, as described in Question 8. The filing date of his patent application in Mexico is November 22, 2017. After having filed these patent applications, John found that a catalog of a company producing and selling life jackets in China indicates that their life jackets use the innovative feature that John had invented and for which the patent applications mentioned in Question 8 were filed. The catalog is written in Chinese and was published on November 25, 2016. Based on these facts alone, which statement(s) is/are correct?

A. John's application filed in Canada will be rejected, because there is a published catalog disclosing the same invention before the filing date of John's Canadian application.

B. John's application filed in Canada will not be rejected, because he claimed priority.

C. John's application filed in Canada will not be rejected, because the catalog is written in Chinese.

D. John's application filed in Mexico will be rejected, because the catalog of the Chinese company is prior art that destroys the novelty of John's invention.

E. John's application filed in Mexico will not be rejected, because he can validly claim priority based on his earlier application.

F. Since the filing date of John's Mexican application is within 12 months from the publication of the Chinese catalog, the catalog of the Chinese company cannot destroy the novelty of John's claimed invention in his Mexican application.

Territoriality

Question 10.
Axel has invented the world's first left-handed "grabject," which allows left-handed people to control and maneuver industrial production machinery more easily and securely. Assume his application filed with the European Patent Office led to grant of a European patent and assume further that Axel has validated his European patent in the United Kingdom (UK), Ireland, Spain, France and Germany.

(1) May Axel later sue those who are making the patented invention in Italy for patent infringement?

A. Yes, because of the European Patent Convention.

B. No, because of the Patent Cooperation Treaty.

C. Yes, because of the Paris Convention.

D. No, because he does not have an Italian patent.

(2) Axel's patent in Germany was invalidated by a German court. May Axel sue those who are making the patented invention in Spain?

A. Yes, because Axel's patent in Spain is still in force.

B. Yes, because Axel filed a patent application with the European Patent Office.

C. No, because Axel's patent in Germany was invalidated.

D. No, because he obtained a European patent.

Question 11.
Skalman invented an innovative autonomous vacuum cleaner and sold all rights to BamSka AB, a Swedish company. BamSka obtained a patent covering the product in Sweden, the US, the UK, Ireland and China. Krösus Sork, a highly competitive entrepreneur, also enters the vacuum cleaner business, selling products in the US, Vietnam, China and Japan. Sork learned how to make the vacuum cleaner by studying Skalman's patent published in Sweden. Sork could not care less about the possibility of patent infringement. All of Sork's products are manufactured in Vietnam. Based on these facts alone, which statement(s) is/are correct?

A. Sork may be liable for infringement of the BamSka patent in Sweden only.

B. Sork may be liable for infringement of the BamSka patent in the US, China and Sweden.

C. Sork may be liable for infringement of the BamSka patent in China only.

D. Sork may be liable for infringement of the BamSka patent in the US and China.

Patent Cooperation Treaty

Question 12.
Mark as true (T) or false (F) the following statements relating to the Patent Cooperation Treaty (PCT).

- The PCT regulates the granting of a worldwide patent. .....
- An international application filed under the PCT has the effect of patent filing in all designated PCT contracting states. .....
- A PCT application must be filed with the World Intellectual Property Organization in Geneva. .....
- If an applicant receives a positive PCT international Search Report (that is, an examiner did not find any prior art that negatively affects the patentability of the claimed invention), the applicant can be sure that it will get a patent. .....
- During the international phase of the PCT, key stages include filing of an international application, international search and publication of an international application,, and if requested by an applicant, international preliminary examination. .....
- During the national phase, the designated or elected office decides on the substantive patentability of the claimed invention, based on the provisions of the PCT. .....

Prior art

Question 13.
John filed a patent application on a life jacket with the European Patent Office on May 15, 2016. His application was published by the European Patent Office on November 16, 2017. Based on these facts alone, which disclosure could possibly affect the patentability of John's life jacket?

A. Competitor A announced sales of similar life jackets at a press conference on November 1, 2016.

B. Researcher B published the essential technological features of the life jacket in a Russian technology journal, published in Russian on January 22, 2016.

C. Inventor C exhibited a similar life jacket at an exhibition organized by a national inventors association in India on April 14, 2016.

D. A video describing how a similar life jacket functions has been posted by an Indonesian company on the internet since May 14, 2016.

Patentability

Question 14.
Axel has invented the world's first left-handed "grabject," which allows left-handed people to control and maneuver industrial production machinery more easily and securely. If Axel disclosed his invention at a local trade show in Bangkok, Thailand on July 14, 2006, will this cause him any problems in obtaining a patent from the European Patent Office for an application filed on November 1, 2006?

A. Yes, because he has lost absolute novelty before filing his application.

B. No, because Thailand is not a member of the European Patent Office.

C. No, because Thailand did not join the World Trade Organization until 2007.

D. Yes, because his invention is obvious.

Question 15.
Axel has invented the world's first left-handed "grabject," which allows left-handed people to control and maneuver industrial production machinery more easily and securely. If Axel disclosed his invention at a local trade show in Bergen, Norway on July 15, 2006, will this prevent him from obtaining a patent from the US Patent and Trademark Office for an application filed on November 1, 2006?

A. No, because his disclosure was in Norway.

B. Yes, because Norway is a member of the World Trade Organization.

C. No, because the US has a one-year grace period following public disclosure.

D. Yes, because his invention lacks industrial applicability.

Question 16.
Mark as true (T) or false (F) the following statements relating to inventive step:

– More than one piece of prior art may be combined for the determination of lack of inventive step. .....

– Whether a claimed invention is obvious or not is judged from the perspective of a person skilled in the art, who should have an extremely high level of knowledge in the technological field relevant to the invention. .....

– If a claimed invention is a combination of element X and element Y, and those elements X and Y are already known individually before the filing date of the application claiming that invention, the invention is obvious. Consequently, it lacks inventive step. .....

– Inventive step means that the claimed invention can be used in an inventive way. .....

Question 17.
Axel's invention is for a left-handed "grabject," which allows left-handed people to control and maneuver industrial production machinery more easily and securely. If the patent examiner finds prior art on a grabject usable by right-handed people only, what kind of rejection may a patent examiner use against Axel's pending patent claims?

A. Lack of novelty.

B. Lack of inventive step/obviousness.

C. Lack of industrial application.

D. Lack of best mode disclosure.

Infringement

Question 18.
BamSka AB, a Swedish company, has been selling innovative autonomous vacuum cleaners in many countries. BamSka obtained several patents on a three-dimensional sensor mechanism that allows its vacuum cleaners to move without hitting obstacles, such as walls, furniture, etc. Patents have been granted in Germany, Japan, Sweden, the UK and the US. BamSka found that there are several companies that sell autonomous vacuum cleaners using the patented three-dimensional sensor mechanism. BamSka wants to stop those companies from infringing his patents. Mark a statement(s) that is/are appropriate.

In order to stop other companies from infringing its patents, in general, BamSka may:

A. do nothing, because BamSka has the patents.

B. send a request to the patent offices that issued the patents to stop infringement.

C. initiate a court action(s) against alleged patent infringers.

D. send a letter to alleged infringers, informing them of the existence of its patents and warning them that BamSka may take a legal action against them.

E. do nothing, because it does not have patents in all countries.

Question 19.
Krösus Sork, a German company, has been producing and selling autonomous vacuum cleaners with exactly the same appearance and outer design as those of BamSka's patented cleaners described in Question 18. Krösus Sork sells them in Germany and the US. Based on these facts alone:

A. Krösus Sork infringes BamSka's patents in Germany and the US.

B. Krösus Sork does not infringe BamSka's patents.

C. It cannot be determined whether or not Krösus Sork infringes BamSka's patents.

D. BamSka can seek remedies for patent infringement in Sweden, because it is a Swedish company.

Question 20.
Ky Rei, a Japanese company, has been producing and selling in Japan and China autonomous vacuum cleaners that use a three-dimensional anti-collision sensor mechanism. The mechanism is patented by BamSka in Japan and China, although BamSka is not exporting, selling or producing its cleaners in Japan. What kind of action against Ky Rei can BamSka take?

A. BamSka cannot take any action in Japan, because it is not selling its patented product in Japan.

B. BamSka can seek to license its Japanese patents to Ky Rei.

C. BamSka can seek to sell (assign) its Japanese patents to Ky Rei.

D. BamSka can seek to stop Ky Rei from selling its autonomous vacuum cleaners that use the BamSka's patented technology in Japan and China.

E. BamSka cannot take any action in China.

1.2 Patent drafting theory

General structure and purpose of each part of a patent application

Question 21.
(a) List the five typical parts of a patent application.
(b) What are other documents that may be required in certain cases?

Question 22.
Mark as true (T) or false (F) the following statements:

- When filing a patent application before a patent office, a request form and a power of attorney must be submitted in order to obtain a filing date. The other documents can be submitted later. .....
- It is not necessary to include all essential parts of the invention at the time of the application filing, since they can be added later during the prosecution. .....
- A computer program is used to carry out the claimed invention. In this case, a software program must be submitted with a patent application. .....
- A patent application must be accompanied by a working model. .....

Question 23.

(a) The main parts of a patent application are listed in A to E. Link the statements (1) to (10) with the corresponding part (or parts) of a patent application.

A. Request

B. Claims

C. Description

D. Drawings

E. Abstract

(1) This part defines the legal scope of patent protection.
(2) This part describes a very short summary of the invention.
(3) This part contains figures, diagrams, pictures or any other images.
(4) This part may provide the title of the invention, a description of background technologies, and explains how the invention can be carried out by a person skilled in the art.
(5) This part provides bibliographic information about the applicant(s), inventor(s) and representative(s), such as their names and addresses.
(6) This part must always be included in a patent application.
(7) This part is included in a patent application, if necessary.
(8) In principle, information contained in this part is made publicly available, when an international application under the Patent Cooperation Treaty (PCT) is published.
(9) If you are merely interested in the technological aspects of inventions, it is useful to read this part of the published patent applications/patents.
(10) If you want to avoid infringing patents of others, this is the most relevant part in the published patents.

(b) In general, which of the parts A to E, above, should be prepared first? Why?

.....

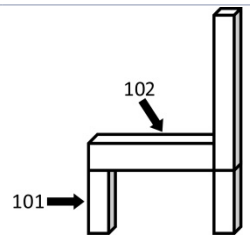
.....

Claims

Question 24.
Which of the following is the broadest reasonable claim term for element 101? Why?

.....

.....

Invention:	
Specification:	Element 101 supports the seat 102 and any occupants that it holds. Element 101 prevents the occupants from resting proximally close to the floor. Wood comprises one suitable material for element 101 …

A. A leg

B. A chair leg

C. A wooden leg

D. A seat-supporting element

E. A support member

F. A wooden member

Question 25.
Which of the following claims is the broadest?

A. A composition comprising 40% X, and substantially equal portions of Y and Z.

B. A composition consisting of 40% X, 30% Y and 30% Z.

C. A composition comprising 30 to 50% X, and substantially equal portions of Y and Z.

D. A composition comprising 30 to 50% X, and equal portions of Y and Z.

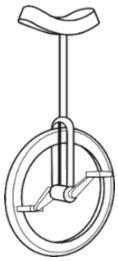
Question 26.
In each of the following independent claims:

- identify the (i) preamble part; (ii) transitional phrase; and (iii) body part.
- state the feature(s) that provide(s) the novelty to the claimed invention.

The prior art is the left picture and the product covered by the claim is on the right.

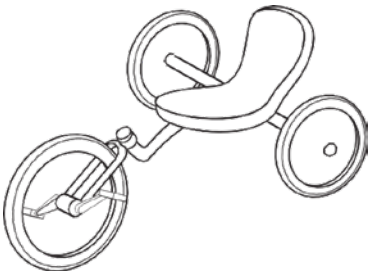
(a) 1. A vehicle for transporting a person over ground comprising a frame carrying a seat for the person to sit on and at least one wheel rotationally supported by the frame to make rolling contact with the ground.

Prior art

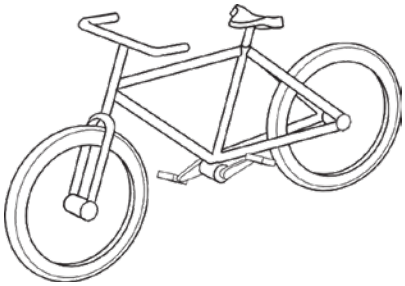


Product covered by the claim

1. A vehicle for transporting a person over ground comprising a frame carrying a seat for the person to sit on and only two wheels, each wheel rotationally supported by the frame to make rolling contact with the ground.



Prior art



Product covered by the claim

Question 27.
Which of the following claims is broader? Why?

1. A method for making tea, the method comprising:
   - boiling water;
   - adding tea leaves to the boiling water to form a mixture;
   - filtering the mixture.

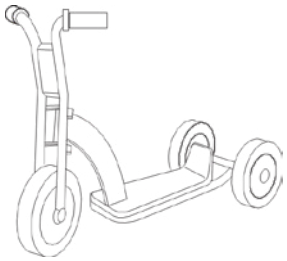
2. A method for making tea, the method consisting of:
   - boiling water;
   - adding tea leaves to the boiling water to form a mixture;
   - filtering the mixture.

Question 28.
What is wrong with each of these claims? What can be improved?

A. 1. A toothpaste dispenser consisting of a flexible tube that contains toothpaste, the tube having an outlet at one end via which the toothpaste is dispensable when the tube is squeezed.

B. 1. A car comprising:
   - a wide windscreen;
   - a narrow rear screen;
   - a motor;
   - axle;
   - a first long wiper with a first rubber strip;
   - a second short wiper with a second rubber strip.

C. 1. A vehicle for transporting a person standing in an upright position, the scooter comprising:
   - an iron frame that supports a deck on which a person can stand;
   - a front steering assembly that is pivotally engaged to the front of the frame and that holds a front wheel that can contact the ground to roll over the ground;
   - one wheel or two wheels secured to the back that can contact the ground to roll over the ground.



D. 1. An apparatus for harvesting corn comprising:
   - a thrasher for cutting corn;
   - moving the cut corn into a hopper;
   - a rotating pivot attached to the thrasher.

Independent/dependent claims

Question 29.
Why is it important to include independent and dependent claims in a patent application?

Question 30.
We have the following independent and dependent claims for an invention:

1. A device, comprising a pencil and an eraser attached at one end of the pencil.

2. A device as claimed in claim 1, wherein a light is also attached to the central part of the pencil.

The examination of this application reveals that the prior art already discloses a device comprising a pencil and an eraser attached at one end of the pencil. However, the characteristic of the light attached to the central part of the pencil has not been found in the prior art search. Rewrite a new independent claim so that this invention can be patentable.

Dependencies and multiple dependencies

Question 31.
The following claims contain one independent claim and eight dependent claims. Are there any improper dependent claims? How do you correct them?

1. An apparatus comprising:

    a. a pencil; and
    b. an eraser attached to the pencil.

2. The apparatus of Claim 1, wherein the eraser is attached to one end of the pencil.

3. The apparatus of Claim 1, further comprising a light attached to a pencil.

4. The writing tool of Claim 1, wherein the pencil is made of wood.

5. The apparatus of Claim 8, wherein the pencil lead is red in color.

6. The apparatus of Claim 1, 2 or 3, wherein the light is detachably attached to the pencil.

7. The apparatus of Claim 3 or 6, further comprising a photoelectric device controlling luminosity of the light.

8. The apparatus of Claim 1 or 3, further comprising a pencil lead release button attached to the pencil.

9. The apparatus of Claim 3, wherein the eraser is attached to one end of the pencil.

Claim categories

Question 32.
Please categorize the claims A to I under: (i) product claims; (ii) process claims; and (iii) product by process claims.

A. A rice cooker, comprising:

a vessel for holding rice; and
a heater configured to heat the rice-holding vessel.

B. An insecticide consisting of compounds X, Y and Z.

C. A communication system comprising a plurality of transmitting and receiving stations.

D. A process of killing insects using a substance consisting of compounds X, Y and Z.

E. A metal product produced by annealing a specific alloy from temperatures X to Y at a rate of Z degrees per second.

F. An isolated polynucleotide comprising a member selected from the group consisting of:

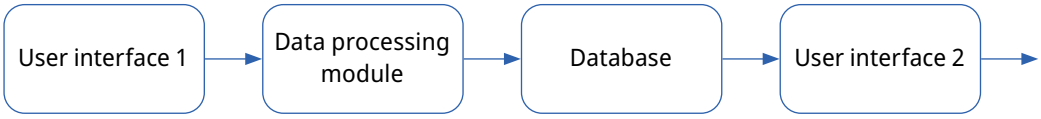
(a) a polynucleotide encoding a polypeptide comprising amino acid 1 to amino acid 255 as set forth in SEQ ID NO:1; and
(b) a polynucleotide which hybridizes to and which is at least 95% complementary to the polynucleotide of (a).

G. A beverage comprising water, a tea extract and sugar.

H. A method of making a beverage including the steps of boiling water, adding sugar to the boiling water, adding tea leaves to the boiling water to form a mixture and filtering the mixture.

I. A pharmaceutical composition for treating cholesterol, comprising simvastatin or its pharmaceutically acceptable salt.

Question 33.
Assume that an invention relates to searching for information on the Internet. It allows a user to input a search term and carries out a search on the Internet. The result of the search is provided to the user through a user interface, such as a screen. The schema of the invention and Claim 1 are described, below:



1. A system for searching information on the internet, said system comprising:

– a first user interface configured to store search request data;
– a data processing module configured to receive the search request data and perform a search on the internet;
– a database configured to store results produced by the search; and
– a second user interface configured to present the search results to a user.

Draft a method claim for the same invention as "A method for performing an internet search, the method comprising …".

Question 34.
Which of the following claims include a proper Markush group?

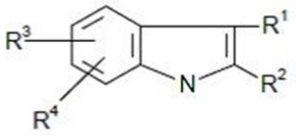
A. A pharmaceutical composition comprising an anti-inflammatory compound such as aspirin, ibuprofen and naproxen.

B. A deproteinized natural rubber wherein the anionic surfactant is selected from the group consisting of carboxylic acid surfactants, sulfonic acid surfactants, sulfate surfactants and phosphate surfactants.

C. An antihelminthic composition comprising:

(i) an effective amount of at least one macrolide;
(ii) an effective amount of praziquantel in suspension;
(iii) a wetting agent;
(iv) an antifoaming agent;
(v) a dispersing agent; and
(vi) water to complete the volume.

D. Compounds of the formula:



wherein R1 is selected from the group consisting of phenyl, pyridyl, thiazolyl, triazinyl, alkylthio, alkoxy and methyl; and R2-R4 are selected from methyl, benzyl and phenyl.

Patent infringement and invent-around by competitors

Question 35.
John obtained a patent with the following claim:

"A food article, comprising, in this order:
a first bread layer;
a layer of sauce comprising ketchup;
a layer of lettuce;
a slice of tomato;
a meat layer; and
a second bread layer."

Mark, who runs a sandwich stand in front of John's shop, sells various kinds of sandwiches, as described in A to F, below. Which sandwich(es) of Mark's infringe(s) John's patent?

A. A sandwich that has a layer of ketchup, two layers of lettuce, a slice of tomato and a layer of hamburger, in that order, between two layers of bread.

B. A sandwich that has a layer of ketchup, a layer of lettuce, a slice of tomato and a slice of ham, in that order, between two layers of bread.

C. A sandwich that has a layer of ketchup, a layer of pickles, a layer of lettuce, a slice of tomato, a layer of cheese and a slice of ham, in that order, between two layers of bread.

D. A sandwich that has a layer of lettuce, a slice of tomato and a layer of hamburger, in that order, between two layers of bread.

E. A sandwich that has a layer of mayonnaise, a layer of lettuce, a slice of tomato and a layer of hamburger, in that order, between two layers of bread.

F. A sandwich that has a layer of lettuce, a slice of tomato, a slice of ham and a layer of ketchup, in that order, between two layers of bread.

Question 36.
Axel invented the world's first left-handed "grabject," which allows left-handed people to control and maneuver industrial production machinery more easily and securely. He applied it to a device for turning lead into gold in a process known as "zmooshing." Assume Axel's pending patent application contains the following claim:

1. A device for zmooshing, comprising:
   - a grabject having a positronic balance between -0.1 and +0.1;
   - a targeting device operably coupled to the grabject; and
   - a spring-mounted trigger configured to engage operation of the grabject.

Axel's competitor Zorg has developed a competing zmoosher that also uses a left-handed grabject but has an on/off switch instead of a trigger.

Based on the information provided, which sentence is most correct?

A. If a patent is granted on Claim 1 as presently drafted, Zorg infringes Axel's patent.

B. If a patent is granted on Claim 1 as presently drafted, Axel must enter into compulsory licensing negotiations with Zorg.

C. Axel can amend the pending patent claim to include an on/off switch, if his patent specification supports an on/off switch.

D. If a patent is granted on Claim 1 as presently drafted, Zorg can invalidate Axel's patent on the basis of prior art.

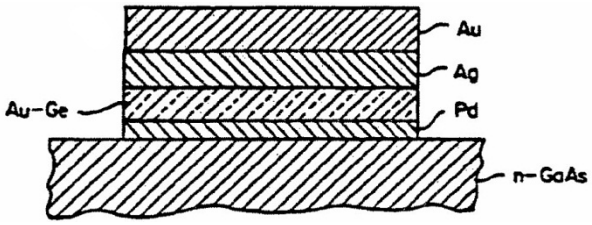
Analyzing claims[1]

Each of the questions below gives a brief statement of an invention, a graphical illustration of the invention (if necessary to understand the invention), a statement of known prior art, and either: (i) an incomplete claim followed by five expressions to select from to complete the claim; or (ii) five claims to select from to describe the invention.

Select one of the five claims, or one of the five expressions to complete the claim, to provide a claim which best describes the invention set forth in the statement of the invention. Briefly explain the reasoning behind your selection.

You do not need to consider prior art issues beyond those mentioned below.

Question 37.
Invention: A shallow ohmic contact is formed on an n-type gallium arsenide (GaAs) substrate using layers of palladium (Pd), gold-germanium (Au-Ge), silver (Ag) and gold (Au). Each of the layers is formed by a conventional vapor deposition technique, i.e., the coating material is vaporized and the vapor condenses and solidifies on the surface to be coated. The vapor deposition technique does not add any unique physical or chemical properties to the ohmic contact formed.



Prior art: Known to deposit gold on an n-type GaAs substrate to form an ohmic contact.

An ohmic contact comprising ..... .

A. at least one layer of palladium, gold-germanium, silver or gold on a substrate consisting of an n-type gallium arsenide.

B. forming a layer of palladium on the surface of the n-type gallium arsenide, forming a layer of gold-germanium on the palladium layer, forming a layer of silver on the gold-germanium layer and forming a layer of gold formed on the silver layer.

C. the steps of vapor depositing a layer of palladium on the surface of the n-type gallium arsenide, vapor depositing a layer of gold-germanium on said palladium layer, vapor depositing a layer of silver on said gold-germanium layer and vapor depositing a layer of gold on said silver layer.

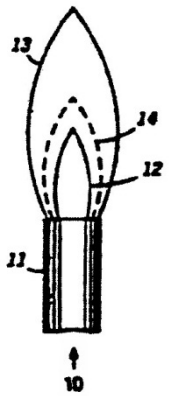
D. a layer of a metal selected from the group comprising gold, silver, palladium or gold-germanium on an n-type gallium arsenide substrate.

E. a layer of palladium on an n-type gallium arsenide substrate, a layer of gold-germanium on the palladium layer, a layer of silver on the gold-germanium layer and a layer of gold on the silver layer.

1 This part is inspired by former USPTO patent agent examination questions.

Question 38.

Invention: A method of removing contaminants from a plated article by exposing the article to a clean flame 12, 13, and 14 produced from a gaseous mixture 10 of pure hydrogen and pure oxygen through tube 11. The gaseous reactants originate from commercially available cylinders of pure liquid hydrogen and pure liquid oxygen.



Prior art: Some rocket engines use liquid hydrogen and liquid oxygen as propellant reactants. When hydrogen and oxygen are combined in a gaseous state and ignited, a flame is produced which passes through the nozzle of the engine. The nozzle is made of carbon fibers.

A method of removing contaminants from an article ..... .

A. in which water is decomposed into pure hydrogen and pure oxygen and then burned in the presence of oxygen to vaporize contaminants from the plated article.

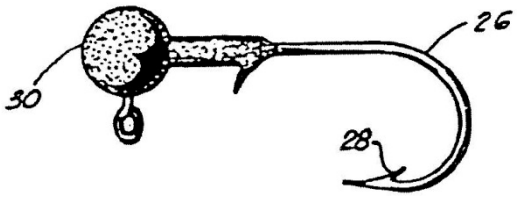
B. whereby pure hydrogen is mixed with pure oxygen and then burned to vaporize the article.

C. which comprises providing a plated article; producing a clean flame by burning pure hydrogen in the presence of pure oxygen; and exposing the plated article to the clean flame to vaporize contaminants from the plated article.

D. which comprises pure hydrogen and pure oxygen which when combined produce a clean flame and vaporizing contaminants from said plated article.

E. comprising the steps of decomposing water into pure hydrogen and pure oxygen, producing a clean flame, and providing the plated article.

Question 39.
Invention: A weighted fishing lure. The lure is a metal hook 26 with a weighted end 30 and a barbed end 28. The weighted end is formed by coating the end with a metal alloy by dipping the end into a molten bath consisting of 90% tin and 10% antimony.



Prior art: Known to coat metal fishing hooks with tin by immersing the entire hook in a bath of molten tin.

A. A fishing lure comprising a metallic hook connected to the weighted end portion.

B. A fishing lure comprising a metallic hook having a barbed end portion and a weighted end portion of a metal alloy opposite the barbed end, said alloy having melting point substantially higher than the melting point of the metallic hook.

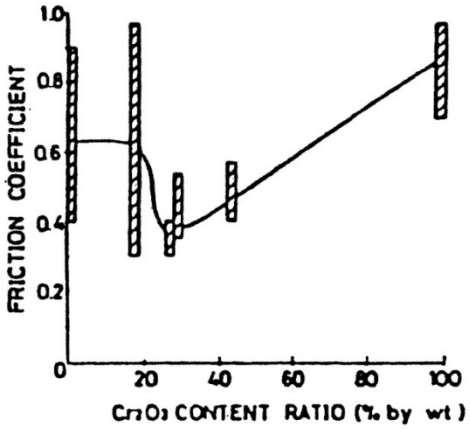
C. A fishing lure comprising a barbed end and an end opposite said barbed end coated with a metal.

D. A fishing lure comprising a weighted end portion contiguous with said hook portion having a barbed end portion opposite said weighted end portion, wherein the weighted end portion is coated with an alloy consisting of 90% tin and 10% antimony.

E. A fishing lure comprising a metallic hook having a barbed end portion and a weighted end portion opposite said barbed end portion, wherein said weighted end is coated with a metal alloy comprising 90% tin and 10% antimony.

Question 40.

Invention: An oxide-type solid lubricant consisting of Cr2O3 and Na2ZrO3. The friction coefficient of the lubricant must be less than 0.6. The expression "Cr2O3 Content Ratio (% by wt)" in the graph means the content in weight percent of Cr2O3 in the solid lubricant.



Prior art: Known in the art to use oxide lubricants consisting of Cr2O3 and Na2ZrO3 wherein the friction coefficient is more than 0.6.

An oxide-type solid lubricant consisting of Cr2O3 and Na2ZrO3 wherein the Cr2O3 content of the lubricant is ..... .

A. less than 60% by weight.

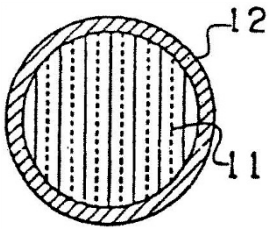
B. at least 20% by weight.

C. in the range of from 20% to about 60% by weight.

D. more than 20% by weight.

E. more than 10% by weight, but less than 80% by weight.

Question 41.
Invention: A superconductor 11 enclosed in a metal pipe 12. The metal pipe is made of silver, gold, platinum or iridium.



Prior art: Known to coat a superconductor with a layer of platinum.

A composite comprising an outer metal portion and an inner superconductor portion, wherein said outer metal portion ..... .

A. is a metal selected from the group consisting of silver, gold and iridium.

B. is a metal selected from the group comprising silver, gold or iridium.

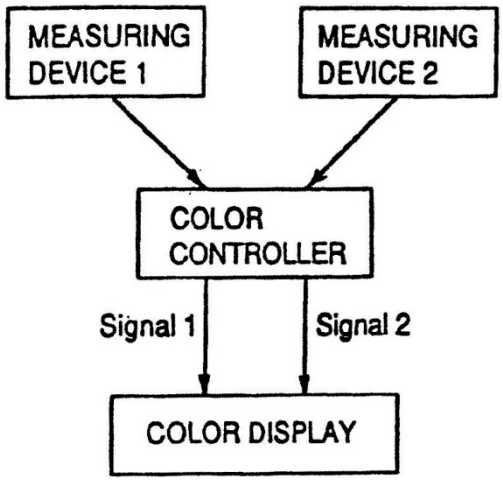
C. is a metal selected from the group comprising silver, gold, platinum and iridium.

D. is a metal selected from the group consisting of silver, gold, platinum or iridium.

E. is silver, gold and iridium.

Question 42.

Invention: A first digital signal from measuring device 1 and a second digital signal from measuring device 2 are processed through a color controller. The color controller assigns a color to each signal corresponding to the measured value of each signal. Signal 1 and Signal 2 are generated by the color controller and transmitted to a color display where the measured values of the signals are simultaneously displayed. The color displayed for each measured value is determined by the color controller.



Prior art: Known to connect measuring devices 1 and 2 directly to a color display and to display first digital signal from measuring device 1 and a second digital signal from measuring device 2 simultaneously in the same color on the color display regardless of the measured value of each signal.

An apparatus for simultaneously displaying measured values in color, the apparatus comprising

.....

A. means for measuring the values of said first and second signals and means for displaying said measured values in color.

B. measuring a first quantity and generating a first signal, measuring a second quantity and generating a second signal, processing said first and second signals to assign a color to each of said signals corresponding to the measured value of each signal, and displaying the measured value of each signal on a color display.

C. means for generating first and second signals and means for displaying the measured values of said first and second signals.

D. means for generating a first signal from a first measuring device, means for generating a second signal from a second measuring device, means for assigning a first color for the measured value of said first signal and a second color for the measured value of said second signal, and means for displaying the measured values of said first and second signals.

E. a first measuring device and a second measuring device connected to a color display.

Question 43.
Invention: A composition comprising a mixture of an abrasive grit material and a gel-like carrier consisting of a mixture of polyvinyl alcohol and water to coat stone surfaces. The components of the composition must be mixed just prior to use.

Prior art: Known to coat and seal wood surfaces with a composition comprising a mixture of an abrasive grit material and a gel-like carrier consisting of polyvinyl alcohol and water. The composition does not have to be mixed immediately before use to be an effective sealant.

A. A method of using a composition to coat stone surfaces comprising the steps of mixing an abrasive grit material with polyvinyl alcohol and water to form a stone coating composition, and immediately applying the composition to the stone surface to be coated.

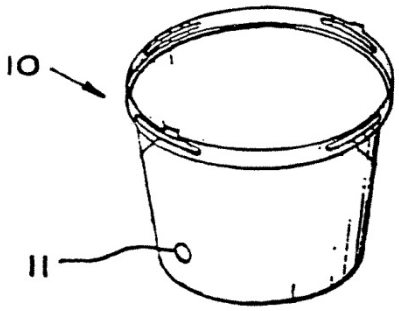
B. A method of coating a substrate surface comprising the step of applying a composition comprising an abrasive grit material and a gel-like carrier agent to the surface.

C. A coating composition comprising a coating constituent including an abrasive grit material and a gel-like carrier agent consisting of a mixture of polyvinyl alcohol and water.

D. A method of making a composition comprising the step of mixing an abrasive grit material with a gel-like carrier agent.

E. A coating composition consisting of an abrasive grit material and a gel-like carrier agent.

Question 44.
Invention: Plant growing pot 10 to promote the growth of plant roots. The roots grow out of the pot through at least one hole 11 in the side of the pot.



Prior art: An ordinary red clay flowerpot with a hole in the bottom of the pot and a plant positioned in the pot in a slurry of water, soil and fertilizer. Plant roots have been known to exit from the hole in the bottom of the pot.

A plant growing receptacle, ...

A. said receptacle comprising a side wall extending from a bottom wall, at least one opening in said wall, said opening forming a root exit opening of said receptacle.

B. said receptacle having a bottom, a side wall, and an open top, said side wall extending upwardly from the bottom to the open top, at least one opening formed in said side wall, said opening forming a root exit opening.

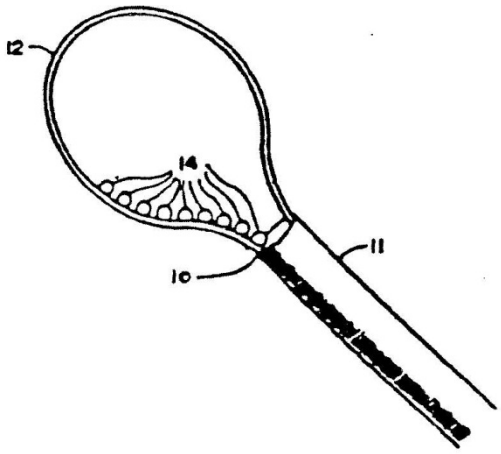
C. said receptacle comprising an open top and a side wall, at least one opening in said side wall extending upwardly from the bottom wall, said opening forming a root exit opening of said receptacle.

D. said receptacle consisting of an open top extending downwardly along said sides of said receptacle, an opening formed in said side wall extending from the bottom wall, said opening forming a root exit opening.

E. said receptacle consisting of an open top and a side wall extending downwardly, at least one opening formed in a bottom wall which extends from said side wall, said opening forming a root exit opening.

Question 45.

Invention: A surgical snare for marking polyps. One end of a wire is attached to a housing 11 at 10 while the other end of the wire passes through the housing 11, thereby forming a wire loop 12. The end of the wire passing through the housing 11 exits at the lower end of the housing (not shown). A crushable marking agent 14 is secured to the wire loop 12. The loop is extended (i.e., increased in size) and placed over the polyp. The loop is then retracted (i.e., reduced in size) by gently pulling on the end of the wire which exits from the lower end of the housing. The loop is retracted only to the extent necessary to crush the marking agent against the polyp to mark the polyp, and not damage the polyp tissue.



Prior art: It is known to retrieve objects from a body of water using a retractable wire loop. The loop is formed by attaching one end of a wire at one end of a hollow handle and passing the other end of the wire through the handle. The wire exits at the end of the handle opposite to the end where the loop is formed. The loop is extended and placed around the object to be retrieved from the water. The loop is retracted by pulling on the wire exiting the hollow handle to secure the object within the loop. By pulling on the handle, the object is then removed from the water.

A surgical polyp marking snare comprising ..... .

A. a wire loop extending from a housing, a tissue-marking agent disposed on said wire loop, and the means to move said wire loop between the extended and retracted positions to thereby crush the polyp with the marking agent.

B. a housing and a wire loop, a crushable tissue-marking agent disposed on said wire loop, the wire loop being positioned around the polyp and retracted to crush the marking agent against the polyp, and means to move the wire loop between the extended and retracted positions.

C. a wire loop extending from a housing, the wire loop being movable between an extended position arid a retracted position, and a means for moving said loop between the extended and retracted positions.

D. a wire loop extending from a housing, a crushable tissue-marking agent disposed on the wire loop, the wire loop being movable between an extended position in which the loop is placed over a polyp, and a retracted position in which the size of the wire loop is reduced to thereby crush the polyp against the marking agent.

E. a housing, a wire loop extending from said housing, a crushable tissue-marking agent disposed on the wire loop, the wire loop being movable between an extended position in which the loop is place over a polyp, and a retracted position in which the size of the wire loop is reduced to thereby crush the marking agent against the polyp, and means to move the wire loop between the extended and retracted positions.

Question 46.
Instructions: Read the written description and claims below describing a method for increasing the height of solder bumps illustrated in Figures 1 and 2. For the purpose of this examination, unless otherwise directed, claims 1–8 are not to be considered part of the original disclosure.

Method for increasing the height of solder bumps
The instant invention is directed to forming solder bumps on electrical contact pads on semiconductor chips. In particular, the invention is directed to techniques for increasing the height of such solder bumps.

Background of the invention

In fabricating semiconductor chips, it is known to form "solder bumps" on the metallized contact pads of the semiconductor chips. The solder bump is then exposed to an elevated temperature to reflow the solder to form the bond. Reflowed solder joints have been found to have high mechanical strength and are also quite ductile and are capable of absorbing stresses induced by thermal cycling. Because of the high strength and integrity of the resulting solder interconnections, device reliability has been reported to be higher than for wire-bonded interconnections.

It is desirable to deposit as much solder as possible on each bonding pad to provide good mechanical strength for the solder joint. It is also important to have solder bumps with a maximum height in order to provide as much distance as possible between the semiconductor chip and the substrate to which the chip is bonded. This space precludes shorts between the chip and the substrate.

It is known to immerse the semiconductor chip in molten solder to form the solder bump. However, with immersion, the amount of solder deposited and hence the solder bump height appears to be limited by the bonding pad area wherein the larger bonding pad areas give rise to solder bumps of greater height. While solder immersion has been found to yield less than desirable bump heights, it is the least expensive method of deposition.

Accordingly, there is a need for a method of increasing the height of solder bumps formed when using solder immersion techniques.

Summary of the invention

The instant invention overcomes the foregoing problems with a method of increasing the height of a solder bump comprising the steps of sequentially applying a different molten solder alloy to the solder bump wherein each alloy has a lower melting temperature than the alloy previously applied.

Advantageously, this technique has resulted in substantial increase in the solder bump height associated with solder immersion of devices.

Brief description of the drawings

Figure 1 is a partial cross-sectional view of a semiconductor device with a homogenized solder bump thereon formed in accordance with this invention.

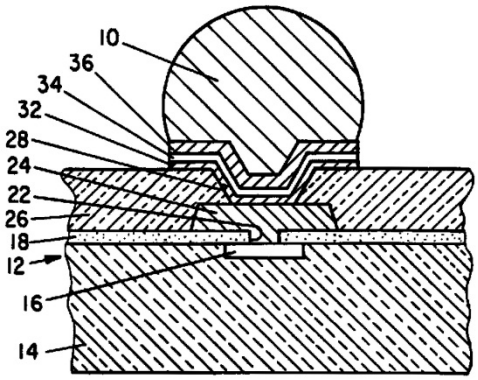


Figure 1
(PRIOR ART)

Figure 2 is a block diagram depicting the steps of the instant method.

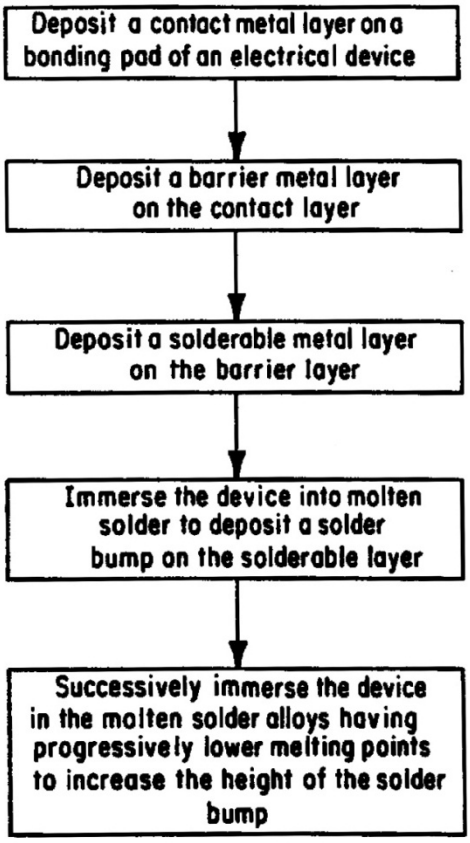


Figure 2

Detailed description

Figure 1 is a partial cross-sectional view of a solder bump 10 formed on a semiconductor chip 12. The semiconductor chip 12 is comprised of a silicon base 14. A silicon dioxide layer 18 is deposited on the surface of the silicon base 14. An opening 22 is formed in the dioxide layer 18 to expose a portion of the base 14. Aluminum is then deposited through opening 22 and covering a portion of silicon dioxide layer 18 to form aluminum bonding pad 24. During the aluminum deposition step, the aluminum interacts with the silicon base 14 to form the diffused region 16. A one micron thick passivation layer 26 is applied over the bonding pad 24. Compounds which have a common property that function in a manner to be used as the passivation layer are gallium nitride, silicon nitride and silicon oxynitride. An opening 28 is formed in the passivation layer to expose a portion of the bonding pad 24. The passivation layer provides mechanical protection and also protects chip 12 from flux and solder during the solder immersion step. It also acts as a barrier to prevent moisture penetration and the resulting corrosion of the underlying metallization.

An adhesion layer of nickel 32 is applied to the bonding pad 24, a diffusion barrier metal layer 34 is deposited over the adhesion layer 32. Finally, a solderable metal layer 36 is applied to the barrier layer 34. The layer 36 is critical for good adhesion of the solder bump 10 and, if thick enough, permits the chip to withstand repeated soldering and resoldering reflow cycles. It is known to utilize a 15 millimicron thick layer of copper. Following deposition of the solderable metal layer, a thin layer of gold (not shown in Figure 1) is frequently deposited to preserve its solderability.

After deposition of the layers 32, 34 and 36, the solder bump 10 is formed on layer 36 by solder immersion. A solder alloy of 95% lead and 5% tin is used almost universally for such solder bump interconnections. As outlined in the block diagram of Figure 2, in order to increase the amount of solder deposited by immersion, successive layers of different molten solder alloys having progressively lower melting points are deposited to form solder bump 10 to increase the height thereof to a predetermined value. The solder is deposited in successive layers without melting the previously deposited layers. Once all the layers have been deposited, the chip is heated to a temperature sufficient to homogenize all the deposited alloys into a single solder alloy. Such a technique has resulted in an increase of 27% to 76% in the height of the solder bump 10.

To achieve an overall solder alloy of 95% lead and 5% tin, the chip with the contact/diffusion/solderable metal layers is immersed in a solder alloy consisting of 99% lead and 1% tin which has a melting point temperature of 327°C. This step is followed by an immersion in a 95% lead and 5% tin solder alloy which has a melting point temperature of 317°C, and then followed by a final immersion in a solder alloy consisting of 91% lead and 9% tin having a melting point temperature of 302°C. The solder bump thus formed is then heated to a temperature of 327°C to form a homogeneous alloy as shown in Figure 1 of 95% lead and 5% tin and a bump larger than that attainable with a single immersion.

What is claimed is:

1. A method of increasing the height of a bump of solder alloy deposited on a substrate, the steps comprising sequentially applying a plurality of different molten solder alloys to the solder alloy bump wherein each alloy has a higher melting temperature than the alloy previously applied.

2. The method as set forth in claim 1 which comprises the further step of heating the sequentially applied alloys thereon to an elevated temperature to form a homogeneous solder alloy.

3. A method of forming a solder bump on a bonding pad of a semiconductor chip by sequentially applying different solder alloys thereon, comprising the steps of:
   (a) applying a passivation layer selected from the group consisting of gallium nitride, silicon nitride, silicon oxynitride and silicon dioxide on the semiconductor chip;
   (b) forming an aperture in the passivation layer to expose the aluminum bonding pad there through;
   (c) depositing a diffusion barrier layer to the exposed bonding pad;
   (d) applying an adhesion layer over the diffusion layer;
   (e) applying a solderable metal layer to the barrier layer;
   (f) forming a bump of solder alloy on the solderable metal layer by solder immersion; and

(g) sequentially applying a plurality of different solder alloys to said bump, each alloy having a lower melting temperature than the alloy previously applied.

4. The method according to claims 3 or 5, further comprising the step of depositing a gold layer on the solderable metal layer prior to forming a solder bump thereon.

5. A method of increasing the height of a bump of solder alloy deposited on a substrate, the steps comprising sequentially applying a plurality of different molten solder alloys to the solder alloy bump, and then heating the sequentially applied alloys thereon to an elevated temperature to form a homogeneous solder alloy.

6. The method as set forth in claim 5. The solder alloy bump is formed by solder immersion.

7. The method as set forth in claim 3 which comprises the further step of heating the solder bump with the sequentially applied alloys thereon to a temperature to homogenize the deposited layers.

Answer Questions (1) to (7) below by selecting the choice which makes the statement presented in each question a true statement. Unless otherwise directed, consider each question independently of the others.

(1) In claim 1, the clause "wherein each alloy has a higher melting temperature than the alloy previously applied" is

A. an improper "means" clause.

B. improper because the clause defines an old combination.

C. improper because "wherein" must be "whereby."

D. a proper "means" clause.

E. misdescriptive of the invention.

(2) Claim 2 ..... a proper dependent claim because ..... .

A. is not ...the process defined by claim 1 precludes further steps.

B. is not ... it does not include the feature of "the solder alloy bump."

C. is not ... there is no antecedent support in claim 1 for "sequentially applied alloys."

D. is ... it further limits claim 1.

F. is ... there is antecedent basis in claim 1 for "solder immersion."

(3) The "Markush" group in step (a) of claim 3 is

A. improper because the term "consisting of" should be "comprising."

B. improper because it has not been established that gallium nitride, silicon nitride, silicon oxynitride and silicon dioxide have a property in common.

C. improper because Markush claims of diminishing scope are generally not permitted.

D. proper because gallium nitride, silicon nitride, silicon oxynitride and silicon dioxide are disclosed in the patent specification.

E. proper because the Markush groups are only permitted in chemical cases.

(4) Claim 6 ..... proper because ..... .

A. is ... it is misdescriptive of the invention.

B. is ... the scope of claim 5 is similar to the scope of claim 2.

C. is not ... the claim does not conform to accepted claim drafting practice.

D. is not ... there is no antecedent basis for "solder alloy bump" in claim 5.

E. is not ...the invention is narrower in scope than claim 5.

(5) The order of steps (a) through (g) in claim 3 ..... .

A. is proper because the order of the steps is a matter of logical convenience.

B. is proper in the absence of prior art.

C. is improper because the preamble of the claim does not specify that the steps be performed in a specific order.

D. is improper because the sequence is logical.

E. is improper because it is not supported by the description of the invention and the drawings.

(6) Step (b) of claim 3

A. is unclear because the "aluminum bonding pad" lacks antecedent basis.

B. is misdescriptive of the invention.

C. precludes the formation of an aperture.

D. should be step (a) of the claim.

E. is indefinite because there is no support for the step in the written description of the invention.

(7) If claims 1–8 were presented as original claims in the specification, claim 4 would .....

..... dependent claim because ..... .

A. be a proper ... the claim includes acceptable multiple-dependent claim language.
B. be a proper ... the claim further limits claim 2.

C. not be a proper ... the claim depends upon a dependent claim.

D. not be a proper ... the claim depends upon a succeeding claim.

E. not be a proper ... the phrase "solderable metal layer" lacks antecedent basis in claim.

2 Drafting claims

This chapter involves practical exercises on patent claim drafting and applies the principles and techniques discussed in the *WIPO Patent Drafting Manual* (particularly Modules IV to VI).

Introduced below are ten exercises, each comprising a hypothetical scenario in which an invention is outlined. The overall task for each exercise is to prepare a **set of claims** to define a boundary of patent protection for the hypothetical invention.

The claim set should include one or more **independent claims**, each directed to the technical features which are essential to the core inventive concept. The independent claims should not include any features which are not essential to achieve this core inventive concept (otherwise the claims, and the scope of protection, would be too narrow). The claim set should also include a series of **dependent claims**, each introducing a preferred, but non-essential, feature of the invention. These dependent claims serve as fallback positions, which can be useful during patent examination and post-grant validity proceedings.

Exercises 1 to 3 provide step-by-step guidance as to how to approach patent claim drafting in a formulaic manner. This starts with spotting the inventive concept underlined in the invention, followed by drafting independent claims and dependent claims, and reviewing the drafted claims. Exercises 4 to 6 offer less guidance, as the readers are expected to have learned the basic approach. Finally, Exercises 7 to 10 require readers to draft claims without structured guidance, although limited drafting tips and common drafting pitfalls are provided so that they may help readers to review their first draft accordingly.

It should be emphasized that there is no single "correct" way of drafting patent claims. The approaches outlined below are merely examples as to how one could draft claims. Others may approach the drafting of claims in an entirely different manner. For Exercise 1, we will adopt a style of drafting which is appropriate for prosecution before the European Patent Office. Other jurisdictions have slightly different styles and some notes on the differences are provided below.

For each exercise, it should be assumed that the description of the prior art landscape is complete – you should not consider any other prior art of which you are aware, or any other information relating to the technical field of the relevant invention.

2.1 Exercise 1: Staple remover

This exercise contains 26 questions, which will guide you through one way of drafting claims. A sample answer to each question is provided at the end of section 2.1. The sample answers should not be considered exhaustive answers. They are only examples.

Outline of the invention

The hypothetical invention of the first exercise is a new tool for assisting in the removal of staples from paper. Images of the invention are shown below:



The tool has sharp teeth for inserting under a staple. The tool includes two pairs of such teeth, each pair being provided at one end of an elongate jaw. The jaws are pivotally attached to one another at the opposite end to that provided with the teeth. The teeth on each jaw face each other. Squeezing the handles of the tool causes the jaws to pivot relative to one another and thereby bring the teeth together. When teeth are inserted under a staple, squeezing grips the staple between the teeth and allows the staple to be pulled from the paper easily.

A torsion spring is provided so that the teeth are forced to return to their original position once the gripping pressure is released. This allows for many staples to be removed in quick succession and also allows for easy disposal of the removed staple.

Chrome-plated steel was found to be an optimum material for this spring, as such a material is resistant to fatigue resulting from repeated use.

Plastic grips are provided on the tool to allow it to be operated comfortably using fingers.

The tool has a locking pin to allow the jaws to remain closed. This feature makes the tool safer (e.g. if being used around children) as the sharp teeth are not exposed when in the closed position. It also makes the tool compact when not in use.

When this tool was at the prototype stage, plastic teeth were used, but these were not particularly durable. Metal teeth are much more effective.

Prior art
Existing solutions (the "prior art") for removing staples are slow to use and not particularly effective. A prior art staple remover is shown right.

The prior art staple remover has a single flat metal plate provided at one end of an elongate handle. The flat metal plate can be inserted under a staple and levered to remove the staple from the paper.

2.1.1 Phase 1: Spotting an inventive concept

Set out below are two approaches that can be helpful as a guide to assist in patent claim drafting, namely:

(a) a problem and solution approach; and
(b) a table of features approach.

These approaches partition and categorize the information given about the invention into manageable portions that can later be built up into the claims for your claim set.

Each approach is discussed in turn below.

Problem and solution approach

The problem and solution approach involves a purpose-based outlook. This seeks to understand the technical effects provided by the invention. As a reminder, a specific technical effect may be understood to be a purpose, advantage, a result, a property, etc.

Once the technical effects have been derived, a hypothetical challenge is posed: "how does one provide a particular technical effect"? This hypothetical challenge is known as the "problem" of the invention. The "solution" to this problem is the technical feature(s) that are responsible for achieving that specific technical effect. The technical feature(s) may, for example, be one or more components of a tool.

It is important not to conflate technical effects (corresponding to problems the invention addresses) with the technical features that are responsible for achieving those technical effects (corresponding to the solutions).

It may be useful to compartmentalize the approach as follows:

(1) determine the problems solved by the invention;
(2) determine the solutions to those problems;
(3) determine whether each problem and respective solution is present in the prior art;
(4) consider commercial importance; and
(5) determine which problem/solution covers the "core" inventive concept that gives broad protection.

Each step is discussed in turn below.

Step 1: Determine the problems solved by the invention

For any given embodiment of an invention, there is typically an overall purpose (this is what the embodiment achieves in broad terms).

Question 1.
What is the overall purpose of the tool of Exercise 1 (what does the tool do, in broad terms)?

The overall purpose of the tool is .....

.....

For any given embodiment of an invention, there are typically numerous technical effects contributing to that overall purpose (effects that improve the broad function). As a reminder, a specific technical effect may be understood to be a purpose, advantage, a result, a property, etc.

Each technical effect contributing to that overall purpose can be reformulated into a problem-format by posing a hypothetical challenge: how to provide the particular technical effect?

Question 2.
If the tool has an advantage, in that it enables many staples to be removed in quick succession, then what might a corresponding problem be formulated as?

A problem is - how to .....

.....

In a typical invention, there will be many technical effects and corresponding problems that are solved by different elements of the invention. In the problem and solution approach, the claim drafter should scan the information provided to derive any information regarding technical effects and corresponding problems.

Question 3.
List as many as possible of the problems that the tool of Exercise 1 aims to solve (there are at least eight):

(i) How to enable many staples to be removed in quick succession.

(ii) How to grip staples.

(iii) How to enable comfortable operation.

(iv) .....

.....

(v) .....

.....

(vi) .....

.....

(vii) .....

.....

(viii) .....

.....

Step 2: Determine the solutions to those problems

The next stage in this approach involves posing a question of "what are the solutions to the identified problems"? In other words, what technical features of the tool are responsible for addressing the identified problems.

This tool has a number of technical features that achieve solutions to the various problems identified. However, not all of these technical features solve every problem – some are only involved in solving certain problems.

Question 4.
Which features contribute to the ancillary problems (what component is responsible for solving each problem)? Two of these are listed below:

The respective solutions are:

(i) Problem: How to enable many staples to be removed in quick succession.
Solution: **Torsion spring to force teeth to return to their original position once the gripping pressure is released.**

(ii) Problem: How to grip staples
Solution: **Pivoting movement of teeth on jaws.**

(iii) Problem: How to enable comfortable operation.
Solution: **Plastic finger grips.**

(iv) Problem: .....

.....

Solution: .....

.....

(v) Problem: .....

.....

Solution: .....

.....

(vi) Problem: .....

.....

Solution: .....

.....

(vii) Problem: .....

.....

Solution: .....

.....

(viii) Problem: .....

.....

Solution: .....

.....

Step 3: Determine whether each problem/solution is present in the prior art.

The problems/solutions should next be compared against the prior art. This is important because our patent claim must meet the legal patentability requirements of novelty and inventive step.

In Exercise 1, we have been given details of an existing prior art tool for removing staples. It is against this prior art that we should compare our identified problems and solutions.

Certain components may not be identical in the embodiment and in the prior art. However, any "equivalent" components should be identified. Equivalent components in the prior art are those which perform the same or similar function as the corresponding component of the embodiment.

Question 5.
Taking each problem and solution in turn, does the prior art include them?

The respective answers to the question are:

(i) Problem: How to enable many staples to be removed in quick succession.
Solution: Torsion spring to force teeth to return to their original position once the gripping pressure is released.
Prior art: No spring. Prior art has pivoting parts.

(ii) Problem: How to grip staples
Solution: Pivoting movement of teeth on jaws.
Prior art: No gripping part. Prior art works by levering the staple out of the paper.

(iii) Problem: How to enable comfortable operation.
Solution: Plastic finger grips.
Prior art: Equivalent. Prior art includes a plastic handle, which is equivalent to the plastic grips (both are the components that are held by an operator during use of the device).

(iv) Problem: .....

.....

Solution: .....

.....

Prior art: .....

.....

(v) Problem: .....

.....

Solution: .....

.....

Prior art: .....

.....

(vi) Problem: .....

.....

Solution: .....

.....

Prior art: .....

.....

(vii) Problem: .....

.....

Solution: .....

.....

Prior art: .....

.....

(viii) Problem: .....

.....

Solution: .....

.....

Prior art: .....

.....

Step 4: Consider commercial importance

We now know which of these problems and solutions is or is not disclosed in the prior art. We could, in principle, direct our patent claim set to any one of these solutions not disclosed in the prior art. This would achieve a novel claim. However, not all of these solutions may be commercially important, and it is necessary to consider this when drafting an independent claim.

There is not always a single correct answer at this stage in the approach. Commercial considerations may mean that focusing on the problem of "how to enable safe operation" is correct for one patent applicant's business, whereas another applicant may find it more commercially relevant to focus on the problem of "how to enable many staples to be removed in quick succession."

Step 5: Which problem/solution covers the "core" inventive concept that gives broad protection?

In many inventions, there is a single problem/solution which is not disclosed in the prior art. We can focus on that problem/solution, which will give us broad protection and also encompasses all of the other problems and solutions. If we focus our claim set on that problem/solution, the scope of protection under that claim set would provide protection for any invention employing any of the solutions identified.

In this example, **the pivotal movement of teeth on jaws** is not shown in the prior art, nor is the corresponding problem of how to grip staples (the prior art merely levers the staple). This solution is required for all other problems and solutions of our invention. For example, the torsion spring works with this pivotal movement, as do the finger grips, teeth, locking pin, etc.. This gives us an indication that this is the problem and solution on which we should focus our independent claim.

In other words, this represents the primary aspect or the "core inventive concept" of the invention. The other problems and solutions should not feature in our independent claim. Instead, the other problems and solutions should feature in our dependent claims.

We will use the information in the answers to questions 3 to 5 above when drafting our claim set.

Table of features approach

An alternative methodology to the problem and solution approach is the "table of features" approach.

In problem and solution, the approach employs a purpose-based outlook. The approach seeks to understand what technical effects are provided by the invention and then works backwards to determine which technical features (solutions) are responsible for achieving those technical effects.

In table of features, we approach the embodiment in the opposite way. The approach involves first identifying what technical features are present in the invention and then seeking to understand what technical effects are provided by those features. The remaining steps of the table of features approach are similar to that of the problem and solution approach and hence there is repetition of content below.

It may be useful to compartmentalize the approach as follows:

(i) determine the technical features;
(ii) determine the technical effects provided by those technical features;
(iii) determine whether each technical feature and respective effect is present in the prior art;
(iv) consider commercial importance; and
(v) determine which technical feature and respective effect.

Each step is discussed in turn below.

Step 1: Determine the technical features

As a reminder, a technical feature of a physical device may be a component of a device, the way that component moves, what something is made of, spatial relationships between components (e.g. one component being between two other components), parameters (e.g. size, weight, etc.), etc.

Question 6.
Generate a list of any technical features of the embodiment. Two are listed below (there are at least 11):

(i) Teeth

(ii) Teeth comprise metal

(iii) .....

.....

(iv) .....

.....

(v) .....

.....

(vi) .....

.....

(vii) .....

.....

(viii) .....

.....

(ix) .....

.....

(x) Torsion spring comprises chrome-plated steel

(xi) Pivotal movement of teeth on jaws

Step 2: Determine the technical effects provided by those technical features

The next step involves matching up the technical features with their associated technical effects. In other words, for each technical feature you have derived, what technical effect is provided by that technical feature. As a reminder, a specific technical effect may be understood to be a purpose, advantage, a result, a property, etc.

Here, you should construct a table with two columns: a first column with the technical features and a second column with their corresponding technical effects. You may note that you have an entry in one column which is missing a corresponding entry in the other column. This might indicate that you have missed a technical feature responsible for providing a technical effect (or vice versa). Constructing the table in this way can help you fill in any blanks.

Question 7.
Generate a table based on a first column with technical features and a second column with their corresponding technical effects.

	Technical features	Technical effects
i	Teeth	For gripping staples
ii	Teeth comprise metal	Durability
iii		
iv		
v		
vi		
vii		
viii		
ix		
x	Torsion spring comprises chrome-plated steel	Improved fatigue properties during repeated use.
xi	Pivotal movement of jaws/teeth	For gripping staples

In answering this question, you may have listed certain features in combination with one another. For example, you might have listed a technical feature “chrome-plated steel torsion spring.” You might also have listed two corresponding technical effects in your table, namely allowing for easy disposal of the removed staple and removal of many staples in quick succession and improved fatigue properties during repeated use.

By listing the technical features and corresponding technical effects in the table, you should appreciate that the torsion spring is responsible for one of these technical effects (namely, allowing for easy disposal of the removed staple and removal of many staples in quick succession), whereas the chrome-plated steel is responsible for the other technical effects (namely improving fatigue properties during repeated use). These should appear as separate rows on the table.

In general terms, your table should have a separate line for each technical effect. Generating a table in this way can be useful to ensure that technical features and technical effects are considered separately where appropriate.

The next step involves consolidating the table to group any repeated technical effects.

Question 8.
Prepare a consolidated table where multiple features that contribute to the same technical effect are grouped together.

	Technical features	Technical effects
i	Teeth	For gripping staples
xi	Pivotal movement of teeth on jaws	
ii	Teeth comprise metal	Durability
iii		
iv		
v		
vi		
vii		
viii		
ix		
x	Torsion spring comprises chrome-plated steel	Improved fatigue properties during repeated use

Step 3: Determine whether each technical feature and respective effect is present in the prior art.

We should next compare our technical features against the prior art. This is important because our patent claim must meet the legal patentability requirements of novelty and inventive step. In this hypothetical example, we have been given details of an existing prior art tool for removing staples and it is against this prior art that we should compare our identified technical features and effects.

Certain technical features may not be identical in the embodiment and in the prior art. However, any “equivalent” technical features should be identified. Equivalent technical features in the prior art are those which perform the same or similar function as the corresponding technical feature of the embodiment.

Question 9.
Add a column to the table to note whether the prior art includes the identified feature, or if it includes something equivalent.

	Technical features	Technical effects	Prior art
i	Teeth	For gripping staples	Equivalent. Prior art includes a plate
xi	Pivotal movement of teeth on jaws		No. Prior art works by levering the staple out of the paper. There are no gripping parts
ii	Teeth comprise metal	Durability	Equivalent. Prior art includes a metal plate
iii			
iv			
v			
vi			
vii			
viii			
ix			
x	Torsion spring comprises chrome-plated steel	Improved fatigue properties during repeated use	No. There are no pivoting parts and hence no spring

Step 4: Consider commercial importance.

We now know which of these technical features and their corresponding technical effects is, or is not, disclosed in the prior art. We could, in principle, direct our patent claim set to any one of the features not disclosed. This would achieve a novel claim. However, not all of these technical features may be commercially important, and it is necessary to consider this when drafting an independent claim.

There is not always a single correct answer at this stage in the approach. Commercial considerations may mean that focusing on the technical effect of "safety and compactness" is correct for one patent applicant's business, whereas another applicant may find it more commercially relevant to focus on the technical effect of "allowing for easy disposal of the removed staple and removal of many staples in quick succession."

Step 5: Which technical feature and respective effect is the "core" inventive concept that gives broad protection?

In many inventions, there is a single technical feature/technical effect which is not disclosed in the prior art. We can focus on that technical feature/technical effect, which will give us broad protection.

In this example, **the pivotal movement of teeth on jaws** is not shown in the prior art, nor is its technical effect of gripping staples (the prior art merely levers the staple). This technical feature is required for all other technical features and their corresponding technical effects of our invention. For example, the torsion spring works with this pivotal movement, as do the finger grips, teeth, locking pin, etc. This gives us an indication that this is the technical feature and corresponding technical effect on which we should focus our independent claim.

In other words, this represents the primary aspect or the "core inventive concept" of the invention.

The other technical features and their corresponding technical effects should not feature in our independent claim. Instead, the other technical features and their corresponding technical effects should feature in our dependent claims.

We will use the information in the answers to Questions 6 to 9, above, when drafting our claim set.

2.1.2 Phase 2: Drafting an independent claim

The core inventive concepts identified in section 2.1.1 will serve as the basis for drafting claims.

Generally speaking, it is best to start with drafting an independent claim directed to the most commercially important aspect of your invention as derived in Phase 1, above. By way of reminder, we decided that the most commercially important aspect was the pivotal movement of the tool and how this permitted gripping of staples (the prior art merely levers the staple).

As discussed in Module IV.2.1. of the WIPO Patent Drafting Manual, an independent claim is traditionally written as a single sentence and has three parts.

Question 10.
What are the three main parts of a patent claim (provide the name and function of each part)?

(i) .....

.....

(ii) .....

.....

(iii) .....

.....

Question 11.
To capture the most important aspect of the invention, what word or words do you choose for the first of the three main parts?

.....

.....

Tip

You may also include in your preamble a brief phrase noting the suitability of the tool for removing staples. This is optional, but phrases denoting suitability can be useful to improve the clarity of a claim.

For example, your preamble may read: “A tool suitable for removing staples from paper....”

Here, please note that the word “for” has a specific meaning in patent claims directed to physical entities, as set out in Module VI of the WIPO Patent Drafting Manual.

Question 12.
What word or words do you choose for the second of the three main parts?

.....

.....

Tip

Other open-ended phrases, such as "including," "having," etc., would equally be fine. Further commentary can be found at Module IV of the WIPO Patent Drafting Manual.

How to draft the body part of an independent claim?

The third section of the claim, the body, is the main part of a claim that outlines what technical features are required and explains how they relate to one another. The first step in preparing the body part is to determine which technical features should appear.

At this point, it is useful to refer to the "problem and solution" or "table of features" sections above. The body should be directed to the technical features (physical components, the way something moves and/or how something functions) underlying the primary aspect or "core inventive concept" of the invention that were identified by the "problem and solution" or "table of features" approach.

Crucially, the independent claim should only include the **minimum essential features** involved in the primary aspect of the invention. These are the features that are responsible for solving the essential problem (or for providing the essential advantage/purpose/effect in the table of features approach) of the embodiment.

Ultimately, the minimum essential features should be used to draft our independent claim. The independent claim should not include non-essential features, i.e. features that are not essential for solving the problem.

For example, the photos illustrating the invention of Exercise 1 show a number features. Are the plastic grips part of the minimum essential features? Is it essential to have two teeth on each jaw? Would it be possible to remove a stapler with one tooth (like the one in the prior art photo) on each jaw?

Question 13.
Using the information gathered on the table prepared under the "problem and solution" approach or "table of features" approach, separate:

(a) the minimum essential features that underlie the primary aspect of the invention

.....; and

(b) the features that are not involved in this primary aspect of the invention

.....

.....

.....

Finally, we put everything together to draft our independent claim. Here, we take the preamble and transitional phrase we have selected above and combine this with the features for the body.

We should elaborate and explain the relationship between features in the body to explain how they interact with one another to achieve the most important aspect of your invention.

Tip

Claiming movement features is often achieved by defining the extremes (i.e. endpoints) of the path of movement using "first position" (one extreme), "second position" (another extreme), etc. Here, one extreme brings the jaws together and the other extreme brings the jaws apart.

Question 14.
Putting together your answers from 1–4 above, now prepare a complete independent claim (claim 1).

1. .....

.....

Review the drafted independent claim

It is important to review your drafted claim before you finalize this phase of drafting an independent claim. It is very rare that we can draft a proper claim with just one attempt. Even experienced patent drafters might need to review and rewrite claims several times in order to arrive at a proper claim set that covers the scope he/she wants to protect.

When reviewing the claim you have drafted, be sure to check the following points:

- The claim uses open-ended "comprising" terminology, meaning that claim 1 covers any tool that contains at least all features in claim 1 and may contain other features;
- All features in your claim have correct antecedent basis (see Module IV.2.2 of the *WIPO Patent Drafting Manual*);
- Your claim is clear. Ensure all features in a claim are interrelated. All features present must interact with at least one other feature (see Module VI.3 of the WIPO Patent Drafting Manual);
- Your claim is not unduly limited with other features which do not belong in an independent claim (see Module VI.5 of the WIPO Patent Drafting Manual);
- Your claim as a whole must define a collection of features which overcome the prior art (i.e. it must define a novel and inventive tool; see Module VI.8 of the WIPO Patent Drafting Manual);
- There are no laudatory statements.

Question 15.
Review the claim you have drafted under Question 14. Do all features have correct antecedent basis? Are all features in a claim interrelated? Is your claim unduly limited with unessential features? Is your claim clear?

Be sure to check the following points:

- Ensure your claim is not unduly limited with other features, such as the torsion spring, plastic grips, locking pin, etc. These are non-essential features and, as such, do not belong in an independent claim.
- Check how many "teeth" your claim refers to. The depicted device does have two teeth on each jaw (four teeth total). However, in principle this tool would work with only one tooth on each jaw: only one tooth on each jaw is required to grip a staple. Broader protection can therefore be obtained if we do not limit ourselves to two teeth on each jaw.

2.1.3 Phase 3: Drafting dependent claims

The next step is to move onto drafting dependent claims. These set out technical features of the invention which are dependent on (i.e. subordinate to) the main aspect outlined in the independent claim. As discussed in Module IV 3.2 of the WIPO Patent Drafting Manual, dependent claims "depend from" another "parent" claim – either an independent claim or another dependent claim.

Patent drafters commonly draft a combination of broad and narrow claims that effectively capture the complete scope of an invention. As a practical matter, they approach this by first drafting a broadest independent claim, and then draft a number of dependent claims covering various ranges of narrower scopes.

When drafting an independent claim in Phase 2, you answered Question 13 and identified: (i) the minimum essential features; and (ii) other features that are not involved in this primary aspect of the invention. These other features are summarized below.

- The tool has a locking pin to enable lockable movement of the jaws/teeth. This is useful to improve the safety and compactness of the tool.
- The torsion spring enables forced return of jaws/teeth to their original position after a staple is gripped.
- The torsion spring comprises chrome-plated steel. This improves fatigue properties during repeated use.
- The tool has plastic grips to enable comfortable operation.
- The tool comprises metal teeth. This improves tool durability.

We will focus on those additional features when drafting dependent claims.
For the sake of this exercise, you are asked to draft dependent claims based on the following independent claim:

1. A tool for removing fasteners, the tool comprising:
   - a pair of jaws,
   - a tooth on each jaw, the tooth of one jaw opposing the tooth of the other jaw, wherein jaws are pivotable relative to one another between a first position in which the teeth are brought together and a second position in which the teeth are apart.

Preamble of a dependent claim

A preamble of a dependent claim should match the preamble of the parent claim and should include a statement that the dependent claim includes all features from the parent claim.

Question 16.
Draft the preamble of claim 2, a first dependent claim, which is to be dependent on the independent claim (claim 1).

2. .....

.....

The preamble begins with the word "The" to highlight that you are referring to the same tool that was defined in claim 1 (the antecedent tool).

How to draft the body part of a dependent claim?

The body of a dependent claim should introduce a feature that solves a single problem or a collection of features which cooperate to solve a single problem.

Question 17.
Draft the remainder of claim 2, which is to be directed to the technical feature of the locking pin.

2. .....

.....

Question 18.
Next, draft claim 3, which is to be directed to the physical feature of the teeth being metal. Here, be sure to consider the dependency of claim 3. In other words, can the features of claim 3 be used in combination with claim 1, claim 2 or both?

3. .....

.....

Question 19.
Next, draft claim 4, which is to be directed to the technical feature of the torsion spring (note: for the purposes of this exercise, the claim should refer to a "torsion spring" and not just a "spring" more generally).

4. .....

.....

The torsion spring achieves the effect of biasing the jaws/teeth towards the second (teeth apart) position. A torsion spring is a specific way of achieving such a bias and, in reality, this can be achieved in a number of ways. The bias could alternatively be provided by an elastomeric material, for example, and would solve the same problem. In other words, a tool having an elastomeric material to bias the jaws/teeth would still achieve the same effects of allowing for quick and easy removal of staples.

As a tip here, functionally defined features (such as biasing jaws/teeth towards the second position) generally offer broader scope than corresponding physical features (such as a torsion spring).

Question 20.
Assume that the initial draft of claim 4 was:

> 4. The tool as claimed in any preceding claim, wherein the tool is biased towards the second position by means of a torsion spring.

Redraft claim 4 above in a functional manner.

4. .....

.....

The scope of the redrafted claim 4 now covers any elements that have the function of biasing a jaw/tooth to the second position, such as a torsion spring, elastomeric material etc.

After claim 4, we can consider including another dependent claim that is limited to a torsion spring as a manner of biasing the jaw/tooth.

Question 21.
Add a dependent claim directed to the specific manner in which the bias is provided in the embodiment (i.e. *via* the *physical feature of* a torsion spring).

5. .....

.....

A torsion spring is a very specific way of achieving such a bias and this could, in fact, alternatively be provided by a different type of spring, such as a leaf spring, and would solve the same problem.

In view of this, you may wish to redraft claim 5 in a way that more broadly defines the features that solve this problem, e.g. by removing reference to a spring being a torsion.

Question 22.
Redraft claim 5 to more broadly capture the feature of the bias being provided by a spring (i.e. not limited to a torsion spring).

5. .....

.....

You can then draft another dependent claim that has a narrower scope than claim 5, by limiting the dependent claim specifically to a torsion spring.

Question 23.
Now add a new claim directed specifically to the torsion spring.

6. .....

.....

Question 24.
Next add a new claim directed to features that solve the problem of how to address spring fatigue during repeated use.

7. .....

.....

Note here that the claim can be dependent on claim 5 or 6, meaning that the chrome-plated steel qualifies the material of either the spring (generally) or the torsion spring (specifically).

Question 25.
Next, draft the remainder of the dependent claims directed to any other suitable technical features.

8. .....

.....

9. .....

.....

10. .....

.....

11. .....

.....

12. .....

.....

2.1.4 Phase 4: Reviewing the entire set of claims

When reviewing the claim set you have drafted, be sure to check the following points:

- The claims use open-ended "comprising" terminology, meaning that each claim covers any tool that contains at least all the features in that claim, and may contain other features;
- All features in each of your claims must have correct antecedent basis. This should also be considered when you draft dependent claims. For example, you must find correct antecedent basis in the claim(s) on which your dependent claim depends;
- Your claims are clear. Ensure all features in each claim are interrelated. All features present must interact with at least one other feature claimed in claim 1 or the dependent claim itself (see Module VI.3 of the WIPO Patent Drafting Manual);
- Your set of claims contains a broad independent claim(s) and an appropriate number of narrower dependent claims, which as a whole would effectively capture the complete scope of an invention;
- There are no laudatory statements.

Question 26.
Review the entire set of claims you have drafted, namely, claims 1 to 12.

2.2 Exercise 2: Tea pot

Outline of the invention and background art

The hypothetical invention of Exercise 2 is a new tea pot with two spouts (article 1) and two cups having two handles (article 2). Images and figures of the invention are shown below:

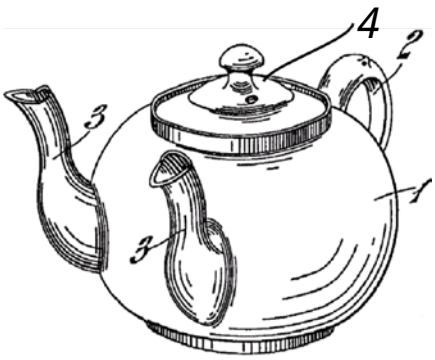


Fig.1.

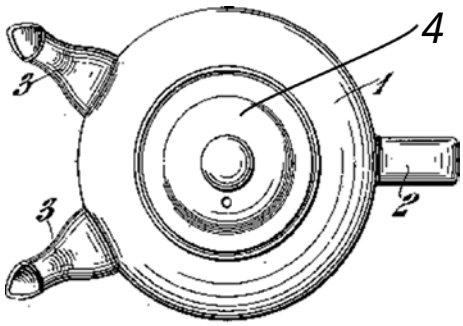


Fig.2.

For the present exercise, you are taking the role of a patent drafter and you are meeting the inventor who invented this hypothetical invention comprising two articles: namely, a new tea pot with two spouts (article 1) and two cups having two handles (article 2).

Drafter: Can you tell me what you have invented?

Inventor: I run a small tea stand serving tea. Many people come to get tea but during rush hours, there is a long queue and some don't want to wait, so I am losing clients every day. To avoid losing money and to get my clients satisfied, I have invented a new kind of tea pot with two spouts (article 1) and two cups with two handles (article 2) so that I can serve the tea quicker.

Drafter: Did you or anyone else publish your invention? Did you tell anyone about your invention?

Inventor: No, I heard that prior publication may destroy novelty.

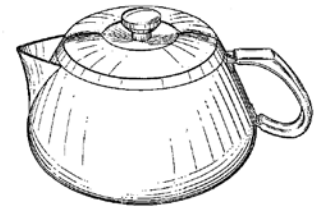
Drafter: Could you explain more about your invention? How does it function? How is it constructed? How is it used? Did you test it already?

Inventor: My invention is designed for pouring tea in a cup having two handles. I hold the handle of the tea pot, and the tea flows simultaneously from the two spouts into these matching cups made in the same color and with the same material, matching nicely with a tea pot. Both articles (tea pot and cups) are made with a high quality

ceramic. Besides the two handles of the cups present a nice design. I did not test it publicly, it is still a concept I am experiencing. The picture above as well as Figures 1 and 2 perfectly illustrate my invention.

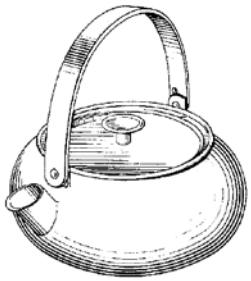
Drafter: What prior art exists concerning the invention? Do you know anything similar to your invention?

Inventor: I brought with me three tea pots that belong to the prior art. They all consist in a single spout (3) but the other features are more or less the same. Tea pots from the prior art all comprise a container (1), a handle (2) and a cover (4). For the tea cup, I have invented the existing prior art is a conventional cup with one handle.



Tea pot No.1

Tea pot No.2



Tea pot No.3

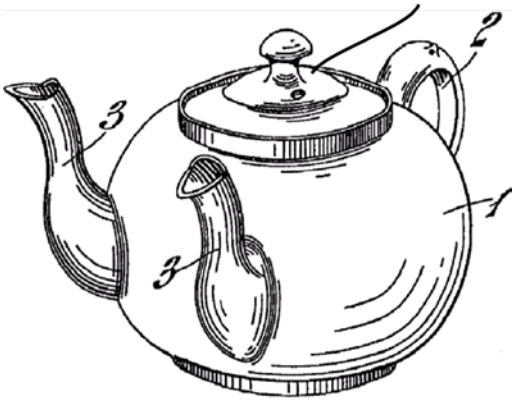


Fig.1.

Tea pot of the inventor

Drafter: What single piece of prior art is the closest to the invention and why? What is the difference between the closest prior art and your invention?

Inventor: I would say that tea pot No.2 is the closest prior art, because it possesses most of the features in common with my invention. Besides, it is also made in ceramic. The differences are the presence of 2 spouts for my tea pot (article 1) and two handles for my cup (article 2)

Drafter: What are the advantages over the prior art?

Inventor: I can serve tea faster than before and I will not need to hire a new employee to help me, so I hope to earn more and to save money. As to my tea cup, it is easier to handle.

Drafter: Can you see any other application of your invention, in other words can you use it for other purposes?

Inventor: I guess it must be possible to serve coffee too.

2.2.1 Phase 1: Spotting an inventive concept

Some tips for spotting the invention

Before taking the steps necessary to protect a particular invention, you need to find that particular invention.

What the inventor brings to you is only an example (embodiment) of his/her invention. The inventor generally does not really know what the invention is – usually the inventor thinks the prototype/embodiment is the invention, but it is not always the case!

If you are to protect his/her invention, you need first to identify what that invention is about. It is not uncommon for them to have more than one invention within a single prototype/embodiment (tea pot with two spouts and/or cups with two handles?).

What is the invention?

Oftentimes, answering the following questions helps to understand what the invention is:

- What are the differences between the closest prior art and the invention that you can spot? What do you catch, detect, determine, discern, discover, distinguish, find, isolate, identify, notice, make out, locate, perceive, pick out, recognize, single out etc.?
- What are the technical effects of each identified difference?
- Which technical effect seems to be the most important one? Which one is most significant, most substantial or most unexpected?

How to spot the invention?

If there is a novel invention (only novel inventions are worth considering), it must involve at least one technical feature which distinguishes the prototype (embodiment, example) from what is already publicly known. In the patent jargon, we usually talk in terms of technical features, which are the different components of the invention.

But not every new feature in the example is useful to define the invention. You need to identify the new feature(s) or combination of features which are inventive. Such new and inventive features provide the "trick" of the invention. For example, if an invention is a combination of features A, B and C (A+B+C) but each feature A, B and C is known in the art previously only through its individual use, the combination A+B+C is possibly novel. We then need to identify what problem did the inventor objectively solve by the combination. The hard part is deciding the minimum elements of the combination that are needed to get the desired benefit.

Look for the trick of the invention

What is the "trick" of the invention? This is how would you summarize the invention in one or two sentences. The "trick" or "gist" of the invention is related to the technical effect, advantage or benefit which the invention provides over the closest prior art.

To find out the "trick" of the invention, it may be useful to first identify the most commercially important advantage(s) of the invention. Then, you may ask the following question:

- What needs to be there to achieve that most important advantage? In other words, what is the problem(s) to be solved?
- How does the invention solve that problem? For this, you need to identify the technical features of the invention.
- Due to which technical feature is the problem underlying the invention solved? This will result in identifying the main technical feature(s) of the invention.

It is sometimes helpful to use a finger to show where in the drawing (picture) the important feature of the invention can be seen.

Question 1.
Coming back to the invention, what is the overall purpose of each article of Exercise 2 (what are both articles doing, in broad terms)?

Overall purpose of article 1: .....

.....

Overall purpose of article 2: .....

.....

Each technical effect contributing to that overall purpose can be reformulated into a problem-format by posing a hypothetical challenge in the following format: How to provide the particular technical effect (advantage)?

Question 2.
If the tea pot has an advantage that it enables many cups to be filled at the same time, then what might be the corresponding problem?

Problem 1: How to .....?

.....

Question 3.
If the tea cup has an advantage that it enables users to better handle a cup, then what might be the corresponding problem?

Problem 2: How to .....?

.....

In a typical invention, there will be many technical effects and corresponding problems that are solved by different elements of the invention.

What provides the benefit or trick?

Generally the person drafting the patent application has to analyze the prototype to see which of its features work together to provide the benefit. You need to consider carefully the accuracy of what the inventor says.

If there is more than one advantage, you need to consider whether they are due to the same distinct set of features. If different advantages come from some quite distinct sets of features, then they are likely to belong to separate inventions.

Question 4.
Which features contribute to solve the problems *(what main technical feature is responsible for solving each problem)*?

In other words, what technical feature(s) of each article is/are responsible for addressing the above-identified Problems 1 and 2?

The respective solutions are:

Problem 1: How to reduce time to fill many cups?

Solution 1: .....

.....

Problem 2: How to better handle a cup, improving safety and comfort?

Solution 2: .....

.....

Determine whether each problem/solution is present in the prior art.

The problems/solutions should next be compared against the prior art. This is important because our patent claim must meet the legal patentability requirements of novelty and inventive step (see Module II.2 of the WIPO Patent Drafting Manual).

In this hypothetical example, we have been given details of an existing prior art tool for serving tea, namely the conventional tea pot (2) with one spout and a conventional cup with one handle and it is this prior art against which we should compare our identified problems and solutions.

Certain technical features may not be identical in the embodiment and in the prior art. However, any "equivalent" feature should be identified. Equivalent features in the prior art are those which perform the same or similar function as the corresponding feature of the embodiment.

Question 5.
Taking each problem and solution in turn, does the prior art include these? In other words, please check for each problem and solution (numbers 1 and 2) identified above whether and how the prior art can solve it?

	1	2
Problem	How to reduce time to fill many cups?	How to better handle a cup, improving safety and comfort?
Solution	By adding a second spout to the tea cup	By adding a second handle
Prior art		

Since we now know which of these problems and solutions is, or is not, disclosed in the prior art, we could in principle direct our patent claim set to any one of the problems not disclosed in the prior art and this would achieve a novel claim.

For example, our independent claim could focus on the problem of "how to reduce the filling time when pouring tea" and its corresponding solution of using a second spout. Alternatively, we could focus on the second problem of "how to better handle a cup" and its corresponding solution of using a second handle.

In this example, there are two problems/solutions on which we can focus. To assist in determining which problem and solution gives us the maximum benefits in term of commercial interest here, we should next determine which of the problems and solutions above interact with one another and which do not. To do this, we ask whether any of these problems/solutions

is “dependent” on another problem/solution. For example, can Solution 1 (adding a second spout) only be achieved if Solution 2 (adding a second handle) is present?

Question 6.
For each of the problems and solutions, which are dependent on another problem/solution?

	1	2
Problem	How to reduce time to fill many cups?	How to better handle a cup improving safety and comfort)?
Solution	By adding a second spout to the tea cup	By adding a second handle
Prior art	No: there is only one spout. To solve this problem you should use two tea pots simultaneously, for example, by using your two hands or by hiring two waiters.	No: there is only one handle
Dependency		

Here, we see that the first and second problems/solutions are entirely independent of each other.

We have then two independent inventions which are not grouped in the same common inventive concept. There is no unity of invention in the present case (see Module VI. 11 of the WIPO Patent Drafting Manual). Thus we cannot group both inventions in one patent application because they are not related.

Question 7.
Determine which problem and solution is most commercially important. Why?

.....

.....

.....

.....

2.2.2 Phase 2: Drafting an independent claim

Generalizing the embodiment of the invention

Once you have spotted the specific feature or combination of features important for the invention you are still not quite ready to draft your main claim.

One needs to generalize the important feature(s) and crystallize what one thinks the general idea underlying the invention is. It is important to generalize the concept of the invention by concentrating on the essential technical features, by using broad technical concepts, broad language and by avoiding unnecessary limitations.

Question 8.
To help you before drafting a claim, please determine the technical features of the invention. Generate a list of any technical features of the embodiment.

- a container (1 in Figure 1)
- .....
- .....
- .....
- .....

Patent claims shall define the matter for which protection is sought. They shall be clear and concise and be supported by the description. A claim stating the essential features of an invention will be self-contained – this is known as an independent claim. The first independent claim is called the main claim.

Patent claims should be drafted so that they are broad enough to sometimes cover a system that may be used in an entirely different industry. However, keep in mind that if the claims are drafted too broadly, there is a risk that the claimed invention is not "new" vis-à-vis the prior art and thus may not be patentable.

In some jurisdictions, as in Europe, it is recommended to draft the main claim in a two-part format with a preamble which is a generalization covering the known features and a characterizing part with the new features. However, "Jepson claims" (claims in a two-part format) are not mandatory, but help in determining the essential technical features.

The characterized portion is preceded by the words: "characterized in that," "characterized by," "wherein the improvement comprises," or any other words to the same effect and states concisely the technical features which, in combination with the features stated in the preamble, it is desired to protect.

Where the patent application contains drawings, in some jurisdictions (as in Europe), the technical features mentioned in the claims shall preferably be followed by the reference signs relating to such features. When used, the reference signs shall preferably be placed between parentheses. However, in other jurisdictions (as in the United States of America), inclusion of reference signs in the claims should not be made.

Question 9.
Now start with a draft claim using the technical features identified above.

1. .....

.....

What does your independent claim look like? It might be something along the lines of:

1. A tea pot comprising a container (1) containing tea, a handle (2) for handling said container (1), a spout (3) for pouring the tea contained in said container (1) and a cover (4), characterized in that the tea pot comprises a second spout (3).

This claim well describes the core inventive concept of having a second spout to reduce time for pouring tea. However the scope of protection obtained by this claim is rather narrow. For example, if a competitor produces a coffee pot with two spouts, it does not infringe this claim. Now that you have spotted the invention, you should start generalizing the feature to broaden your main claim.

Look at all the features that are limiting the scope of protection as well as the features that are not necessary to solve the technical problem.

Should the invention be limited to serving tea? Should it be a tea pot? Should the spouts be limited to two? Are some technical features of the invention mandatory or simply optional to solve the technical problem at hand? Optional features could be placed in dependent claims.

Question 10.
Draft one independent claim defining the invention and granting the broadest possible protection.

1. .....

.....

Tip

A good independent claim would not be limited to a tea pot, but would claim a more general vessel for dispensing any liquid. Also, a broad independent claim should not be limited to two spouts but would use a wording like a "plurality of spouts" or "at least two spouts." To have a broad claim coverage, sometimes a technical element can be described by its function. Consequently, the spout (3) can advantageously be replaced by means (3) for discharging the liquid.

Finally, the independent claim should not contain unnecessary limitations like the handle or the cover. It is possible to dispend a liquid without requiring a handle or a cover to be connected to the container.

2.2.3 Phase 3: Drafting dependent claims

In this exercise, a suggested claim 1 could be drafted as follows:

1. A vessel for dispensing a liquid comprising a hollow body (1) adapted to be filled with a liquid and means (3) for discharging the liquid, characterized in that the means for discharging the liquid consists of a plurality of spouts (3).

Alternatively, if you do not choose the two-part format and do not include reference signs:

1. A vessel for dispensing a liquid comprising a hollow body adapted to be filled with a liquid and means for discharging the liquid consisting of a plurality of spouts.

Any claim stating the essential features of an invention may be followed by one or more claims concerning particular embodiments of that invention.

Any claim which includes all the features of one or more other claims shall do so by a reference, if possible at the beginning, to the other claim or claims and shall then state the additional features claimed.

Claims that refer to previous claims using wording such as "... as claimed in (or as defined by, or according to) claim 1 or claim 2..." are known as dependent claims.

As dependent claims relate to particular embodiments of the invention, they always refer to a specific independent claim (and/or other dependent claims). They include all limitations of the recited claim and add more limitations to that claim.

Question 11.
Assume that the independent claim, claim 1, is drafted as indicated above. Please draft several dependent claims defining fallback positions (in case the invention according to the independent claim would not be valid because further prior art exists).

2. .....

.....

3. .....

.....

4. .....

.....

5. .....

.....

Tip

Try to narrow the scope of protection by additional limitation, for example, by using the optional features of the invention.

If you are claiming an object represented by figures, it is usually recommended to give the spatial relationship regarding the positions of the different features of the object (such as the positions of a handle and spouts). It is also important to indicate how the different features are connected together.

Please do not forget to provide a claim that exactly covers the invention of your client (inventor). Usually this claim is put at the end of the claim set and is very limited in terms of protection. This will generally satisfy your client because you did cover the exact embodiment of the invention that has a commercial value according to the inventor.

2.2.4 Phase 4: Reviewing the entire set of claims

It is important to review the entire set of claims before finalizing the claims. You may ask the following questions:

- Does my set of an independent claim and dependent claims effectively capture the invention with the broadest scope as well as with a range of narrower scopes?
- Are my claims clear? Do they have correct antecedent basis?
- Does my independent claim contain unnecessary limitation?
- Do my claims overcome prior art (are they at least novel)?
- Does my dependent claim refer back to correct preceding claim(s), particularly in the case of multiple-dependent claims?

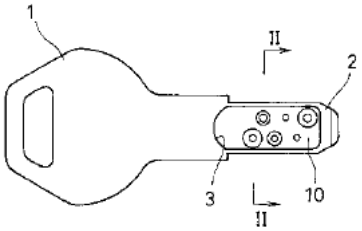
The tips found in previous sub-sections will also guide you to check possible pertinent mistakes that can be made when drafting claims.

2.3 Exercise 3: Dimple key

It is rarely the case that only a single prior art reference is discovered by the drafter during the patent drafting process. Often, a prior art search reveals that the invention is in a crowded field of technology, with several or perhaps dozens of examples of similar devices or methods. Furthermore, the drafter should anticipate that, during examination, the patent examiner is likely to cite several prior art references either individually or in combination to make a rejection for lack of inventive step (obviousness). In this example, we will use a slightly more complex invention to demonstrate the identification of an inventive concept in the face of more than one relevant prior art reference.

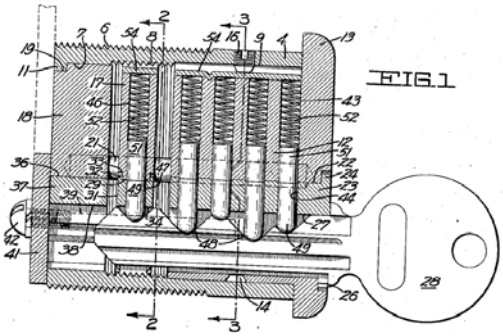
Outline of the invention and background art

The field of the invention is related to the use of a key to unlock a door, and the inventor tells you that the purported invention is a “dimple key” as shown below:

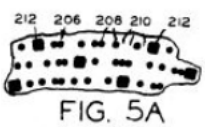


The inventor explains that the key is a flat bar of metal or other material with a series of dimples spaced randomly across the face of the bar. The dimples may be of uniform depth or may vary in depth. The key may be reversible such that the same dimple pattern is found on each flat side of the metal bar. The inventor notes that the key can be cut from a blank using a common drill press equipped with a metal-compatible drill bit, and that such devices are widely available and therefore more convenient for the user.

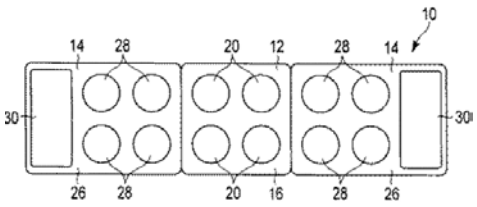
A prior art search reveals several items of interest. The first reference (Reference 1) shows the more traditional key, with a series of ridges on the edge of a metal bar. The reference notes that forming the key requires a specialized jig and cutting wheel. An image of the key inside of a lock is shown below:



The second prior art reference (Reference 2) describes a flat disk made of plastic and imprinted with a series of microscopic pits in a spiral pattern. The spacing and size of the pits along the spiral are used to encode data, and the data can be determined by reflecting a laser off the surface of the plastic disk. An image from a small section of the spiral is shown below:



A third piece of prior art (Reference 3) is a board game comprising a long flat board made from wood and containing a series of divots placed along the board. The game involves moving rocks from one divot to another based on a set of rules. An image of the board is provided below:



In this image, item 30 refers to larger (non-circular) divots, meant to be a reservoir of rocks belonging to either player of the game.

2.3.1 Phase 1: Spotting an inventive concept

Question 1.
Using the table of features approach described in Exercise 1, prepare a table of features, and identify an inventive concept for the dimple key given the various features, equivalents of those features, and instances of those features being found in the prior art.

(1) As a first step, prepare a list of technical features.

Elongated bar
Elongated bar is made of metal
A plurality of dimples
Dimples are aligned linearly in rows, but spaced randomly, along the length of the elongated bar

From this list of features, we can see aspects of the dimple key that may be considered part of the core inventive concept. The use of dimples, and particularly the arrangement of the dimples corresponding to the arrangement of pins in the lock, is fundamental to the operation of the key. Other technical features may be clearly subordinate to the core inventive concept, such as the presence of beveled corners or that the dimple pattern is repeated on two sides of the elongated bar. These conclusions relating to the identity of features of the inventive concept may be intuitive to the drafter but should be confirmed with the inventor, and further interrogated to determine whether there are ready alternatives to the various critical technical features.

(2) The known prior art is also used in identifying core features of the inventive concept. Thus, identify the technical effect of each technical feature, and consider whether each technical feature, or equivalent thereof, is found in the prior art, namely, References 1, 2 and 3.

Technical feature	Technical effect	Prior art
Elongated bar	A structural element	References 1 and 3, elongated bars.
Elongated bar is made of metal	Durability, low cost and high processability	References 1, a bar of metal
A plurality of dimples	Interfaces with lock in unique combination	References 2 and 3
Dimples are aligned linearly in rows, but spaced randomly, along the length of the elongated bar	Standardizing of production	References 2 and 3

From the table and a simple visual inspection, there are clearly differences between the various prior art references and the purported invention. Given that there are multiple prior art references, however, one must consider whether obvious combinations of features found in the various references are likely to narrow the inventive concept.

For example, there are several arguments to both support and refute the position that it would be obvious to combine the divots found in Reference 3 with the metal elongated bar found in Reference 1. If, in consultation with the inventor, the drafter considers such arguments and decides that it would be obvious, such combination may be considered as disclosed in the prior art, and this consideration may influence the ultimate identification of the inventive concept.

Given that Reference 2 is in a field of technology (recording devices) that is quite different from the field of technology for a dimple key, it is likely that elements disclosed in Reference 2 are available to provide an inventive concept suitable for patentability.

In view of the above, an inventive concept for the dimple key may be a device, used for opening a lock, that includes dimples (as opposed to ridges) in a specific pattern (i.e., parallel rows) on a flat face of a key (as opposed to an edge of the key). The possibility of using different depths and widths of dimples is also an important part of the inventive concept.

2.3.2 Phase 2: Drafting an independent claim

Let us begin with a product claim directed at the dimple key, recalling that a claim is built from three parts.

For the first part of the claim, the preamble, there are generally three options. First, one might consider selecting a descriptive term that provides some indication as to the nature of the claimed invention. In this case, a descriptive term might be “a key.” An alternative option is to select a generic term that is neutral as to the nature of the object, such as “a device” or “a tool.” Finally, a hybrid of these approaches is to use a generic term and to include a statement as to the intended use of the object. Examples of the hybrid approach include “a tool for opening a lock” or “a device for converting a lock from a closed position to an open position.” The selection of any one of these three options will depend on a variety of factors, including the known prior art, whether specificity is necessary for clarity and, to a limited extent, personal choice. The

drafter should continue to take note that, in some instances, the preamble may be considered limiting, in the sense that it can be used when interpreting the claims during an infringement proceeding. Whether the preamble is considered limiting may depend on the jurisdiction as well as the specific set of circumstances. Patent drafters will often attempt to avoid the possibility of a limiting preamble by using a relatively generic term.

The second part of the claim, the transition, is selected from the limited choices that are described previously. Most commonly, "comprising" is the transition of choice, and typically only when faced with known prior art that is close enough to the purported invention to be problematic will the drafter select a more limiting transition phrase. In particular, if the drafter believes that an inventive concept involves the removal of an element from a known prior art device, the use of "consisting of" or "consisting essentially of" may be warranted.

The third part of the claim, the body, consists of a plurality of limitations describing the core inventive concept. In this case, we have listed previously the technical features of the core inventive concept of the dimple key, taking into account the known prior art. The drafter will recall that each limitation relates to a technical feature, either by describing the technical feature or by describing something about the technical feature. Furthermore, apart from the first limitation in a claim, each subsequent limitation should refer back to at least one other limitation in the claim in order to provide some relationship between the new limitation and the prior limitation(s) in the claim.

Question 2.
Draft an independent claim for a dimple key based on the information provided above and in previous exercises.

1. .....

.....

.....

Tip

In some cases, it helps to identify a "backbone" technical feature – i.e., one to which all or most other technical features can be easily related. Our dimple key example appears to be one such case, as most or all of the features relate in some way to the elongated bar.

2.3.3 Phase 3: Drafting dependent claims

As before, drafting dependent claims is a matter of selecting technical features from the list of technical features that are not yet in the independent claim.
Examples of limitations suitable for dependent claims in the case of the dimple key include the following features:

- the elongated bar is made of metal;
- the elongated bar comprises beveled corners at a distal end;
- the plurality of dimples are aligned linearly in one or more rows, but spaced randomly, along the length of the elongated bar;
- the dimples are of varying depth and width;
- the plurality of dimples are arranged in a pre-determined pattern;
- the device further comprises a second plurality of dimples arranged in the pre-determined pattern along a second face of the elongated bar.

Each of the above limitations can be a separate dependent claim.

Question 3.
Draft a set of dependent claims based on your independent claim or based on the model independent claim from the prior exercise.

2. .....

.....

3. .....

.....

4. .....

.....

Tip

You may explicitly include various combinations of the limitations in the claims. Alternatively or in addition, such combinations can be explicitly enumerated in the specification, such that the combinations are easily imported into the claims if necessary. Examples include the following combinations:

the elongated bar is made of metal, and wherein the plurality of dimples are aligned linearly in rows, but spaced randomly, along the length of the elongated bar;

By including such combinations explicitly in the claims or in the specification, the drafter ensures that such combinations can be imported into the claims without the risk of being rejected by a patent office as unsupported by the specification.

2.3.4 Phase 4: Reviewing the entire set of claims

A review of the set of claims proceeds as described in the prior exercise. The following few additional comments are provided as instructional and are based on the model answer to the exercises above.

For novice drafters, it is sometimes challenging to draft proper multiple-dependent claims. It is quite easy to lose track of limitations when claims are dependent upon dependent claims, and this is likely to result in a rejection for lack of antecedent basis (i.e., referring to a limitation using the article "the," even though the limitation has not yet been described in the preceding claim to which the dependent claim refers). To avoid such a problem, you may draft dependent claims directly dependent upon an independent claim (or one dependent claim). Compared with using multiple-dependent claims, this way of drafting dependent claims would lead to a greater number of claims, which might have negative implications for an application fee.

Some jurisdictions will reject claim amendments that introduce combinations that are not explicitly present in the original application. Including dependent claims that combine limitations from other dependent claims helps to minimize that situation.

2.3.5 System inventions and method inventions

The patent drafter should always consider that an invention may involve one or more products, processes and combinations thereof. Continuing with the previous exercise, the dimple key is merely a part of a system that also includes the lock, and the two system components are used together to achieve the goal of locking/unlocking a door or something similar. Therefore, you may also consider claiming a lock and/or a security system to protect the invention.

Similarly, an inventive concept of a key might also reside in its manufacturing process.

Overview of the method of manufacturing the dimple key

The method of manufacturing the dimple key involves some, or all, of the following steps:

(i) determining an arrangement of dimples;
(ii) forming a digital version of the pre-determined arrangement of dimples;
(iii) storing the pre-determined arrangement of dimples in a database;
(iv) communicating the pre-determined arrangement of dimples to an automatic drilling machine;
(v) selecting a drilling bit;
(vi) selecting a dimple key blank;
(vii) securing the dimple key blank into a drilling machine;
(viii) drilling a series of dimples into the key blank face according to the pre-determined pattern;
(ix) rotating the key 180 degrees around the long axis;
(x) repeating the drilling of the series of dimples into the opposing blank face of the key.

In addition to the steps identified above, one may also consider the raw materials needed to carry out the method of manufacture. Specifically in the case of the dimple key, the key is produced from a "blank," which is a partially shaped bar of metal. Steps involved in the production of the blank (e.g., cutting the blank from a larger bar of metal, shaping the blank in a specific way, etc.) may be useful as claim limitations, depending on the prior art and the inventor's idea of the inventive concept.

Approaches to drafting method claims

The first decision that the drafter must make is whether to make the method claim an independent claim or a claim that depends on a product claim. Several factors may influence this decision, including the number of independent claims in the claim set (since patent offices may charge for an excess above a certain number), whether the relevant jurisdiction allows such practice and the desirability of having a standalone set of claims to the method (e.g., for ease of licensing, etc.). In our case and for the purpose of illustration, we will keep the method claims separate from the product claims.

The second decision involves the intended target user of the claim – i.e., the drafter must consider who might be carrying out the claimed method. This is an important consideration because instigating infringement lawsuits against certain potential users can sometimes be a delicate or undesirable course of action. For example, a method claim might target the manufacturer of a device, in which case it is most likely that an infringer will be a corporation or other business entity. However, if a method claim targets an end user, the patentee may be forced to sue individual users. It will be appreciated that suing individual users for patent infringement can be comparatively resource consuming, inefficient and even politically/socially sensitive. In our case, we could try to claim the method of opening a lock with a dimple key, but for such claims, the likely infringer is the end user of the lock (in some jurisdictions, it may be possible to sue a manufacturer for inducement of infringement when the user is the entity actually performing the infringing act, but for now we will ignore this possibility). Therefore, it may be better to claim a method of *manufacturing* a dimple key, as well as *manufacturing* the lock that corresponds to the dimple key, instead of claiming a method of using a dimple key.

Having settled on method of manufacturing claims, it helps to list all of the steps that are relevant to the method of manufacture, as well as any relevant limitations on the steps or components used in the steps. It is also helpful to determine who/what performs each step, as well as any known or hypothesized alternatives.

Comparison of the steps and limitations to known prior art is also helpful at this stage. The process is analogous to the process described above for product claims. However the drafter should not necessarily limit the analysis to processes mentioned in the prior art references that were found relevant to the product invention/claims. Relevant process steps may be found in other prior art references, even if the products in the prior art are completely unrelated to the invention. For our purpose, the three prior art references mentioned previously will be referenced again in relation to the methods of manufacture.

Step	By whom? How?	Optional? Alternatives?	Prior art
Determining an arrangement of dimples	A computer can generate the pattern, using random number generators and/or algorithms, or a human can generate the pattern	Alternatively, a random arrangement can be determined during the process of drilling	Reference 1 (in which a prearranged shape of the key's edge is determined) and Reference 2 (in which the arrangement of pits is determined by the data to be stored)
Forming a digital version of the pre-determined arrangement of dimples	Via scanning equipment or the like	Necessary if the arrangement is done by a human and the drilling machine is automatic	
Storing the pre-determined arrangement of dimples in a database		Optional, allows replacement keys to be made in future	
Communicating the pre-determined arrangement of dimples to an automatic drilling machine		Alternatively, a manual drilling machine could be used	
Selecting a drilling bit	Automatically, by the drilling machine	Alternatively, a laser or other cutting instrument could be used	References 1 and 3 (selecting a cutting tool)
Selecting a dimple key blank	Automatically, based on the pre-determined arrangement of dimples and other factors	Alternatively, the key blank may be determined when modeling the arrangement of dimples	Reference 1
Securing the dimple key blank into a drilling machine	Manually, or automatically, by the drilling machine		Reference 1
Drilling a series of dimples into the key blank face according to the pre-determined pattern	Automatically, by the drilling machine	Alternatively, a human can drill the dimples manually	Reference 1 (cutting ridges on the key)
Rotating the key 180 degrees around the long axis	Automatically by the drilling machine	Alternatively, the drilling machine can have two cutting tools in an opposing configuration. Also alternatively, the key may have dimples on only one face.	
Repeating the drilling of the series of dimples into the opposing blank face of the key	Automatically, by the drilling machine		None

This table of method steps with equivalents and comparisons to prior art assists identification of "optional" and "mandatory" steps to manufacture a dimple key.

In converting the mandatory steps identified above to an independent method claim, as before, the drafter must determine a **minimized combination of steps** that perform two functions:

(a) sufficiently describe a workable embodiment of the invention; and
(b) distinguish the claim from the known prior art.

A set of dependent claims are also drafted as in previous examples, from the optional steps identified in the table which are not necessary included in the independent claim.

In preparing the claims, the drafter should consider that certain aspects of the product may also be required in describing the inventive method. In the instant case, for example, it may be helpful to describe the key as elongated, in order to explain the orientation of the drilled dimples.

Reference to the preceding product claim(s)

In some jurisdictions, such as the European Patent Office, if new inventions relate to a new compound and a new method of manufacturing such a compound, it is a common practice to draft an independent method claim with a reference to the preceding product claim(s). Let's assume that claim 1 covers a new compound X. An independent method claim may read "2. A process for manufacturing the compound of claim 1, comprising: ....." In other jurisdictions such as the United States of America, patent drafters usually do not use such a reference, and fully recite compound X in the subsequent process claim.

2.4 Exercise 4: Vehicle

Outline of the invention and prior art

The hypothetical invention of this exercise is a vehicle. An image of the vehicle is shown below in Figure 1.

The vehicle has a frame (1) made from metal and with which a front wheel (2), mounted on forks (3), is attached to the frame. Handlebars (4) are attached to the forks so that a user can steer the front wheel. In use this allows the direction of the vehicle to be controlled. The frame also has a back wheel (5) attached to it. The back wheel and front wheel are both in contact with the ground in use. They are generally in line with each other. The vehicle has pedals (6) turning a sprocket and a chain (7) going to the back wheel so that a user can pedal and power the back wheel to propel the vehicle along. A user can sit on a seat (8) that is carried by the frame. The seat is positioned between the front and back wheels and in a manner so that a rider can sit on the seat and pedal the pedals and reach the handlebars with their hands to be able to steer the front wheel. To make the ride more comfortable, the forks include shock absorbers (9). When the front wheel hits any bumps in the road the shock absorbers dampen the impact. The handlebars include a bell (10) that can be used to alert other road users.

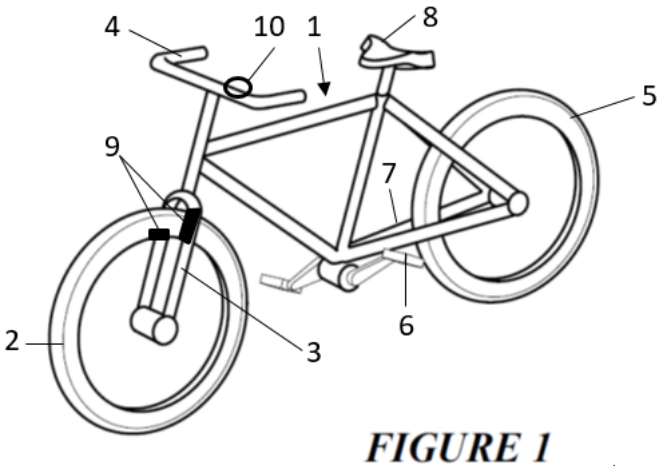


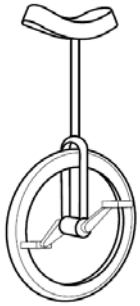
FIGURE 1

The inventor has tried mounting two wheels or a common axle, so side by side rather than in-line, and this does not work. It is too unstable.

The closest existing solution (the "prior art") is a unicycle as seen below in Figure 2.

The unicycle has been around for many years but it is not easy to use. A person needs to spend a lot of time learning to balance on the unicycle. A person needs to balance both in a side to side direction and also in a front to back direction. To steer the unicycle a person must use their upper body to twist and create momentum to cause the unicycle to pivot around a vertical axis to then cause the rolling direction of the wheel to change. This can be difficult to learn and is also not a very accurate way of steering.

FIGURE 2



The vehicle of the invention does not require a user to balance the vehicle in a front to back direction, only in a side to side direction. This makes the vehicle easier to learn to ride and use. It has better stability both when stationary and when moving. The handlebars allow the user to more accurately steer the vehicle.

Draft independent and dependent claims for the invention.

Tip

It is recommended to take a table of features approach for this exercise to identify the essential features of the invention to put into the independent claim(s) and to identify the novel and inventive feature of the invention to ensure you claim the invention in a novel and inventive manner. Here is a start:

Feature	Name	Function/essential	In prior art?
1	Frame	Hold the other components together (Y)	Yes
2	Wheel	Support on ground (Y)	Yes
3	Handlebar	Steering (Y)	No
4	Fork	...	Yes
5	A second wheel		
6	...		

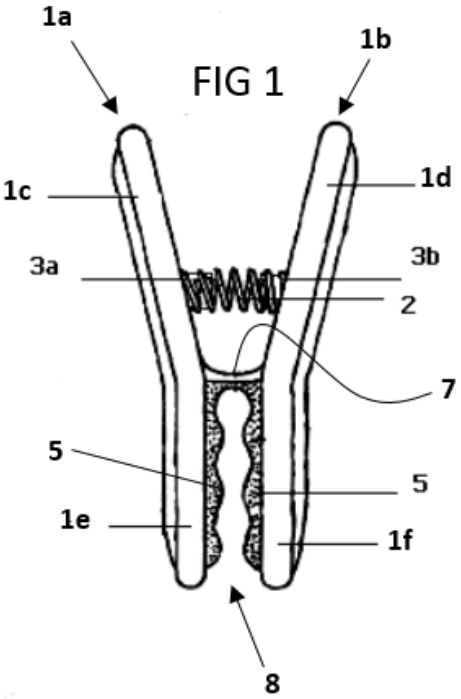
2.5 Exercise 5: Clothes peg

Outline of the invention

This invention is a new clothes peg. It has been designed primarily to avoid damaging clothes, which is often a problem encountered with prior art clothes pegs.

Wet clothing is typically dried on a clothes line. Pegs are used to retain the items of clothing on the line. There are many commercially available clothes pegs, including push-on clothes pegs and 'alligator type' or 'pinch type' pegs. These prior art pegs are shown at the end of this section. These prior art pegs often damage delicate and expensive clothing.

Here are pictures of the new clothes peg.



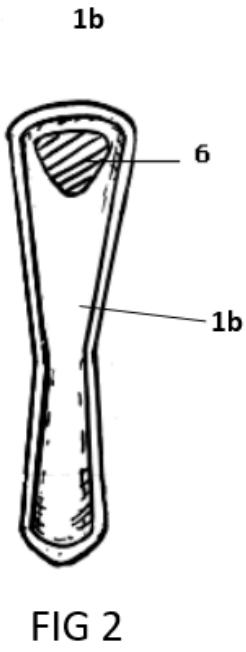


Figure 1 is a front view of the peg showing arms (1a)(1b) forming a jaw (8) at one end of the peg. The jaw is shown in a slightly open position (as if someone is squeezing the arms at the other end together to partially open the jaw). Figure 2 is a side view of the peg. It shows an arm 1b having a ribbed finger gripping zone 6. The other arm, not shown in Figure 2, is identical.

The body of the peg is formed of plastic and can be injection molded as a single part. A bridge (7) extends between the two arms and acts as a hinge so that the arms can rotate relative to each other.

The two arms (1a, 1b) form a jaw (8) by jaw parts (1e) and (1f) of the arms on one side of the bridge and have lever parts (1c) and (1d) on the other side of the bridge. The jaw parts are able to be pressed toward each other to a closed position by a coil spring (2) located between inner surfaces of the lever parts (1c) and (1d) of the peg. Because the jaw parts are pressed toward a closed position the peg can provide a firm hold on clothes and is unlikely to slip off the washing line in strong winds.

The main reason that the peg helps avoid damage to clothes is because the coil spring is located away from the jaws at the point where the peg grips the clothes. It is located between inner surfaces of the lever parts (1c, 1d) of the arms of the peg and there is hence less risk that any sharp edges on the ends of the coil spring can catch on clothing and rip a hole in the clothing.

A projecting cylinder-shaped protrusion or spigot (3a, 3b) of each arm is located on the inner surface of each lever part. Each end of the coil spring is positioned to surround a respective spigot to hold the coil spring in place between the peg arms.

A rubber substrate having a ribbed surface (6) has been bonded to the sides of the peg to allow the peg to be easily gripped during use (see Figure 2). These could be included as inserts during injection molding of the peg body.

Rubber pads (5) are located on inner surfaces of the jaw parts of the peg to further help reduce damage to clothing. The pads can be included as inserts during injection molding of the peg.

A cheaper version of the peg might exclude the rubber pads on the jaws and lever portions.

A less desirable version of the peg includes a leaf spring (9) secured to the inside or to the lever portions as shown below in Figure 3. The leaf sprint is a metal strip that is bent to a U-shape as shown. It is of a metal that will encourage the strip to move back to its flat condition and this means that it pushes the lever parts apart in the direction of the arrows and the jaw parts together. The leaf spring could instead be connected to the outside of the lever portions (1d,1e).

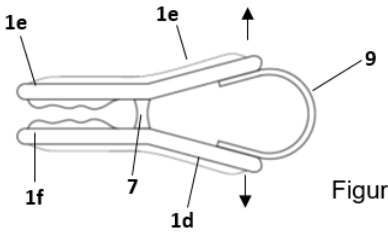
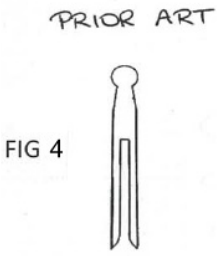


Figure 3

Prior art pegs

The first type of prior art peg is a push-on peg shown in Figure 4. On windy days this peg can ‘slide off’ the line, leaving your clothes in a crumpled and muddy heap on the ground.

A second type of prior art peg is the alligator peg. This includes a pair of arms (1, 2) and a torsion spring (3) and is illustrated in Figures 5 and 6. It has an unusually shaped spring acting on and used to push the jaw (6) of the peg to a closed position. The spring has a pair of spiral-shaped portions (4), one spiral-shaped portion being located on either side of the peg. The spring is made from wire. The ends (5) of the spring wire are positioned on external facing surfaces of the peg at the jaw regions. The ends can be sharp and can catch on clothing. Because the ends of the spring are located at the jaw region (6) and on the external surfaces of the arms, clothes can brush against the sharp ends on a windy day, creating holes in clothes. The invention solves this, the biggest problem with the prior art, by having the spring acting at the other end of the arms.



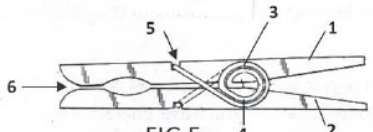


FIG 5

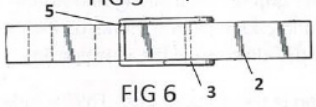


FIG 6

Draft independent and dependent claims that cover the preferred form of the invention as well as the less preferred forms.

Tip

Use the table of features approach for this invention also. It will help you to determine the features that are essential to the function of the invention, the features that contribute to the solution to the main problem and the features that are nice to have but are not critical to solving the main problem (so should not be put into the independent claims). Also think about how you can claim both the coil spring and the leaf spring in a more generic manner. Consider using functional language to do this in the independent claims and more structural language in the dependent claims.

2.6 Exercise 6: Picture-hanging hook

Outline of the invention and prior art

This invention is a picture-hanging hook.

Interior walls of houses are often constructed with timber frames covered by plasterboard. If an article such as a picture is to be hung on such a wall, provided a stud of the timber framing can be located, it is possible to drive a nail or screw through the plasterboard into the stud to form a strong anchor point for the article to be hung from, and most of the holding strength is derived from the stud. Plasterboard is typically made of gypsum and is not by itself strong enough to support a nail or screw from which a heavy picture is then hung. The nail or screw is likely to pull out if driven only into plasterboard, and hence it is desirable to also secure the nail or screw into the underlying stud.

Sometimes there is no stud located where a picture is to be hung.

Various prior art devices are available that can be sufficiently supported by the plasterboard alone, when there is no stud conveniently located behind the plasterboard.

Figures 1–3 show a wall anchor device called a gravity toggle device. The device has a toggle body (1) that can pivot about a nut (2) so that when the toggle body is aligned with the bolt (3) (see Figure 2) the device can be inserted in a hole in a wall and then when the toggle body reaches the inside of the plasterboard, it will pivot 90 degrees under gravity to the position shown in Figure 1. The bolt (3) can then be tightened to force the toggle body (1) against the interior face of the plasterboard to provide a strong anchor point. The toggle helps spread the load to a larger surface area of the plasterboard compared to merely a screw that is screwed into the plasterboard. If the bolt (3) is unscrewed and removed, the toggle body (1) will fall off the end of the bolt and drop away behind the wall and cannot be recovered to be reused. This device is a one-use-only device.

Figures 4–6 illustrate another prior art anchor known as a wall plug. The plug has a split body (14) that is initially in a configuration shown in Figures 4–6. The body (14) is inserted into a hole in the plasterboard. After insertion in the hole, a screw (15) engages with the end (16) of the body that is outside the plasterboard. The screw is then turned by a screwdriver to enter the body causing the opposite end (17) of the body to be forced apart by the screw, as indicated by the arrows in Figure 2b. The body is provided with features (18) that assist with engagement with the plasterboard as the end (17) of the body is forced apart to help prevent the anchor being accidentally pulled out of the plasterboard. The device has projecting teeth (19) which provide limited engagement with the plasterboard by biting into the front surface of the plasterboard to prevent the body (14) turning when the screw is turned. This device helps reduce the chance of pulling out of the plasterboard that a mere screw or nail may experience. Only in a very limited way does it also spread load.

The invention will now be described. The anchor of the invention is a one-piece plastic molding as shown in Figures 7–10. Figures 7 and 8 show the device in its rest position. The device has wings (37) that can bend between the positions shown in Figures 9 and 10. Initially, a user pushes the wings (37) together from the position shown in Figure 7, to the position shown in Figure 9. The wings (37) and body (36) are inserted into a hole in the plasterboard (38). A screw (30) is then passed through a hole (35) in the body (36) and into a hole (31). The screw thread engages in the hole (31) so that when the screw is turned, the wings (37) will spread and compress against the interior face of the plasterboard as shown in Figure 10. The body (36) of the anchor has projections (32) to prevent rotation of the anchor in the hole in the plasterboard. The screw (30) can be removed from the device so the wings can contract again and the device can be removed from the plasterboard (38). This is because the device is preferably of one-piece plastic and the plastic can repeatedly flex and hinge in the appropriate regions. The device is hence reusable.

Prepare independent and dependent claims for filing a PCT international application.

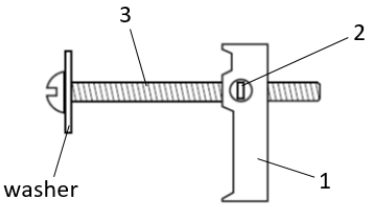


FIGURE 1

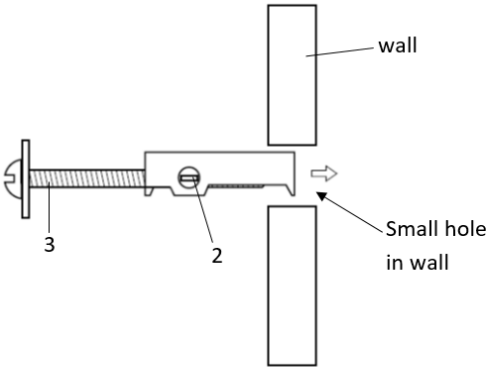


FIGURE 2

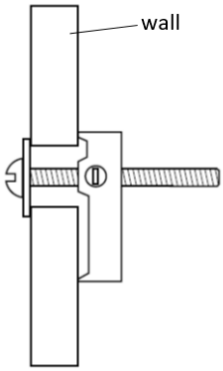


FIGURE 3

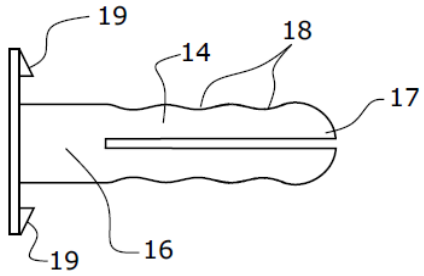


FIGURE 4

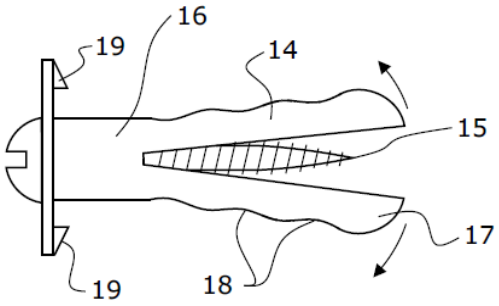


FIGURE 5

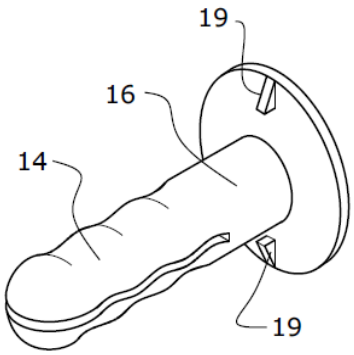


FIGURE 6

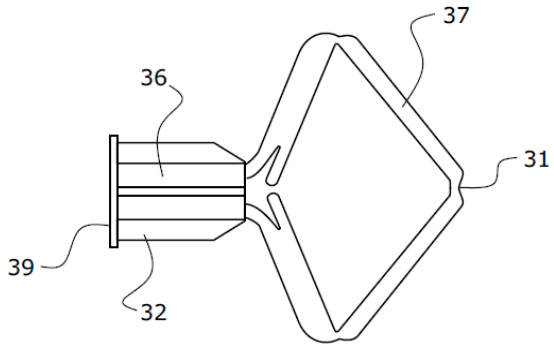


FIGURE 7

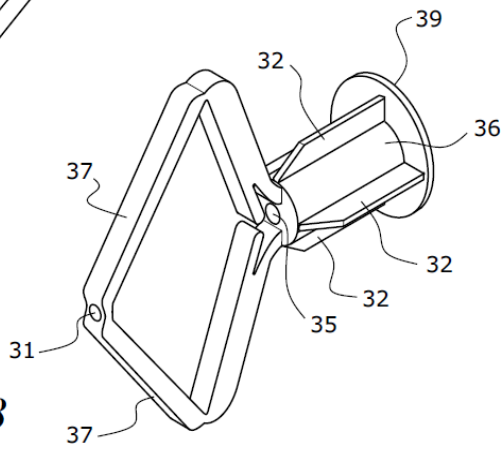


FIGURE 8

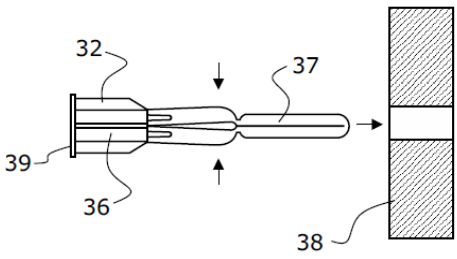


FIGURE 9

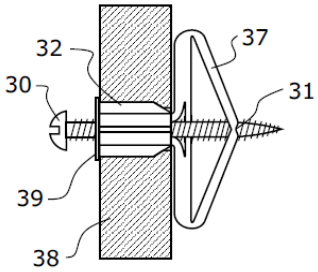


FIGURE 10

Tip

Think about words to use in the claims to describe each part of the invention with reference to human body parts: arms, elbows, head, body etc. Just because an inventor gives you their words to use, does not mean that there are not better more generic words you can use in the claims to try and get broader patent scope. Refer to a dictionary to look up meanings of words. Ask yourself and/or the inventor questions. Does the claim need to be limited in scope to the hanging of picture frames? And for use with walls? Can it be used with a ceiling panel?

2.7 Exercise 7: Bag for storing food

Outline of the invention and prior art

You are a patent attorney and have just met a new client who wants you to file an urgent patent application for her invention. Norma is a product designer and mother. Her family lives a busy life and she often invents ways to make the household tasks more efficient. To help the family make and preserve pre-cooked meals, Norma has made a handheld vacuum pump that can extract air out of plastic bags in which pre-cooked meals can be stored in the freezer.

The process usually works like this: large batches of food such as vegetables or chicken drumsticks are cooked. This food is then portioned into common plastic bags. The bags with cooked food inside are then placed in a freezer, after the air in the bag has been evacuated by her invention, to be frozen until later consumption.

When the bags with food inside have had the air evacuated, the food is able to be frozen in the bags without frost forming on top of the food. Frost can spoil the food. Frost can be created when air is still trapped in the bag. This is a known problem and currently people merely squeeze as much air out of the bag as possible before closing the food-containing bag and putting it in the freezer. But for some food types the shape of the food still leaves air pockets in the bag that cannot be removed by merely squeezing the bag. Sometimes people use their mouths to suck the air out of the bag but this is not very hygienic or effective.

Norma has invented a handheld suction pump. It is shown in cross-section in Figure 1A and 1B.

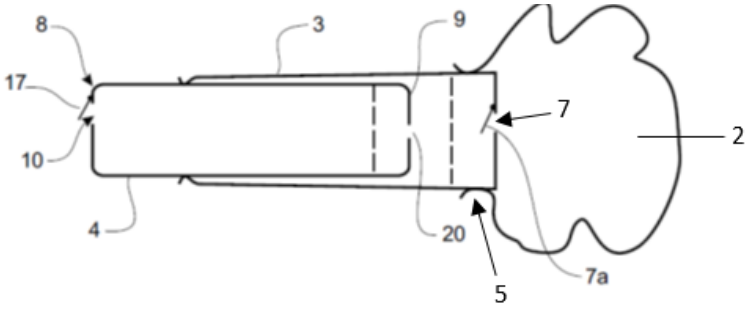


FIGURE 1A

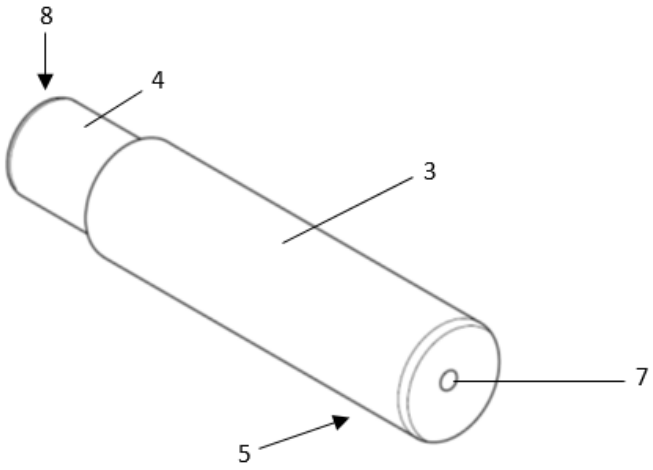


FIGURE 1B

The pump has two main parts, the piston (4) and cylinder (3). A bag (2) is able to be held sufficiently sealed by a user's hand at the end (5) of the cylinder. The other hand of the user can grasp the piston. The piston can then be moved by the user in a reciprocating manner to move inside the cylinder. This motion causes air to be sucked out of the bag. Here is how:

The cylinder includes an opening (7) that can be closed by a one-way valve (7a). The valve is a flap valve to allow air to flow into the cylinder from the bag but prevents air flowing out of the cylinder via the opening (7) into the bag. The opening (7) is at the end of the cylinder where the bag can seal to the cylinder. The piston likewise includes an opening (10) at end (8). This is an opening of the piston to the surrounding atmosphere. The opening (10) can be closed by a one-way valve (17). The valve is a flap valve to allow air to flow out of the piston and to prevent air flowing into the piston via the opening (10). The piston has another opening (20) into the cylinder at its opposite end (9).

When the piston is moved away from the bag as seen in Figure 2 below, air in the bag is sucked from the bag through the opening (7) of the cylinder into the cylinder. The one-way valve (17) is closed because of the negative pressure created by moving the pistons, in the piston. The valve (7A) is open.

When the piston is moved towards the bag and into the cylinder more, the positive pressure created in the cylinder and piston causes the valve (7a) to close and valve (17) to open. This is shown in Figure 3. The air that was sucked out of the bag in the extraction stroke and into the cylinder then flows out of the opening (10). Repetitive movement of the piston and cylinder hence causes more and more air to be sucked out of the bag. When the desired amount has been sucked out, the user can twist the bag to seal the bag and slip the bag off the cylinder. It can then go into the freezer.

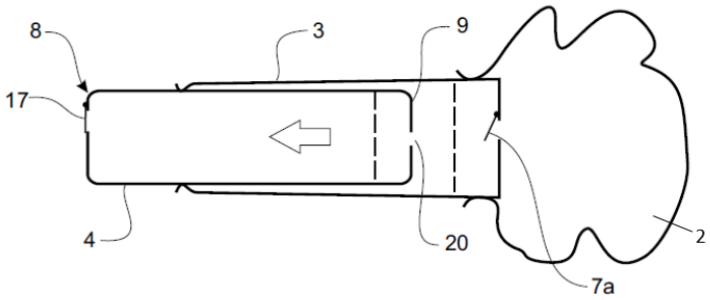


FIGURE 2

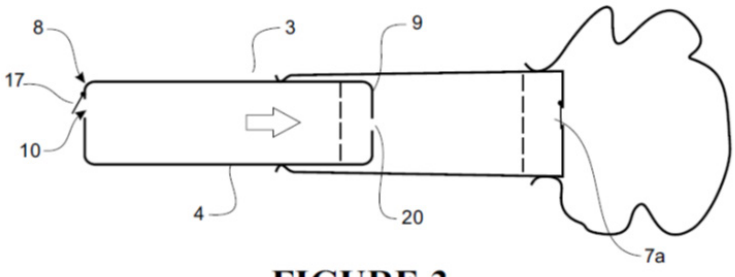


FIGURE 3

Draft independent and dependent claims suitable for filing as a PCT international application.

Tip

Think about what is happening with the airflow through the device in each direction of movement of the piston. Then consider what each opening and valve is doing to allow that airflow to establish and how that affects that airflow.

An independent claim usually has, as one of its first features in the body of the claim, the primary component or components of the invention from which other components depend or are part of. Here the primary components are the piston and cylinder. These should be references as the first two features of the body of the independent claim. This will then make it easier to write the rest of the claim.

Also think about whether the invention can be used for more than just freezer bags. You may want to use broad generic wording in the preamble of the claims to ensure the claim can cover other uses of the device.

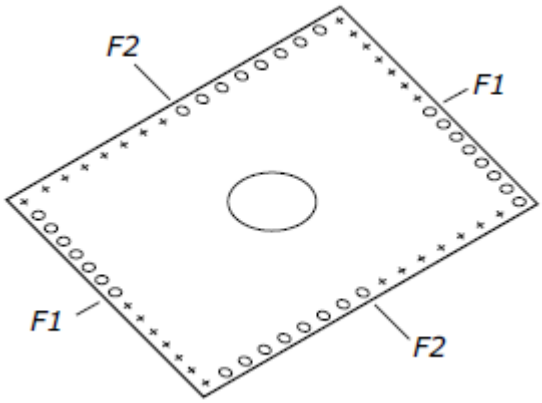
This exercise is based on a true story of Norma McCulloch and prepared with permission from her son and daughter. You can find more about the invention on New Zealand patents NZ152864 and NZ535689 of Norma McCulloch.

2.8 Exercise 8: Convertible poncho

This next invention looks simple. This makes it tempting to use common or simple words in the claims to describe the essential features of the invention. But sometimes the simple looking inventions are the hardest to claim broadly.

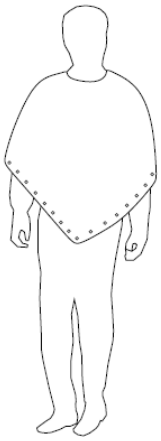
Outline of the invention and prior art

This invention is about a convertible poncho. This poncho can convert from a poncho to a tent canopy, a duffle bag, a sleeping bag and a picnic blanket. It is made from a single sheet of waterproof fabric and looks like this:

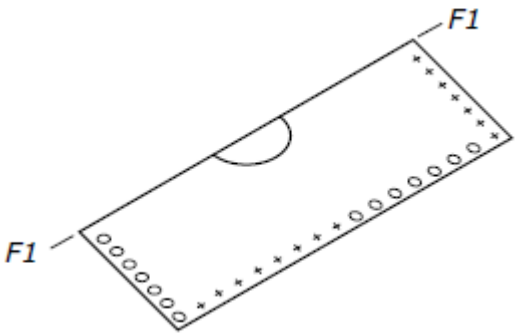


In this format the sheet can be used as a picnic blanket.

There is a hole in the middle big enough for a person's head to pass through when the sheet is worn as a poncho, as shown below. The hole may have a cover panel to close the hole. The panel may be zipped into place to close the hole or Velcro may be used. Here is the sheet used as a poncho.

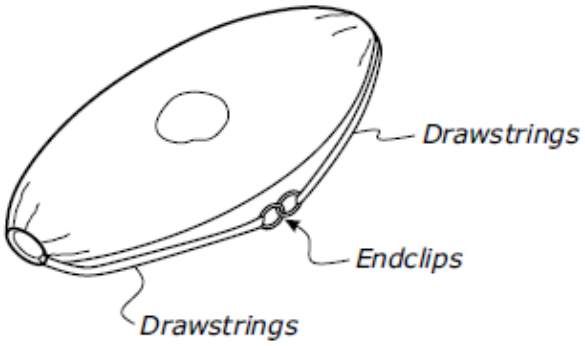


In the preferred form the sheet is square and along each edge are fasteners. Two-part fasteners are used. For example, two-part dome fasteners may be one example of the type of fasteners used. A first and second part of such fasteners are denoted by X and O respectively on the drawing above. X-type fasteners extend along half of each edge and O-type fasteners extend along the other half of each edge. The O-type fasteners can releasably fasten to the X-part fasteners. Below, the sheet is shown folded along fold line F1–F1. It can also be folded along fold line F2–F2 or on the diagonal.

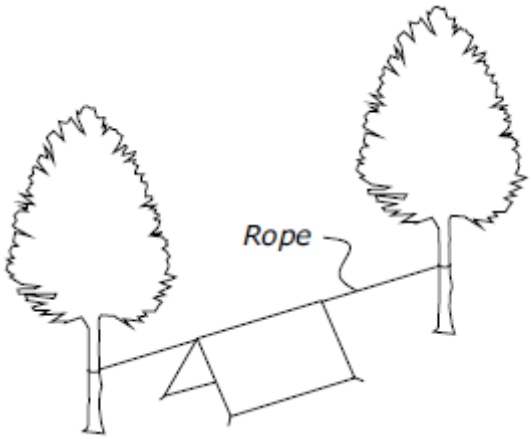


The fasteners along each side can be fastened together to create a rectangular enclosure. In the rectangular configuration as seen above, and when fasteners at one end are disconnected, an end opening is created and a sleeping bag format is then provided.

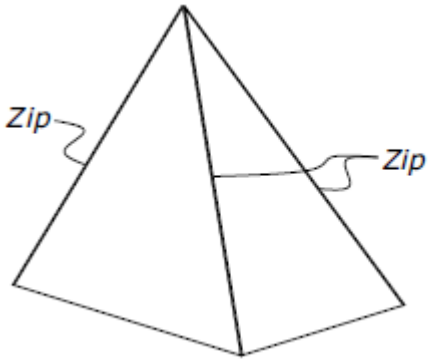
The sheet may include a hem at two opposed ends in which a drawstring is located. This allows the sheet to be used as a duffel bag. The ends of the drawstrings can have end clips that can connect together to create a shoulder strap as shown below.



The sheet can also be used as a tent canopy as shown below using a rope spanning between two trees.



The closest prior art is a tent that is made up of four triangular sheets of fabric that can be zipped together as shown below. One of the zips can be undone to allow all four sheets to be laid flat on the ground to act as a picnic blanket, albeit of an unusual plan shape.



Draft independent and dependent claims.

Tips

Having a prototype in hand when you are drafting can be very helpful. This is especially so for inventions that have components that move relative to each other or that have components that interact with each other.
In this case take a square piece of paper and mark the fastener configuration on it. Fold the piece of paper along many fold lines to see how the invention can work. Try a rectangular piece of paper too. Try a trapezoidal piece. Do the complementary fasteners need to extend exactly 50/50 along a side of the piece? What if the “O fasteners” extended along only 30 percent and the X 70 percent of an edge? This may make you realize that some of the words chosen in your first draft of the independent claim(s) are too narrow. Words like “square” and “midway” or “middle” are very specific and possibly too narrow in independent claims for this invention.

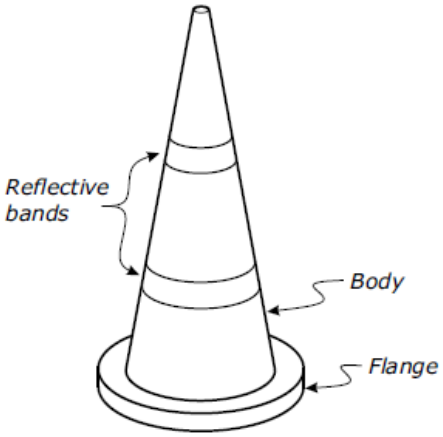
2.9 Exercise 9: Road cone

Outline of the invention and prior art

This invention is about road cones. Road cones are used to help guide traffic and warn road users and pedestrians of danger. Hundreds of thousands of road cones are used worldwide and many get damaged or stolen each day. There is a need for them to be as cheap as possible yet still be functional.

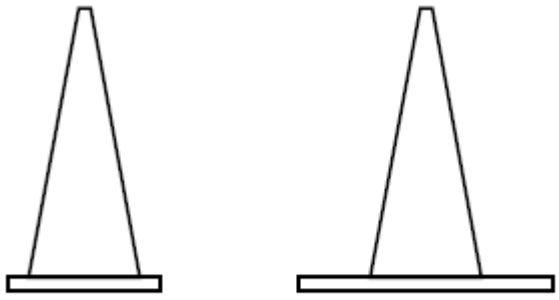
Road cones are made of molded plastic formed as a hollow cone with a flange at the bottom to act as a base. The body of the cone needs to be of a height to be sufficiently visible. The height is usually dictated by traffic laws and regulations. A common height is 900mm. The flange creates a wider base for the cone and this helps with keeping the cone upright. To keep costs down, the body and base are made as a single piece so that assembly does not need to occur. The only other component of a typical basic road cone is the optional reflective band or bands. These are stuck on after the cone has been molded.

Here is a picture of a road cone.



US2333273A shows how the hollow body can allow for the cones to stack on top of each other for storage.

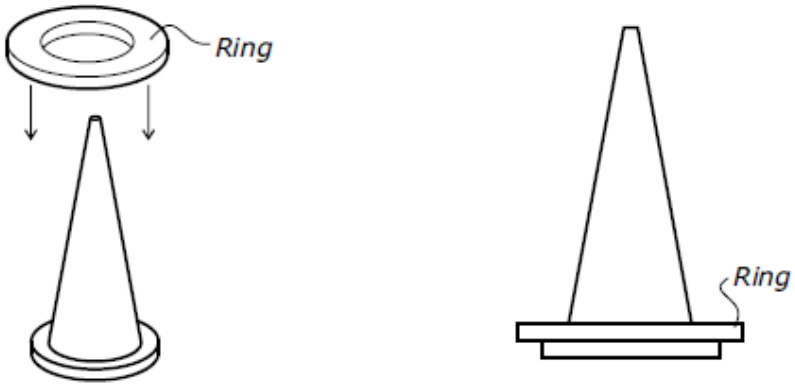
In some places where road cones are used, the wind can be very strong. The force of the wind can cause road cones to topple over. For these places, road cones are currently made with a much wider base. But this almost doubles the amount of plastic that is used compared to a small-base road cone. It also means two types of injection molds need to be made and serviced. Such wide-base road cones are hence almost twice as expensive to produce. Here is a picture illustrating the narrow and wide-base cones.



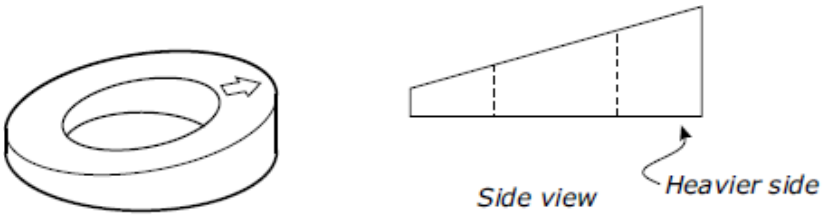
Narrow base Wide base

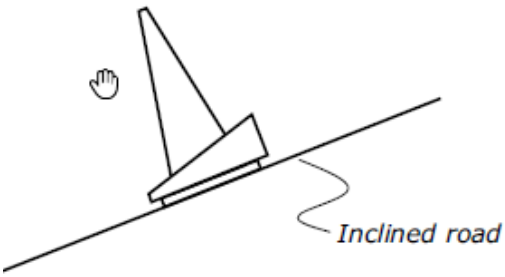
Some cone manufacturers have made narrow-base cones in two parts where the body is made from plastic and the base is made from heavier metal. But this is expensive as it requires manual assembly of the two parts. It also means that all cones are made this way even if they do not need the extra stability because they will not be used where it is windy. This makes them expensive to make and transport and harder to handle.

The invention avoids the need to make two different-shaped road cones. A small-base road cone can be used in all situations and be made more stable for windy conditions by dropping a metal ring over the body and onto the base. A roadworker setting out road cones hence has the option of making the cone more stable, if the cones will be out in windy weather.



The inventor has made an improved version that uses less metal in the ring to keep costs down. Because wind usually comes from a prevailing direction, less weight is needed on the downwind side of the base. A ring with an uneven weight distribution has been designed that allows for a roadworker to place a cone on the ground and for the ring to be placed with its heavier side on the upwind side of the cone. An arrow is cast into the metal ring to help position the heavier side on the upwind side of the cone by pointing the arrow into the prevailing wind direction. The inventor tells you that the ring is also helpful in keeping cones upright when they are placed on a road with a steep incline.





Draft independent and dependent claims to this invention.

Tips

- Think about what would be a direct infringement of your claims. Are you claiming a road cone with a metal ring? Would that capture a manufacturer who only makes rings?
- Research road cone shapes and look up the dictionary for words that you are using to describe features of the invention. Words like “conical” and “ring” are very specific words, for example.

2.10 Exercise 10: Quick release shackle

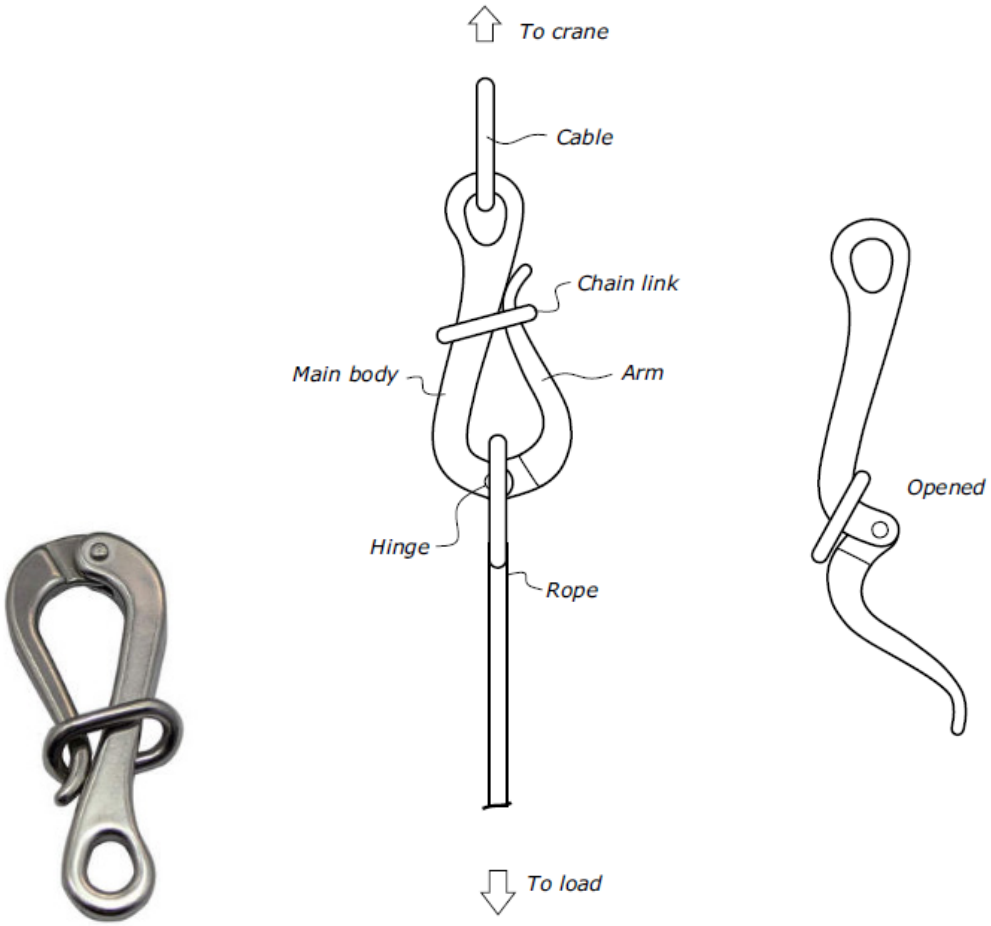
Outline of the invention and prior art

This invention is about a quick release shackle.

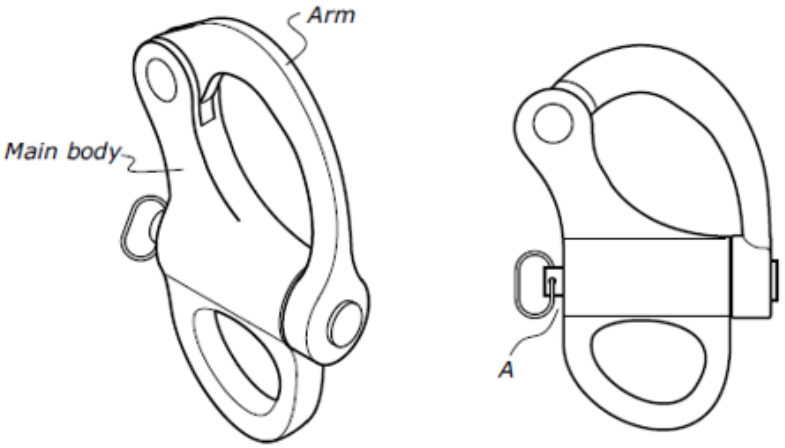
Shackles have been around for many years. They are typically used to quickly connect items together such as an anchor to a chain or a rope to the mast of a yacht or part of a sail to a rope. Here is the most common form of shackle used. It has a pin with a handle at one end and a threaded opposite end. The pin can pass through a hole at one end of the U-shaped body and into a threaded hole at the opposite end.

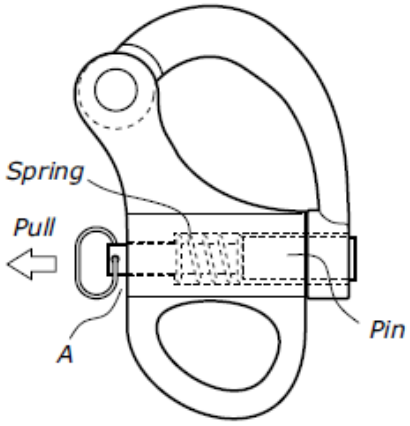
This common shackle can take time to secure and unsecure as it requires the pin to be turned multiple times to tighten or undo it from the threaded hole of the body.

A quick release shackle that can be released a lot quicker that the shackle above, is shown below. It has a body that has two parts: a main body and an arm. These are connected by a hinge pin. The two parts are held together by a chain link. A person can slip the chain link off the end of arm to allow the arm to hinge relative to the main body. This shackle can only be used in the orientation shown to ensure that the chain link does not slip off the end of the arm unintended. If the shackle is used upside down the chain link could drop off the end of the arm and allow the shackle to open. This shackle can allow the two connected components (e.g., the crane cable and the load) to quickly separate. The rope to the load becomes naturally positioned on the arm side of the hinge. This means that the rope will pull the arm open from the body as soon as the chain link is slipped off. However, when under a large load, the arm will press hard on the chain link and this makes it hard for the chain link to be slipped off the end of the arm.

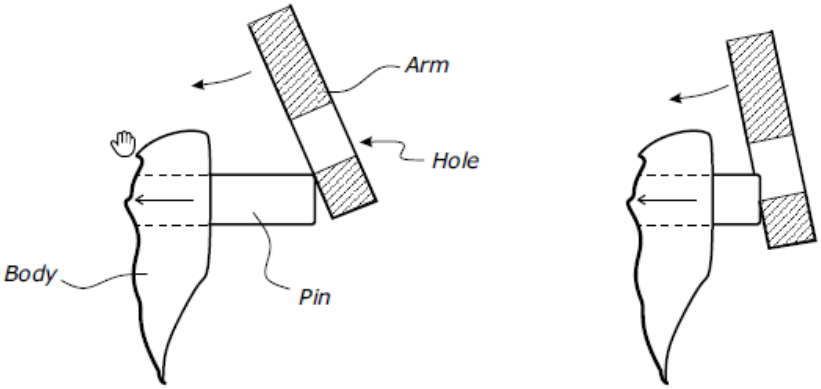


The invention is called a snap shackle. Below are some drawings of it.





It is similar to the quick release shackle, but instead of a chain link, it has a pin that is located by the main body of the shackle. The pin can slide back and forth and is biased to a locking position by a spring inside the body. The arm has a hole that can receive the end of the pin. A person can pull the pin at its end (A) to cause the other end to release from the hole in the arm. This allows the arm to hinge over 180 degrees away from the body to release the load. This shackle does not need to be used in a particular orientation. It is also able to be quickly re-secured. The end of the arm when it is closing up again will push onto the end of the pin, depressing the pin until the hole at the end of the arm aligns with the pin and the spring shoots the pin into the hole of the arm thereby locking it in place again, as shown below.



Draft independent and dependent claims to this invention.

3 Drafting patent specifications

This chapter involves practical exercises on full patent specification drafting and applies the principles and techniques discussed in the WIPO Patent Drafting Manual (particularly Module VII). Exercises 1 and 2 will build on Exercises 1 and 2 in Chapter 2 of this book, and will involve drafting full patent specifications, based on the claim set prepared for the inventions introduced in Chapter 2.

3.1 Exercise 1: Step-by-step process of drafting a patent specification (staple remover)

This section follows on from Exercise 1 in Chapter 2 regarding a staple remover. It provides step-by-step instructions for drafting a full patent specification set based on that exercise. Nine questions will guide you to follow this process. Sample answers to these questions are provided at the end of this section.

As with claim drafting, it is to be noted that there is no single "correct" way of drafting a patent specification and the approach outlined below is merely an example as to how one could draft a specification. Others may approach the drafting of a specification in an entirely different manner.

An important factor to bear in mind is one of consistency. The terminology used in your patent specification should be consistent throughout the various sections. This aids with interpretation of your specification.

Specifically, if a term is used in the claims and the same term appears in the detailed description section, then a reader understands that the patent draftsperson is referring to the same technical feature.

In contrast, if different terminology is used then it is unclear whether the technical feature in the claims is intended to be somehow different to that discussed in the detailed description.

A full patent specification typically comprises the following sections:

(i) Title
(ii) Technical field
(iii) Background
(iv) Summary of invention / Detailed description /Disclosure of invention
(v) Brief description of the figures
(vi) Specific description (of the examples, figures and/or embodiments)
(vii) Claims
(viii) Abstract
(ix) Drawings

Many drafters start by drafting claims, and then move on to the remainder of the specification, because doing so helps the drafters better refine the "inventive concept" of the invention in their mind.

It is generally logical to approach at least the title, field of invention, summary of invention, definitions, detailed description and the examples and embodiments after the claims have been drafted. This is because these sections must adopt the consistent terminology noted above.

Starting with claim drafting also helps a drafter to formulate the background section in such a way that it highlights the advantageous technical features of the claimed invention against the backdrop of the state of the art. In some occasions, drafting the background before moving onto the claims and then completing the remainder of the specification might be helpful to establish the prior art landscape in the mind of the drafter. In that case, however, a drafter should revisit the first draft of the background section once the entire specification has been drafted.

Each section is discussed in turn below with reference to the claim set that has been prepared for Exercise 1 in Chapter 2, above.

(i) Title

The title is, in some jurisdictions (e.g. the UK), published shortly after filing an application. This is in contrast to the remainder of a patent specification, which is typically published about 18 months from filing (or earliest priority, if claimed).

As a result, there is a strategic consideration to bear in mind for the title. It is recommended only to include information that you are happy to be published early. In view of this, many patent drafters elect to adopt a broad title that does not include much information.

In the broadest sense, a title may be a single word, such as "product" or "method," depending on what is most appropriate to the primary aspect of the invention. The title may include more information than this, perhaps outlining in very general terms what the invention relates to.

There is no single correct way of approaching this. A general guide is to mirror the preamble of your independent claims for the title. So, if your primary independent claim has the preamble "A clip for holding multiple items together…," your title might simply read:

"Clip" or "A clip"

Often, drafters include further information relating to the purpose of the invention, such as:

"Clip for holding multiple items together"

Question 1.
Prepare a title for your patent application for the invention in Chapter 2, Exercise 1.

.....

.....

(ii) Technical field

This section should provide slightly more information about what the invention does (i.e. what is the broadest technical effect achieved by the invention). However, the field section should not explain how it achieves that result (i.e. the technical features responsible for those technical effects).

This section should be one or two sentences and typically takes the form:

> "The present application relates generally to... The present application relates more specifically, but not necessarily exclusively, to..."

This format is used to outline both the general field of the invention and a more specific implementation. There is no single correct way of approaching this. Going back to the clip, if it had a purpose of being able to hold together multiple sheets of paper, your field might read:

> "TECHNICAL FIELD
> The present application relates generally to a clip for holding multiple items together. The present application relates more particularly, but not necessarily exclusively, to a stationary clip suitable for holding multiple sheets of paper together."

Question 2.
Prepare a suitable field of the invention for your patent application.

> TECHNICAL FIELD
> The present application relates generally to .....

(iii) Background

This section should include a broad discussion of background information that is relevant to the invention in question. The background typically establishes a problem with existing technology in the field of invention – this sets the scene for the invention, which solves the problem in the field. You may wish to refer to a prior art product or method here, if that is helpful.

It is commonplace in modern patent drafting to include only a brief acknowledgement of such background information here. Generally, one or more paragraphs will suffice.

Keeping with the clip, the background section may read:

> BACKGROUND
> It is useful to be able to hold multiple items together. In an office environment, for example, holding multiple sheets of paper together is useful to present the multiple sheets as a single document. Prior art techniques for holding multiple sheets of paper together include paper clips. However, paperclips do not hold the paper particularly tightly, and so are prone to falling off and releasing the sheets from one another.

Question 3.
Prepare a suitable background section for your patent application.

> BACKGROUND
> It is useful to .....

(iv) Summary of invention / detailed description / disclosure of invention

The summary section, which may be called the "Detailed description" section or the "Disclosure of invention" section, is formulaic. If you have one independent claim, you should begin this section by "In an aspect, the present application relates to..." and should then reproduce the wording of your independent claim.

Thus, if a patent specification included the following independent claim:

"A clip comprising:

(i) a pair of opposing surfaces, the pair of surfaces being movable between:
(a) an open position suitable for receiving multiple items to be held, and
(b) a closed position suitable for gripping multiple items to be held; and
(ii) a pair of handles;
wherein the pair of opposing surfaces are biased towards the closed position, and
wherein the pair of handles can be operated to cause the opposing surfaces to move to the open position."

Then this section may begin:

"DETAILED DESCRIPTION
In an aspect, the present application relates to a clip comprising:
(i) a pair of opposing surfaces, the pair of surfaces being movable between:
(a) an open position suitable for receiving multiple items to be held, and
(b) a closed position suitable for gripping multiple items to be held; and
(ii) a pair of handles;
wherein the pair of opposing surfaces are biased towards the closed position, and
wherein the pair of handles can be operated to cause the opposing surfaces to move to the open position."

Following this paragraph, an explanation of the utility, operation and function of the tool should be included.

Question 4.
Prepare the beginning of a suitable detailed description for independent claim 1, including an explanation of the utility, operation and function of the tool.

For reference, independent claim 1 prepared in Exercise 1 in Chapter 2 above is provided below:

1. A tool for removing fasteners, the tool comprising:
a pair of jaws,
a tooth on each jaw, the tooth of one jaw opposing the tooth of the other jaw,

wherein jaws are pivotable relative to one another between a first position in which the teeth are brought together and a second position in which the teeth are apart.

DETAILED DESCRIPTION
In an aspect, the present application relates to .....

.....

The tool has particular, but not exclusive, utility in .....

.....

Next, this section should provide discussion on any optional features of the tool, i.e. features that are not included in the independent claim. This discussion should reflect your dependent claims as a minimum. There may be other optional features that the claims drafter decided not to include in the dependent claims (e.g. because it was felt that it was not worth claiming this optional feature) – these can also be included in this section as well.

The statements introducing optional features should use wording that makes it clear that these features are optional and not essential. There is no single correct way of doing this, but the following statements may be useful:

- "The tool may comprise a [technical feature]."
- "In some instances, the tool comprises a [technical feature]."
- "When the tool comprises a [technical feature] it may also comprise a [technical feature]."
- "Optionally, the tool comprises a [technical feature]."
- "In some implementations, the tool may comprise a [technical feature]."
- "The tool may comprise [broad technical feature] such as a [specific technical feature]."
- "The tool may comprise [broad technical feature] (optionally a [specific technical feature])."

After each feature has been introduced, it is generally advisable to include discussion of any technical effects that are provided by that aspect or feature. There is no single correct way of doing this, but some exemplary statements are provided below:

> "The tool may comprise a **[technical feature]. [Technical feature] has the advantage of… [technical effect/advantage]**."
>
> "In some instances, the tool comprises a [technical feature]. **Such tools may be useful because [technical effect/advantage]**."
>
> "When the tool comprises a [technical feature] it may also comprise a [technical feature]. **Tools combining these features may achieve [technical effect/advantage]**"
>
> "Optionally, the tool comprises a [technical feature]. **In such tools [technical effect/advantage**]."
>
> etc.

It is also advisable to include clarifying discussion to explain anything that might be unclear or ambiguous, such as how parts of the tool are joined together or how they operate. Again, there is no single correct way of doing this, but the following statements may be useful:

> "In some implementations, the tool may comprise a [technical feature]. **Such a [technical feature] may be joined to the tool by means of a [clarifying explanation]**"
>
> "The tool may comprise [broad technical feature] such as a [specific technical feature]. **Such a [specific technical feature] is a more specific version of [broad technical feature] and can be used to [clarifying explanation]**"

Question 5.
Prepare the detailed description section for the set of dependent claims in Exercise 1 in Chapter 2 and provided below:

2. The tool as claimed in claim 1, further comprising a locking pin for releasably locking the pair of jaws in the second position.

3. The tool as claimed in claim 1 or claim 2, wherein the teeth comprise metal.

4. The tool according to any preceding claim, wherein the tool is biased towards the second position.

5. The tool according to claim 4, wherein the bias is provided by a spring.

6. The tool according to claim 5, wherein the spring is a torsion spring.

7. The tool according to claim 5 or 6, wherein the spring comprises chrome-plated steel.

8. The tool according to any preceding claim, wherein one or both jaws are provided with gripping members.

9. The tool according to claim 8, wherein the or each gripping member comprises plastic.

10. The tool according to any preceding claim, further comprising a locking pin for releasably locking the pair of jaws in the second position.

11. The tool according to any preceding claim, wherein the teeth comprise steel.

12. The tool according to any preceding claim, wherein the teeth comprise stainless steel.

The tool may comprise a ..... Such tools may be useful because .....

.....

In some instances, the tool comprises a .....

..... , which has the advantage of

.....

etc.

There are two additional independent claims to consider for this invention and incorporate into the detailed description. The first of these is a so-called **"kit of parts" independent claim**. Kit of parts claims define a physical entity in a disassembled form. In the context of Exercise 1 in Chapter 2 above, the kit of parts claim might read:

13. A kit of parts for a tool, the kit comprising:
a pair of jaws, each jaw being provided with a tooth, said jaws being pivotably connectable to one another such that the tooth of one jaw opposes the tooth of the other jaw and pivotable relative to one another between a first position in which the teeth are brought together and a second position in which the teeth are apart.

Here, the adjective "connectable" is used to note that the jaws are disassembled (i.e. not physically connected) but are able to be connected together.

The second is a **"method of manufacture" independent claim**. As the name suggests, these claims define a method for manufacturing (e.g. assembling) a physical entity. In the context of Exercise 1 in Chapter 2 above, the method of manufacture claim might read:

14. A method of manufacturing a tool comprising a pair of jaws, each jaw being provided with a tooth, the method comprising:
pivotably connecting a first jaw in the pair to a second jaw in the pair, such that the tooth of one jaw opposes the tooth of the other jaw and such that pivotal movement of the jaws causes said teeth to move relative to one another between a first position in which the teeth are brought together and a second position in which the teeth are apart.

Here, the verb "connecting" is used to refer to an active method step.

The kit of parts and method of manufacturing are both additional "aspects" of the invention. The detailed description should include discussion on these in the same manner as adopted above for the aspect of the invention described above for the tool *per se*.

Again, this should start by introducing each aspect using the wording of each independent claim. This should then include an explanation of the utility, operation and function of the kit/method. This should then be followed by a discussion on any optional features of the kit and method, as well as their technical effects and advantages. Any clarifying explanation should be included as necessary in the same manner as above.

For the optional features, it may be possible simply to refer to optional features "described above" in the context of the tool and highlight that these features apply equally to the kit/method. If it is not immediately clear how optional features of the tool would apply to the kit/method, it is wise to include new discussion and specifically adapt this to the kit/method.

Question 6.
Prepare a suitable discussion for independent claims 13 and 14 above for inclusion in the Detailed Description.

In a second aspect, the present application relates to a kit of parts for a tool, the kit comprising

.....

The kit can be used to .....

The kit may comprise a .....

..... Such kits may be useful because .....

In some instances, the kit comprises a .....

.....

etc.

In a third aspect, the present application also relates to method of manufacturing a tool

comprising a pair of jaws, each jaw .....

The method can be used to .....

The method may comprise a .....

.....

In some instances, the method comprises a .....

..... , which has the advantage of .....

etc.

Next, this section can include definitions of terms (if necessary). In the event there are any unclear or perhaps ambiguous terms in your specification, it is useful to have a definitions section in which you can include definitions for each of these.

In the invention of Exercise 1, it may be useful to describe what is meant by metal fatigue (in the context of the torsion spring).

Question 7.
Prepare a suitable definition to explain the meaning of metal fatigue in the context of this invention.

In the context of the present application, metal fatigue may be understood to be

.....

(v) Brief description of the figures

Since drawings are required when they are necessary for the understanding of the invention, it is often useful to include one or more figures to illustrate the invention (e.g. with photographs or drawings) and/or to provide experimental data (e.g. with graphs or other charts).

The first step with this is to give a brief description of the figures such that the reader knows what each of the drawings are. Here, your description of each figure should define the type of figure (photograph, line drawing, graph, schematic representation, etc.); define any visual perspective that the figure depicts (e.g. top-down view, side-on view, perspective view, exploded view, etc.) and a brief note of what the figure actually depicts (e.g. whether it's a device, chart showing data, etc.).

This section should begin with a statement that the drawings are illustrative of one or more embodiments of the invention, followed by a listing of the different figures, followed by the description of each figure.

An example might be:

> BRIEF DESCRIPTION OF THE FIGURES
>
> The invention will now be further described, by way of example only, with reference to the accompanying figures, in which:
>
> Figure 1 shows a photograph of a clip according to the present application from a perspective view.
>
> Figure 2 shows a further photograph of the clip from a side-on view.

Question 8.
Prepare a brief description of the drawings section for the three images in Chapter 2.1 (Exercise 1).

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is ..... ;

Figure 2 is ..... ; and

Figure 3 is .....

(vi) Specific description of the examples figures and/or embodiments

(ix) Drawings

Sections (vi) and (ix) are interrelated and should be drafted together.

The earlier sections (i.e. sections (i) to (v)) and particularly the claims (section (vii)) provide a discussion of an invention that is highly generalized. Sections (vi) and (ix) exemplify this generalized discussion with explanation of one or more specific embodiments of the invention, for example a specific description of a prototype device.

As mentioned in Module VII.3.6 of the WIPO Patent Drafting Manual, if a patent agent uses an abstract term elsewhere in the specification, e.g. the claims, then they should consider using the term in this section but in a manner that ties the abstract term to a specific embodiment of the invention. This allows the reader of a patent to see an example of the abstract term in the context of the specific embodiment.

Here, if you have any drawings or photographs of a device, it can be useful to include these in your patent specification in one or more figures (see Module VII.4 of the WIPO Patent Drafting Manual). It is recommended (and often patent offices will require) that these are annotated with reference numerals so that corresponding discussion of these figures can easily and clearly refer to the depicted elements.

There is not one correct way of approaching this. An example is set out below:

SPECIFIC DESCRIPTION

Figures 1 and 2 show a clip (1) according to one aspect of the present invention. The clip (1) is suitable for gripping multiple items (e.g. pieces of paper) together.

The clip (1) comprises a metal structure in a generally triangular shape, having a pair of plates (2, 3) having opposing surfaces (2a, 3a) and a bridge (4) between the plates (2, 3). The clip (1) further comprises a pair of metal handles (5, 6) connected to the edges of the plates distal (furthest) from the bridge (respective edges denoted (2b) and (3b)).

The figures show the clip (1) in a "closed position." In this position, edges (2b, 3b) of the plates distal from the bridge rest against one another.

In Figure 1, the handles (5, 6) are shown in a "primed" position, generally pointing in a parallel orientation to the pair of plates (2, 3). In this position, the handles (5, 6) can be brought together by application of pressure (e.g. by squeezing with fingers). This causes the bridge (4) to deform and the edges (2b, 3b) of the respective plates (2, 3) distal from the bridge (4) to move away from one another – this is referred to as the "open" position.

The bridge (4) is elastic and biases the clip (1) towards the closed position: when squeezing pressure is released, the opposing surfaces (2a, 3a) of the plates (2, 3) move towards each other once again.

In the open position in which the handles (5, 6) are squeezed together, multiple items to be gripped can be inserted between the opposing surfaces (2a, 3a) of the clip. The squeezing pressure can then be released, causing the opposing surfaces (2a, 3a) of the plates (2, 3) to move towards each other and grip the items provided between them. The biased nature of the bridge (4) means that, in the closed position, a force is applied to the gripped items and this positively holds the items in place. The magnitude of the bias can be adjusted to provide a corresponding force suitable for a given application.

The distal edges (2b, 3b) of the plates (2, 3) are curved and are less likely to damage the items being gripped as a result.

The handles (5, 6) are pivotally connected to the distal edges (2b, 3b) of the plates. This allows the handles (5, 6) to lie against the items being gripped, reducing the profile of the clip. This is partly illustrated in Figure 2.

The handles (5, 6) are generally omega (Ω) shaped. This enables the handles (5, 6), and by extension the entire clip (1), to be hung from a hook.

The clip (1) is coated with waxy black oxide. This provides a number of advantages. The coating reduces or eliminates marks being made on the items when gripped by the clip (1) and reduces or prevents rusting of the metal. It also provides a good aesthetic appearance to the clip (1).

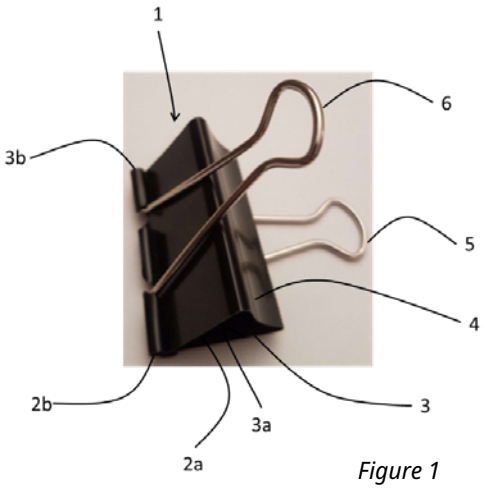


Figure 1

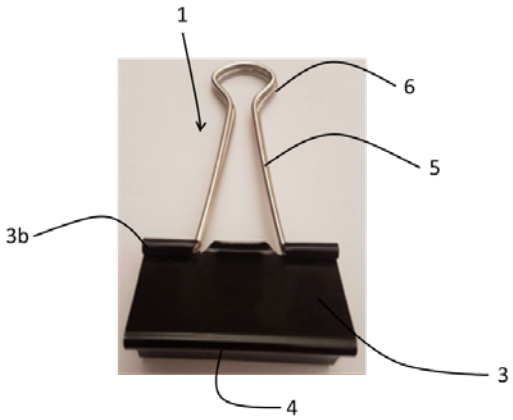


Figure 2

Question 9.
Prepare a suitable specific description (of the examples, figures and/or embodiments) section as well as annotated figures with reference to the three images in Chapter 2.1 (Exercise 1).

SPECIFIC DESCRIPTION

.....

.....

(vii) Claims

This part of the specification is discussed already in Chapter 2.

(viii) Abstract

The abstract can be drafted in a formulaic manner by first stating "The present application relates to..." and then reproducing the wording of claim 1 with additional punctuation to separate out clauses in the claim into distinct sentences. However, there is no single right way of doing this.

For example, if a claim was worded according to the clip claim in section (iv) above, then the abstract may be:

> *"A clip comprises a pair of opposing surfaces. The pair of surfaces are movable between (a) an open position suitable for receiving multiple items to be held, and (b) a closed position suitable for gripping multiple items to be held. The clip further comprises a pair of handles. The pair of opposing surfaces are biased towards the closed position. The pair of handles can be operated to cause the opposing surfaces to move to the open position."*

Question 10.

Prepare a suitable abstract for the set of claims concerning a tool for removing fasteners in section (iv).

.....

.....

3.2 Exercise 2: Tea pot (continued)

This exercise follows on from Exercise 2 in Chapter 2 regarding a tea pot. We will move on to draft a full patent specification relating to this invention.

The aim of the description is to disclose and teach the invention so as to support the claims, but also to provide the basis for interpretation of the claims and to provide a context within which to view the claims. The description also provides a basis for future amendment of the claims (during prosecution or litigation).

The description shall disclose the invention in a manner sufficiently **clear and complete** for the invention to be carried out by a person skilled in the art, namely, to describe in detail at least one way of carrying out the claimed invention. This shall be done using examples where appropriate and with reference to the drawings, if any.

The patent description must **support the claims**. A claim that is not supported by the description is invalid. Therefore, before filing the application, the patent drafter must review the description and claims to verify that every claim has support in the description.

The description is the source of all allowable amendments during prosecution of the patent application – no new matter can be added after filing. That is why what you describe in your patent application at the filing – the start of the patenting process – is very important.

Tips

In order to make it easier to describe the invention and in order to facilitate understanding, set out your material as though you were telling a story.

This means that you should describe the context of the invention, then the main structure, before you start to describe small details of the invention or a particular embodiment.

When you describe the invention, ensure that the reader can easily follow your explanations about the structure, function and use of the invention. Start with the big picture and work into the detail of the invention.

Do not throw the reader right into the heart of the invention – lead the reader progressively along a logical path with no sudden changes of direction.

The way in which you describe the problems with the prior art influences the way in which the invention will be understood. If you identify problems in the prior art, the assumption is that your invention solves them all. Consequently, something which does not solve all the problems may be considered not to be covered by the claims of the patent application. So, make it clear if the invention only solves some of the problems. It is often better not to mention problems which remain unsolved. If you reduce a problem but don't (always) eliminate it, make this clear.

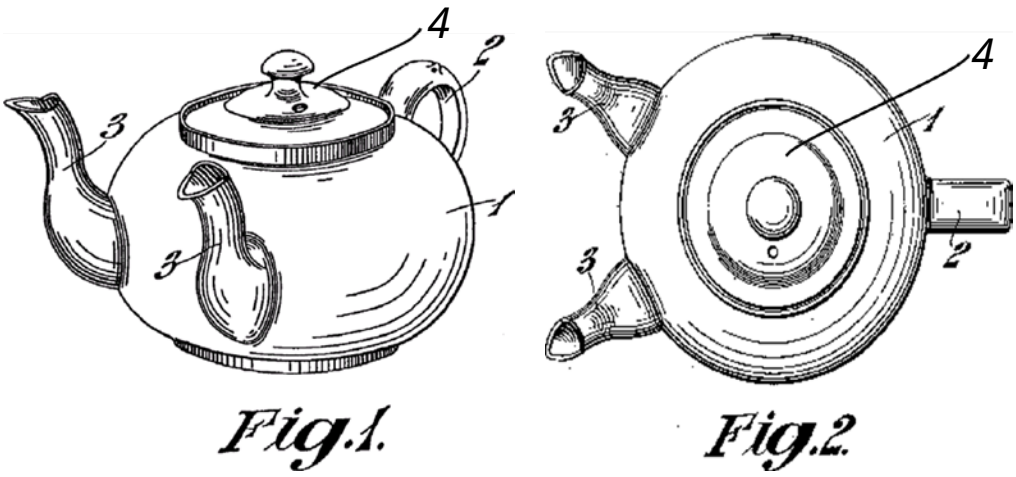


Fig.1. Fig.2.

Question 1.
Before starting drafting of a specification, let's refresh our memory about the invention of Exercise 2 in Chapter 2. Please complete the following parts of the description with one sentence maximum.

- Title
- Prior art discussion
- Drawback of the prior art
- Problem to solve
- Solution
- Advantage of the invention

Question 2.
Now draft the complete specification using the claims as set forth below, which is in accordance with section 2.2:

1. A vessel for dispensing a liquid comprising a hollow body (1) adapted to be filled with a liquid and means (3) for discharging the liquid, characterized in that the means for discharging the liquid consists of a plurality of spouts (3).

2. The vessel according to claim 1, wherein the vessel has two spouts (3).

3. The vessel according to claim 2, wherein the hollow body (1) of the vessel is provided with a handle (2) and the two spouts (3) are attached to the hollow body (1) on the side opposite to the handle (2).

4. The vessel according to claim 2 or 3, wherein the spouts (3) are at a distance allowing to fill simultaneously two cups placed next to each other on a support surface.

5. The vessel according to any of the preceding claims wherein the vessel is suitable to serve tea.

The full specification should contain the following parts:

- Title
- Technical field
- Background art
- Summary of invention or Disclosure of invention
- Brief description of the drawings
- Description of embodiments or Mode(s) for carrying out the invention
- Claims
- Drawings
- Abstract

Review the drafted specification

When you have finished your complete description, claims, drawings, abstract, etc., review them, particularly with reference to the texts of the claims.

Although this is not an exhaustive list, you should check the following points:

- Are all the features mentioned in the claims also present in the description?
- Have you explained how the embodiments or elements of the invention interact or can be used together?
- Does the detailed description of the invention explain the different embodiments?
- Do you make use of the figures and the reference numbers of the figures?
- Do you use consistent terminology throughout the claims and the description?

Tips

- Don’t give the advantages and solution brought by your invention too early, for example in the title or in the background art discussion. We have to keep the suspense.
- Don’t refer to the drawings of your invention and the reference numbers on these drawings before you reach the section “brief description of the figures.”
- If you are not sure whether technology X is already prior art or not, it is prudent to avoid including statements relating to technology X in the “background art” section.

4 Amending patent specifications

This chapter involves practical exercises on responding to an *official office* action from a patent office and applies the principles and techniques discussed in Module IX of the WIPO Patent Drafting Manual.

Office actions are issued during examination of a patent application and often set out objections from a patent office. They can be formulated on a variety of grounds, such as lack of novelty, lack of inventive step, lack of clarity, etc.

The objections that might be raised during examination depend on the national patent laws of the country which is examining the application.

The overall task for each exercise is to prepare a response to the office action. This may include amended application documents (such as an amended claim set, amended description and/or amended figures), together with a cover letter explaining the amendments made and commenting on the objections raised.

In the event that objections are raised against claims, it may be necessary to make amendments to address these. Amendments may be clarifying, e.g., to address typographical objections, or may involve amending the scope of the claims to overcome prior art objections. In some jurisdictions (for example, Europe) it is customary to use the “tracked changes” feature in word processing programs to show the amendments made, typically a marked-up version (with tracked changes shown).

This chapter will build on the exercises in Chapters 2 and 3. In particular, we set a hypothetical situation where the patent applications prepared from these exercises (i.e., referring to the model answers) undergo examination by a patent office and objections are raised against these.

Suitable response letters can take any suitable format. A letter would generally begin with a reference to the patent application under prosecution and the office action that has been issued, such as:

Over letter

This is in response to the Office Action issued on patent application no.1234567.1.
If any amendments are made in the response, the cover letter should then go on to explain these. Suitable passages to explain the amendments might take the following format:

Amendments

Please cancel the current claims in favor of the enclosed replacement claims, which are provided in both "marked-up" and "clean" format. In the marked-up format enclosure, text for deletion is stricken through (e.g. ~~text~~) and newly added text is underlined. (e.g. text).

Claim 1 has been amended to add...
Claim 2 has been amended to specify...
Claim 3 has been amended to replace...
(Repeat for all amendments made.)

The cover letter should then address each of the objections raised by the examiner. Again, there is no single correct way of doing this and the content here will vary depending on the nature of the objections raised.

4.1 Exercise 1: Staple remover (continued)

The first exercise is based on Exercise 1 from Chapters 2 and 3. For the purpose of this exercise, please assume that the claim set filed at the patent office for this Office Action is as follows:

Claims

1. A tool for removing fasteners, the tool comprising:

   - a pair of jaws,
   - a tooth on each jaw, the tooth of one jaw opposing the tooth of the other jaw,
   - wherein jaws are pivotable relative to one another between a first position in which the teeth are brought together and a second position in which the teeth are apart.

2. The tool as claimed in claim 1, further comprising a locking pin for releasably locking the pair of jaws in the first position.

3. The tool as claimed in claim 1 or claim 2, wherein the teeth comprise metal.

4. The tool according to any preceding claim, wherein the tool is biased away from one another.

5. The tool according to claim 4, wherein the bias is provided by a spring.

6. The tool according to claim 5, wherein the spring is a torsion spring.

7. The tool according to claim 5 or 6, wherein the spring comprises chrome-plated steel.

8. The tool according to any preceding claim, wherein one or both jaws are provided with gripping members.

9. The tool according to any preceding claim, wherein the or each gripping member comprises plastic.

10. The tool according to any preceding claim, further comprising teeth of steel (optionally stainless steel).

11. The tool according to any preceding claim, wherein the teeth comprise stainless steel.

A hypothetical office action received from a patent office is provided below.

Office action

Patent application no.1234567.1

Examination of the above-identified application has revealed that it does not meet the requirements of patentability for the reasons set out below. If the deficiencies indicated are not rectified, then the application may be refused.

You are invited to file your observations and, insofar as the deficiencies are rectifiable, to correct the deficiencies within a period of:

4 months from the date of this communication.

If filing amendments, you must identify them and indicate the basis for them in the application as filed.

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn.

The following document is cited herein, which forms the basis of certain objections set out below:

D1: 'Stationery Supplies Weekly': 7 January 2019 edition (a copy of which is annexed to the present Office Action).

Clarity

- The claims are not numbered sequentially. Renumbering is requested.
- It is unclear from claim 4 what the phrase "the tool is biased away from one another" is intended to mean. Clarification is requested. It is suggested that wording reflecting the parts of the tool that are biased away from one another be used instead. For example, claim 1 defines that the jaws are pivotable relative to one another and it is understood that the bias applies to these jaws.
- The claim numbered 8 is dependent on "any preceding claim" and specifies that "the or each gripping member comprises plastic" (emphasis added). This claim lacks antecedent basis when dependent on any claim other claim than the claim numbered 7. It is suggested that the dependency of this claim be amended to refer to this claim only.
- The wording of claim 9 is unclear. It implies that the tool comprises additional teeth beyond those set out in claim 1 and that these are comprised of steel. Rewording of this claim is requested. It is suggested to replace the term "further comprising" with alternative wording.

Novelty and inventive step

- The tool defined in claim 1 is not novel having regard to the disclosure in prior art document D1. In particular, D1 discloses a tool for removing fasteners, comprising a pair of jaws, a tooth on each jaw, the tooth of one jaw opposing the tooth of the other jaw, wherein jaws are pivotable relative to one another between a first position in which the teeth are brought together and a second position in which the teeth are apart.

Thus, D1 discloses all features of claim 1. D1 also appears to disclose features of dependent claims numbered 2, 3 and 7 to 10 set out in the application as originally filed.

Since the tool of claim 1 is not novel, there cannot be an inventive step either.

Annex

Stationery Supplies Weekly: 7 January 2019 edition

BREAKING NEWS: Staples getting you down? Don't worry! New tool has the answer!

With sharp teeth and a hinged mechanism, this new tool promises fast removal of staples from even the most complicated documents. Our design uses a unique construction with sharp teeth to grip and remove unwanted staples easily. Simply squeeze the teeth together to clasp a staple between the teeth and then pull on the staple to remove. The staple can be released from the tool by pulling the teeth apart again after removal.

With a beautiful chrome-plated steel design, this tool will look great on your desk, in your pencil case or even on your mantlepiece!

Prepare a response to the objections raised in this office action. Here, it should be noted that there is a feature in the claims of the application that is not disclosed in the document cited in the office action. A correct response involves spotting this feature and limiting the claims of the application (by way of amendment) to incorporate this feature into claim 1.
The response should include an amended claim set and a cover letter to the patent office explaining any amendments made and commenting on the objections raised. An amended description is not required.

4.2 Exercise 2: Tea pot (continued)

This exercise is a continuation of Exercise 2 in Chapters 2 and 3.

For the purpose of this exercise, let's assume that a patent application on the "Improvements in or relating to vessels for dispensing a liquid" was filed with a patent office. The whole specification of this patent application No. 765432.1 is reproduced in Annex I, below.

After some time, the applicant has received the following (hypothetical) office action from the patent office (see Annex II, below).

Amend the current set of claims to overcome the novelty and inventive step objections set forth by the examiner. At the same time also amend the description.

Tip 1

To anticipate an invention (or to destroy novelty), each feature (element) of the claimed invention should be generally disclosed in one single reference.

In case you can restore novelty of new amended claim 1, it is also requested to argue on the inventive step so as to proceed to the grant of the patent at the same time to avoid receiving further office actions.

In analyzing conformity with the inventive step requirement, a “problem-solution” approach may be used. There are three main stages:

determining the “closest prior art”;

establishing the “objective technical problem” to be solved; and

considering whether or not the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to a skilled person.

The closest prior art is a single reference which constitutes the most promising starting point for a development leading to the invention. In selecting the closest prior art, the first consideration is that it must be directed to a similar purpose or effect as the invention or at least belong to the same or a closely related technical field as the claimed invention. In practice, the closest prior art is generally that which corresponds to a similar use and requires the minimum of structural and functional modifications to arrive at the claimed invention.

If you find it appropriate, you may use a table of features so as to distinguish the invention from the cited prior art.

Tip 2

In principle, a patent application may not be amended in such a way that it contains subject matter which extends beyond the content of the application as filed. The underlying idea is that an applicant should not be allowed to improve his position by adding subject matter not disclosed in the application as filed, which would give him an unwarranted advantage of obtaining a patent on the idea that was not in his/her mind as of the filing date, and could be damaging to the legal security of third parties relying on the content of the original application. Thus, it is important to review the description of the application as filed to check whether there is a support for the amendments.

Annex I

Patent Application No. 765432.1

Improvements in or relating to vessels for dispensing a liquid

Technical field:
The invention consists broadly of a vessel for dispensing a liquid such as a tea pot or the like comprising a single pot or container or hollow body and a plurality of spouts.

Background art:
A teapot with one spout is known but it is time consuming to pour several cups. To solve this problem it is possible to use two hands to hold two teapots but this would require having a second teapot but also to be skillful enough with both hands. Another possibility would be to ask someone to help you but you would probably need to pay for this assistance.
Thus, there is still a need to pour several cups at the same time with a single tea pot.

Summary of invention:
The present invention relates to a vessel for dispensing a liquid such as a tea pot or like portable pouring vessel and has for its primary object the provision of an improved vessel or the like whereby the liquid may be poured out into cups with reduced time compared to a conventional tea pot or the like.

It is one object of the invention to provide a vessel for dispensing a liquid comprising a hollow body adapted to be filled with a liquid and means for discharging the liquid, wherein the means for discharging the liquid consists of a plurality of spouts from which the contained liquid may be poured simultaneously.

The invention is therefore particularly useful in for example tea shops in which large numbers of cups of tea have to be served in a short time.

However, the invention may obviously be applied to other portable pouring vessels than tea pots.

Brief description of the drawings:
In order that the invention may be more clearly understood a vessel in accordance therewith will now be described, reference being made to the accompanying drawings.

Fig. 1 is a perspective view of a vessel according to the invention. Figure 1 illustrates a vessel (1) with a handle (2) and two spouts (3).

Fig. 2 is a plan of the same.

Description of embodiments:
It is one object of the invention to provide a vessel for dispensing a liquid comprising a hollow body (1) adapted to be filled with a liquid and means (3) for discharging the liquid, wherein the means for discharging the liquid consists of a plurality of spouts (3).

Preferably, the vessel has two spouts (3).

According to the embodiment of the invention, the body (1) of the vessel is provided with a handle (2) and the two spouts (3) are attached to the hollow body (1) on the side opposite to the handle (2).

According to the invention, the spouts (3) are at a distance allowing to fill simultaneously two cups placed next to each other on a support surface.

In a preferred embodiment of the invention, the vessel is suitable to serve tea.

Referring to the drawings (Figures 1 and 2) said vessel comprises a single individual pot or container or hollow body (1) of usual rotund form and a single handle (2) for lifting and operating the same. Symmetrically on each side of the point diametrically opposite to said handle (2) and disposed radially with respect to the vertical center line of the hollow body (1) are two spouts (3) at such a distance apart that tea or liquid may be conveniently poured from said spouts into two cups simultaneously.

In accordance with the invention, the vessel comprises a single undivided pot or container or hollow body (1) of usual rotund form and a single handle for lifting and operating the same. Symmetrically on each side of the point diametrically opposite to said handle and disposed radially with respect to the vertical center line of the hollow body (1) are a plurality of spouts preferably two spouts at such a distance apart that liquid such as tea may be conveniently poured from said spouts into two cups simultaneously.

The invention may obviously be applied to other portable pouring vessels than tea pots.

Claims:
A vessel for dispensing a liquid comprising a hollow body (1) adapted to be filled with a liquid and means (3) for discharging the liquid, characterized in that the means for discharging the liquid consists of a plurality of spouts (3).

The vessel according to claim 1, wherein the vessel has two spouts (3).

The vessel according to claim 2, wherein the hollow body (1) of the vessel is provided with a handle (2) and the two spouts (3) are attached to the hollow body (1) on the side opposite to the handle (2).

The vessel according to claim 2 or 3, wherein the spouts (3) are at a distance allowing to fill simultaneously two cups placed next to each other on a support surface.

The vessel according to any of the preceding claims wherein the vessel is suitable to serve tea.

Drawings:

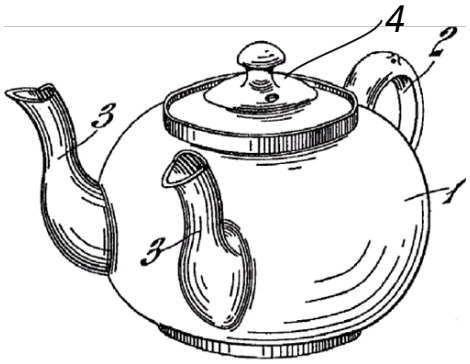


Fig.1.

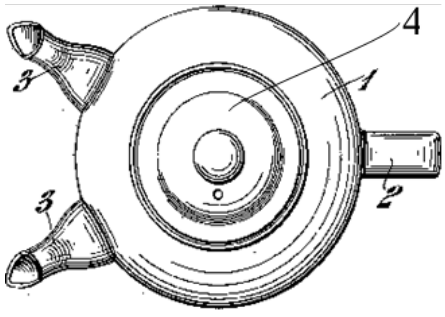


Fig.2.

Abstract:
The invention consists broadly of a vessel for dispensing a liquid such as a tea pot or the like comprising a single pot or container or hollow body and a plurality of spouts.

Annex II

Office Action
The examination of the above-identified application has revealed that it does not meet the legal requirements for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period of **4 months** from the notification of this communication.

One set of amendments to the description, claims and drawings is to be filed within the said period on separate sheets. If filing amendments, you must identify them and indicate the basis for them in the application as filed.

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn.

The following documents are cited by the examiner. A copy of the documents is attached to the communication and the numbering will be adhered to in the rest of the procedure.

D1: Double Spout and Bridge Bottle, Date: 7th–5th century BC, Peru, Culture Paracas
https://www.metmuseum.org/art/collection/search/307622

D2: WEDCO Two-in-One Mix Gas/Bar Oil Container
https://www.homestead.com/~site/ecomm/page/Firewood-Cutting-Supply's/Wedco-FuelOil-Containers/44683?&hsid=1756835154&mode=fb

Novelty and inventive step
The features of claim 1 are already fully anticipated by the disclosure of document D1 and document D2.

Both documents D1 and D2 disclose a vessel for dispensing a liquid comprising a hollow body adapted to be filled with a liquid and means for discharging the liquid. The means for discharging the liquid in D1 and D2 consist of two spouts which is comprised within the definition of a plurality of spouts according to claim 1 and defines the scope of current claim 2.

Dependent claims do not appear to contain any additional features which, in combination with the features of any claim to which it refers, meet the requirements of the novelty and inventive step.

Therefore, the subject matter of claims 1–5 is not new.

Conclusions
It is not at present apparent which part of the application could serve as a basis for a new, allowable claim. Should the applicant nevertheless regard some particular matter as patentable, an amended independent claim should be filed. When filing amended claims, the applicant should take into consideration documents of the state of the art. The applicant should also indicate how the subject matter of the new claim differs from the state of the art and the significance thereof.

In order to facilitate the examination of the conformity of the amended claims with the requirements, the applicant is requested to clearly identify the amendments carried out, irrespective of whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based.

Documents of the state of the art should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

Prior art documents cited by the examiner

D1:
Double Spout and Bridge Bottle, Date: 7th–5th century BC, Peru, Culture Paracas

A thick application of mustard-yellow paint on the body of this double spout and bridge vessel provides a vivid backdrop for the red and green geometric and figural designs.

Displayed parallel to the bridge of the vessel, two stylized birds extend lengthwise on either side of the vessel. The figures may represent an abstract raptor. The birds' bodies are formally segmented with stamped circles and incised stripes with alternating red and green colors. Below the birds is a band of bracketed concentric-squares punctuated by a single concentric-diamond.

Informal registers of figural and geometric decorations are often-used techniques in Paracas art. This vessel is from the Paracas culture of the south coast of Peru and dates between the 7th and 5th century BC. Paracas affinity for symmetry and curvilinear forms is also apparent in their sophisticated textiles, as seen in textile fragments in the MMA collection, such as 33.149.24, which features similar stylized depictions of fauna to the double spout and bridge vessel. Both art forms share iconography and coloration and were likely fundamental to Paracas ideology.

At the base of each stirrup spout, alternating red and black circles were reed-stamped. The burnished brown paint on the bridge and spouts of the vessel highlights their delicate quality. The double spout and bridge vessel form endured regionally on the south coast of Peru from the Paracas tradition through successive Andean cultures until European contact in the 16th century.

This type of spouted vessel may have been intended to hold liquids. The vessel's form and elaborate decoration implies it was a special vessel, likely used in ceremonies and not for everyday use. Many Paracas double-spouted vessels of this type feature an internal construction that produces whistling sounds when liquids are poured.

The vessel body was shaped by hand, using a coiling technique to form the body's shape. The body structure was then refined using a paddle-and-anvil. The bridge and spouts were shaped separately and later added to the body of the vessel. The bridge and spouts were hand-modeled or perhaps molded with tools such as small bones, perhaps a bird's long bone. The vessel's birds and geometric shapes were incised prior to firing, and colored paint was added afterwards. The Paracas tradition is well known for this technique called "post-fired painting." The method involved an amalgam of ground mineral pigments mixed with a plant-resin binder to adhere the mineral pigments to the vessel. Although the Paracas potters also produced slip or pre-fired painted vessels, it is the post-fired painting technique that represents some of their most dynamic designs.

Paracas culture came to regional prominence during the 1st millennium BC. It was first documented archaeologically in 1925 by Julio Tello and Xesspe Mejia who carried out

archaeological excavations at the Necropolis of Wari Kayan, located on the arid Paracas peninsula that juts into the Pacific, south of present-day Lima. Tello and Mejia excavated over 400 mummy bundles which were interred over the course of several hundred years. Commonly referred to as a "mummy bundle," the deceased individual's body was placed sitting upright, in large baskets, along with funerary goods such as ceramics and jewelry. These baskets and individuals were then wrapped in multiple layers of richly decorated garments and textiles, sometimes numbering in the hundreds. The sack-like configuration of the mummy bundle was then interred in a shallow grave in the barren, desert landscape of the Paracas Peninsula. This double spout and bridge vessel was likely part of one such assemblage.

D2:
WEDCO Two-in-One Mix Gas/Bar Oil Container

Wedco 2-in-1 Gas/Bar Oil Container

Made of high-density polyethylene for unlimited uses. Store two-cycle gas/oil mix in one side and chain bar oil in other side. Spouts meet CARB compliant standards and are child-resistant. UL® classified, MA Fire Marshal approved, and C.S.A. approved. 1-1/2 Gallons (2-1/2 quarts).

The manufacturer of the two-compartment fuel/oil container stocked by the National Interagency Support Caches has developed a new version that conforms to the new regulations. According to the company, this container should be available during 2009. The container will be marketed under the Wedco trade names. The manufacturer's part number is 85310.

4.3 Exercise 3: Dimple key (continued)

In this exercise, we will revisit the dimple key of Chapter 2. A set of device claims as shown below were submitted to a patent office as part of a full patent application.

A device comprising:
an elongated bar;
a plurality of dimples disposed on a face of the elongated bar and arranged to be complementary to a set of pins in a lock; and
a finger grip attached to a proximal end of the elongated bar.

The device of claim 1, wherein the elongated bar is made of metal.

The device of claim 1, wherein the elongated bar comprises beveled corners at a distal end.

The device of claim 1, wherein the plurality of dimples are aligned linearly in one or more rows, but spaced randomly, along the length of the elongated bar.

The device of claim 1, wherein the plurality of dimples are aligned linearly in at least two rows along the length of the elongated bar.

The device of claim 1, wherein the dimples are of varying depth and width.
The device of claim 1, wherein the plurality of dimples are arranged in a pre-determined pattern, and wherein the device further comprises a second plurality of dimples arranged in the pre-determined pattern along a second face of the elongated bar.

The device of claim 1, wherein the elongated bar is made of metal, and wherein the plurality of dimples are aligned linearly in rows, but spaced randomly, along the length of the elongated bar.

The device of claim 1, wherein: the plurality of dimples are aligned linearly in one or more rows, but spaced randomly, along the length of the elongated bar; the plurality of dimples are arranged in a pre-determined pattern; and the device further comprises a second plurality of dimples arranged in the pre-determined pattern along a second face of the elongated bar.

The device of claim 1, wherein each dimple in the plurality of dimples is positioned to align with a corresponding pin from the set of pins in the lock, such that, when the elongated bar is at least partially inserted in the lock, the plurality of dimples align with the set of pins in the lock and shift each pin horizontally to align the pins and enable rotational movement within the lock.

The patent office conducts an examination and returns an office action, as set forth below.

#1 Claims 1–4, 6, and 8 are rejected for obviousness over US 2,266,163 (Ching, cited by applicant). The key in Ching comprises ridges along an edge of the key, and the ridges correspond to the length of pins in a lock. According to the examiner in the office action, the person of ordinary skill in the art would have learned of this device and found it obvious to put such ridges onto a face of the key rather than an edge. In doing so, the ridges would have necessarily become dimples.

#2 Claims 7 and 9 are rejected for obviousness over Ching and further in view of US 3,264,852 (Gysin). The disclosure of Gysin, particularly Fig. 1, shows a key with shaped ridges on two edges. The specification of Gysin, in column 2, lines 5–16, describe a second set of grooves on a reverse face of the key. The symmetry of the key is such that the key will fit a set of pins when inserted into a lock in either of two orientations.

#3 Claim 10 is rejected for failing to further limit the claim from which it depends.

#4 Claim 6 is rejected for lack of clarity or lack of antecedent basis: it is unclear whether the "dimples" referenced in the claim are the same as the "plurality of dimples" in claim 1.

A copy of US 2,266,163 and US 3,264,852 can be searched on the internet at the USPTO website, https://ppubs.uspto.gov/pubwebapp/static/pages/landing.htmlr Google Patents https://patents.google.com/.

In relation to the issues raised by the examiner, the specification as filed contains the following paragraphs:

Specification, paragraph [0036] et seq.

[0036] The dimple key of the instant specification has a number of features and advantages over prior lock and key combinations. In one embodiment, the numerous dimples of a single dimple key can be varied in diameter. This allows the pins of the corresponding lock to also be varied in diameter, thereby increasing the number of permutations and the complexity of the key/lock combination. Each dimple diameter can be individually selected from a value in the range of 0.5 – 2 mm, or individually selected from the following values: 0.5, 0.75, 1, 1.25, 1.5, 1.75, and 2 mm.

[0037] Furthermore, in an embodiment, the two faces of a dimple key are not symmetrical, such that the dimple pattern on one face is distinct from the dimple pattern on the opposite face of the same key. In this embodiment, the key must be inserted in a specific orientation, but the number of permutations (and therefore the security of the key) is greatly increased.

[0038] Furthermore, it is well known among practitioners that the wider face of an elongated bar is easier to manipulate and shape compared with the narrower edge of an elongated bar. The devices

of the current invention make use of this by providing dimples on the faces of the elongated bar and keeping the edges of the elongated bar unshaped/unmodified.
[0039] Finally, it is also well known among practitioners that traditional edge-shaped keys are formed with a rotating drum that cuts into the metal edge to form ridges. This method is not capable of adaptation for modifying the face of the key (as opposed to the edge), since the rotating drum has a large width that would not be capable of finely shaping the face of the key.

In view of the above claims and selected paragraphs from the specification as well as the rejections set forth by the patent examiner, draft a response to the office action, including arguments and/or claim amendments as appropriate.

Tips

How to overcome obviousness rejection

Option 1: Incorporate the limitations found in the dependent claim(s) to the independent claim.

Just to prevent an obviousness rejection, this option is highly effective. However, since the scope of patent protection gets narrower, the applicant needs to consider whether pursuing the narrower claims is still worthwhile for his/her business. For example, what will be the benefits for you to exploit such narrower patent, if granted? In this exercise, the drafter should notice that claims 5 and 7 are not included in Rejection #1.

Option 2: Find a limitation that is not in the claims as filed, but is in the description as filed.

In principle, an amendment of a patent application shall not go beyond the disclosure in the application as filed. In other words, an application may not be amended in such a way that it contains subject matter that extends the content of the application as filed. In practice, patent offices in various countries may apply this principle in a different way. This option requires careful scrutiny of the specification in view of cited prior art and national practice on amendment of claims.

Option 3: Demonstrate non-obviousness of the claimed invention without any amendment to the claims.

Arguments that support non-obviousness of the claimed invention may be made in various ways. For example, one might argue about the characterization of a person skilled in the art, and demonstrate that a true person skilled in the art would not have found the claimed invention obvious. You might also show evidence that support inventive step of your invention, for example, by demonstrating that prior art “teaches away” the solution of the claimed invention. In addition, your argument might address the technical reasoning made by the examiner or his/her application of law.

4.4 Exercise 4: Computer system for organization of medical records

In some cases, an office action might state that the claimed invention is not patentable, because it does not fall within the patentable subject matter. In general, this question may be raised more frequently, if not exclusively, in the fields of biotechnology and software-implemented inventions. Rejections for non-patentable subject matter do not typically involve prior art, but are some of the more difficult rejections to overcome. The definition of "inventions" under the applicable patent law and which subject matter is excluded from patentable inventions are different from one country to another. Therefore, it may happen that a claimed invention is considered patentable in one country, while the same claimed invention is regarded as non-patentable subject matter in another country. Continuous and rapid technological developments in those technical fields also challenge patent drafters.

This exercise relates to a computer system that stores packages of icons at different resolutions, and executes a program that selects the resolution of an icon based on the operating system that is in use by the computer system. The patent specification indicates that the invention can be useful, for example, where a computer application such as a mobile phone application may be deployed on a variety of different operating systems, and the application must be compatible with each of the different operating systems.

The specification of the application includes long descriptions of the icons, the various resolutions and the need for compatibility with differing resolutions, and the method by which the computer system selects a resolution according to the invention. A relevant portion of the specification is as follows:

One aspect of the embodiments described herein relate to a computer system in which icons can be displayed on an output device associated with the computer system. These icons can be images that are created in a set of different resolutions such as "N" different resolutions (e.g., N=3 means three different resolutions) for a particular image. For example, a particular icon can have in one embodiment three different versions of the same image, but each being for use on devices with different screen resolutions. For example, a particular icon can have a high definition (high resolution) version, a medium resolution version, and a low resolution version. In addition to the image, an icon may further comprise identifying data such as an image name and an image file size, along with other information as needed. In one embodiment, these icons or icon images can be uploaded and then grouped in different packages which can contain different icon images, but all having the same resolution for use on a device with a particular screen resolution. For example, a package of icons, each configured for use on the particular screen resolution, can be created and placed on one or more servers to allow downloading of the package for a device that has the corresponding screen resolution. Once downloaded by the user of that device, the user can select an icon from the package, or the device can select an icon from the package and display it on the screen.

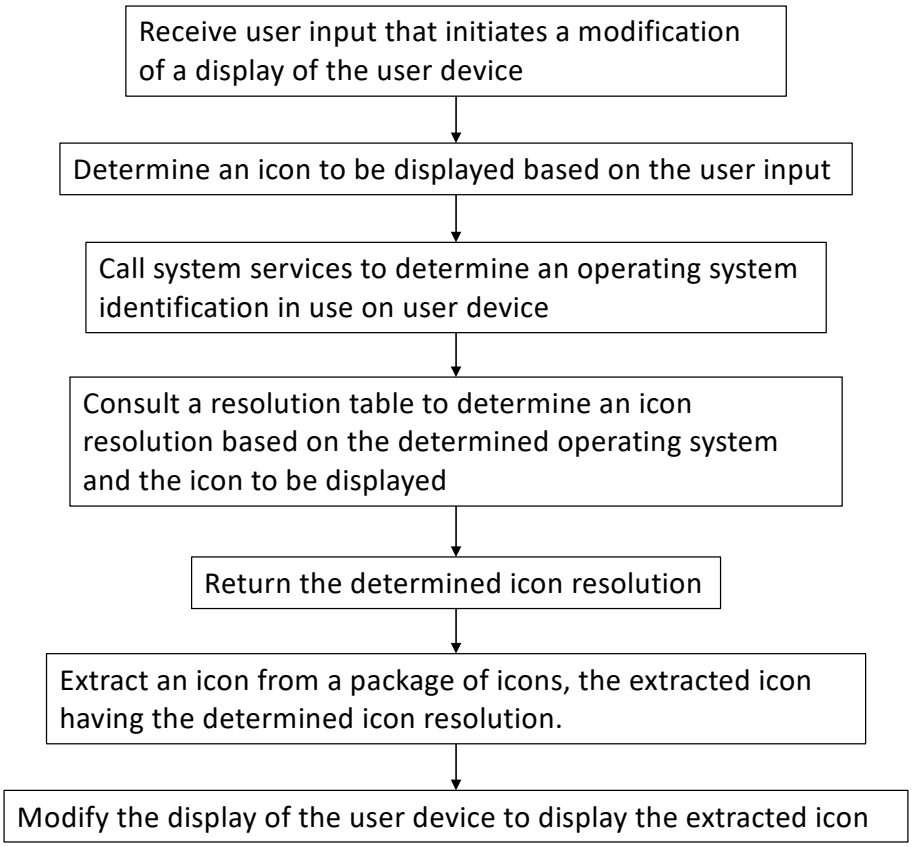
In embodiments, the icons can be shareable, such that a user can share icons or icon images from one device with another device having the same or different screen resolution. Sharing icons from one device to another may involve sending a message with the icon as an attachment or other file transfer method. The message sent in one embodiment does not include an image file for the icon but rather includes an identifier, such as a universally unique identifier of the particular icon. In one embodiment, the receiving device can use the identifier to determine whether the receiving device has the icon in a local cache for its screen resolution. If it does not, then the receiving device can obtain the icon in one embodiment by purchasing the package or by obtaining the icon through the use of an authorization token which can be provided by the sending device, wherein the authorization token can be used by the receiving device to retrieve the icon for its resolution. After receiving the icon, the receiving device can display the icon and request instructions from the user, such as whether to keep the icon or discard it.

A method according to one embodiment described herein can include the following operations:

- receiving a plurality of icons, wherein for each image in the plurality of icons there are a plurality of versions of the image for use with different screen resolutions;
- creating a plurality of packages in a memory, each of the packages containing icons of one of the different screen resolutions;
- receiving a first request from a first device for a set of icons, the first request specifying a screen resolution of the first device; and
- sending, in response to the first request, one of the packages that is for use with the screen resolution of the first device.

In one embodiment, one of the versions of the plurality of versions is a high resolution version for use on a high resolution screen and another version of the plurality of versions is a low resolution version for use on a low resolution screen. In one embodiment, each of the packages contains icons of only one of the different screen resolutions. In one embodiment, the method can be performed by one or more servers in a service that provides icons which can be downloaded from the service. In one embodiment, the plurality of icons can be received from a developer of icons or a graphic artist. In one embodiment, the first request is from a first device that is configured to communicate with other devices through one or more messaging servers. In one embodiment, the first request specifies the screen resolution of the first device either implicitly or explicitly. In one embodiment, the first request can implicitly specify the screen resolution by specifying a set of model and manufacturer identifiers or a set of one or more traits known by the one or more servers that implicitly specify the screen resolution of the first device. In one embodiment, each package can include a metadata file that contains icon identifiers, one for each icon in the package.

The specification further contains the following flowchart as a figure, with appropriate explanations in the text of the specification:



Assume that claims 1–6 in a patent application read as follows:

1. A non-transitory machine readable medium storing executable program instructions which when executed by a data processing system cause the data processing system to perform a method comprising:

   – receiving a plurality of icons, wherein for each image in the plurality of icons there are a plurality of versions of the image for use with different operating systems;
   – creating a plurality of packages, each of the packages containing icons for one of the different operating systems;
   – receiving a first request from a first device for a set of icons, the first request specifying an operating system of the first device;
   – sending, in response to the first request, one of the packages that is for use with the operating system of the first device.

2. The medium as in claim 1 wherein one of the versions of the plurality of versions is a high resolution version for use on a first operating system and another version of the plurality of versions is a low resolution version for use on a second operating system and wherein each of the packages contain icons for only one of the different operating systems.

3. The medium as in claim 1 wherein the method is performed by one or more servers in a service that provides one or more catalogs of icons and wherein the plurality of icons are received from a developer of icons or a graphic artist.

4. The medium as in claim 1 wherein the first request specifies an operating system either implicitly or explicitly.

5. The medium as in claim 4 wherein the first request implicitly specifies the operating system by specifying a set of model and manufacturer identifiers.

6. The medium as in claim 5 wherein each package includes a metadata file that contains icon identifiers, one for each icon in the package.

The claims are examined, and an office action is issued with the following four (paraphrased) rejections:

(1) Claim 1 is rejected as obvious in view of a US Patent Application XXXXX that contains the following disclosure:

In an embodiment, the invention includes a system comprising: at least one processor; and a memory storing instructions that, when executed by the at least one processor, cause the system to perform: storing a set of image portions that forms an image formatted for a specific operating system; acquiring a request from a client device for the image, the request including information about one or more properties associated with the client device; selecting a subset of image portions out of the set of image portions based on the one or more properties associated with the client device; and transmitting the subset of image portions to the client device in response to the request.

(2) Claim 1 is rejected for lack of clarity and/or antecedent basis. The phrase “each image in the plurality of icons” is not clear or lacks antecedent basis.
(3) Claim 1 is rejected for lack of clarity, as it is unclear the nexus between “creating a plurality of packages” and “sending… one of the packages.” Although a package is “created,” such creation is digital and there is no indication that such digitally created package remains available for later “sending.”
(4) Claims 1–6 are rejected for lacking patentable subject matter. In particular, the claims are directed to an abstract idea implemented in the circuitry of a computer.

In view of the above claims and the rejections set forth by the patent examiner, draft a response to the office action, including arguments and/or claim amendments as appropriate.

Tips: How to overcome non-patentable subject matter rejection

Overcoming a rejection based on non-patentable subject matter may take a variety of approaches.

First, the drafter can consider amending the claim to include a step with a tangible outcome/result. Such an amendment takes the claim from being entirely carried out within a computer to a claim that involves some physical and measurable output. For example, the invention of claim 1 above is suited for organization and management of medical records. Processing of medical records can be configured to produce tangible outcomes. Provided that those physical and measurable outputs are disclosed in the patent application as filed, incorporating them into the independent claim may overcome the rejection.

An alternative to introducing a tangible outcome is to demonstrate that the claimed invention alters and improves the way that a computer operates. By improving the efficiency of operation, or altering the way that data is manipulated, it may be possible to argue that the invention is neither abstract nor a series of mere mental operations.

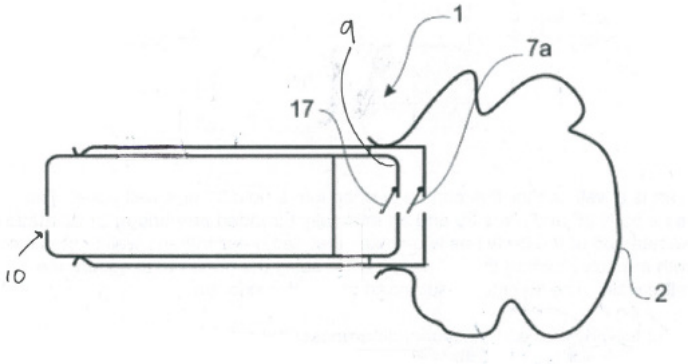
5 Patent drafting in certain technical fields

5.1 Mechanics

5.1.1 Exercise 1: Bag for storing food

This exercise is designed to make you think about variations in product design that may work as well, better or perhaps not so well compared to the preferred form of the product. It is important to work with the inventor when you are drafting claims to ensure that you know about as many variations in product design that are commercially and technically feasible. This will help ensure that your claims are broad enough to cover variations in product design that may otherwise allow a competing product into the market. Ask the inventor about earlier product designs that they trialed. Ask about how they performed, how well they performed and why they decided to change the product design.

A variation of the product of Exercise 7 in Chapter 2 (section 2.7) is shown below. It has the one-way valve (17) of the piston located at the opening at the end (9) of the cylinder. It works in the same way as the preferred form, is as cheap to make and as easy to use as the preferred form shown in Exercise 7.



The inventor has also tried a variation where the piston has no one-way valve at all. In this variation a person needs to hold their thumb over the opening (10) at the end of the piston to seal the opening when the piston is being extracted (moving left) from the cylinder and to release their thumb when the piston moves in the opposite direction. The thumb substitutes the one-way valve of the piston. This variation is not as easy to use but is cheaper to make because it does not need a second one-way valve. The inventor hence wants this variation covered also.

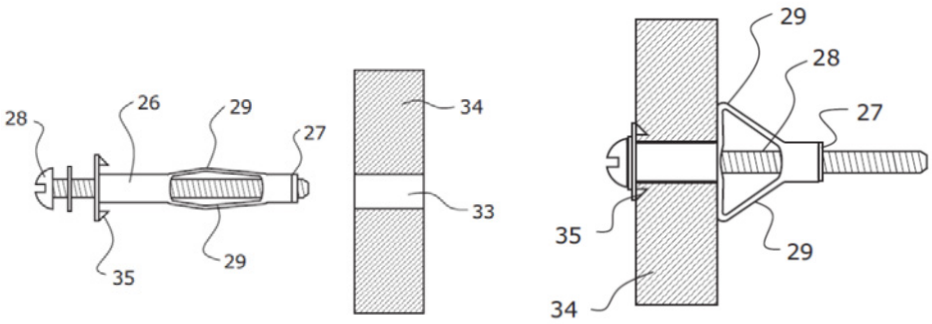
Revisit your claims of Exercise 7 to see if you need to broaden the independent claim(s) to cover these two variations.

See if you can think of other variations that may also work and that you can write your claims to, to cover such.

For example, do you need a cylinder and piston to displace air out of the bag via the valved opening (7)? Could a flexible volume cylinder that is biased to an expanded state by a compressible spring (like below) be made to work? Perhaps this is a feasible design-around solution for a competitor that should be covered by the claims. If you are not sure whether variations you think of could work, run them past the inventor for feedback. They are the technical expert.

5.1.2 Exercise 2: Picture-hanging hook

Just before filing the patent specification you have prepared for Exercise 6 in Chapter 2 (section 2.6) you find out about another piece of prior art. Here are its details.



This prior art is a wall anchor that can be pushed into a hole (33) or a wall panel. The anchor has a body (26) and arms (29) and an internally threaded arm bridge (27) all made of metal. The head (35) of the body has two spikes that can press into the wall to stop it co-rotating with the bolt (28) when the bolt is turned to splay the arms out to secure the anchor to the wall. The inventor is surprised to see this prior art.

Make a list of the physical and functional differences that still exist between the invention and this new prior art. Some of the differences appear in the other prior art (see Exercise 6) and may hence not be sufficiently inventive to limit the claims to.

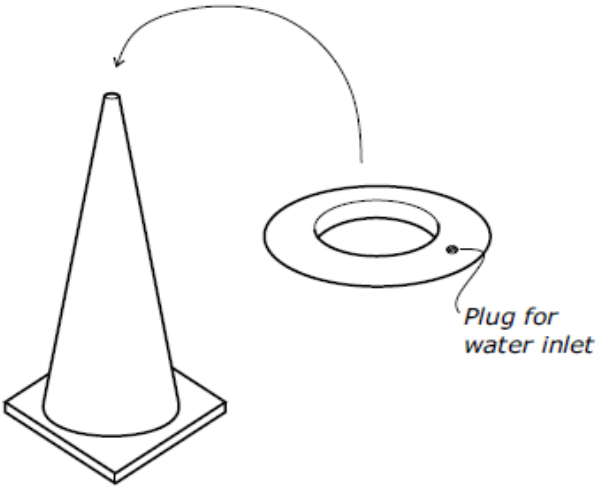
With this list you then discuss the difference with the inventor to identify the most important difference(s). The inventor tells you that her device is not reusable. Once the arms are bent they stay in that position. The inventor tells you that her invention allows the arms to fold back towards themselves once the bolt is removed and for the device to then come out of the wall. In Exercise 6, did you draft dependent claims to this aspect of the invention that you can now use to rewrite the broader independent claim(s)?

5.1.3 Exercise 3: Road cone

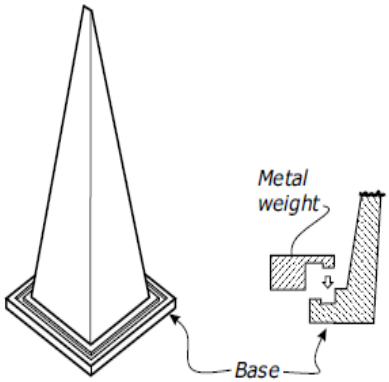
This exercise follows on from Exercise 9 in Chapter 2 (section 2.9).

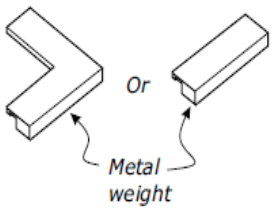
Two years after filing the PCT application and the launching of the anti-tip ring for road cones, the following occurs.

1. Your client designs a donut-shaped plastic container that can be filled with water. This can be dropped over the body onto the base of the cone. This is what it looks like:



2. A competitor has realized that the added weight can be placed just at one edge of their flat sided road markers to achieve the same benefit. The weight does not need to drop over the body and onto the base. The base of their road marker has a slot into which a lip of their weight can be dropped to locate with the marker. They start to sell a straight bar version and an L shaped version of their weight.





Redraft your claims of Exercise 9 (section 2.9) so that the independent claim(s) avoid this prior art and are novel and arguably inventive over all the listed prior art.

Do the claims you drafted in Exercise 9 cover these variations? Can you think of other variations?

Broaden your claims to cover these design-around variations but avoid the prior art. If your claims are already broad enough, then redraft your independent claims to cover the donut container variation on the assumption that all the other embodiments described are prior art. Could the donut-shaped water-filled container be made to be heavier at one side?

5.2 Chemistry

When drafting a patent specification in the field of chemistry, it is important to think about the categories of patent claim that are available and which of these are appropriate for defining the scope of protection sought. For example, you might consider:

- Molecules (including intermediates, if the invention relates to a synthetic method)
  For example: "A compound having formula $CH_3CHClCH_3$."

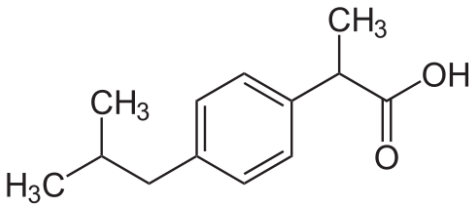
- Compositions of matter
  For example: "A composition, comprising a compound having formula $CH_3CHClCH_3$ and water."

- End-products or articles (e.g. a car, fabric, etc.)
  For example: "A fabric comprising fibers of polylactic acid."

- Apparatus, tool, device, etc.
  For example: "An apparatus, comprising a liquid reservoir and liquid conduits suitable for connecting the liquid reservoir to a source of liquid."

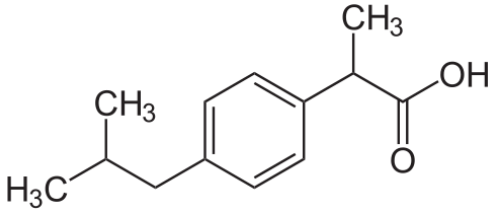
- Use of a physical entity in a particular manner
  For example: "The use of a compound having formula $CH_3CHClCH_3$ as a solvent."

- Medical uses (the use of a compound to treat a disease)
  For example: "A compound of formula:



  for use in providing pain relief."

- Methods of treatment
  For example: "A method of pain relief, comprising administering a compound of formula:



  to a patient in need thereof."

– Methods of diagnosis
  For example: "A method of diagnosing acne in a human patient, said method comprising:
  a. obtaining a skin culture from a human patient;
  b. detecting whether Propionibacterium acnes is present in the skin culture; and
  c. diagnosing the patient with acne when the presence of Propionibacterium acnes is detected in the skin culture";
  wherein said homogenizing is conducted at a temperature between 50 and 75°C."

– Methods of performing the steps of a process
  For example: "A method of producing a composition, the method comprising:
  a. mixing water, a surfactant and a compound having formula $CH_3CHClCH_2CH_2CH_3$; and
  b. homogenizing the mixture in a colloid mill."

The types of claim you include in your claim set will depend on the nature of the invention in question. It should be noted that certain types of claims, such as a method of treatment claim and a method of diagnosis claim, may not be accepted in some countries.

Set out below are six example exercises in the field of chemistry. These each comprise a brief explanation of an invention. The task in each instance is to prepare a full draft patent specification, including a description, claims and any figures, based on the brief explanation.

5.2.1 Exercise 1: Detergent

Considering the various categories of claims in the chemical field, draft at least four main claims (products, use and process) and several dependent or multiple-dependent claims for the invention described below. There should be no more than 10 claims.

A brief description of the technical features of the invention is as follows:

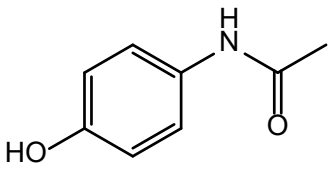
Your client informs you that he has found that compound X which is known to be an effective insecticide shows an excellent activity as a detergent. Further, when heated to a temperature of 150°C to 250°C for 15 minutes and subsequently cooled to room temperature, it can be used against skin burns. A new topical formulation has been developed. This formulation is preferably in the form of a cream, lotion, butter, solution and/or powder.

Compound X without this heating process has no such activity. Your client has tried to analyze the chemical structure of compound X after this heating process; however, he is not able to determine its structure. Therefore, this compound has been provisionally identified as Compound X1.

Note: The inventor believes that the invention is novel and inventive. You are not requested to conduct a prior art search.

5.2.2 Exercise 2: Paracetamol

I have devised an invention relating to a new form of paracetamol (which you may know as acetaminophen). The drug I have developed is particularly effective as an analgesic, with up to three times the pain relief!
The structure of paracetamol is shown below:



My studies have focused on substituting the hydroxyl moiety with other substituents in an effort to improve analgesic properties.

I have conducted a series of experiments and the results are set out below. As you will see, I have compared the properties of the novel compounds with the properties of paracetamol, taking the pain relief of paracetamol as having a reference value of 1 and higher values in the novel compounds indicating greater pain relief. Some of the novel compounds tested performed less well, but others achieved great results.

Expt. ID	OH subst.	Pain relief
Paracetamol	OH	1
P1	C(O)Me	0.94
P2	C(O)Et	0.81
P3	$C(O)C_3H_7$	0.71
P4	COOMe	0.72
P5	COOEt	1.6
P6	$COOC_3H_7$	1.5
P7	$COOC_4H_9$	1.3
P8	$COOCF_3$	0.8
P9	$COOCH_2CCl_3$	2.4
P10	$COOCH_2CF_3$	2.8
P11	$COOCH_2CH_2CF_3$	3

We intend to sell our products as a pharmaceutical composition including an excipient and a diluent. We're not interested in protecting compounds with lower pain relief properties than paracetamol.

5.2.3 Exercise 3: Hollandaise sauce

I am a chef and have recently developed a new sauce. The sauce is based on egg yolks, butter and lemon juice. Usually, this combination of ingredients does not combine well, but with my new technique, the ingredients come together to form a smooth emulsion.

From my own research, I understand that a component of the egg yolks, lecithin, is an emulsifier. I believe this stabilizes the water and oil ingredients in my recipe. My research tells me that lecithin is a collection of compounds, including phosphatidylcholine, phosphatidylethanolamine, phosphatidylinositol, phosphatidylserine and phosphatidic acid. I wonder whether other emulsifiers could be used, but I have not had an opportunity to experiment here, as yet.

Even with the egg yolks, work is required to form the sauce. I start by combining the ingredients together and then whisking them over a low heat until the ingredients combine to form the emulsion.

I have experimented with this technique extensively and know that the optimum temperature for forming the emulsion seems to be about 60 to 63°C. Beyond about 65°C, the mixture curdles. I understand this is through a mechanism known as flocculation, creaming and coalescence. I did manage to form an emulsion at 35°C, although this was very difficult.

The emulsion begins to form immediately after I start whisking. Whisking for at least two minutes is required to obtain a desirable sauce suitable for service to a customer, however. An acceptable sauce is formed at around 20 seconds, but it's not good enough to serve to any customer of mine!

Butter has been chosen as this gives the best flavor profile, but other fats or oils (aliphatic components) do give a similar emulsion.

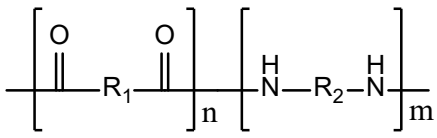
I am interested in making this sauce on a large-scale, so I have experimented with some industrial equipment as well. In a pressure vessel operating at over 125 kPa, I am able to obtain a sauce with a finer consistency. If I raise the pressure to between about 200 and 300 kPa, I get the best results.

The lemon juice provides the water (aqueous) component in the emulsion, as well as imparting an acidic flavor. In principle, simple tap water could be used instead if the flavoring was not required.

I often add salt, vinegar, white pepper and/or cayenne pepper, depending on the desired flavor. I believe this methodology has application beyond the culinary sciences and I am interested in protecting this as broadly as possible.

5.2.4 Exercise 4: Polymers

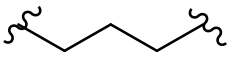
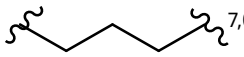
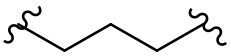
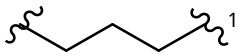
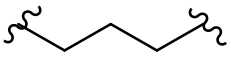
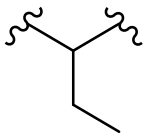
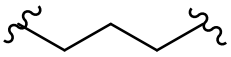
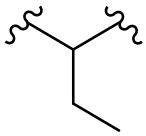
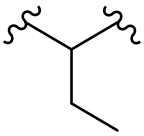
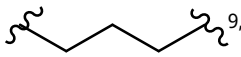
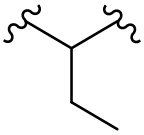
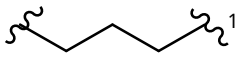
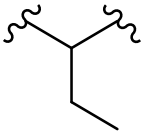
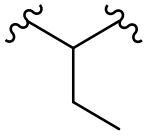
I have been developing new textiles for clothing applications. My research in this area has focused on textile elasticity, strength and resistance to shrinkage. I produced various textiles by varying the chemical composition of copolymers forming synthetic fibers that made up the textile. The general chemical structure is shown below.

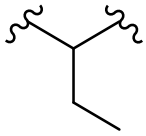
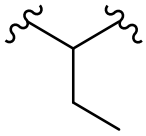


wherein:
R_1 is an alkyl moiety;
R_2 is an alkyl moiety;
n and m are integers greater than 0; and
n+m is greater than 100.

Spunbonding was conducted to yield fibers having a uniform thickness of 0.01 mm and circular cross-section. The textiles produced had a fiber density of about 100 fibers/mm^2. The textiles had a thickness of about 1 mm.

Textile properties:

R_1	R_2	MWt	Elasticity (N/mm^2)	Strength MPa	Shrinkage at 40°C wash cycle
		7,000	8,500	600	6%
		10,000	9,000	750	2%
		8,500	8,750	1,000	7%
		11,000	9,250	900	3%
		9,000	6,500	800	8%
		10,500	7,000	650	4%
		5,000	6,000	950	9%

R_1	R_2	MWt	Elasticity (N/mm²)	Strength MPa	Shrinkage at 40°C wash cycle
		10,000	6,750	1050	1%

Generally speaking, fibers having an elasticity of 6,000 to 10,000 N/mm², a strength of at least 500 MPa and which shrink by less than 10 percent when washed at a 40°C wash cycle, are considered to be suitable for textile formation for clothing purposes. Textiles with an elasticity of 7,500 to 8,500 N/mm², a strength of at least 850 and which shrink by less than 5 percent when washed at a 40°C wash cycle, are considered to be optimal.

The molecular weights are "number averages." I measured these with the standard methodology set out in ISO 16014-2. Elasticity was measured in accordance with ASTM E111 – 17. Tensile strength was measured in accordance with ISO 3781:2011.

Note on the exercise

In the example solution, elasticity and tensile strength are noted as being "suitably measured in accordance with" certain standard methodologies. In the field of chemistry, it is important to include standard methodologies for measuring parameters and properties. This is because it is often the case that different measurements can be made depending on the methodology used. This is particularly important if a parameter or property appears in a claim, since the boundaries of a claim must be clear and precise. Including a standard methodology means that a third party can know the boundaries of the claim with respect to a given parameter or property.

Otherwise, if a standard methodology is not present, then the claim may be unclear, and a patent office may object. Ultimately, if a parameter or property is crucial to the definition of an invention, then this objection from the patent office may cause the patent application to be refused.

Any standard methodology should be self-contained, meaning that a reader should not need to make any assumptions to employ the methodology. If, for example, the standard methodology can be conducted at different temperatures and the temperature at which it is conducted has an impact on the result, then the patent application should state a temperature to adopt when following this methodology.

5.2.5 Exercise 5: Compositions

My company has developed a new coating composition. The new composition is useful for painting a pigment onto a surface and forms a durable finish that is resistant to scratching and UV damage (bleaching).

The composition includes pigment microparticles, a surfactant and a binder. Our research determines that a specific weight ratio between the pigment microparticles, a surfactant and a binder is required to obtain a stable composition. The optimum seems to be about 69–71 wt% pigment particles, about 19–21 wt% surfactant and about 10 wt% binder. We expect that we could form a stable composition with as little as about 5 wt% binder and about 10 wt% surfactant, however.

The ratio of components is not the whole story. The sizing of the pigment nanoparticles is crucial. Anything between about 100 to 250 µm seems to produce a reasonable composition with adequate scratch resistance, but the best results are obtained with particles sized between about 150 and 200 µm.

By "average," I mean a number average. I measure this with the standard methodology set out in ISO 22412:2017.

We've experimented with the pH of the composition and note that we can impart useful UV-radiation resistance (i.e. against bleaching of the pigment) can be imparted with a pH of between about 4 and 5. Our prototype formulation has a pH of about 4.7, which seems to produce the best results.

The surfactant we use is an anionic surfactant known as sodium dodecyl sulfate. I believe any surfactant will do the job, although anionic surfactants are more compatible with pigment nanoparticles.

We've experimented with a wide range of binders, including polyurethane, polyester or siloxanes. All of these work well, although we've settled on polyurethane as these provide useful thermosetting properties. These are particularly useful when the coatings are applied to surfaces that encounter high temperatures.

In a second aspect, the present application relates to a coating comprising a cured composition according to the first aspect.

Note on the exercise

In the example solution, average particle size is noted as being "suitably determined in accordance with" a standard methodology. In the field of chemistry, it is important to include standard methodologies for measuring parameters and properties. This is because it is often the case that different measurements can be made depending on the methodology used. This is particularly important if a parameter or property appears in a claim, since the boundaries of a claim must be clear and precise. Including a standard methodology means that a third party can know the boundaries of the claim with respect to a given parameter or property.

Otherwise, if a standard methodology is not present, then the claim may be unclear, and a patent office may object. Ultimately, if a parameter or property is crucial to the definition of an invention, then this objection from the patent office may cause the patent application to be refused.

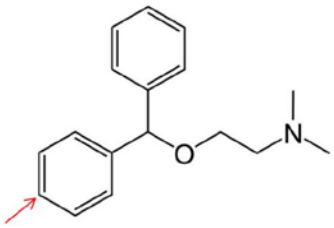
Any standard methodology should be self-contained, meaning that a reader should not need to make any assumptions to employ the methodology. If, for example, the standard methodology can be conducted at different temperatures and the temperature at which it is conducted has an impact on the result, then the patent application should state a temperature to adopt when following this methodology.

5.2.6 Exercise 6: Diphenhydramine

I am a pharmaceutical chemist working in the field of antihistamines. I have developed a new class of antihistamine compounds that specifically target the HRH1 (histamine) receptor. My new compounds achieve similar efficacy as diphenhydramine, the current best-seller.

Diphenhydramine is a powerful compound, but easily crosses the blood-brain barrier (BBB) and causes drowsiness in those taking it as a result. Drowsiness is directly related to the quantity of the antihistamine crossing the BBB.

My studies have focused on modifying the chemical structure of diphenhydramine, by substituting the hydrogen atom at the position shown below with a number of different chemical groups.

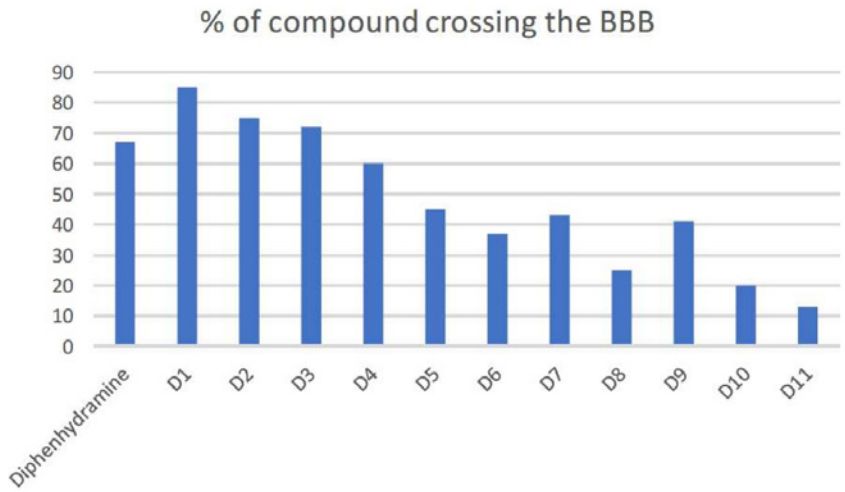


Diphenhydramine

I have conducted a series of experiments on the compounds identified below.

Compound ID	Subst.
Diphenhydramine	H
D1	NH_2
D2	NHCHO
D3	$NCH_3C(O)CH_3$
D4	$C(O)NH_2$
D5	$C(O)NHCH_3$
D6	$C(O)N(CH_3)_2$
D7	$C(O)NHC_2H_5$
D8	$C(O)N(C_2H_5)_2$
D9	$C(O)NHC_4H_9$
D10	$C(O)N(C_4H_9)_2$
D11	$C(O)N(C_6H)_{13})_2$

The experiments demonstrate that my compounds are less able to cross the BBB than diphenhydramine. The results are shown in the figure below.



I also conducted experiments with diphenhydramine substituted at the position shown with $C(O)NHC_{10}H_{21}$, but this compound did not provide any antihistamine effect at all.

We commissioned some prior art searches, which located a chemical abstracts disclosure of D11 – apparently someone has made that molecule before. However, the searchers didn't find any documents which suggests that D11 can be used as an antihistamine.

We generally administer our compounds to patients in salt form, in a pharmaceutical composition including a pharmaceutically acceptable carrier, diluent, excipient or combination thereof.

We wish to obtain protection for any compound that is less prone to crossing the BBB than diphenhydramine. The other compounds are not valuable to us.

5.3 Biotechnology

5.3.1 Exercise 1: Genetically modified *Prunus Persica* seeds

Instructions: Draft all possible independent claims (product, process, use) and possible dependent claims for the invention described below. You do not need to prepare more than 10 claims in total.

A brief description of the technical features of the invention is given below:

You have made the very surprising discovery that vector* V (known from EP 0 XXX XXX-B1 for modifying tobacco seeds) promotes the *in vitro* growth of peaches.

When *Prunus persica* seeds are genetically modified by transformation with vector V using standard techniques and under suitable conditions, it results in dwarf peach trees which produce full size peaches under careful growth conditions, provided that the growing peaches are maintained *in vitro*.

Note: The inventor believes that the invention is novel and inventive. You are not requested to conduct a prior art search.

* A vector is a usual technical feature in biotech claims. A vector is a DNA molecule designed for transfer between different host cells.

Tip

Your task is to outline a set of patent claims to obtain maximum protection covering every potentially patentable aspect, paying attention to all possibilities for commercialization.

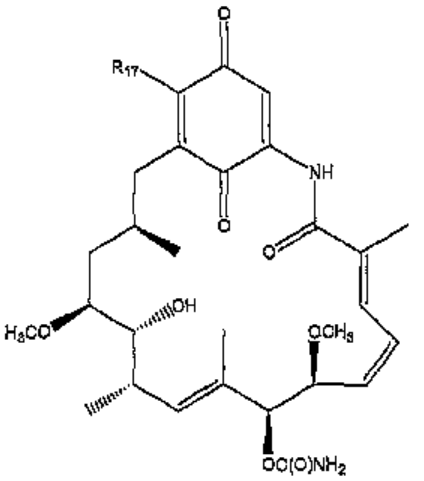
5.3.2 Exercise 2: Drug for the treatment of cancer

Explanation of terms

– Heat shock protein 90 (HSP 90)
  Belongs to a class of proteins that protect cells when stressed by elevated temperatures; assists in tumor repression.

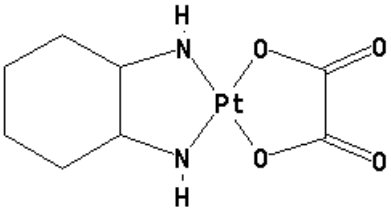
– Heat shock protein 90 inhibitor (HSP 90 inhibitor)
  Compounds which block the functioning of HSP 90.

Example of HSP 90 inhibitor: geldanamycin or 17-alkylamino-17-desmethoxygeldanamycin (17-AAG).



17-AAG, R17 = alkylamino

– Platinum coordination complexes
  Platinum complexed with ligands. These compounds are used as chemotherapeutics.
  Examples: cisplatin, carboplatin, oxaliplatin.



oxaliplatin

A. Invention

Applicant X invented an improved way of treating people suffering from breast cancer by injecting a platinum coordination complex and optionally also an HSP 90 inhibitor.

The invention shows improved results by combining the two compounds. The specific combination of oxaliplatin and 17-AAG has a synergistic effect.

A platinum coordination complex in general was already known to the public when the invention was made. Applicant X, however, believes that it has never been used for treatment of breast cancer.

Question 1.
How can Applicant X protect its invention? Suggest an independent claim.

B. Prior art search

Applicant X carried out a prior art search, and found a journal article that discloses the following invention.

> Cancer Treatment Reports 67(3) 235-238, 1983
>
> "... 2 [patients] with adrenocarcinomas in the breast ... were treated with cisplatin at a dose of 60 mg/m2."

This means that a platinum coordination complex (i.e. cisplatin) for use in the treatment of cancer is already known.

Question 2.
Suggest an amended claim taking into account the search result.

Submit one independent claim and several dependent claims.

C. Office action and new prior art

Applicant X filed a patent application with the set of claims you have prepared for Question 2.

The patent office examined the application, and considers whether the invention as claimed is new and non-obvious.

The patent office did find the following prior art document:

"Methods for enhancing the efficacy of cytotoxic agents through the use of HSP90 inhibitors"

(12)特許協力条約に基づいて公開された国際出願

(19) 世界知的所有権機関
国際事務局

(43) 国際公開日
2002 年2 月28 日 (28.02.2002)

PCT

(10) 国際公開番号
WO 02/15925 A1

This document discloses the combination of HSP 90 inhibitor with anticancer agents like carboplatin or cisplatin to inhibit growth of breast cancer cells.

Applicant X's claim 1 in Question 2 was:
"A combination of a platinum coordination complex and an HSP 90 inhibitor for use in the treatment of breast cancer."

WO 02/15925 already discloses a platinum coordination complex (e.g. cisplatin) and an HSP 90 inhibitor to treat breast cancer. Therefore, the examiner concludes that the invention according to claim 1 is already disclosed and claimed in WO 02/15925.

Question 3.
(1) Check again the material revealed in the prior art searches.
   – Does the invention have any features NOT disclosed in the prior art (novelty)?
   – What are the advantages of the invention compared with the prior art (inventive step)?
(2) How can the claims be amended to reflect the invention in a way that is new (considering all the prior art)?

Tips

If one compound is simply replaced by another without showing any unexpected or surprising effect, such a replacement is frequently considered to represent routine for an expert (skilled in the art).

If an unexpected or surprising effect can be shown, then the invention is often considered to be inventive (i.e. the invention is not obvious for an expert working in the technical field).

5.3.3 Exercise 3: Actinomycete strain X

Suppose that you are walking through a cultivated field and you find a zone in the soil in which the inhibition of weed growth is observed. Taking several samples from that soil where no plant growth is observed, and carrying out isolation and purification of the microorganisms present therein, an actinomycete strain X was predominantly recovered. After the corresponding testing and analysis, it was found that said strain produces, when cultured, a substance Y (of unknown structure) with strong herbicidal activity that is excreted.

The strain X was taxonomically characterized and discovered to be a non-previously described actinomycete strain.

Question 1.
What would be the first step for assessing whether you are in the presence of a patentable invention?

Question 2.
To fulfill the enabling disclosure requirement for your patent application, what should you do?

Question 3.
Propose a preliminary set of claims.

Question 4.
Even if you do not know the structure of the substance Y with strong herbicidal activity produced by the microorganism X, what could you protect at this stage of your research? For better protecting your invention, what are the further actions you should carry out?

5.3.4 Exercise 4: Biodegradable strip

The invention relates to a biodegradable elastic polymeric strip which is placed and knotted around of the flower glomeruli to maintain cohesion and proximity of each banana or plantain hands during their growth. The strip is made of material that can be broken by itself through its own oxidation at a certain time of the plant growth (between 20 to 45 days), and when it falls in the soil, it is easily degraded (see the figure below).

The composition of the biodegradable material from which the strip is made comprises:

Compound	Concentration
Polymeric material	69-82 % (w/w)
Stearic acid	1 to 2 % (w/w)
Zinc oxide	1 to 3 % (w/w)
Mercaptobenzothiazole disulfide	0.75 to 1 % (w/w)
Tetramethylthiuram monosulfide	0.25 to 0.3 % (w/w)
Micronized sulfur	2 to 3 % (w/w)
Paraffin	2 to 3 % (w/w)
Vaseline	0.5 to 3% (w/w)
Precipitated silicon dioxide	10 to 15 % (w/w)
Bis[3-(triethoxysilyl)propyl]tetrasulfide	0.5 to 0.7 % (w/w)

The inventor, without professional assistance, has filed by himself, a utility model application for the above-identified strip together with the below set of claims:

1. A biodegradable elastic polymeric strip for the optimal use of the fruit of the banana / plantain plant is characterized in that the elastic band, made from a special formula, is placed around the flower glomeruli to maintain cohesion and proximity of each banana or plantain hand during their growth allowing more stable, united and rigid commercial units. Likewise, the disclosed device has the feature of breaking without the aid of human hands, after some time.

2. The biodegradable elastic polymeric strip of claim 1, wherein the special formula contained therein is the following:

Concentration	Concentration
69-82 % (w/w)	69-82 % (w/w)
1 to 2 % (w/w)	1 to 2 % (w/w)
1 to 3 % (w/w)	1 to 3 % (w/w)
0.75 to 1 % (w/w)	0.75 to 1 % (w/w)
0.25 to 0.3 % (w/w)	0.25 to 0.3 % (w/w)
2 to 3 % (w/w)	2 to 3 % (w/w)
2 to 3 % (w/w)	2 to 3 % (w/w)
0.5 to 3% (w/w)	0.5 to 3% (w/w)
10 to 15 % (w/w)	10 to 15 % (w/w)
0.5 to 0.7 % (w/w	0.5 to 0.7 % (w/w

Question 1.
Consider the above claims.

(1) Do you think that protection through a utility model is suitable for covering this kind of invention?
(2) What do you think that the examiner will object to in claim 1?
(3) Propose a set of claims that completely and effectively protect the present invention.

5.3.5 Exercise 5: Immunological assay[2]

Assume that you have received a letter from your client (Annex I), which includes a description of an invention for which the client wishes to obtain a patent, together with references to the most pertinent prior art known to him (Annexes II and III).

You are expected to draft an independent claim (or claims) which offers the applicant the broadest possible protection and at the same time has a good chance of succeeding before the patent offices. When drafting the claim(s), you should bear in mind the requirements of the patent law, including the need for novelty and inventive step. Dependent claims, which should be limited to a reasonable number, should be drafted in order to provide a fallback position in the event of failure of the independent claim(s).

You are expected to draft claims that meet the requirements of unity of invention.

You must accept the facts given in the exercise and limit yourself to these facts. You may decide whether and to what extent these facts are to be used for the preparation of claims. You should not use any special knowledge you may have of the field of the invention.

2 This exercise is taken from the 2005 European Qualification Examination, Paper A, published on the website of the European Patent office (EPO).

Annex I

LETTER FROM THE APPLICANT

Montezuma PLC has been investigating new tests for bacteria associated with food poisoning. Our experiments have revealed some very interesting results which we believe are worth patenting. We request that you file a patent application covering as much of the work as possible.

Salmonella bacteria are one of the most common causes of food-borne intestinal infections in the developed world, with over 40,000 cases reported in the United States each year. Up to 1,000 of these infections are fatal.

Salmonella bacteria are often difficult to detect. A food sample with a suspected Salmonella contamination needs to be cultured for 2–3 days. A skilled microbiologist can then identify Salmonella bacteria in the culture. This test is however very time consuming and when the sample only contains low bacterial counts often provides false negative results.

A number of groups have recently been attempting to provide a faster and more reliable test for Salmonella bacteria. One approach that has shown considerable promise is the use of tests using labeled antibodies for the detection of the bacteria. An antibody useful in the invention is an immunoglobulin protein having a specific binding site for a bacterium. Antibodies with binding sites for Salmonella bacteria will selectively bind to these bacteria. The label on the antibody is a compound or group that can be detected by chemical or spectroscopic means. The test thus involves contacting the Salmonella bacteria with the labeled antibody, allowing the antibody to bind to the bacteria and detecting the resulting labeled antibody-bacteria complexes. This method is very selective since the antibody will only bind to the bacteria of interest. These tests are however still often not very sensitive, requiring a high concentration of bacteria in the sample being tested to provide a positive result.

We have now developed a more sensitive immunoassay for Salmonella bacteria, which is based on the use of a tris(2,2'bipyridine)osmium complex as a chemiluminescent label. A chemiluminescent compound is one that will undergo a chemical reaction causing it to emit light. This light can be detected.

Specifically, we provide an immunological method for detecting Salmonella bacteria present in a bacterial culture or in a contaminated food sample, which comprises the following steps:

- bringing the sample to be tested into contact with a solid phase, during a first incubation time sufficient to allow the bacteria to be immobilized upon or inside the structure of said solid phase;
- subjecting the solid phase with the immobilized bacteria to a first wash step to remove the unbound bacteria;
- bringing the washed solid phase into contact with an antibody, which is labeled with a chemiluminescent agent comprising a tris(2,2'bipyridine)osmium complex, said contact being performed during a second incubation time sufficient to allow the labeled antibody to bind to the bacteria;
- subjecting the solid phase from step c) to a second wash step to remove any unbound labeled antibody; and
- placing the solid phase obtained in step d) under conditions whereby light may be produced, and the luminescence activity produced may be quantitatively measured with the help of an appropriate device.

The method of the present invention preferably uses in step a) a solid phase in the form of a bead, a tube or a microtiter plate well, which is made of polystyrene, polyvinyl chloride, nylon or agarose. It is particularly preferred that the solid phase is a microtiter plate well made of polystyrene.

A first incubation time of between 15 minutes and 3 hours, and preferably between 20 minutes and 2 hours 30 minutes is normally used. The temperature during the first incubation is

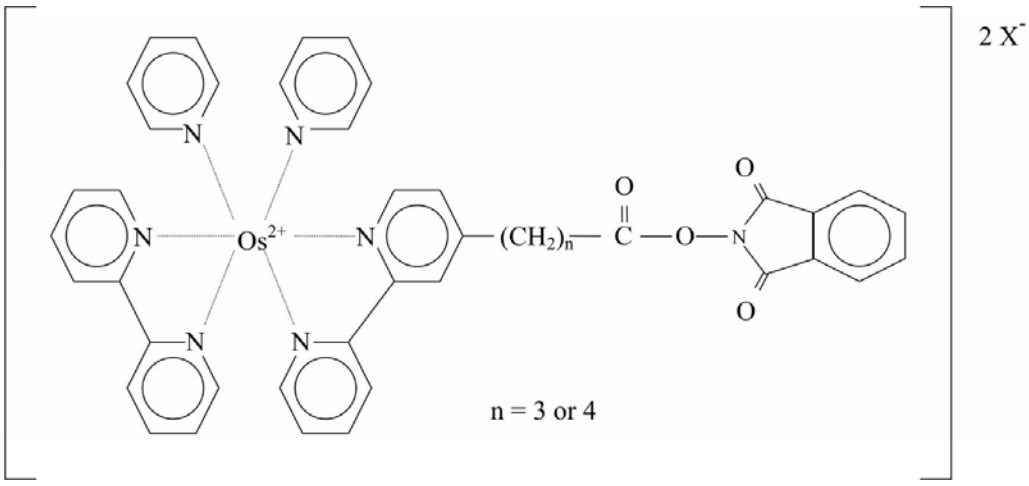
preferably maintained in the range of 20°C to 40°C. Generally the incubation is performed in the presence of a buffer which is preferably a saline buffer giving a pH between 8.0 and 9.5. Generally, the wash steps described under points b) and d) are each performed by using a buffer and preferably a saline buffer also giving a pH between 8.0 and 9.5.

The second incubation time used in step c) of our process (exposure of the labeled antibody to the bacteria immobilized upon or inside the structure of the solid phase) generally varies between 15 minutes and 3 hours, and preferably between 20 minutes and 2 hours 30 minutes. The temperature used is preferably in the range of 20°C to 40°C. This step is generally performed in the presence of a buffer which is preferably a saline buffer giving a pH of 8.0 to 9.5.

In the final step e) of the method of the invention the labeled antibody bound to the bacteria to be detected undergoes a light-emitting reaction. An activating solution is contacted with the labeled antibodies bound to the bacteria. This causes the osmium complex to emit light. The activating solution is typically an aqueous solution of a sodium oxalate (0.05 M) and hydrogen peroxide (0.02 M). The intensity of the light emitted is proportional to the concentration of osmium complex and thus the number of bacteria present. The intensity of the light emitted can be measured using a luminometer. The number of bacteria in the sample is proportional to the relative light units (RLU) registered on the luminometer. A sample highly contaminated by Salmonella bacteria will give a high RLU count, whereas a negative sample will give a very low RLU count.

The antibody used under point c) is an antibody which will bind to Salmonella bacteria with sufficient specificity to provide a useful assay. The preferred antibody is a monoclonal antibody belonging to the class of proteins called immunoglobulins gamma (IgG) derived from rabbits. The antibody may be made by conventional techniques known per se and is commercially available.

The chosen antibody is labeled with a chemiluminescent agent which is a tris(2,2′-bipyridine) osmium complex. These osmium complexes are well known chemiluminescent agents. The complex as such however only binds poorly to antibodies and is therefore not a suitable label. In order for the complex to be used as a label it must be substituted with a linking group able to bind the complex to the antibody. We have found it to be essential to the invention to use an ester of a carboxylic acid containing 3 to 8 carbon atoms and N-hydroxysuccinimide or N-hydroxyphthalimide as the linking group. A tris(2,2′-bipyridine)osmium complex with such a linking group may be prepared by firstly reacting a dichloro bis(2,2′-bipyridine)osmium with a carboxylic acid substituted 2,2′-bipyridine (this first step of the reaction scheme used to make the label has been published in the J. Complex Chem. Vol. 66 (1953), 44), to obtain a carboxylic acid substituted tris(2,2′-bipyridine) complex. The label is obtained by reacting this carboxylic acid substituted tris(2,2′-bipyridine) complex in a second step with N-hydroxysuccinimide or N-hydroxyphthalimide to form the tris(2,2′-bipyridine) complex substituted with the ester. A particularly preferred group of compounds useful as labels has the following structure:



A suitable scheme for labeling the antibody with the tris(2,2'-bipyridine)osmium complex involves the following steps:

- dissolving the antibody in a saline buffer at a pH of 8.0 to 9.5;
- adding said antibody solution to the label (i.e. the osmium complex substituted with the linking group) in solution in an organic solvent, and mixing the ingredients thoroughly;
- stirring the mixture for a period of 5 minutes to 30 minutes;
- optionally purifying the labeled antibody solution.

The Salmonella test may be provided as a kit for detecting Salmonella bacteria in a culture or in a contaminated food sample, which comprises:

- a solid phase, preferably in the form of a microtiter plate well;
- an antibody (preferably a monoclonal antibody of the IgG type) labeled by coupling with a tris(2,2'-bipyridine)osmium complex;
- an aqueous solution of sodium oxalate (0.05 M) and of hydrogen peroxide (0.02M).

In order to further illustrate the present invention and the advantages thereof, the followings examples are given, it being understood that they are intended only as illustrative and in no way limiting.

EXAMPLE I

Preparation of Osmium bis (2,2'-bipyridine) (2,2'-bipyridine-4-butanoic acid) bis(hexafluorophosphate) as known from *J. Complex Chem*. Vol. 66 (1953), 44.

Sodium bicarbonate (0.40 g), osmium dichloro bis(2,2'-bipyridine) (0.40 g), and 2,2'-bipyridine-4-butanoic acid (0.30 g) were stirred in refluxing methanol (20 ml)-water (5 ml) for 9 hours. The resulting solution was cooled in an ice bath, treated with 5 drops of concentrated sulfuric acid, and allowed to stand at ice temperature for 1.5 hours. A precipitate formed, which was separated by filtration and washed with methanol (8 ml).
The combined filtrate and wash solution were treated with a solution of sodium hexafluorophosphate (5.0 g) in water (25 ml). The resulting solution was cooled in an ice bath for 3 hours, and the resulting precipitate of red-purple crystals was collected by filtration (0.40 g).

EXAMPLE II

Preparation of N-hydroxyphthalimide ester of osmium bis(2,2'-bipyridine) (2,2'-bipyridine-4-butanoic acid) bis(hexafluorophosphate)

Dicyclohexylcarbodiimide (DCC, 0.046 g) and N-hydroxyphthalimide (0.034 g) were dissolved in dimethylformamide (DMF, 2 ml) with stirring, and cooled in an ice bath. A solution of osmium bis (2,2'-bipyridine) (2,2'-bipyridine-4-butanoic acid) bis (hexafluorophosphate) (0.101 g, prepared as in Example I) dissolved in DMF (1 ml) was added, and the mixture was stirred 5 hours at ice bath temperature. A precipitate formed and was separated by centrifugation. The supernatant containing the ester of the osmium complex was retained and is used as the label.

EXAMPLE III

Preparation of antibody

The antibody used was an anti-Salmonella IgG monoclonal antibody. This antibody was prepared, in a manner known per se, as a pure solution.

Labeling of anti-Salmonella IgG monoclonal antibody (IgG) with osmium complex

The solution of N-hydroxyphthalimide ester of osmium bis(2,2'-bipyridine) (2,2'-bipyridine-4-butanoic acid) bis(hexafluorophosphate) prepared in Example II (1 ml) was added to a stirred solution of IgG in aqueous physiologic buffered saline (PBS, 5 ml, pH

9.0; 25 mg/ml IgG). The mixture was stirred for 20 minutes, and precipitate was removed by centrifugation. The supernatant containing osmium-labeled IgG was retained.
The success of the labeling reaction was tested by dialyzing the osmium-labeled IgG solution with PBS solution. As a control, the unbound, activated osmium complex prepared in Example II was also dialyzed with PBS solution. After 8 hours, the control showed no fluorescent species within the dialysis tube. The osmium-labeled IgG solution, however, showed strong fluorescence, demonstrating that the osmium complex was bound to the IgG.

EXAMPLE IV

Detection of Salmonella bacteria

The following methodology was pursued:
A sample containing Salmonella bacteria is added (0.1 ml/well) to the wells of a polystyrene microtiter plate used for immunoassays. This is incubated for 30 minutes at 37°C in the presence of Tris buffer, pH 9.2;

Microtiter plate is then washed 5 times with PBS buffer, pH 9.0, containing 0.05% Tween 20 surfactant (polyoxyethylenesorbitan monolaurate);

Tris(2,2'-bipyridine)osmium complex-labeled antibody (as prepared in Example III) is added at 0.1 ml/well and incubated for 30 minutes at 37°C in the presence of Tris buffer, pH 9.2;

Plate is washed as in step b); and

Luminescence measured on LB96P luminometer, which automatically adds an aqueous solution of sodium oxalate (0.05 M) and hydrogen peroxide (0.02 M) to each well of the plate.

The procedure was repeated using antibodies labeled with a number of different commercially available fluorescent labels and the sensitivity of the labeled antibodies was compared. A control well which underwent the same sequence of steps, but to which no bacteria were added was provided for each labeled antibody. A positive result is defined to be a signal having a strength in RLU at least 20 percent higher than the signal obtained from the control. A sequence of samples with known bacterial counts were tested and the lowest bacterial concentration that could be detected was determined for each of the labels tested.

Label used	Detection limit (bacteria /ml)
N-hydroxyphthalimide Ester of Osmium bis(2,2'-bipyridine) (2,2'-bipyridine-4-butanoic acid)	10
Acridinium Ester	100
Fluorescillium	700
Bacdetect	400
Glowdark	3,000

EXAMPLE V

A food sample (minced beef) was artificially contaminated with Salmonella bacteria. The beef was divided into 25 g portions, and mixed with an equal volume of Tris buffer, pH 9.2. A controlled number of bacteria were added to each sample and the samples were well shaken and cultured for 4 hours at 37°C. The cultured samples were filtered through a membrane with 10 micrometer apertures to separate the beef from the bacteria and the liquid obtained was tested using the labeled antibody obtained in Example III using the procedure of Example IV.

The samples all gave positive results. All the known commercial tests require that samples are cultured for at least 24 hours and thus our test is more sensitive than known tests and can considerably reduce the time needed to test food samples.

Yours sincerely,
Product development,
Montezuma PLC

Annex II

DOCUMENT 1 (STATE OF THE ART)

Method of detection of bacteria
The invention relates to a new method for detecting Salmonella bacteria in a culture or in a contaminated food sample.

This invention utilizes a test employing antibodies labeled with chemiluminescent molecules to measure the number of bacteria present. This invention further concerns kits for performing tests according to the method.

Salmonella bacteria exist in a range of environments but impose the greatest danger to health when found in food and feedstuffs. Poultry, meat and eggs are common sources of Salmonella. When the bacteria are consumed, they are able to establish themselves in the gut and multiply, resulting in the appearance, several days after the initial ingestion, of clinical symptoms, including vomiting, diarrhea and nausea, and in severe cases said symptoms may result in death. It is therefore highly desirable to provide test methods by means of which such dangerous bacteria may be detected. Tests for Salmonella bacteria are disclosed in the prior art. However these tests are characterized by a level of sensitivity which remains to be improved.

Description of the invention
Specifically, in one aspect, the present invention provides an immunological method for detecting Salmonella bacteria present in a culture or in a contaminated food sample, which comprises the following steps:

a) bringing the sample to be tested into contact with a solid phase, during a first incubation time sufficient to allow the bacteria to be immobilized on the solid phase;
b) subjecting the solid phase with immobilized bacteria to a first wash step to remove the unbound bacteria matter;
c) bringing the washed solid phase into contact with a specific antibody, which is labeled by coupling to a chemiluminescent agent comprising an acridinium derivative, said contact being performed during a second incubation time sufficient to allow the labeled antibody to bind to the bacteria;
d) subjecting the solid phase from step c) to a second wash step to remove any
e) unbound labeled antibody; and
f) placing the solid phase obtained as previously described under point d) above under conditions whereby light may be produced, and the luminescence activity produced may be quantitatively measured with the help of an appropriate device.

The present invention provides a method which is performed by using, under point (a), a solid phase in the form of a bead, a tube or a microtiter plate well, which may be made of material such as, for example, polystyrene, polyvinyl chloride, nylon, agarose beads or cellulose derivatives.

It is preferred that the solid phase is a microtiter plate well made of polystyrene.
The exposure of the sample (which comprises the bacteria to detect) to the solid phase (the first incubation time) may vary between 15 minutes and 3 hours, at a temperature in the range of 20°C to 40°C and generally in the presence of a saline buffer giving a pH of 8.3–9.5.

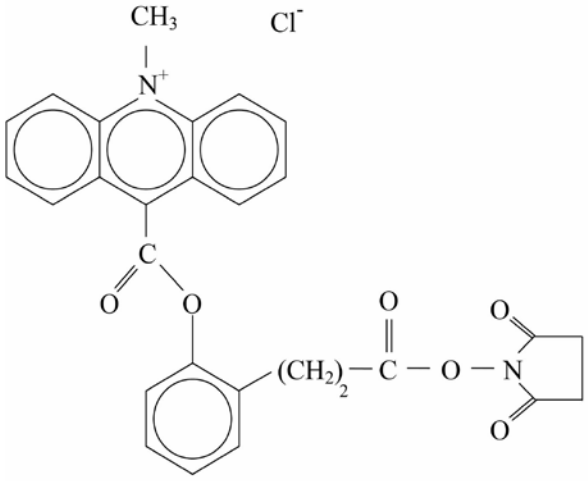
Generally, the wash steps described under points (b) and (d) are each performed by using a saline buffer also giving a pH of 8.3–9.5.

The exposure in step (c) of the labeled antibody to the bacteria immobilized on the solid phase (the second incubation time) may vary between 15 minutes and 3 hours, at a temperature in the range of 20°C to 40°C and generally in the presence of a saline buffer giving a pH of 8.3–9.5.

In the final step (e), an activating solution which may be a dilute aqueous solution of a sodium oxalate (0.05 M) and hydrogen peroxide (0.02 M) is added to the labeled bacteria on the solid phase. This causes the acridinium label to emit light. The number of bacteria present can be quantified by

measurement of the intensity of the emitted light by means of a luminometer. The concentration of acridinium molecules which is proportional to the number of bacteria can be determined by the relative light units (RLU) registered on the luminometer. A highly contaminated sample will give a high RLU count, whereas a negative sample will give a very low RLU count.

The antibody which is used under point (c) is an antibody which will bind to Salmonella bacteria with sufficient specificity to provide a useful assay. The antibody used is preferably an antibody belonging to the class of proteins called immunoglobulins gamma (molecules IgG) derived from rabbits. The antibody is made by conventional techniques known per se. The chosen antibody is labeled with a chemiluminescent agent selected from acridinium derivatives. Preferably, the labeling step is performed by using an acridinium derivative consisting of a substituted phenyl ester of 10methylacridinium-9- carboxylic acid corresponding to formula (1) below:



The acridinium esters of formula (1) which are used to carry out the method of the present invention are known compounds, the preparation of which is described in the reference EP-A-0082 636.

A general scheme for labeling the antibody with the acridinium derivative involves the following methodology:

- dissolving the antibody in a saline buffer at a pH of 2;
- adding said antibody solution to the label (3 to 10 moles per mole of antibodyprotein)
- optionally in solution in an organic solvent, and mixing the ingredients thoroughly;
- leaving the mixture to stand in the dark at a temperature of 20°C to 30°C for a period of 5 minutes to 30 minutes;
- optionally followed by purifying the labeled antibody to remove the excessof labeling compound by gel permeation chromatography.

In another aspect, the present invention provides a kit for detecting bacteria of the genus Salmonella present in a culture or in a contaminated food sample, which comprises:
a solid phase, preferably in the form of either a microtiter plate well or amembrane;

- an antibody labeled by coupling with an acridinium derivative;
- an aqueous solution of sodium oxalate (0.05 M) and hydrogen peroxide (0.02 M).

In order to further illustrate the present invention and the advantages thereof, the followings examples are given, it being understood that they are intended only as illustrative and in no way limiting.

EXAMPLE I

Preparation of antibody labeled with acridinium derivative

The antibody used was an anti-Salmonella IgG antibody. This antibody was prepared, in a manner known per se, as a pure solution.

The acridinium derivative used was that of formula (1).

The acridinium labeling reaction is performed as follows:

- Dissolve antibody (50 micrograms of IgG) in 0.2 ml of labeling buffer (0.2 M sodium phosphate, pH = 2);
- Add antibody solution to 5 micrograms of acridinium label, and mix well;
- Incubate mixture for 15 minutes at room temperature (25°C) in the dark;
- Load mixture onto a 10 ml column of Sephadex G25M and collect 15 x 1 ml fractions.
- A suitable elution and storage buffer is phosphate buffered saline (0.1 M, pH 6.3, with 0.15 M NaCl) containing 0.05% (w/v) sodium azide and 0.1% (w/v) bovine serum albumin;
- Remove aliquot (0.01 ml) of each fraction and measure activity in luminometer;
- Pool active fractions and store acridinium labeled antibodies at -20°C.

EXAMPLE II

Detection of Salmonella by the method of the present invention

The following methodology was pursued:

(a) Sample (of known concentration of Salmonella) is added (0.1 ml/well) to the wells of a polystyrene microtiter plate used for immunoassays. This is incubated for 30 minutes at 37°C in the presence of Tris buffer, pH 9.2;
(b) Microtiter plate is then washed 5 times with PBS buffer, pH 9.0 containing 0.05% Tween 20 surfactant (polyoxyethylenesorbitan monolaurate);
(c) Labeled acridinium antibody is added to each well and incubated for 30 minutes at 37°C in the presence of Tris buffer, pH 9.2;
(d) Plate is washed as in step (b); and
(e) Luminescence measured on LB96P luminometer, which automatically adds an aqueous solution of sodiumoxalate (0.05 M) and hydrogen peroxide (0.02 M) to each well of the plate.

The present method was able to detect Salmonella bacteria at a concentration of 100 cells/ml, which is more sensitive than any commercially available test for these bacteria.

Claims

An immunological method for detecting bacteria of the genus Salmonella present in a culture or in a contaminated food sample, which comprises the following steps:

(a) Bringing the sample to be tested into contact with a solid phase, during a first incubation time sufficient to allow the bacteria to be immobilized upon or inside the structure of said solid phase;
(b) Subjecting the solid phase with immobilized bacteria to a first wash step to remove unbound bacteria;
(c) Bringing the washed solid phase into contact with a specific antibody, which is labeled by coupling to a chemiluminescent agent comprising an acridinium derivative, said contact being performed during a second incubation time sufficient to allow the labeled antibody to bind to the antigen;
(d) Subjecting the solid phase from step (c) to a second wash step to remove any
(e) unbound labeled antibody; and
(f) Placing the solid phase obtained in step (d) under conditions whereby light may be produced, and the luminescence activity produced may be quantitatively measured with the help of an appropriate device.

A kit for detecting bacteria of the genus Salmonella present, in a culture or in a contaminated food sample, which comprises:

(a) a solid phase;
(b) an antibody of the IgG type labeled by coupling with an acridinium derivative; and
(c) an aqueous solution of sodium oxalate (0.05 M) and hydrogen peroxide (0.02M).

Annex III

DOCUMENT 2 (STATE OF THE ART)

Light-emitting devices (LEDs) are useful in a variety of applications. LEDs consist of a layer of a chemiluminescent compound sandwiched between two electrodes, at least one of which is transparent. A current is applied to the layer from through the electrodes. This causes the compound to emit light. Chemiluminescent compounds are sought which provide a high brightness of emitted light at a low applied voltage.

Among the materials that have been studied, osmium complexes have recently attracted considerable attention.

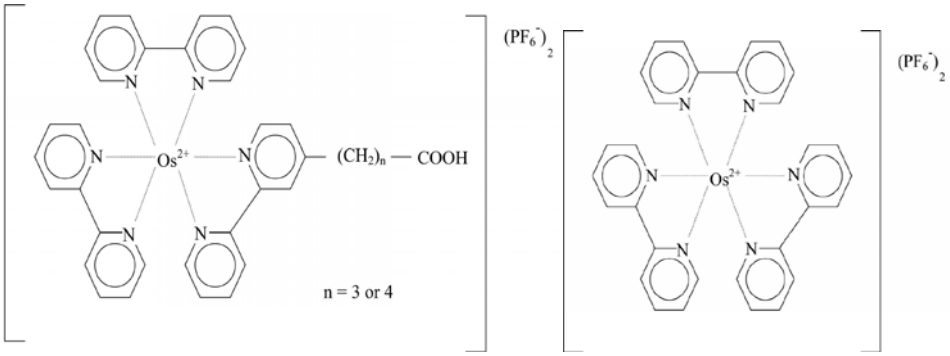
Summary of the invention

The present invention provides a method for producing LEDs with a high brightness at a low applied voltage based on a film of organic light-emitting compounds selected from unsubstituted or carboxylic acid substituted tris(2,2′-bipyridine)osmium complexes.

Description of the preferred embodiments

The inventors have discovered that the use of tris(2,2′-bipyridine) osmium complexes as the organic light-emitting compound provides LEDs with the desired characteristics. Particularly good results have been obtained when the osmium complex used is selected from tris(2,2′-bipyridine) osmium bis(hexafluorophosphate), bis(2,2′-bipyridine)(2,2′-bipyridine-4 pentanoic acid) osmium bis(hexafluorophosphate) or bis(2,2′-bipyridine)(2,2′-bipyridine-4 butanoic acid) osmium bis(hexafluorophosphate).

The chemical structures of these osmium complexes are as follows:



These complexes may be synthesized using a procedure described elsewhere (*J. Complex Chem*. Vol. 66 (1953), 44).

Preparation of the light-emitting device
A glass plate was sputter-coated with a 5-micrometer thick layer of indium tin oxide (ITO). This layer forms a transparent anode. A thin film (about 100 nm thick) of tris(2,2′-bipyridine)osmium bis(hexafluorophosphate) was spin-coated onto the indium tin oxide-coated substrates from a 4% (tris(2,2′-bipyridine)osmium bis(hexafluorophosphate) solution in acetonitrile at room temperature. The film was heated in a vacuum oven at 125°C for at least 8 hours. Aluminum cathodes were then printed on top of the films at room temperature. The anode and cathode were each electrically connected by soldering a thin copper wire to the electrode.

Characterization of the light-emitting device
The brightness-voltage characteristics of the device were measured at room temperature.

The LED manufactured as described above under a voltage of 3.0 V gave a bright red emission clearly visible in a lighted room. A similar emission was obtained for a LED in which a layer of bis(2,2′-bipyridine)(2,2′-bipyridine-4-butanoic acid) osmium bis(hexafluorophosphate) was used

as the light-emitting layer. These results show that the present LEDs exhibit an outstanding brightness at a very low applied voltage.

What is claimed:

(1) A high brightness, low voltage thin film organic light-emitting device (LED) comprising an organic light-emitting layer consisting of unsubstituted or carboxylic acid substituted tris(2,2'-bipyridine)osmium complexes.

5.4 Software-implemented inventions

This chapter contains exercises that focus on software-based inventions. National/regional laws and practices that apply to software-implemented inventions vary. In many jurisdictions, abstract ideas, computer programs as such, pure mental acts and methods of doing business per se are not patentable subject matter and are excluded from patent protection. While elaborating on the law and practices regarding the patentability of software-implemented inventions in various jurisdictions is not the purpose of this Exercise Book, it is important to note that a patent drafter should understand the legal interpretation of the relevant subject matter in the target jurisdiction(s).

Patent drafters can use conventional product/device and method claims to cover software-implemented inventions. In addition, patent applications relating to software-implemented inventions often contain specialized claim formats for such inventions. The acceptable claim formats for these types of inventions may also vary from country to country (see WIPO Patent Drafting Manual, Module V. 2.7). Since patent law and practices in this field continue to evolve, a patent drafter should be informed about the latest legal developments in this area.

Having said that, a few caveats may be worth mentioning. First, differences in programming language between the potential invention and the prior art are rarely, if ever, sufficient for inventiveness (non-obviousness). Second, you might find convincing arguments for patentability of systems that involve dedicated computers, as opposed to multi-purpose computers, although this fully depends on the claimed invention, is jurisdictionally dependent and a dedicated computer will in no way guarantee patentability. Third, as stated earlier, national/regional laws may be highly specific in excluding subject matter that is often encountered in software-based inventions. For example, many laws exclude "business methods" as patentable subject matter, and many software-based inventions are, at first glance, integrally related with methods of doing business. Therefore, when encountering a software-based invention that involves or relates to a method of doing business, in a country that restricts such inventions, a patent drafter must be very careful to look for a "technical effect," apart from the business-related outcome, derived from the inventive concept.

In view of the differences in national/regional laws and practices and the evolving nature of software-based inventions, the examples in this section are limited in focus to inventions that involve software, a machine executing the software and some tangible output or result from executing the software. While a sample answer is provided for each exercise, it should be regarded as one example of possible answers, which might be accepted in some jurisdictions, but not in others.

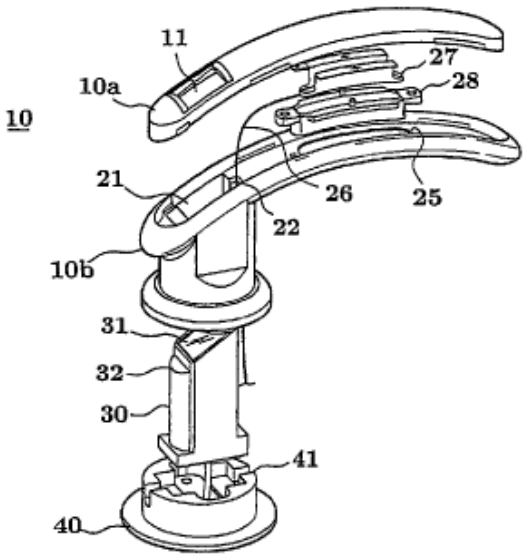
5.4.1 Exercise1: Face recognition door lock

The hypothetical invention is a new method for controlling a door lock with a networked computer, an attached camera, and an algorithm that uses facial recognition to identify an individual wishing to unlock the door. The lock and camera are attached to a controller, and said controller is networked to a remote server containing a database storing authorized facial images. An algorithm run by the server compares an image taken by the camera against the database of facial images, and in the event of a match, sends instructions to the controller to operate the lock (i.e., from a locked to unlocked position, or from an unlocked to locked position).

Communications between the controller and the server are moderated by a communications module using any of a variety of means, such as WiFi connectivity, mobile connectivity (with insertion of an optional SIM), or WAN connectivity. The controller can optionally be configured to store a small subset of facial data and to run a minimized version of the facial recognition algorithm. This configuration is convenient for instances when the communications module is not able to connect to the remote server – a limited number of individuals are still able to control the lock.

Power for the various components may be by solar cell (for an outdoor lock), battery, or connection to the main power grid.

A prior art search is conducted and uncovers a US patent disclosing a fingerprint-enabled automatic door lock.



A fingerprint scanner is attached to the door lock, and maintains a locally stored database (labeled 30 in the figure above) of fingerprints that are authorized to unlock the door. An individual places a thumb on the scanner (which is incorporated into the handle – labeled 11 in the figure, above), the scanner reads the fingerprint and compares it to those in the database. When a match is detected, the door automatically unlocks.

Draft a set of product claims and a set of process claims, based on the invention and prior art.

Tips

For product claims, find out which specialized claim formats for software-implemented inventions are accepted in your jurisdiction. Some claim formats that may be allowed in certain jurisdictions are:

5.4.2 Exercise 2: Wearable device

In this exercise, the focus will be on claiming a device that incorporates software controlling one or more aspects of the device. Understanding how to claim such inventions is important in a variety of applications, from medical devices to personal care products, industrial equipment, and electronic goods.

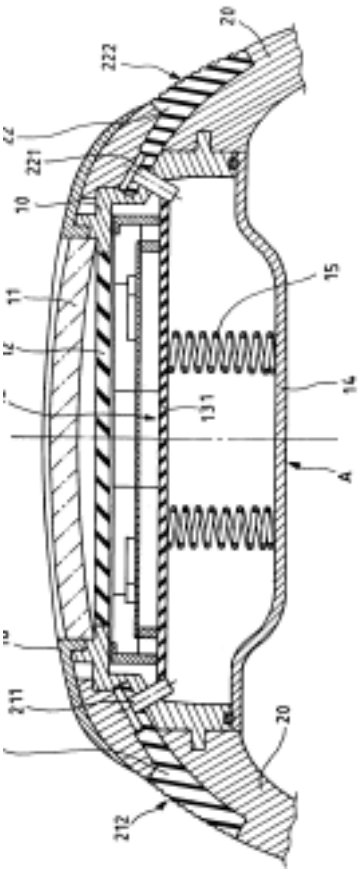
The invention is a new wearable device, specifically, a wristwatch. The watch contains the following components:

- a housing;
- a display;
- a crystal-based timekeeping mechanism;
- a chime (i.e., a component that sounds a chime when activated);
- an internal motion sensor; and
- internal circuitry and associated firmware, the combination of which is referred to as "control circuitry."

The internal motion sensor is used to determine the frequency, direction, intensity of movement of the watch and, by extension, corresponding movements of the person wearing the watch. These movements are analyzed by the control circuitry, which contains a machine-learning algorithm, to determine patterns that indicate whether the wearer of the watch is asleep or awake.

When the watch determines that the wearer is awake, an hourly chime is activated. When the watch determines that the wearer is asleep, the hourly chime is deactivated. This activation and deactivation of the chime, as well as the analysis of sensor data that determines whether to activate or deactivate the chime, are carried out by the control circuitry.

A brief search of the prior art reveals very little apart from a watch configured to detect the wearer's pulse using built-in springs (12), as shown in the figure, below.



Given the above art and invention description, draft a set of claims to the device and/or method, using claim formats specific to software-implemented inventions.

Tips

A device with controlling software consists of one or more physical components that form the device itself. For example, a digital thermometer may have a temperature sensor, a housing and a display. An automated soldering machine may have a heat-producing tip and a movable arm or other support for the heat-producing tip.

The device components are, then, augmented with controlling software and, possibly, additional hardware. The controlling software is a computer program that is specifically configured to cause a change in one or more of the device components in a controlled manner. There is also the potential for hardware such as a control unit or a similar unit. The control unit typically creates the interface between the device components and the controlling software

5.4.3 Exercise 3: Human language translation app

In this exercise, the invention involves software for human language translation.

The software is inventive, according to the inventor, because it works in real time and on a mobile phone platform. The user simply activates the software, selects an output language, and begins speaking. The microphone on the mobile phone will then be ready to receive input. The software will automatically detect the input language and will translate all input to the selected output language. The output will then be delivered in both audible form (spoken by a humanized voice) and visual form (on the display of the phone).

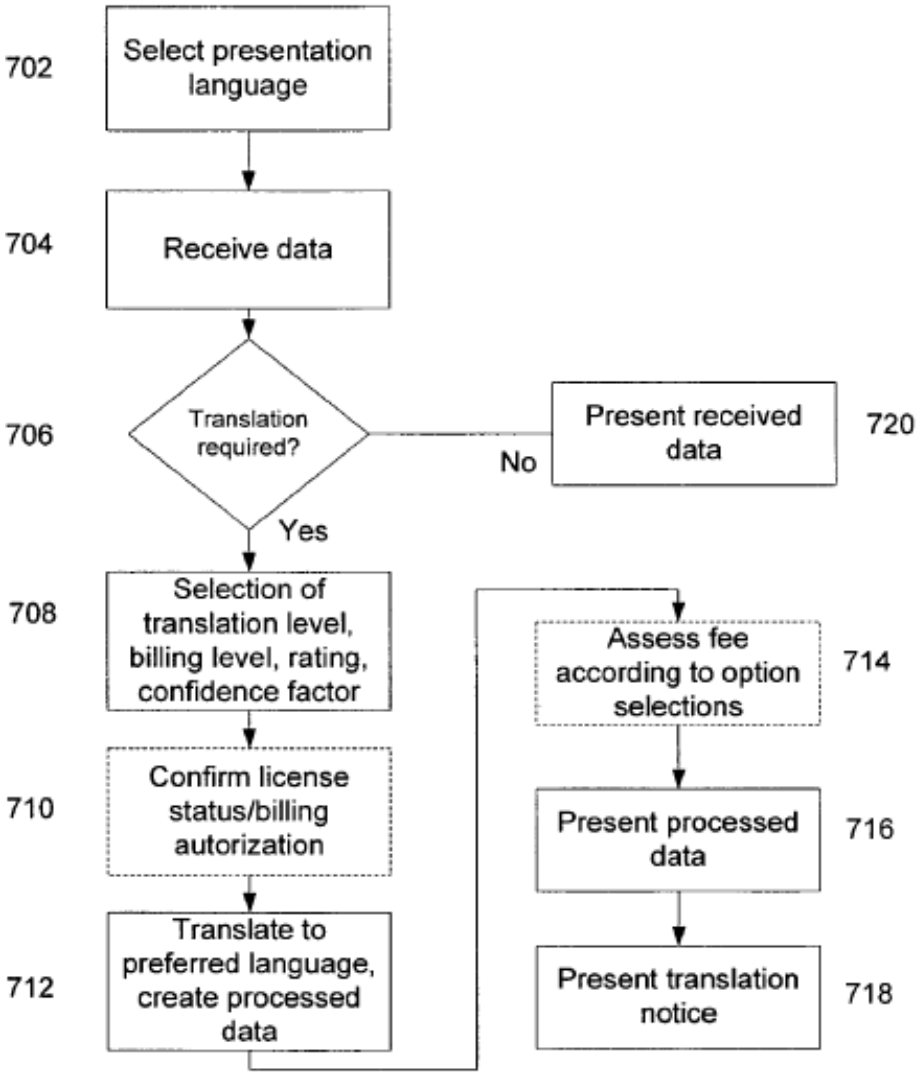
The translation can be done even when the phone is not connected to a data service, although the most accurate translations occur when there is an available data connection.

The detected input and generated output will be stored so that a double transcript of the conversation will be maintained in the storage of the phone.

The invention has been developed for all major current mobile platforms.

In one embodiment of the invention, the phone can be paired with a standard Bluetooth-enabled earbud, such that the output of the invention is delivered directly to the user's ear via the earbud. This embodiment is preferable because it does not require the individual speaking the input language to simultaneously hear the translated output from the phone's speaker.

A prior art search reveals that PC-based human language translation was developed a decade earlier. Specifically, a subscription-style software was designed for desktop devices that have internet connectivity. The software has various levels of accuracy (higher levels of accuracy requiring greater computing power and access to larger data sets), and the user can select an accuracy level as desired. A sample flow diagram for the software is presented below:



A second piece of prior art uncovered in the search describes a piece of software developed as a teaching aid for learning a new language. The software operates on a desktop computer and does not involve translation, but does include an output module that allows words and phrases in a selected output language to be delivered to the user in the form of an audible, humanized voice.

A third piece of prior art describes software that translates source code from an input programming language to an output programming language. The program is designed to operate on a desktop computer, and to accept user input (i.e., identification of the original source code file, identification of the input programming language, etc.) from standard I/O devices. There is no audible output, but the output source code is stored in memory and can be displayed on a monitor.

In view of the above prior art and the description of the invention, the inventor requests you to write a set of claims.

Tips

In many cases, software-implemented inventions do not involve a dedicated device. Instead, the invention is implemented on a general-use computer with standard (i.e., non-specialized) I/O components, power sources, and computing components. Some jurisdictions are not favorable toward patentability of such inventions, while other jurisdictions may allow such subject matter provided that the claims are specifically formatted to comply with legal or judicial requirements. In such cases, the format of the claims becomes critical, and the drafter is encouraged to understand the applicable national/regional requirements.

For example, the preamble and transition of a claim for a software-implemented invention that involves a general purpose computer may take the following specific format in the United States of America: "a non-transitory computer-readable storage medium storing one or more programs, the one or more programs comprising instructions, which when executed by one or more processors of one or more electronic devices, cause the one or more electronic devices to..." The drafter will appreciate that this format has evolved over time and in response to various court decisions on patentability and guidance from government officials.

5.4.4 Exercise 4: Fashion selection device

In this exercise, the software-implemented invention is a fashion selection device and program. The device is a desktop computer with an attached 3-D scanner that can create and store a digital 3-D model of a human client. The system also receives, as input from the client, information about the client's fashion needs (i.e., whether the client needs formalwear, casual clothing, shoes, color preferences, etc.). The digital model and other input are then transmitted, via a network, to a central server. The central server applies certain algorithms to determine appropriate clothing recommendations, including patterns for custom-fit clothing. The algorithms are designed to account for modern clothing trends that are automatically determined (and frequently updated) from trending social media posts on various social media platforms. A set of determined fashion recommendations are then transmitted back to the desktop device and displayed for the user.

Edits and revisions to the recommended fashion can be accomplished via a user interface that facilitates communication between the desktop device and the remote server. This communication is essential, because the fashion trends are only determined by an algorithm on the remote server and are not transmitted to the desktop device.

A prior art search reveals two references. The first reference describes a standalone device that takes a 2-D image of a human client from a built-in camera and displays the image on a monitor. The software then superimposes onto the image any piece of clothing from a locally stored database of available clothes. The purpose of the device is to allow a human client to see a reasonable estimation of how a garment will look when worn, but the software is limited to garments that are in the database. Entering new garments into the database is a tedious process that involves loading images from a physical storage medium (e.g., a CD-ROM or the like).

The second reference describes software that takes a plurality of 2-D images of an object and recreates a 3-D model of the original object. The software was designed for use as a 3-D printing application and does not require any internet connection.

In view of the above prior art and the description of the invention, the inventor requests you to write a set of claims for review.

Tips

Many software-implemented inventions involve computers in various locations communicating via a network. Most commonly, this involves a computer device communicating via the internet or via a mobile network with a remote server.

In preparing the claims, you should consider whether to draft the claims from the perspective of the remote server or from the perspective of the user device. In the case of the user device perspective, the claims may involve "transmitting data to" (or some equivalent phrase) a remote server and "receiving information from" the remote server. Alternatively, from the perspective of the remote server, the claims may involve "receiving data from" a user device and "transmitting information to" the device. See WIPO Patent Drafting Manual Module VI.12 "Claim point of view."

5.4.5 Exercise 5: Wireless computer mouse

In this exercise, the invention is a wireless computer mouse.

Unlike previous devices, the invention comprises a top surface made from foam rubber, such that it can conform to the user's hand. Unlike traditional mouse devices, the invention does not include a mechanism on the bottom surface of the device to detect movement. Instead, a plurality of pressure sensors are embedded within the foam rubber top surface of the inventive device. Thus, the mouse is designed to remain stationary during use, and to send input signals that are based on input from the pressure sensors to an attached computer. When the user wishes to control a cursor or pointer on the computer, the user places a hand on the top surface of the mouse. Pressure applied to various locations of the top surface of the mouse creates a signal analogous to the signals that were generated by movement in previous mouse devices.

For example, if the user wishes to move a pointer up on a display screen, the user applies pressure to the fingertips of the hand that is resting on the top surface of the mouse device. Greater pressure causes the cursor to move faster. Impulsive pressure in the fingertip region is equivalent to "mouse clicks" in previous devices (and up to five different "clicks" can be recognized by the device, corresponding to the five fingertip regions).

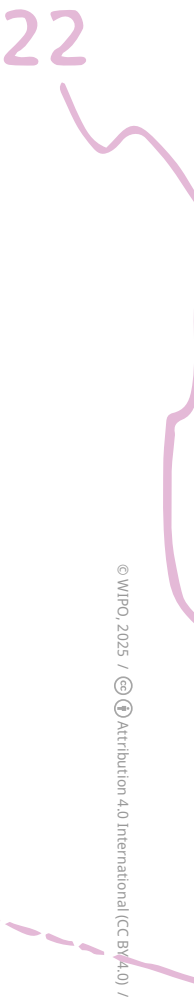
The device uses a Bluetooth connection to communicate with the computer. Inside the body of the mouse device, below the foam rubber layer and protected by a hard-plastic casing, are a plurality of components. These include a battery chamber, a Bluetooth transceiver, and control circuitry. The control circuitry includes custom-built software that interprets input from the pressure sensors. The software is adaptive: as sensor data is acquired over time, the device "learns" to anticipate click pressure intensity based on a variety of factors. Eventually, the overall amount of input required from a user decreases as the software "learns" to anticipate user input.

Manufacturing the computer mouse is a relatively straightforward process of assembling various electrical components, with one exception. The pressure sensors are embedded within the layer of foam rubber during manufacture of the layer. The inventor found that it was not practical to place sensors between two previously formed layers of foam rubber, because the sensors are prone to slipping laterally with such a configuration.

An exhaustive prior art search is conducted and finds only the following four references: US 3,541,541 (Engelbart), US 5,293,000 (Adinolfi), US 5,463,388 (Boie et al.), and US 6,727,889 (Shaw).[3]

Your client requests a draft set of claims for review.

3 A copy of those prior art documents can be searched on the website of the United States Patent and Trademark Office (USPTO) at http://patft.uspto.gov/netahtml/PTO/patimg.htm or Google Patents https://patents.google.com/.



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