

## SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

### F28 HEAT EXCHANGE IN GENERAL

**F28D HEAT-EXCHANGE APPARATUS, NOT PROVIDED FOR IN ANOTHER SUBCLASS, IN WHICH THE HEAT-EXCHANGE MEDIA DO NOT COME INTO DIRECT CONTACT** (heat-transfer, heat-exchange or heat-storage materials C09K 5/00; fluid heaters having heat generating means and heat transferring means F24H; furnaces F27; details of heat-exchange apparatus of general application F28F); **HEAT STORAGE PLANTS OR APPARATUS IN GENERAL [4]**

#### Subclass index

#### HEAT-EXCHANGE APPARATUS WITHOUT INTERMEDIATE HEAT-TRANSFER MEDIA OR BODIES

With stationary conduit assemblies

for only one medium using: mass of fluid; trickle or film; the cooling effect of evaporation.....1/00, 3/00, 5/00

for both media: by tubular conduits; by plate-like conduits.....7/00, 9/00

With moving conduit assemblies.....11/00

With fluidised bed.....13/00

#### HEAT-EXCHANGE APPARATUS WITH INTERMEDIATE HEAT-TRANSFER MEDIA OR BODIES

With the intermediate medium in closed tubes passing into or through the conduit walls.....15/00

In which the intermediate medium or body is contacted successively by the other media.....17/00, 19/00

HEAT STORAGE PLANTS OR APPARATUS.....20/00

OTHER HEAT-EXCHANGE APPARATUS.....21/00

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| <p><b>1/00 Heat-exchange apparatus having stationary conduit assemblies for one heat-exchange medium only, the media being in contact with different sides of the conduit wall, in which the other heat-exchange medium is a large body of fluid, e.g. domestic or motor car radiators (F28D 5/00 takes precedence)</b></p> <p>1/02 • with the heat-exchange conduits immersed in the body of fluid</p> <p>1/03 • • with plate-like or laminated conduits [4]</p> <p>1/04 • • with tubular conduits</p> <p>1/047 • • • the conduits being bent, e.g. in a serpentine or zig-zag [4]</p> <p>1/053 • • • the conduits being straight [4]</p> <p>1/06 • with the heat-exchange conduits forming part of, or being attached to, the tank containing the body of fluid</p> <p><b>3/00 Heat-exchange apparatus having stationary conduit assemblies for one heat-exchange medium only, the media being in contact with different sides of the conduit wall, in which the other heat-exchange medium flows in a continuous film, or trickles freely, over the conduits (F28D 5/00 takes precedence)</b></p> <p>3/02 • with tubular conduits</p> <p>3/04 • Distributing arrangements</p> <p><b>5/00 Heat-exchange apparatus having stationary conduit assemblies for one heat-exchange medium only, the media being in contact with different sides of the conduit wall, using the cooling effect of natural or forced evaporation</b></p> <p>5/02 • in which the evaporating medium flows in a continuous film or trickles freely over the conduits</p> | <p><b>7/00 Heat-exchange apparatus having stationary tubular conduit assemblies for both heat-exchange media, the media being in contact with different sides of a conduit wall</b></p> <p>7/02 • the conduits being helically coiled (F28D 7/10 takes precedence)</p> <p>7/04 • the conduits being spirally coiled (F28D 7/10 takes precedence)</p> <p>7/06 • the conduits having a single U-bend (F28D 7/10 takes precedence)</p> <p>7/08 • the conduits being otherwise bent, e.g. in a serpentine or zig-zag (F28D 7/10 takes precedence)</p> <p>7/10 • the conduits being arranged one within the other, e.g. concentrically</p> <p>7/12 • • the surrounding tube being closed at one end, i.e. return type (F28D 7/14 takes precedence)</p> <p>7/14 • • both tubes being bent</p> <p>7/16 • the conduits being arranged in parallel spaced relation (F28D 7/02-F28D 7/10 take precedence) [4]</p> <p><b>9/00 Heat-exchange apparatus having stationary plate-like or laminated conduit assemblies for both heat-exchange media, the media being in contact with different sides of a conduit wall</b></p> <p>9/02 • the heat-exchange media travelling at an angle to one another (F28D 9/04 takes precedence)</p> <p>9/04 • the conduits being formed by spirally-wound plates or laminae</p> <p><b>11/00 Heat-exchange apparatus employing moving conduits</b></p> <p>11/02 • the movement being rotary, e.g. performed by a drum or roller (F28D 11/08 takes precedence)</p> |
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## F28D

- 11/04 • • performed by a tube or a bundle of tubes
- 11/06 • the movement being reciprocating or oscillating (F28D 11/08 takes precedence)
- 11/08 • more than one conduit assembly performing independent movements, e.g. rotary bundle of tubes in a rotary drum

### 13/00 Heat-exchange apparatus using a fluidised bed

#### Heat-exchange apparatus employing intermediate heat-transfer media or bodies [3]

- 15/00 **Heat-exchange apparatus with the intermediate heat-transfer medium in closed tubes passing into or through the conduit walls**
  - 15/02 • in which the medium condenses and evaporates, e.g. heat-pipes [4]
  - 15/04 • • with tubes having a capillary structure [6]
  - 15/06 • • Control arrangements therefor [6]
- 17/00 **Regenerative heat-exchange apparatus in which a stationary intermediate heat-transfer medium or body is contacted successively by each heat-exchange medium, e.g. using granular particles**

- 17/02 • using rigid bodies, e.g. of porous material
- 17/04 • Distributing arrangements for the heat-exchange media

### 19/00 **Regenerative heat-exchange apparatus in which the intermediate heat-transfer medium or body is moved successively into contact with each heat-exchange medium**

- 19/02 • using granular particles
- 19/04 • using rigid bodies, e.g. mounted on a movable carrier

### 20/00 **Heat storage plants or apparatus in general** (specially adapted for particular applications, *see* the relevant places, e.g. F24D 15/02); **Regenerative heat-exchange apparatus not covered by groups F28D 17/00 or F28D 19/00 [4]**

- 20/02 • using latent heat [6]
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### 21/00 **Heat-exchange apparatus not covered by any of the groups F28D 1/00-F28D 20/00 [4]**