Nov. 12, 1929. J. KOŽELUH 1,735,169

APPARATUS FOR HEATING LIQUIDS IN TANKS

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Fig. 1.

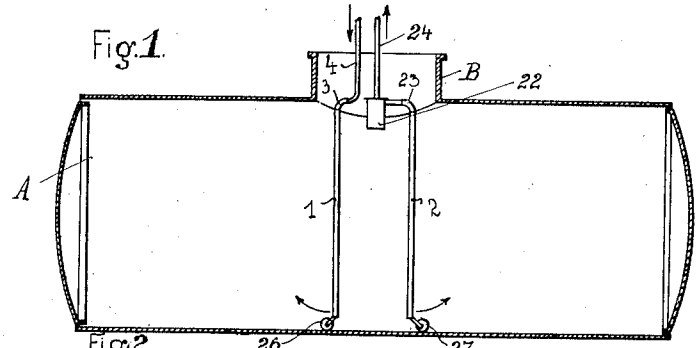
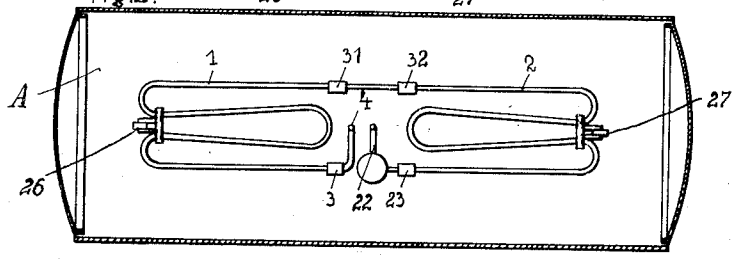



Fig. 2.




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Fig. 3.

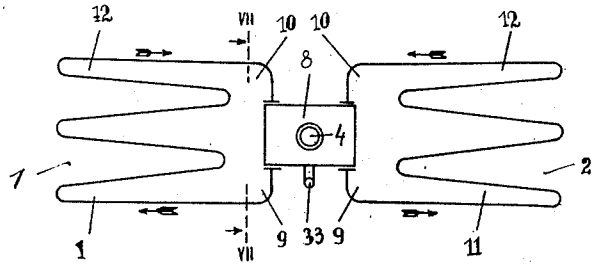
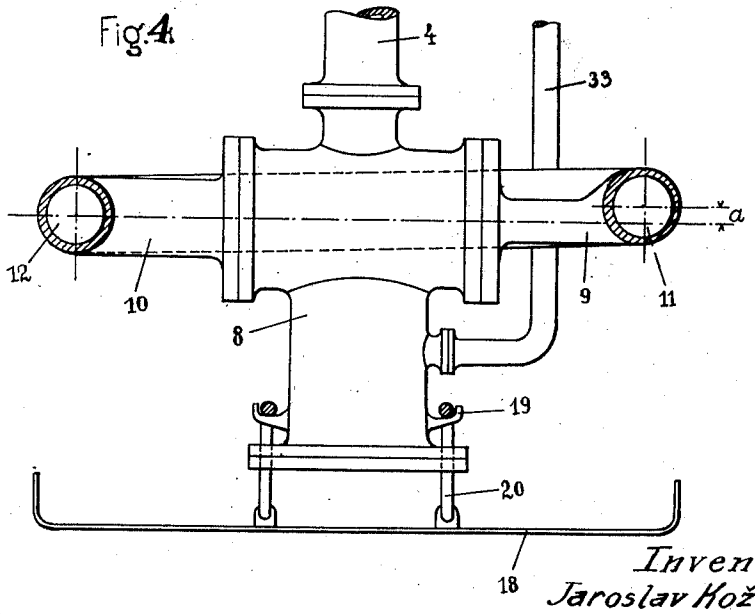



Fig. 4.




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# UNITED STATES PATENT OFFICE

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## APPARATUS FOR HEATING LIQUIDS IN TANKS

Application filed April 7, 1928, Serial No. 268,314, and in Czechoslovakia November 29, 1926.

My invention relates to apparatus for the heating of liquids stored in tanks, such as oil stored in a tank car, in order to facilitate discharging of the tank.

It is an object of my invention to provide improved heating means adapted to this purpose and to this end I have designed a system of foldable pipes which can be lowered into the tank in folded condition in which it is so small as to be readily introduced through the manhole, whereupon the pipes are spread out in the tank.

It is known that oil and other liquids the viscosity of which is depending on the temperature, are often so thick that it is difficult or impracticable to discharge them from the tank. It has been attempted to overcome this drawback by introducing a heating coil through the manhole of the tank, but this expedient was not satisfactory because it only effected local heating. The oil only became thinner in a body constituting substantially a vertical cylinder and the thinner oil, on account of its reduced density, was forced to the surface by the colder and consequently denser oil which prevented access of the thinner oil to the discharge pipe.

This drawback is overcome according to this invention as the contents of the tank are heated throughout. A heating medium, for instance steam, is supplied to a system of pipes by means of a preferably vertical pipe, the condensate being removed by an automatic separator and the excess steam being blown off through a pipe which may be parallel to the steam supply pipe.

Various means may be provided for spreading and folding the system of heating pipes.

In the drawings affixed to this specification and forming part thereof different modifications of heating appliances embodying my invention are illustrated diagrammatically by way of example.

In the drawings

Fig. 1 is a longitudinal vertical section of a tank with the heating apparatus inserted in folded condition.

Fig. 2 is a horizontal section showing the heating apparatus unfolded.

Fig. 3 is a diagram of a modified apparatus, and

Fig. 4 is a section on the line VII—VII in Fig. 3, drawn to a larger scale.

Referring first to Figs. 1 and 2, A is a tank, B is the usual dome to which the manhole cover (not shown) is attached, 4 is a steam supply pipe, 1 and 2 are heating pipes or coils which are connected at one end with the supply pipe 4 by a joint 3, 22 is a condensate separator which is connected with the pipe or coil 2 by means of a link 23, 31 and 32 are joints connecting the pipes or coils 1 and 2 on the side opposite the condensate separator 22; 24 is a discharge pipe through which the excess steam from the separator 22 is removed. When the appliance is lowered into the tank the coils 1 and 2 are in the vertical position as illustrated in Fig. 1, so that the appliance is readily admitted through the manhole and the dome B. Gravity is relied on for spreading the appliance. To this end, the coils 1 and 2 are provided at their free ends with rollers 26 and 27 which as indicated by the arrows in Fig. 1, will move along the bottom of the tank when the appliance is lowered and finally will assume the position illustrated in Fig. 2. When the appliance is removed, the coils will return to their initial position under the action of gravity.

In Fig. 3 the coils 1 and 2 are jointed to a casing 8 at both ends 9 and 10, to which casing the steam supply pipe 4 is connected so that the appliance is raised and lowered in unison with the pipe 4. Passages, not shown, are provided in the casing 8 for conducting the steam to the inlet ends 9, 9 of each coil whereupon it flows through bends 11, 12 of the coils as indicated by the arrows, and finally is discharged into the condensate chamber of the casing 8 from the outlet ends 10, and removed through a vertical pipe 33. As will appear from the section in Fig. 4 the inlet 9 of each coil and the bend 11 which is connected with the inlet, are at a higher level than the bend 12 with the outlet end 10, the vertical pitch being *a*. This facilitates the flow of condensate from 9 to 10 and this action is assisted by the distribution of the weights as the outlet end of each coil is of larger diameter

than its inlet end, and besides its weight is increased by the condensate. This displaces the center of gravity of the system from its vertical axis toward the discharge side so that when suspended the system is inclined toward the discharge side and the draining of the condensate is much facilitated by the inclination of the coils.

A cup 18 as shown in Fig. 4 may be suspended from the lower end of the casing 8 by means of links 20 which are held by hooks 19 on the outside of the casing 18 so that the oil dripping from the appliance is collected.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

I claim:—

1. A heating appliance comprising supply and discharge pipes for a heating medium, a heating unit jointed to said pipes, so that said unit tends to assume one of its final positions under the action of gravity, and abutments on said units which are adapted to move on the bottom of said tank when said appliance is displaced in vertical direction.

2. A foldable appliance for heating the contents of a tank comprising a casing, means for supplying a heating fluid to, and means for discharging the condensate of the fluid from, said casing, and a heating unit jointed to said casing at its two ends, the center of gravity of the appliance being pitched out of the axis of said casing so that said appliance in its operative position assumes an inclination with the outlet end of said unit at a lower level than its inlet end.

In testimony whereof I affix my signature.

JAROSLAV KOŽELUH.