Dec. 21, 1937. M. H. KOTZEBUE 2,102,723

COOLER

Filed Feb. 5, 1937 3 Sheets-Sheet 1

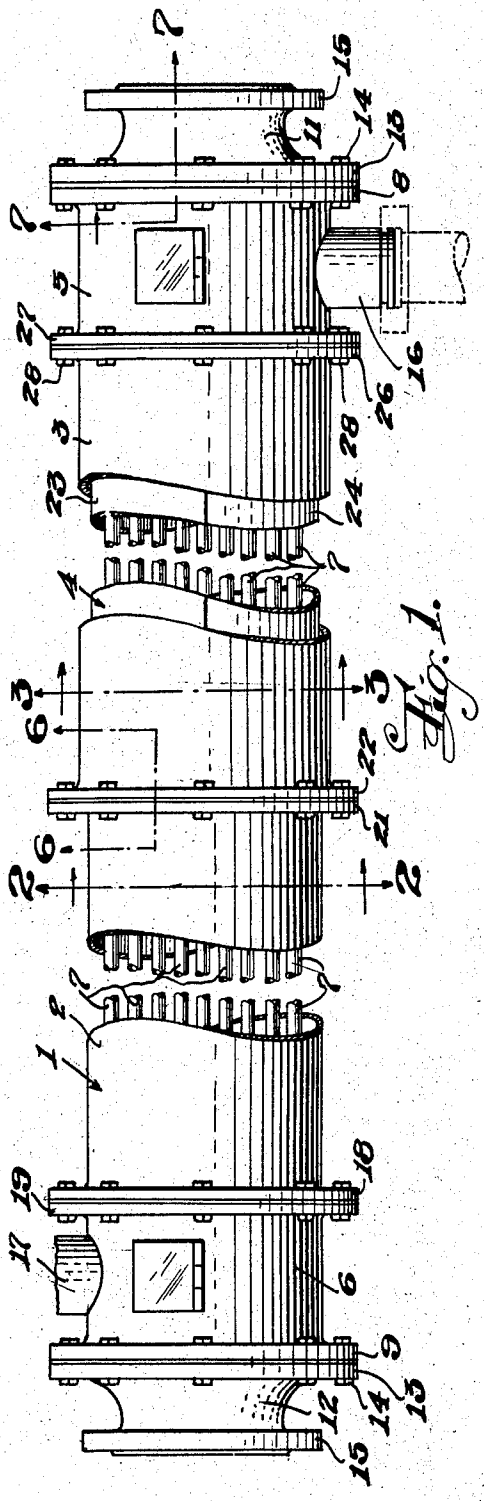


Fig. 1.

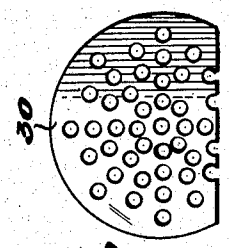


Fig. 5.

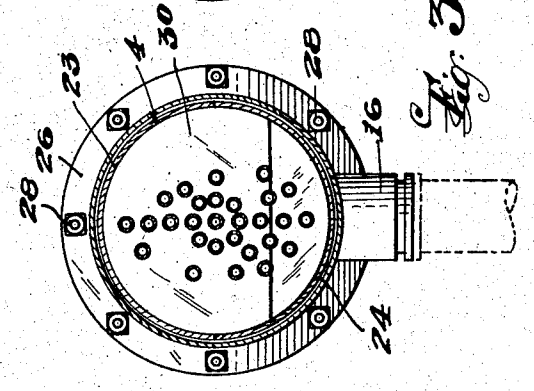


Fig. 3.

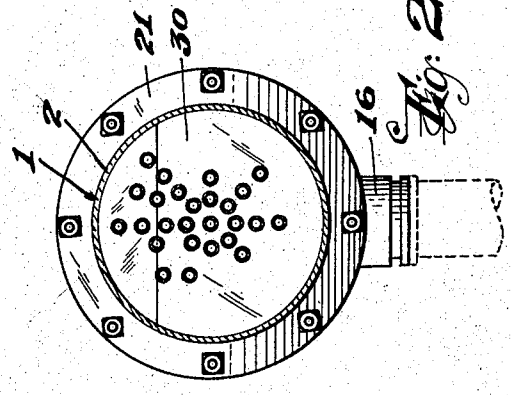


Fig. 2.

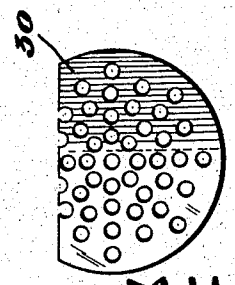


Fig. 4.

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INVENTOR

BY Robie Thompson

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COOLER

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Fig. 6.

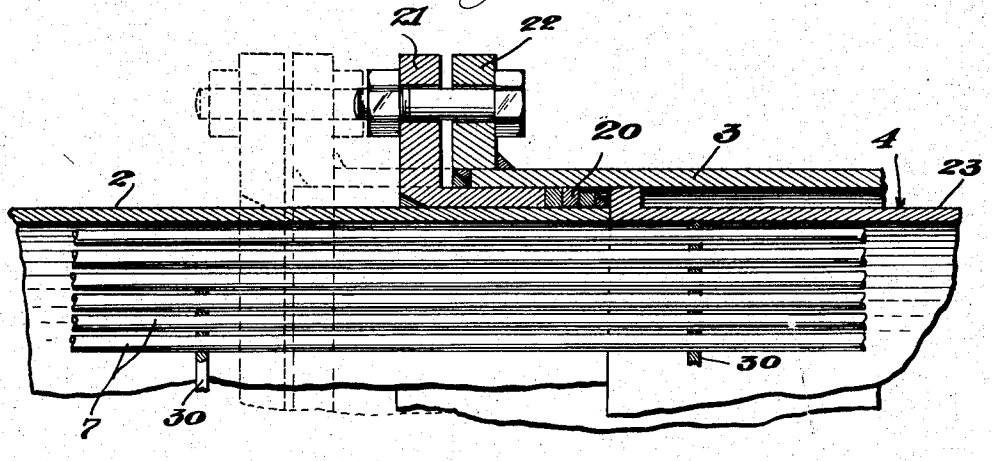
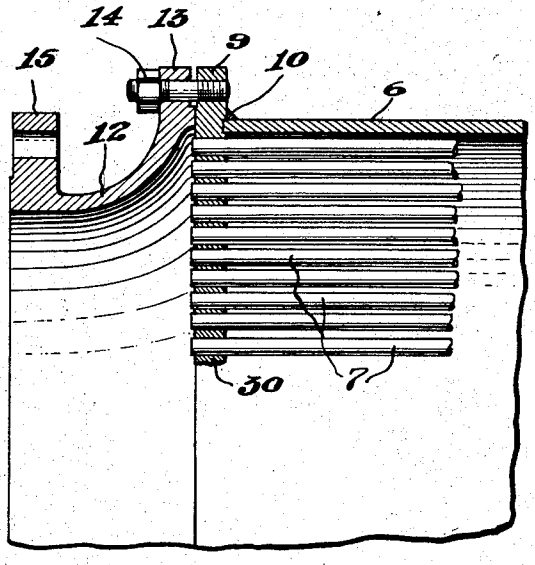


Fig. 7.



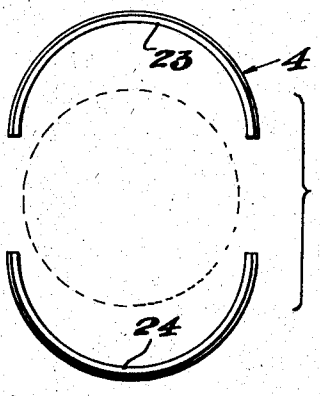


Fig. 8.

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Dec. 21, 1937. M. H. KOTZEBUE 2,102,723

COOLER

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Fig. 9.

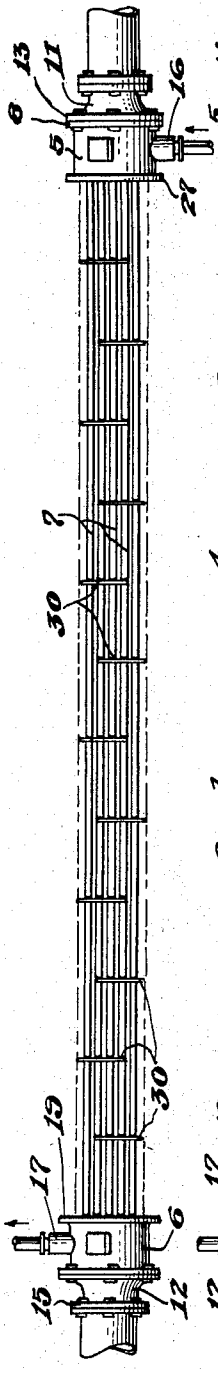


Fig. 10

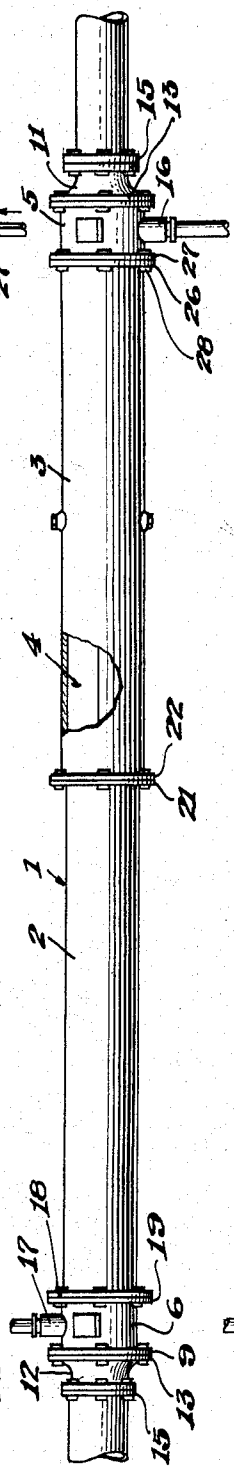


Fig. 11.

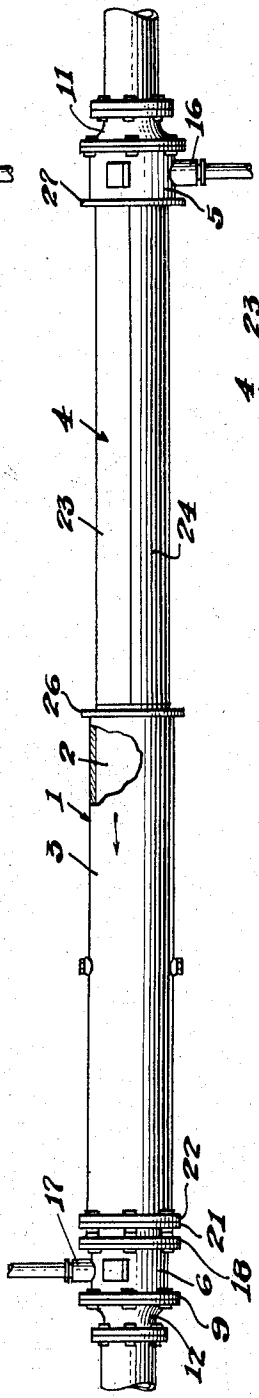


Fig. 12.

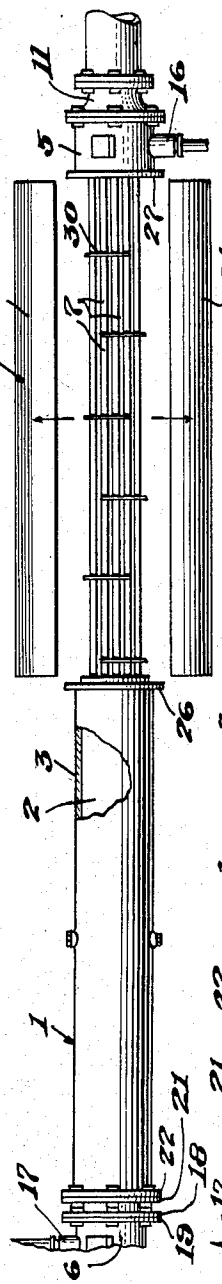
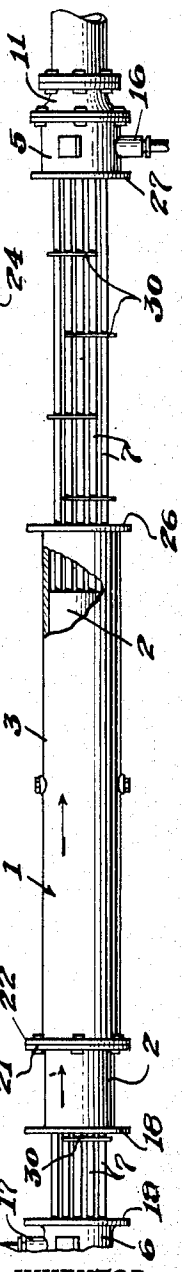


Fig. 13.



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Patented Dec. 21, 1937

2,102,723

UNITED STATES PATENT OFFICE

2,102,723

COOLER

Meinhard H. Kotzebue, Tulsa, Okla., assignor to Worthington Machinery Corporation of Oklahoma, Tulsa, Okla., a corporation of Oklahoma

Application February 5, 1937, Serial No. 124,248

7 Claims. (Cl. 257—236)

This invention relates to heat exchangers and more particularly to coolers for cooling various liquids, particularly about petroleum refineries, such as the jacket water of internal combustion engines, petroleum oils or parts thereof, when pumped through a pipe.

An object of the present invention is to provide a cooler as specified which may be quickly, easily and thoroughly cleaned without disconnecting any of the line connections thereof, either those through which the liquid passing through the tubes of the cooler is pumped or those of the water or other liquid circulating through the jacket of the cooler.

More specifically, the present invention embodies a cooler comprising an outer shell composed of a plurality of sections, certain of which are telescopically associated, while other sections are removable, to permit access to the tubes of the cooler for cleaning sediment from the interior of the casing and from about the tubes.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a cooler of the preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a side elevation of the improved cooler having parts thereof broken away.

Figure 2 is a cross section through the improved cooler taken on the line 2—2 of Figure 1.

Figure 3 is a cross section through the improved cooler taken on the line 3—3 of Figure 1.

Figures 4 and 5 are detail elevations of support plates employed in the cooler structure.

Figure 6 is an enlarged fragmentary section taken on the line 6—6 of Figure 1.

Figure 7 is a detail section taken on the line 7—7 of Figure 1.

Figure 8 is a detail end view of a part of the casing of the cooler.

Figures 9, 10, 11, 12 and 13 are detail views in side elevation showing different positions of the parts of the cooler, so as to permit cleaning thereof, and specifically Figure 9 shows the cooler with the casing removed.

Figure 10 shows the cooler in side elevation with all of the casing sections in place.

Figure 11 is a side elevation of the cooler showing one section of the casing telescoped over the other section so as to permit the removal of the sectional portion of the casing.

Figure 12 is a view similar to Figure 11 showing the removable sections removed.

Figure 13 is a view showing how the smaller section may be telescoped into the larger section to permit access to the tubes for cleaning.

Referring more particularly to the drawings, the improved cooler comprises the casing 1 which is composed of the smaller tubular section 2, the larger tubular section 3, the inner section 4 and the inlet and outlet heads 5 and 6 respectively for the liquid which circulates through the casing. The tubes 7 have their ends attached in the usual manner to tube heads 8 and 9. The tube heads 8 and 9 are welded, as shown at 10, to the ends of the tube or casing forming the inlet and outlet heads 5 and 6. Inlet and outlet heads 11 and 12 for the liquid pumped through the tubes 7 are detachably connected to the tube heads 9 in any suitable manner such as by means of the flanges 13 and bolts 14. The heads 11 and 12 have flanges 15 thereon by means of which they may be connected to the pipes of the pipe line in which the cooler is interposed.

The inlet head 5 has an inlet connection 16 connected thereto and opening into the inlet head preferably from the bottom while the outlet head 6 has an outlet pipe 17 connected thereto, preferably at the topmost portion thereof so as to carry away any air, gas or vapor from the interior of the casing 1.

The section 2 of the casing has a flange 18 formed on its outer end by means of which it is attached to the flange 19 of the head 6 and it is smaller in diameter than the section 3 of the casing. The inner end of the smaller section 2 extends into the inner end of the larger section 3 as clearly shown in Figure 6 of the drawings. Packing shown at 20 is mounted about the inner end of the smaller section 2 and within the larger section 3 and is held in place and compressed by a packing gland 21 which is in turn connected to a flange 22. The flange 22 may be welded or otherwise suitably attached to or formed upon the inner end of the larger section 3.

The inner section 4 is placed within the larger section 3 of the casing and it is formed of a plurality of sections 23 and 24 as clearly shown in the drawings. The sections 23 and 24 engage in longitudinal edgewise engagement as clearly shown in Figure 3 of the drawings so as to form a continuation of the casing through which the liquid circulates, and their inner diameter is substantially equal to the inner diameter of the sec-

tion 2. The inner ends of the sections 23 and 24 engage against the inner end of the section 2 while their outer ends engage against the inner end of the head 5. In the drawings the inner casing 4 is shown as made of only two sections with their joints in a horizontal plane, but it is to be understood that this inner casing section may be made in any number of pieces or sections without departing from the spirit of the present invention, and that their engaging joints may be disposed in any desired practical plane and particularly in a vertical plane, so as to permit them to fall outwardly when the larger section 3 is telescoped over the smaller section 2.

The larger section 3 has a flange 26 on its outer end which is detachably connected in any suitable manner such as by bolts 28 to the flange 27 on the head 5.

With coolers of approved type heretofore in use, it has been necessary to disconnect the pipe connections to the cooler and use considerable force for cleaning the cooler of sediment, entailing considerable expense and also requiring that the cooler be taken off of the line and completely disconnected during the cleaning operation. With the present invention, the interior of the casing and the exterior of the tubes may be thoroughly cleaned, easily and in a short space of time, without requiring the dismembering or disconnecting of any of the pipe connections with the cooler.

When it is desired to clean the cooler, the large section 3 is telescoped over the small section 2, as shown in Figure 11 of the drawings, the only disconnecting operation necessary being that of disconnecting the flanges 26 and 27. After the large section 3 has been telescoped over the small section 2, the inner casing 4 will be exposed so that the sections 23 and 24 thereof may be removed as shown in Figure 12 of the drawings, exposing the tubes 7 of substantially one-half of the length of the cooler, so that the sediment may be easily cleaned from the exposed portions of the tubes. After the portion of the tubes 7 which is normally housed within the inner casing section 4 have been cleaned the casing sections 3 and 2 are then moved over the cleaned portions of the tubes exposing the tubes of the other half of the cooler and permitting them to be thoroughly cleaned. After they have been cleaned, the casing sections 2 and 3 are again moved to the normal position of the smaller section 2 and the removable section 4 is placed in position, after which the larger section 3 is moved or slipped over and the entire cleaned cooler is again ready for operation.

The tubes 7 may be supported at spaced points along their lengths by support sheets 30, each of which forms only a segment of the interior of the casing. The support sheets 30 are arranged staggeredly, as shown in Figure 9 of the drawings, so as to cause the cooling fluid to pass through the cooler in a sinuous path.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In a cooler, a casing, liquid inlet and outlet heads at the ends of said casing, tubes extending through said casing, said casing between said heads being formed of a large section and a small section arranged end to end whereby the smaller section may be telescoped into the larger section to permit access to the tubes at one end of the cooler, and the larger section telescoped over the smaller section to permit access to the tubes at the other end of the cooler, said casing sections being detachably connected to said inlet and outlet heads whereby the latter may remain in place during movement of the casing sections.

2. In a cooler, a casing, liquid inlet and outlet heads at the ends of said casing, tubes extending through said casing, said casing between said heads being formed of a large section and a small section arranged end to end whereby the smaller section may be telescoped into the larger section to permit access to the tubes at one end of the cooler, and the larger section telescoped over the smaller section to permit access to the tubes at the other end of the cooler, and an inner casing section within said larger section and extending from the inner end of the smaller section to the outer end of the larger section.

3. In a cooler, a casing, liquid inlet and outlet heads at the ends of said casing, tubes extending through said casing, said casing between said heads being formed of a large section and a small section arranged end to end whereby the smaller section may be telescoped into the larger section to permit access to the tubes at one end of the cooler, and the larger section telescoped over the smaller section to permit access to the tubes at the other end of the cooler, an inner casing section within said larger section and extending from the inner end of the smaller section to the outer end of the larger section, said inner section having an inner diameter substantially equal to the inner diameter of the smaller section.

4. In a cooler, a casing, liquid inlet and outlet heads at the ends of said casing, tubes extending through said casing, said casing between said heads being formed of a large section and a small section arranged end to end whereby the smaller section may be telescoped into the larger section to permit access to the tubes at one end of the cooler, and the larger section telescoped over the smaller section to permit access to the tubes at the other end of the cooler, an inner casing section within said larger section and extending from the inner end of the smaller section to the outer end of the larger section, said inner section formed of a plurality of sections whereby it may be removed when the larger section is telescoped upon the smaller section.

5. In a cooler, a casing, liquid inlet and outlet heads at the ends of said casing, tubes extending through said casing, said casing between said heads being formed of a large section and a small section arranged end to end whereby the smaller section may be telescoped into the larger section to permit access to the tubes at one end of the cooler, and the larger section telescoped over the smaller section to permit access to the tubes at the other end of the cooler, an inner casing section within said larger section and extending from the inner end of the smaller section to the outer end of the larger section, said inner section formed of a plurality of sections whereby it may be removed when the larger section is telescoped upon the smaller section, the inner end of said smaller section extending into the inner end of the larger section, and packing about the smaller section within said larger section.

6. In a cooler, a casing, liquid inlet and outlet heads at the ends of said casing, tube heads attached to the outer ends of said inlet and outlet heads, tubes carried by said tube heads and ex-

tending through said casing, said casing between said inlet and outlet heads formed of a large section and a small section arranged end to end whereby the smaller section may be telescoped into the larger section to permit access to the tubes at one end of the cooler and the larger section telescoped over the smaller section to permit access to the tubes at the other end of the cooler, an inner casing section within said larger section and extending from the inner end of the smaller section to the outer end of the larger section.

7. In a cooler, a casing, liquid inlet and outlet heads at the ends of said casing, tube heads attached to the outer ends of said inlet and outlet heads, tubes carried by said tube heads and extending through said casing, said casing between said inlet and outlet heads formed of a large section and a small section arranged end to end whereby the smaller section may be telescoped into the larger section to permit access to the tubes at one end of the cooler and the larger section telescoped over the smaller section to permit access to the tubes at the other end of the cooler, an inner casing section within said larger section and extending from the inner end of the smaller section to the outer end of the larger section, said inner section formed of a plurality of sections whereby it may be removed when the larger section is telescoped upon the smaller section.

MEINHARD H. KOTZEBUE.