Nov. 24, 1931. W. H. McGRATH 1,833,876

PIPE COIL HEAT EXCHANGE EQUIPMENT

Filed Jan. 31, 1929 2 Sheets-Sheet 1

Fig.-1

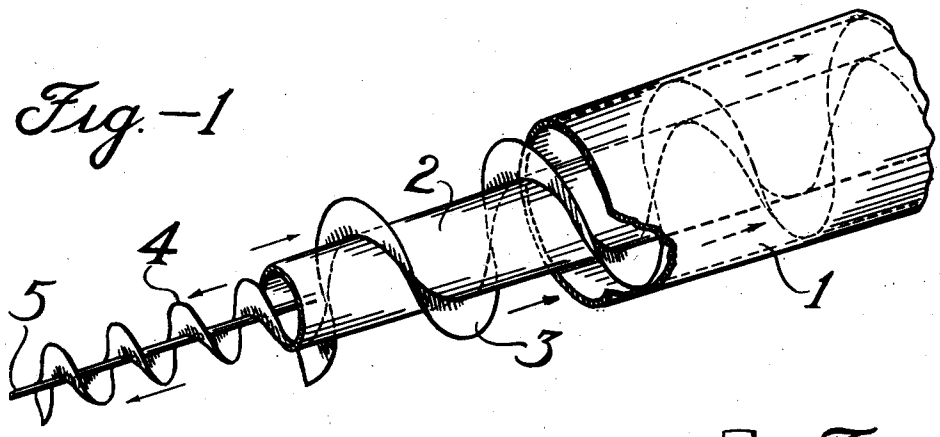
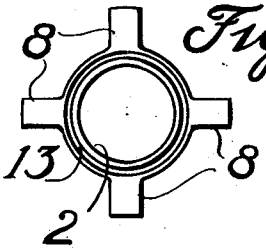


Fig.-3



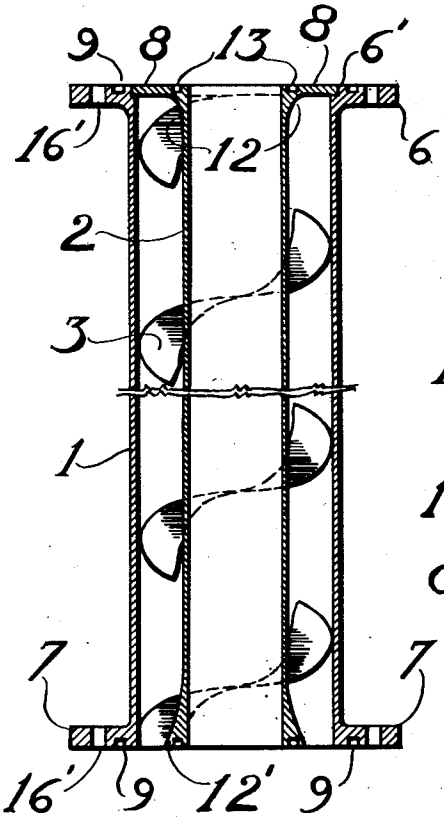


Fig.-2

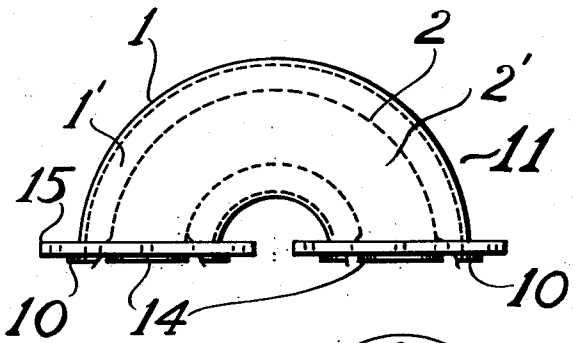


Fig.-4

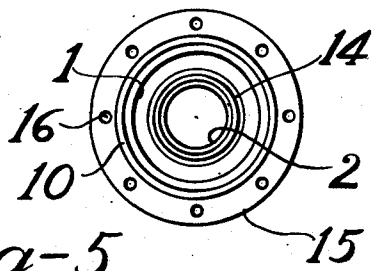


Fig.-5

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PIPE COIL HEAT EXCHANGE EQUIPMENT

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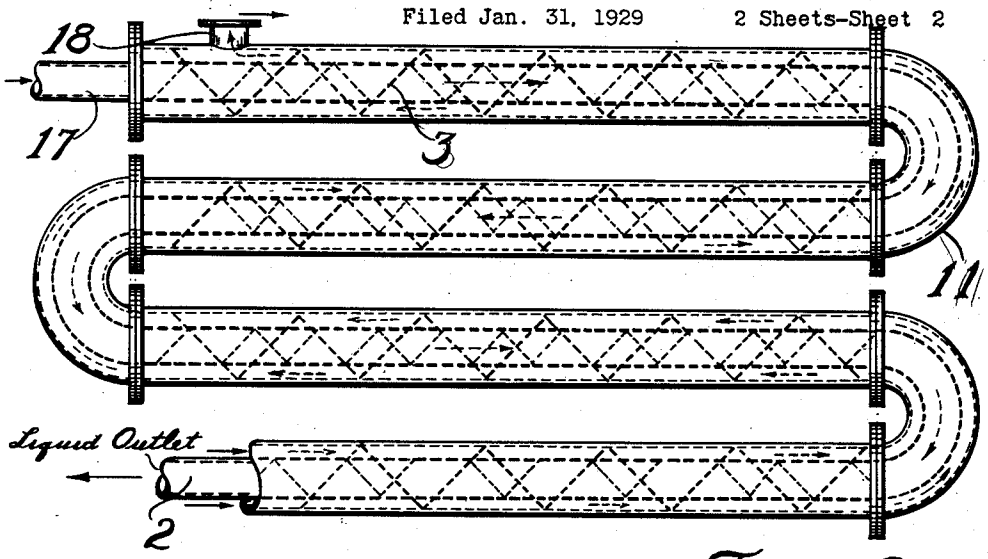


Fig.-6

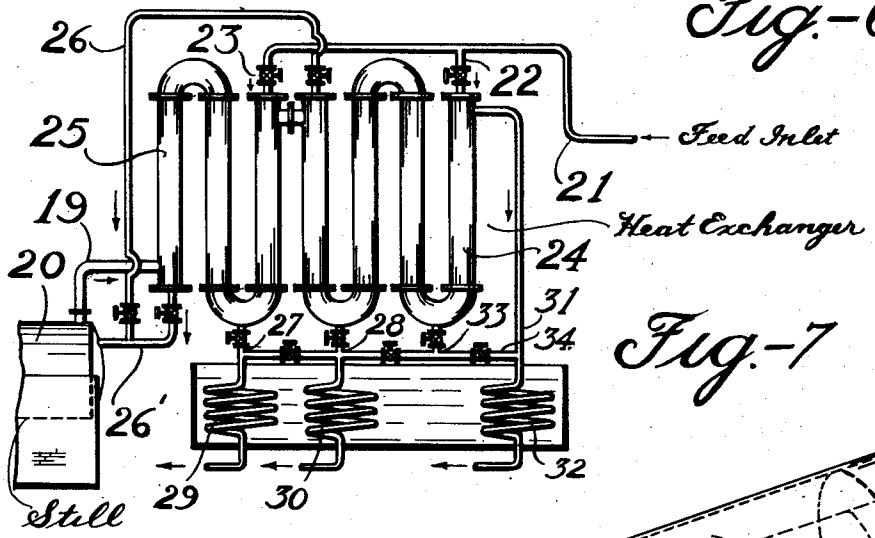


Fig.-7

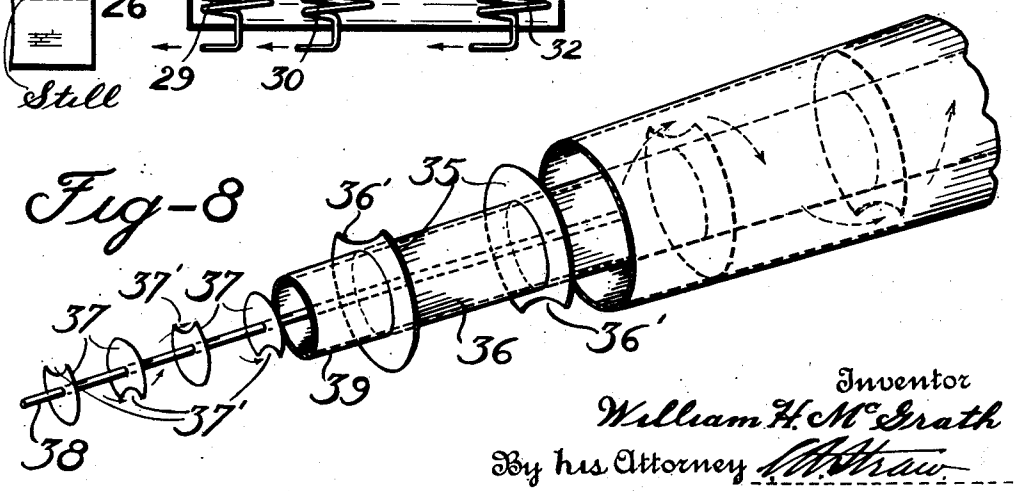


Fig-8

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Patented Nov. 24, 1931 1,833,876

UNITED STATES PATENT OFFICE

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PIPE COIL HEAT EXCHANGE EQUIPMENT

Application filed January 31, 1929. Serial No. 336,370.

This invention relates to improvements in tubular heat exchange equipment of the type in which baffles are placed in the fluid stream. Numerous forms of such equipment have heretofore been proposed with a view to obtaining thorough mixing and efficient contact of fluid with the tube walls. Principal objects of the present invention are to provide simple and effective means comprising internal and external pipes with baffle means in operative relation to both the pipes. In a preferred form of the improvements described herein, the baffles are readily removable for cleaning.

The invention will be fully understood from the following description read in connection with the accompanying drawings, in which

Fig. 1 is a fragmentary perspective view showing the parts in withdrawn position;

Fig. 2 is a vertical section through the outer and inner pipes;

Fig. 3 is an end view of the inner pipe;

Fig. 4 is a side elevation of a preferred type of return bend;

Fig. 5 is an end elevation of the same;

Fig. 6 is a side elevation, partly in section, showing a horizontal arrangement of the exchanger;

Fig. 7 is a diagrammatic side elevation showing the utilization of a vertical form of the equipment in connection with an oil still; and

Fig. 8 is a view similar to Fig. 1, showing a modified form.

Referring to the drawings, 1 denotes an outer pipe and 2 a smaller pipe arranged therein. A helical baffle is secured to the pipe 2, preferably by welding, though it may be secured by removable means such as bolts and nuts. Baffle 3 is of such size as to hold pipe 2 concentrically in pipe 1. A helical baffle 4, mounted on a rod 5, is adapted to fit snugly in pipe 2.

The outer pipe 1 has an outwardly extending annular flange 6 at one end and a corresponding flange 7 at the other end. Flange 6 is recessed at 6′ on its inner margin to receive lugs 8 formed at the end of inner pipe 2. Flanges 6 and 7 have annular grooves 9 to receive a correspondingly shaped tongue 10 on a return bend 11. Enlarged terminal portions 12, 12′, on pipe 2 also have annular grooves 13, adapted to receive a correspondingly shaped tongue 14 on return bend 11. It will be noted that the return bend has inner and outer passages 1′, 2′, corresponding to pipes 1 and 2, so that liquids flowing through these pipes do not at any time come into direct contact with each other.

Flanges 15 on the return bend are secured to flanges 6 and to flanges 7 on adjacent sections of pipes 1, by bolts and nuts or other readily removable means, not shown. Bolt holes 16 may be provided in the flanges 15 to cooperate with bolt holes 16′ in flanges 6 and 7.

In assembling the equipment, rod 5 carrying baffle 4 is run into pipe 2 and then this pipe is inserted in pipe 1 so that lugs 8 are seated in recesses 6′. Return bends 11 are next secured to adjacent sections. It will be seen that the assembly and disassembly are easily accomplished, which is a great advantage, especially if the equipment is to be used with oils or other liquids which may foul the heat exchange surfaces and necessitate frequent cleaning.

In Fig. 6 I have illustrated the use of my device for simple countercurrent heat exchange between two liquids. The inlet for the liquid entering the inner pass is at 17. The liquid in the outer pass flows in the opposite direction and discharges at 18. While countercurrent flow is generally desirable, both liquids may of course flow in the same direction. The equipment may be heated or cooled in any suitable way.

Fig. 7 shows the improved heat exchanger vertically arranged and connected by a vapor line 19 to a still 20. Feed oil is supplied to the still through line 21 which is connected by branches 22 and 23, respectively, to a terminal section 24 and an intermediate section 25 of the heat exchange equipment. Lines 26 and 26′ convey the preheated oil to the still. Suitable valves are arranged in the lines so that the flow of oil through the exchanger may be regulated as desired.

In the installation shown, the feed oil

passes through the inner pipes and the vapors pass through the outer pipes. Condensates may be taken off through lines 27 and 28 to suitable cooling coils 29 and 30. Any vapors leaving the terminal section 24 pass through a line 31 into a cooling coil 32. A draw-off line 33 conveys condensate from the terminal section 24 into a line 34 which is connected with the draw-off lines 27, 28 and 31. Valves are provided in these lines to permit the routing of the condensate in any desired manner.

I prefer to use baffles in a true helical form but this is not an essential of the invention. Any baffle means which will insure adequate mixing of the liquid passing through the tube and effective contact of the liquid with the tube walls may be used in the improved equipment. For example, one alternative form of baffle is shown in Fig. 8 in which plates 35 are mounted on pipe 36 and have cut away portions 36′ oppositely arranged to compel circuitous flow of liquid outward into contact with the tube walls. Similar baffles 37, having cut away portions 37′, are mounted on a rod 38 adapted for insertion in an inner pipe 39.

Instead of the arrangement shown for installing the baffles, any other means may be provided which will permit the removal of the baffles for cleaning.

The construction described is preferred but it will be understood that various changes and alternative arrangements may be made within the scope of the appended claims, in which it is my intention to claim all novelty inherent in the invention as broadly as the prior art permits.

I claim:

1. Heat exchange equipment comprising an outer pipe, an inner pipe in spaced relation thereto, a return bend having outer and inner passageways detachably connected respectively to the outer and inner pipes, and baffle means operatively arranged with respect to both the inner and outer pipes.

2. Heat exchange equipment comprising a plurality of condenser units including pipes concentrically disposed to form an annular passage and an inner passage, a spiral baffle in the annular passage, a spiral baffle detachably supported in the inner passage, the inner pipe being detachably supported in the outer pipe, and return bends detachably connecting adjacent units, each bend having an annular passage and an inner passage communicating with the corresponding passages of the units.

3. Heat exchange equipment comprising a plurality of condenser units including pipes concentrically disposed to form an annular passage and an inner passage, a spiral baffle in the annular passage, a spiral baffle detachably supported in the inner passage, the inner pipe being suspended freely in the outer pipe, and return bends detachably connecting adjacent units, each bend having an annular passage and an inner passage communicating with corresponding passages of the units.

WILLIAM H. McGRATH.