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TAR PUMP SYSTEM

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This invention relates to the pumping of tar, asphalt, and like viscous products which must be heated to put the same in a flowable condition. For convenience and brevity we refer hereinafter simply to tar, but this term is intended to include the other equivalent materials.

Tar is used in roofing, and is preliminarily heated in trailer kettles. Ordinarily the molten tar is raised to the roof by means of buckets, but systems have been used in which a pump raises the tar from the trailer kettle to the roof. The primary object of the present invention is to generally improve such tar pump systems.

A more particular object is to provide for immediate automatic drain of tar from the trailer back into the kettle when delivery is stopped. This avoids solidification of tar filling the riser.

Solidification or freezing of tar in the pump prevents rotation of the pump, and on beginning work it has heretofore been necessary to heat the pump and pipe as well as the tar in the kettle. Another object of the present invention is to eliminate this dual heating operation, and for this purpose the pump is submerged in the kettle, so that melting of the tar also frees the pump.

Further objects are to provide for remote control of the flow of the tar, typically from the roof level, and to provide for recirculation of the tar when it is not being pumped to the roof. For this purpose the motor or engine which drives the pump is operated continuously, but the direction of flow is changed. In accordance with a further feature and object of the invention, the engine is slowed when the tar is being recirculated, and is speeded up when the tar is being pumped to the roof. A single pull rope or lanyard is sufficient to simultaneously control both the delivery and the engine speed.

The melting capacity of a single trailer kettle is limited, and when doing a very large roofing job it may be necessary to use two or more trailer kettles to melt the tar at the needed rate. A further object of the present invention is to make it possible for a single pump system to take care of multiple trailer kettles, and for this purpose a relatively simple transfer means is provided for interconnecting additional trailers with the first trailer. The arrangement is such that the same pump that is used to deliver the tar to the roof may also be used to transfer molten tar from another trailer to the first trailer, and thence to the roof.

Lubrication presents a problem when bearings are operated inside the high temperature kettle. Another object of the present invention is to simplify the lubrication problem, which is done by using the molten tar itself as a lubricant, and for this purpose the molten tar may be pumped to a bearing which is not actually submerged in the molten tar. The submerged bearings are automatically lubricated.

To accomplish the foregoing general objects and other more specific objects which will hereinafter appear, the invention resides in the tar pump system elements, and their relation one to another, as heretofore more particularly described in the following specification. The specification is accompanied by drawings in which:

FIG. 1 is an elevation of the main elements of the tar pump system mounted on a plate ready for attachment to a tar kettle;

FIG. 2 is an elevation looking from the left of FIG. 1;
shown the engine is slowed, but when the valve 22 is closed the engine is speeded. In the present case the engine 16 is an air cooled gasoline engine of the popular single cylinder type commonly used on power lawn mowers, chain saws, and for many other purposes. The particular engine here shown is made by the Briggs & Stratton Corporation of Milwaukee, Wisconsin. The engine has a single cylinder 82 displaced horizontally, with a spark plug shown at 84. It is fed through a carburetor 86 surrounded by an air filter 88. The speed control arrangement is one which is conventional in these engines, it being an air-operated governor. The part 80 varies the speed which the governor seeks to establish. For this purpose a link 80 leads to an angle lever or disc 90, and the latter is here connected by means of a pull spring 92 to an angle piece 94. The latter is urged downward by control rod 72 which preferably is provided with a compression spring 96 beneath a collar 98. The spring 92 may be used as a lost motion connection, so that the rod 72 may be relatively large and forceful, without danger of injuring the air governor mechanism. When the rod 72 is pulled up by means of the lanyard, the governor mechanism at 80 moves to full speed position, either by reason of a return spring or the natural balance of parts within the governor. However, when the lanyard is released, the engine 16 is released, the valve 22, and the air governor is pulled by spring 92 to idling position. The weight 76 helps ensure dropping of the control rod.

Considering the arrangement in greater detail, the parts of the system so far described are preferably mounted on a plate 100 adapted to be positioned over an opening in the top 102 of the tar kettle. The pump 14 is preferably a centrifugal pump disposed with its shaft 104 vertical. The pump is mounted beneath the plate 100, as by means of a bracket 106 secured to an upright channel iron 108 which is welded to the bottom of plate 100. Bracket 106 includes a bearing 110 which steers shaft 104 beneath a coupling 112 which couples the pump shaft 104 directly to the lower end of the shaft of the engine. The engine is mounted on top of plate 100, as by means of mounts shown at 114. The riser 20 preferably passes upward through the plate 100, and the same applies to the control rod 72, so that the entire unit is a single package which may be bodied applied to or removed from the kettle. The plate may be secured to the kettle by means of bolts 116.

The pump 14 is lubricated by its direct immersion in the molten tar in the kettle. The bearing 110 may be shown on level in the kettle, and a lubricating pipe 120 leads from the pump 14 to bearing 110. Molten tar is pumped to bearing 110 and the excess returns to the main body of tar in the kettle. FIG. 4 corresponds to a fragmentary portion of FIG. 1 but shows a modification in which the particular gasoline engine has a speed control means 122 which is operated by a downward instead of a side ward motion. In this case the control rod 124 similarly has a collar 126 and compression spring 128 bearing against a metal strip 130. This is connected by means of a light pull spring 132 to the governor part 122. The arrangement is such that when the control rod is raised, the governor moves automatically to high speed position, but when the control rod is dropped the ensuing pressure on strip 130 causes spring 132 to pull the part 122 to slow speed or idling position. Even when idling there is a helpful circulation of tar in the kettle.

When the work requires a supply of molten tar at a rate faster than can be supplied by a single tar kettle, the present pump system may be used to take care of more than one kettle. An arrangement for this purpose is shown in FIG. 7 of the drawing, referring to which the first kettle 12 carries the pump system including engine 16 driving submerged pump 14 which delivers tar to a riser 20 and thence through pipes 42 and 32 to a roof being tarred. A valve 22 is provided for riser 20 and its position is controlled by means of rod 24 and lanyard 16. As before, the rod 24 also controls the engine speed.

In the present case, however, the pump inlet is connected to a pipe 140 which is fitted with a second riser 142 which also has a valve 144 at or near its lower end. This valve similarly has a control means or rod 146, and for removal control a lanyard 148 may be used, although in practice the rod 146 is more likely to be controlled at ground level by an operator loading and taking care of the kettles. The second riser 142 is connected by means of pipe 150 to an additional tar kettle 152. This is hinged like the first kettle by means of a burner lowered into a well 154, with the flexible pipe drained through upright flues or chimneys 156. A valve 160 is preferably mounted in the connecting pipe 150.

When working with kettle 12 the valve 144 is left in its normal or open position. The system then operates exactly as was described in connection with FIGS. 1 through 5, the tar inlet 34 leading at valve 44, valve 22 closed, the rod of immediately at the pump itself. With valve 22 open the tar is simply circulated, and with valve 22 closed by means of lanyard 26 the tar is delivered to the roof. When the tar supply in kettle 12 becomes low, it is merely necessary to close valve 144 whereupon molten tar is drawn from the lanyard is released to open the valve 22, and the air governor is pulled by spring 92 to idling position. The weight 76 helps ensure dropping of the control rod.

A different transfer system may be provided based on the "ejector" or Venturi suction principle. Such an arrangement is shown in FIG. 6, referring to which the lower end of riser 162, 164 has a butterfly valve 176 at or near its lower end. The riser 162, 164 also has a three-way valve 166 with a return pipe 168, 170 leading back to the kettle. By using the valve 166 the part 162 may be connected to either the part 164, or the return pipe 168, as desired. The return pipe includes a suction device 172 of the Venturi type, and a hose 174 leads to the constriction or suction part of the device 172. The other end of this hose is put into the second kettle 175. In operation when it is desired to transfer tar from the second kettle to the first kettle, the three-way valve 166 is turned to cause the pump delivery to flow through the return pipe 168, 170 and back to the kettle. At this time the drain valve 176 near the lower end of the riser is closed, as though tar was being delivered to the roof. In this state there is recirculation, but the recirculation now is through the ejector unit, in the event of a breakdown the metal is able to take place directly at the butterfly valve 176. The resulting flow through the ejector draws molten tar from the second kettle into return pipe 170 and into the first kettle. When the desired transfer of tar has been completed, it is merely necessary to again open the butterfly valve 176, and to then reverse the control valve 166 to normal position, that is, to connect together the riser parts 162 and 164. When delivery to the roof is wanted the butterfly valve 176 is closed by means of its control rod 178 and arm 189, all as previously described.

In FIGs. 6 and 7 two minor variations may be noted. One is that the valve operating lever 180 has been enlarged so that it acts as its own restoring weight, instead of adding a special weight to the rod 178. Another is that the butterfly valve 176 is located just above an elbow 182, instead of being constructed in the form shown in FIG. 1 to act as an elbow. As before, there is a valve disc 184 turned on a spindle 186 to one end of which the valve operating arm 180 is connected.

In FIG. 6 it will be noted that the parts including the return pipe 170 are all mounted on a single main support plate 190, which may be bolted over an opening in the top of the kettle, as by means of bolts 192. Similar re-
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mark applies to the arrangement shown in FIG. 7, that is, the mounting plate is preferably made large enough to include the additional riser 142 and control rod 146 along with the other parts, so that the entire assembly may be handled as a unitary package which is bodily lowered onto the tar kettle and is thereby secured in position. It will be evident that the construction and operation of our improved tar pump system, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while we have shown and described our invention in several preferred forms, changes may be made in the same without departing from the scope of the invention, as sought to be defined in the following claims. In the claims the term “three-way valve system” is intended to include valves serving the same purpose as a three-way valve. We claim:

1. A tar pump system, particularly for roofing, said system comprising a pump for pumping tar from a heated tar kettle to a riser, a valve at the lower end of the riser leading back to the kettle for circulation of tar and for drainage of hot tar from the riser while hot, an engine for driving the pump, speed control means for said engine, flow control means, and connections from said flow control means to said valve and said speed control means, the relative direction of said connections being such that the engine is slowed but not stopped when the valve is open to drain the riser and the engine is speeded when the valve is closed.

2. A tar pump system, particularly for roofing, said system comprising a centrifugal pump for pumping tar from a kettle to a riser, a valve leading back to the kettle for circulation of tar and for drainage from the riser, a gasoline engine for driving the pump, said engine having a speed governing means extending to the delivery point, and connections from said lanyard to said valve and to said governor, the relative direction of said connections being such that the engine idles when the valve is open and is speeded when the valve is closed.

3. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a centrifugal pump having a vertical shaft, means mounting said pump beneath the plate for immersion in the kettle, a gasoline engine mounted above the plate with its shaft connected to the pump shaft, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a butterfly valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate and means at its upper end for receiving the end of a lanyard tied thereto, and weight means to normally open said valve.

4. A tar pump system, particularly for roofing, comprising a heated tar kettle, a pump immersed in the kettle, an engine above the kettle, means connecting the engine to the pump, said engine having a speed control means, a riser leading upward from the pump outlet, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage of hot tar from the riser while still hot, a control rod extending upward from the valve, and a connection from said flow control means to said speed control means such that the engine is slowed but not stopped when the valve is open to drain the tar and is speeded when the valve is closed.

5. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a heated tar kettle, a pump, means mounting said pump beneath the plate for immersion in the kettle, an engine mounted above the plate, means connecting the engine to the pump, said engine having a speed control means, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage of hot tar from the riser while still hot, a control rod extending upward from the valve through the plate and a connection from said control rod to said speed control means, whereby the engine is slowed but not stopped when the valve is open to drain the tar and is speeded when the valve is closed.

6. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a pump having a vertical shaft, means mounting said pump beneath the plate for immersion in the kettle, a gasoline engine mounted above the plate with its shaft connected to the pump shaft, said engine having a governor, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate and a yieldable connection from said control rod to said governor, whereby the engine idles when the valve is open and is speeded when the valve is closed.

7. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a centrifugal pump having a vertical shaft, means mounting said pump beneath the plate for immersion in the kettle, a gasoline engine having a vertical shaft mounted above the plate with its shaft connected to the pump shaft, said engine having an air governor, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a butterfly valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate and terminating at its upper end in an eye for receiving the end of a lanyard tied thereto, means to help normally open said valve, and a yieldable connection from said control rod to said governor, whereby the engine idles when the valve is open and is speeded when the valve is closed.

8. A tar pump system, particularly for roofing, comprising a tar kettle, a pump immersed in the kettle, an engine above the kettle, means connecting the engine to the pump, a riser leading upward from the pump outlet, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control means extending upward from the valve, the pump inlet itself being fitted with a second riser having a valve near its lower end, and a control means extending upward from said second valve, the second riser being connected to an additional tar kettle so that on closing of the second valve tar is drawn from the second kettle by the pump.

9. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a pump having a vertical shaft, means mounting said pump beneath the plate for immersion in the kettle, a gasoline engine having a vertical shaft mounted above the plate with its shaft connected to the pump shaft, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate, the pump inlet itself being fitted with a riser having a valve at its lower end, and a control rod extending upward from said second valve, said second riser being connected to an additional tar kettle so that on closing of the second valve tar is drawn from the second kettle into the first kettle.

10. A tar pump system, particularly for roofing, comprising a tar kettle, a pump immersed in the kettle, an engine above the kettle, means connecting the engine to the pump, said engine having a speed control means, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a flow
control means extending upward from the valve, a connection from said flow control means to said speed control means such that the engine is slowed when the valve is open and is speeded when the valve is closed, the pump inlet itself being fitted with a riser having a valve at its lower end, and a control rod extending upward from said second valve, said second riser being connected to an additional tar kettle so that on closing of the second valve tar is drawn from the second kettle into the first kettle.

11. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a pump having a vertical shaft, means mounting said pump beneath the plate for immersion in the tar kettle, an engine above the kettle, means connecting the engine to the pump, a riser leading upward from the pump outlet, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate, a yieldable connection from said control rod to said governor whereby the engine idles when the valve is open and is speeded when the valve is closed, the pump inlet itself being fitted with a riser having a valve at its lower end, and a control rod extending upward from said second valve, said second riser being connected to an additional tar kettle so that on closing of the second valve tar is drawn from the second kettle into the first kettle.

12. A tar pump system, particularly for roofing, comprising a tar kettle, a pump immersed in the kettle, an engine above the kettle, means connecting the engine to the pump, a riser leading upward from the pump outlet, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control means extending upward from the valve, the tar system supplying tar to the pump including a suction device of the Venturi type, and means connecting said suction device to a second tar kettle, whereby tar may be drawn from the second kettle when desired.

13. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a pump having a vertical shaft, means mounting said pump beneath the plate for immersion in the kettle, a gasoline engine having a vertical shaft mounted above the plate with its shaft connected to the pump shaft, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate, a yieldable connection from said control rod to said governor whereby the engine idles when the valve is open and is speeded when the valve is closed, the flow system which is driven by the pump including a suction device of the Venturi type, and means connecting said suction device to a second tar kettle, whereby tar may be drawn from the second kettle when desired.

15. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a pump having a vertical shaft, means mounting said pump beneath the plate for immersion in the kettle, a gasoline engine mounted above the plate with its shaft connected to the pump shaft, said engine having a governor, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate, a yieldable connection from said control rod to said governor whereby the engine idles when the valve is open and is speeded when the valve is closed, the flow system which is driven by the pump including a suction device of the Venturi type, and means connecting said suction device to a second tar kettle, whereby tar may be drawn from the second kettle when desired.

16. A tar pump system, particularly for roofing, comprising a plate adapted to be positioned over an opening in the top of a tar kettle, a pump means mounting said pump beneath the plate for immersion in the kettle, an engine mounted above the plate, a vertical shaft connecting the engine to the pump, said shaft having a main bearing, said engine having a speed control means, a riser leading upward from the pump outlet through the aforesaid plate alongside the engine, a valve near the lower end of said riser which may be opened for recirculation of tar and for drainage from the riser, a control rod extending upward from the valve through the plate, a connection from said control rod to said speed control means whereby the engine is slowed when the valve is open and is speeded when the valve is closed, and a lubricating pipe connected between the pump outlet and said main bearing in order to lubricate said bearing by means of the tar.

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