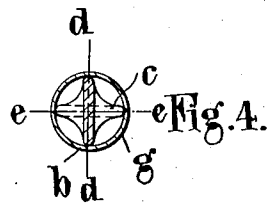
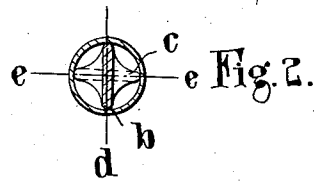
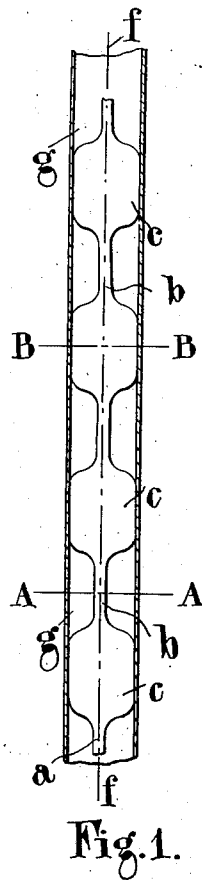


C. A. PARSONS, S. S. COOK & L. M. DOUGLAS.
MEANS FOR HEATING OR COOLING FLUIDS.

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1,058,896.

Patented Apr. 15, 1913.



Witnesses.
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UNITED STATES PATENT OFFICE.

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MEANS FOR HEATING OR COOLING FLUIDS.

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Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed June 25, 1912. Serial No. 705,874.

To all whom it may concern:

Be it known that we, CHARLES ALGERNON PARSONS, K. C. B., a subject of the King of Great Britain and Ireland, and residing at
5 Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, and STANLEY SMITH COOK and LOUIS MORTIMER DOUGLAS, subjects of the King of Great Britain and Ireland, and residing at Tur-
10 binia Works, Wallsend-upon-Tyne, in the county of Northumberland, England, have invented certain new and useful Improvements in and Relating to Means for the Heating or Cooling of Fluids, of which the
15 following is a specification.

This invention relates to means for transmitting heat between fluids and relates particularly to oil or like coolers of the type in which the oil is passed through a tube sur-
20 rounded by a heat absorbing fluid. It is well known that in such apparatus the rate of heat transmission is greatly increased by restricting the passage for the flow of fluid through the tube by means of a core of ir-
25 regular form which acts to change frequently the direction of flow and which, when made of good heat conducting material, further facilitates the heat transmission.

The object of the present invention is to
30 effect further improvements in such means.

The invention consists in heat transmission means of the above type in which the core inserted within each of the tubes is formed at intervals along its length with
35 flats which are situated in central planes of the tube and have their edges contacting with said tube.

The invention also consists in the heat transmitting means hereinafter described.

40 Referring now to the accompanying drawings:—Figure 1 shows in longitudinal section one form of heat transmission means according to the present invention. Figs. 2 and 3 are transverse sections on the lines
45 A—A and B—B of Fig. 1 respectively, while Figs. 4 and 5 are similar transverse sections of a slightly modified form of the device.

One method of carrying the invention
50 into effect is described as applied to apparatus for cooling oil which has been used,—say for lubricating bearings. The oil is passed through one or more tubes suitably arranged usually within a vessel containing

liquid or fluid maintained at a much lower 55 temperature than the oil and thus acting as a heat absorbing medium, while each tube contains a core for the purpose of increasing the rate of heat transmission. A convenient form of such a core, *a* according to the pres- 60 ent invention is shown in Figs. 1, 2, and 3, and is readily made by crushing or flattening a metal tube of ductile material at suitable intervals along its length in such a manner that the alternate flats, *b*, thus pro- 65 duced are at right angles to the intervening flats, *c*, and, as nearly as possible, lie in central planes, *d, d*, and *e, e*, containing the axis, *f, f*, of the tube *g*, into which tube the core is inserted. The inner walls of the 70 crushed tube in some cases touch one another while as shown in Figs. 2 and 3, the crushed tubes themselves are usually closed at both ends as it is not intended to pass fluid through the core itself. 75

It will be seen that by forming the core from a tube having a suitable diameter less than that of the tube, *g*, through which the oil passes, each of the flats, *b* and *c*, can be formed so that the edges touch the inner 80 walls of the surrounding tube, *g*, such contact being made certain preferably by drawing the core through a die or opening of substantially the same dimensions as the inner wall of the surrounding tube. When 85 the core, *a*, thus formed is made of a good heat conducting material, it will be provide an additional cooling surface for the oil, and considerably improve the transmission of heat from the oil to the walls of the 90 tube containing the core.

Although in all cases the flats, *b* and *c*, of the core lie in planes, *d, d* and *e, e*, passing substantially through the axis, *f, f*, of the tube, adjacent flats, *b* and *c*, need not be in 95 two planes at right angles to one another. That is, the planes *d, d* and *e, e*, may be inclined at any angle to one another. Further, each pair of adjacent flats, *b* and *c* may be inclined at any angle to one another, and 100 to a central plane of the tube, *g* this latter angle varying along the length of the core whereby the core or retarder thus produced acts even more efficiently to break up the flow of oil through the tube and thus to im- 105 prove the heat transmission.

In many cases instead of forming the core from a tube the core may be cast in the re-

quired shape or, as shown in transverse section in Figs. 4 and 5, may be formed by twisting solid bars of metal in such a manner that alternate short lengths thereof are in planes substantially at right angles to one another but contain the axis of the bar. The flats thus formed are similar to those shown in Fig. 1, although it is found that the method by which the core is formed by crushing a tube is much more economical. It will further be seen that heat transmission means according to the present invention may be used either for cooling or heating the fluid which is passing through a tube and has its direction of flow frequently changed by the action of the core. The fluid which is outside the said tube and absorbs from or gives up heat to the fluid flowing through the tube, may be gas or liquid inclosed or circulated within a suitable vessel containing the tubes as desired.

Heat transmitting means of this type are exceedingly efficient, and are applicable to coolers, heaters, condensers, and similar apparatus in which there is a transmission of heat between two fluids, one of these fluids being passed through a tube which contains a core of the above type and is surrounded by the other fluid. Moreover such means constructed according to the present invention are inexpensive and easily manufactured, while obviously many modifications can be made in the details of such means in order to meet the particular requirements.

Having now described our invention what we claim as new and desire to secure by Letters Patent is:—

1. A device for transmitting heat between two fluids, comprising in combination a tube through which one of the fluids is passed, a core inserted in said tube, said core having flats which are situated in planes containing the axis of the tube and which contact with the surrounding walls of said tube along lines substantially parallel to the axis thereof.

2. A device for transmitting heat between

two fluids, comprising in combination a tube through which one of the fluids is passed, a core inserted in said tube, said core being made by crushing a tube at intervals along its length to form flats which contact with the surrounding tube and are situated in planes containing the axis of the latter, adjacent flats being in different planes, whereby the surfaces connecting the flats deflect the fluid on to the walls of the surrounding tube and thereby improve the heat transmission.

3. A device for transmitting heat between two fluids, comprising in combination a tube through which one of the fluids is passed, a core inserted in said tube, said core being made by crushing a tube at intervals along its length to form flats which contain the axis of the surrounding tube and contact with the latter along lines substantially parallel with the axis thereof, adjacent flats being in different planes whereby the surfaces connecting the flats deflect the fluid on to the walls of the surrounding tube and thereby improve the heat transmission.

4. A device for transmitting heat between two fluids, comprising in combination a tube through which one of the fluids is passed, a core inserted in said tube, said core being made by crushing a tube at intervals along its length to form flats which contain the axis of the surrounding tube and contact with the latter along lines substantially parallel with the axis thereof, adjacent flats being in planes at right angles to one another, and being connected by surfaces which deflect the fluid on to the walls of the surrounding tube and thereby improve the heat transmission.

In testimony whereof, we affix our signatures in presence of two witnesses.

CHARLES ALGERNON PARSONS.
STANLEY SMITH COOK.
LOUIS MORTIMER DOUGLAS.

Witnesses:

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