Nov. 2, 1926. 1,604,988

F. H. GILCHRIST

TANK HEATER

Filed July 26, 1921 2 Sheets-Sheet 1

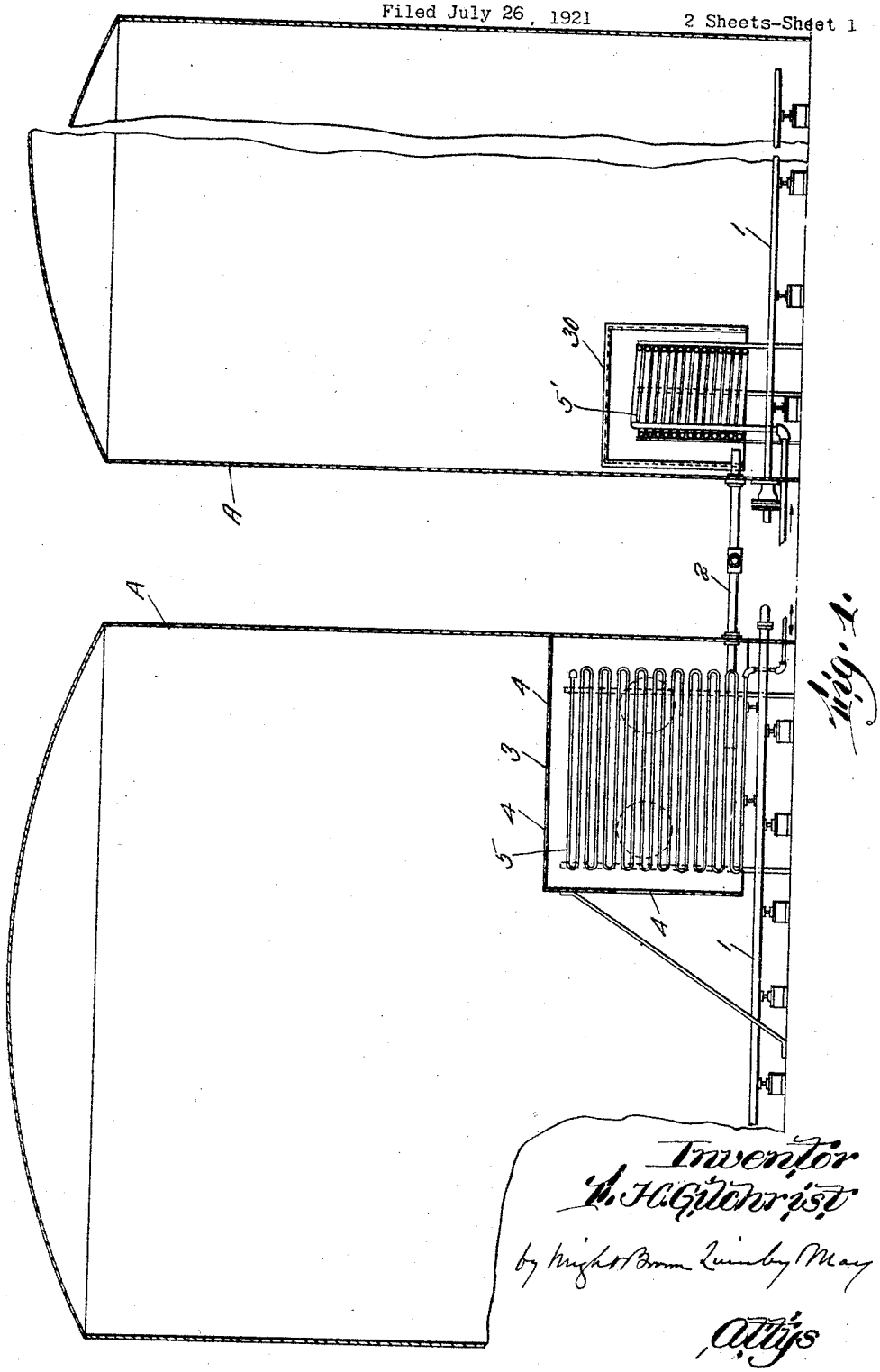

Fig. 1.

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2 Sheets-Sheet 2

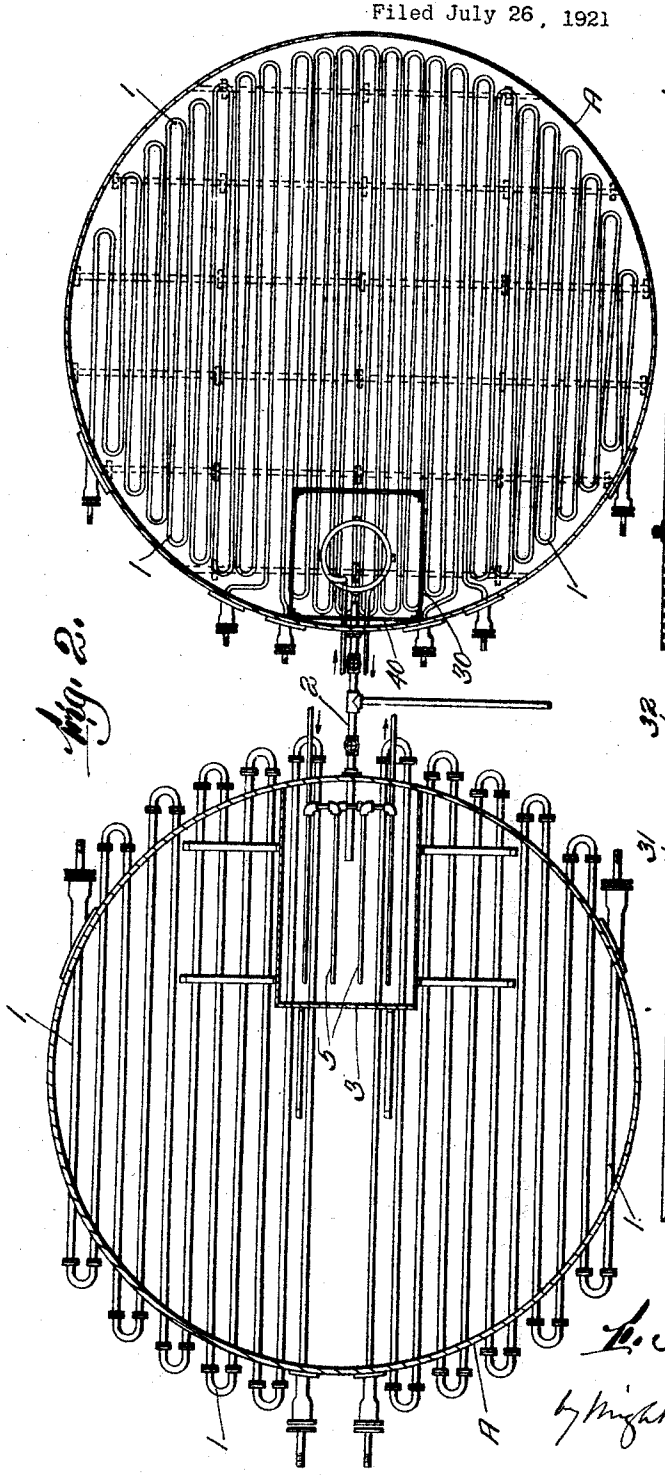

Fig. 2.

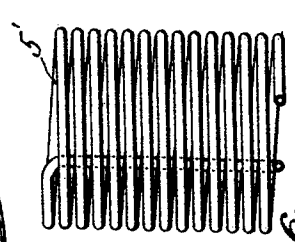

Fig. 6.

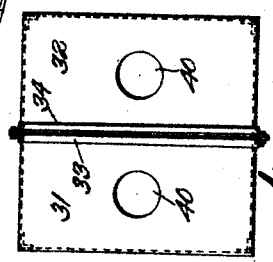

Fig. 5.

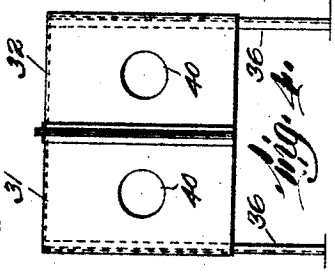

Fig. 4.

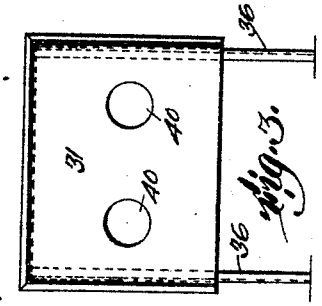

Fig. 3.

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UNITED STATES PATENT OFFICE.

FRANK H. GILCHRIST, OF JOLIET, ILLINOIS, ASSIGNOR TO THE FLINTKOTE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

TANK HEATER.

Application filed July 26, 1921. Serial No. 487,809.

In order to draw off liquids such as heavy oils or asphalt from storage tanks, particularly in cool weather, it is often necessary to apply heat to render the viscid contents sufficiently fluid to flow or be pumped readily. For this purpose such tanks are usually supplied with internal coils or lines of piping through which steam is passed, these heating pipes being disposed over a large area at the bottom of the tank and of sufficient capacity to heat the entire contents. As the tanks have a large superficial area exposed it is evident that, particularly in cold weather, there is a large loss of heat by radiation and convection, necessitating large coil capacity, and a considerable expenditure of steam for effecting the desired result. Moreover, considerable time is required after the steam is turned on for the tank contents to become sufficiently fluid to be drawn off.

When intermittent or occasional drawing off is desirable, it is evident that with this construction heat must be applied continuously in order that the drawing, when required, is not unnecessarily delayed. Heating is then a very considerable item of expense.

This invention provides a method of construction whereby a material saving of heat may be effected without sacrificing any desirable results. By this method no attempt is made to heat and to maintain hot the entire contents of the tank simultaneously, but only to heat that portion of the contents adjacent to the outlet to maintain it in condition to be readily drawn off, the adjacent cooler and more viscid material moving into the heated zone as the heated material is drawn off.

In order to carry out this method a comparatively small heating element is placed in the tank near the outlet, this element being preferably partially enclosed to localize the heating effect but sufficiently open to permit the unheated more viscid material to move into the heated zone as fast as it is required to be drawn off. The cooler material forms during the heating operation a non-conducting casing for the heated portion, preventing radiation of heat to the surrounding atmosphere and such radiation as is permitted is utilized to heat the material to be drawn off later.

For a more complete understanding of this invention, together with further objects and advantageous details and combinations of parts, reference may be had to the accompanying drawings illustrating embodiments thereof in which,

Figure 1 is a partial vertical cross section through a pair of storage tanks showing two forms of heating elements constructed according to this invention.

Figure 2 is a horizontal cross section of the same.

Figures 3, 4, and 5 are side and end elevations and a top plan view, respectively, of the casing for one of these elements.

Figure 6 is a side elevation of a heating coil.

Referring to Figures 1 and 2, at A are shown tanks for containing the oil, asphalt, or other material to be drawn off. While as shown these tanks are of a stationary type, it is evident that a similar construction could be applied to tank cars or any other type of tank receptacle, wherein material of this kind may be stored. In the lower portion of each tank is shown the usual system of heating coils or pipes at 1, it being preferable to employ such pipes when it is desired to heat the tank more thoroughly than can be done by the mechanism of this invention as when it is required to clean the tank, or when it is desired to empty the entire tank in an expeditious manner. As shown these pipes may extend entirely through the walls of the tank, being connected at their ends outside thereof as shown in the left hand tank in these figures, or they may be formed as flattened coils as shown in the right hand tank, or in any other suitable or usual manner, these coils being of sufficient area to expeditiously heat the entire contents of the tank.

An outlet pipe for each tank is shown at 2, these pipes extending to a substantial distance within the outer tank wall and being steam jacketed or otherwise heated outside the tank. In the left hand tank, as shown in these figures, this pipe extends within a metallic casing 3 of comparatively small size relative to the tank and positioned entirely therein having perforations 4 in its top and side faces through which the material may flow inwardly toward the pipe. Positioned substantially surrounding the inner end of this outlet pipe is a series of heating pipes arranged as shown in parallel

flat coils 5, these coils being distributed throughout the interior of the casing 3, and of large capacity relative thereto so as to heat the contents thereof rapidly. As shown in this construction the outer wall of the casing 3 is formed by the wall of the tank itself.

In the right hand tank a different construction is shown in which the enclosure or casing 30 is formed of a pair of mating sections 31 and 32 (see Figures 3, 4, and 5), these sections having flanges 33 and 34 at their adjacent edges which may be bolted together to form a substantially rectangular box open at its lower end and supported from the bottom of the tank by means of standards 36. Holes 40 are made through the side walls and top of the enclosure to allow the material to pass therein toward the outlet pipe, the inner end of which passes within the casing. In this form also the heating element is shown as a coil 5′ (see Figure 6), the upper end of this coil being dropped down within the interior and preferably forming the inlet end, though the heating agent might be forced in the reverse direction if desired. The casing 30 is spaced somewhat from the tank walls so as to be entirely surrounded by the cooler tank contents.

In both forms the enclosure for the heating element is substantially smaller than the entire tank so that a comparatively small portion of the contents is heated at one time. The casing serves to effectually break up any considerable amount of convection currents in the material which would tend to heat the entire contents, but is sufficiently open to permit the heavy material to pass into the enclosure as fast as it may be drawn off through the outlet pipe 2.

Should intermittent use be desired, it is only necessary that sufficient material be heated for each withdrawal in the receptacle, if the openings in the receptacle are large enough to permit the unheated material to replenish that drawn off during the intervals between drawing off.

While certain embodiments of heating elements have been shown it is evident that the type of element is immaterial to this invention and that other than coils might be employed if it should be found desired and that coils in other arrangement than shown may be employed without departing from the spirit or scope of this invention. It is also evident that many other changes and modifications might be made therein without departing from the inventive idea or the scope of the appended claims.

I claim:

1. In combination, a container, an outlet pipe projecting into said container, a heating element located adjacent the inner end of said pipe and a partial enclosure for said pipe and element entirely within said container.

2. In combination, a container having an outlet, a pair of heating elements in said container, one of said elements being positioned adjacent said outlet, and a partial enclosure for said one element.

3. In combination, a storage receptacle, a two part perforated casing having an open lower end supported from the bottom within said receptacle, an outlet pipe for said receptacle projecting into said casing, and a heating coil of relatively large size compared to said casing positioned therein adjacent said outlet pipe.

4. In combination, a storage receptacle, a casing of relatively small size positioned entirely within said receptacle near its lower portion, an outlet pipe for said receptacle projecting into said casing, and a heating element of relatively large size positioned within said receptacle.

5. In combination, a storage receptacle, a casing of relatively small size positioned within said receptacle so as to be entirely surrounded by the contents of said receptacle, an outlet pipe for said receptacle projecting within said casing, and a heater in said casing.

In testimony whereof I have affixed my signature.

FRANK H. GILCHRIST.