June 6, 1944. E. G. BERG ET AL 2,350,715

PUMPING AND FEEDING MECHANISM FOR MIXING MACHINES

Filed Feb. 16, 1942 2 Sheets-Sheet 1

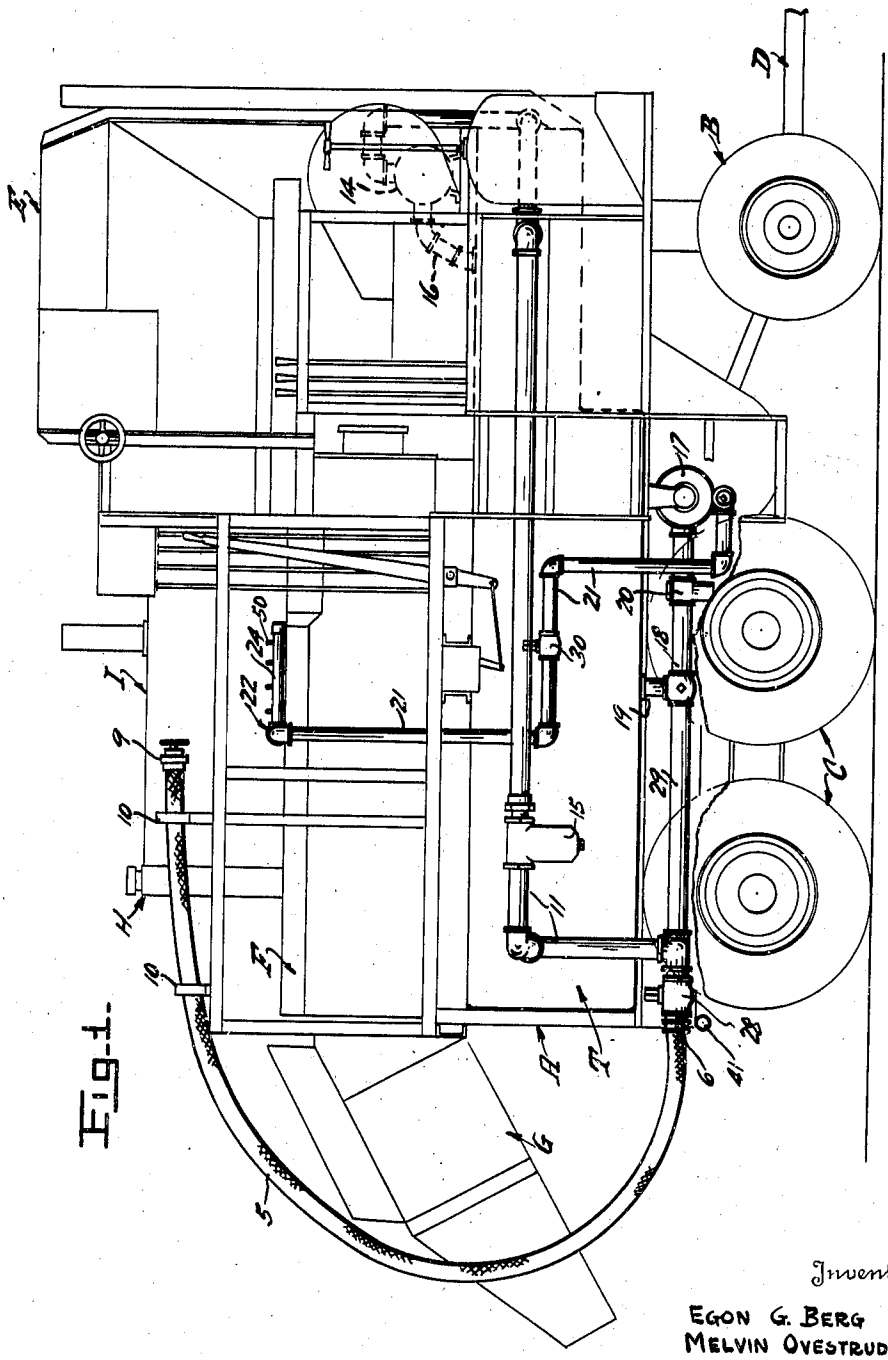


Fig-1.

Inventors
EGON G. BERG
MELVIN OVESTRUD

By Carlson & Hagle
Attorneys

June 6, 1944. E. G. BERG ET AL 2,350,715

PUMPING AND FEEDING MECHANISM FOR MIXING MACHINES

Filed Feb. 16, 1942 2 Sheets-Sheet 2

Fig. 2.

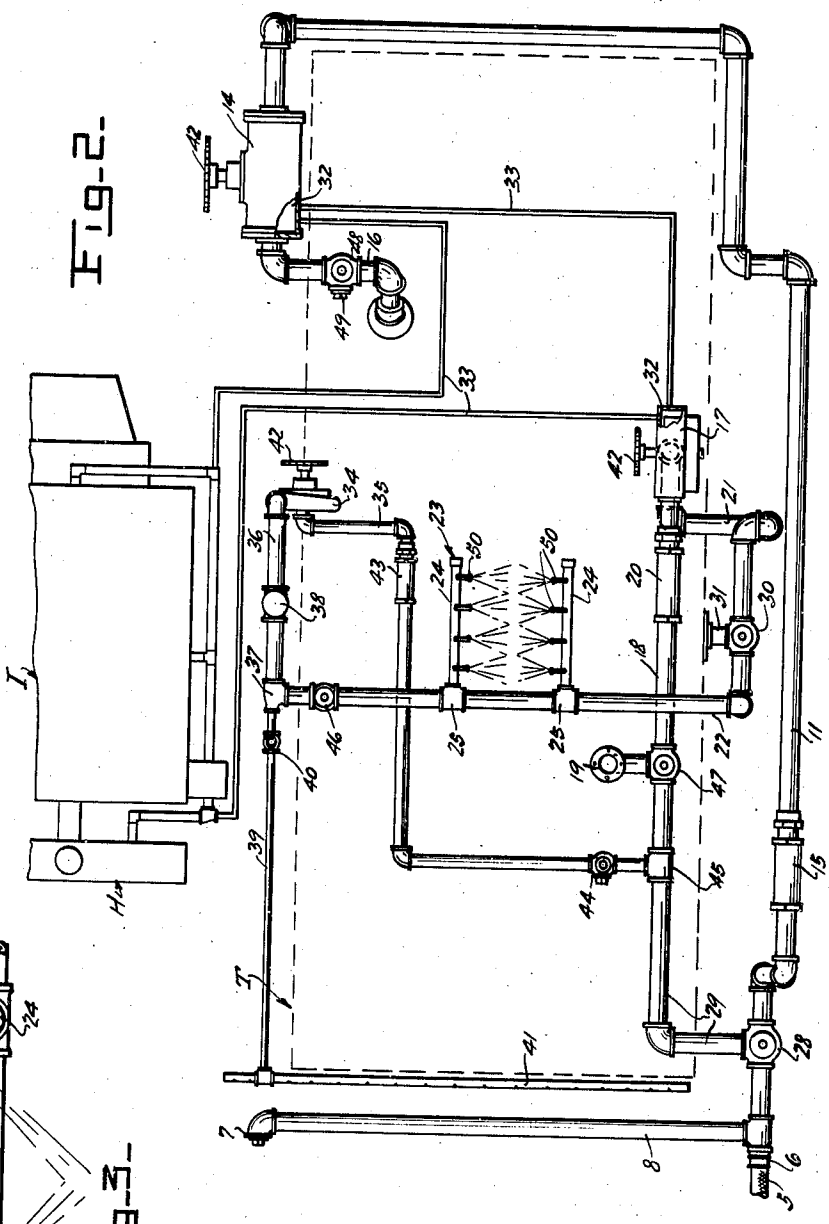
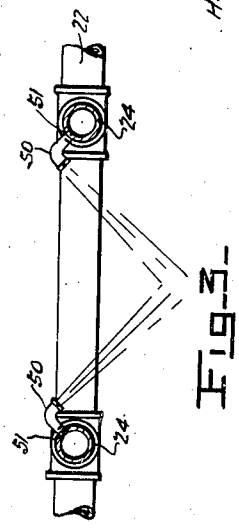


Fig. 3.



Inventors

EGON G. BERG
MELVIN OVESTRUD

By Carlson & Hayle

Attorneys

Patented June 6, 1944 2,350,715

UNITED STATES PATENT OFFICE

2,350,715

PUMPING AND FEEDING MECHANISM FOR MIXING MACHINES

Egon G. Berg and Melvin Ovestrud, Minneapolis, Minn., assignors to Pioneer Engineering Works, Inc., Minneapolis, Minn., a corporation of Delaware

Application February 16, 1942, Serial No. 431,048

1 Claim. (Cl. 259—95)

This invention relates generally to improvements in machines used for mixing road building materials and more particularly to mechanism for pumping, feeding and otherwise handling the fluid materials used in such work.

The machine of the type herein contemplated embodies means for mixing an aggregate or base coarse material with a binder or liquid binding material either of a bituminous or aqueous variety. Such machines embody a storage tank for the binder and must include means for pumping the material into the tank from the source of supply, pumping the material into the mixing apparatus and performing other such operations.

It is the primary object of this invention to provide a mechanism or system of piping, pumps and valves by means of which all commonly employed fluid binding agents may be handled and which will have extreme flexibility of operation and adjustment in order to meet the continuously varying problems and conditions encountered in road building work. Another object is to provide an assembly of this kind in simple and conveniently controlled form.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, in which—

Fig. 1 is a side elevation of a machine for mixing road building materials and showing my invention applied thereto.

Fig. 2 is a somewhat diagrammatical showing of the entire pumping and piping system constituting the present invention.

Fig. 3 is a detail view in vertical cross section through the spray bars.

This application is a continuation in part from our copending application for patent on a Mixing machine, Serial No. 357,708, filed September 21, 1940, now Patent No. 2,297,867, issued October 6, 1942, and to which attention is invited for a complete disclosure of the machine as a whole. Only such parts of the machine as are necessary to the understanding of the present invention are herein shown and described.

Referring now more particularly and by reference characters to the drawings, A represents the frame of the machine which is wheel borne by front and rear trucks B and C and is adapted to be pulled along the highway by a draft connection to the tongue D. A hopper E receives the aggregate or base coarse material and delivers it in desired quantity and at any desired rate to the pug mill or mixer F, wherein it is thoroughly agitated and mixed with the binding liquid and finally discharged at the chute G. A large storage tank T is built into the frame A to carry a quantity of the binding material.

The present invention lies in the means for supplying the binding liquid to the tank and properly pumping and metering the liquid as it is sprayed on the material in the pug mill F.

The tank T is filled from a relay truck tank, not shown, or other supply by connection therewith of a flexible hose 5 which may be attached at one end to either coupling 6 or 7 disposed at the ends of a receiving pipe 8 extending transversely at the rear lower portion of the frame A. The end of the hose 5 has a conventional coupling 9 for making connection to the truck and the couplings 6 and 7 permit connection to the mixing machine at whichever side is most convenient. When not in use the hose 5 is supported in brackets 10 as clearly shown in Fig. 1.

A filler pipe 11 is connected to one end of pipe 8 and runs forwardly therefrom and around to the front of the machine where it is connected to the intake side of a transfer pump 14. A strainer 15 is placed in the pipe 11 to protect the transfer pump from foreign matter and the outlet side of the pump is connected by pipe 16 to the tank T. Obviously the transfer pump 14 thus connected will set up a suction through hose 5 and will pump the binding liquid into the tank.

A volumetric metering type of pump 17 is used for feeding the binding liquid from the tank T to the spraying equipment and to secure constant suction the pump is arranged beneath the tank as best seen in Fig. 1. A suction line or pipe 18 connects the feeder pump 17 to an outlet connection 19 to the tank and a strainer 20 is located in this line to protect the pump. The outlet side of the pump then is connected to a pipe 21 leading upwardly to a header pipe 22 which is arranged transversely across the machine above the pug mill F. The type of pump employed for feeding delivers a constant, metered volume of binder liquid for each revolution and by suitable interconnection with the driving means for the feed from the hopper E the relative amounts of aggregate and binder may be selected and maintained, as set forth in our prior application hereinbefore identified.

The header pipe 22 supports the spray manifold, designated generally at 23, over the pug mill F, said manifold comprising a pair of spray pipes 24 connected to the header pipe by couplings 25. The binder fed from the tank T by the pump 17 will be sprayed from the pipes 24 onto the material in the pug mill as will be apparent.

When a bituminous binder is used in the system as thus far described it is frequently necessary to heat the tank T in order that the bitumen will flow freely. Particularly is this true when the weather is cool and when the material is thus heated it is extremely desirable to be able to recirculate the heated material through the pumps and contiguous piping to facilitate flow therethrough. For this purpose we provide recirculation means now to be described.

A transfer pump recirculating valve 28 is located in the transfer pipe 11 forward of the couplings 6—7 and is connected by a pipe 29 to the

outlet connection 19 leading from the tank T to the feeder pump 17. A feeder pump recirculating valve 30 is arranged in the feeder pipe 21 leading from the pump 17 and is connected by a fitting 31 to the tank T near an upper side thereof. Normally the valve 28 is arranged to open the flow through the pipe 11, shutting off pipe 29, and valve 30 is similarly disposed to open the passage through pipe 21 and close off the tank connection 31. However by moving the valve 28 to close off the couplings 6—7 and open the passage between the pipes 11 and 29 the transfer pump 14 may operate to withdraw binder from the tank at the outlet 19, circulate it through the pipes 29, 11 and 16, and back to the tank, while, by moving valve 30 to close off the header pipe 22 and open a passage between the pipe 21 and tank connection 31, the feeder pump 17 may take binder from the tank at 19 and circulate it through pipes 18 and 21 and back into the tank. Recirculation through both of these pumps 14 and 17 and attendant connections is thus provided for whenever it may be required.

To further facilitate proper pumping both the transfer and feeder pumps 14 and 17 are provided with jackets enclosing water circulating chambers 32 and hot water, or other heating medium, is circulated through these chambers by pipes 33, to thus heat the pumps. Hot water for this purpose is provided by connection of the pipes 33 to the water pump, cooling system and radiator H of the internal combustion power plant or engine I used to drive the working parts of the machine.

In some types of road construction, water is used as a binder for the aggregate or base coarse material and for such work the tank T is used to contain the water and certain parts of the piping system as thus far described also play a part. The water from the relay truck or tank truck is taken through the hose 5 and pumped into the tank by the transfer pump 14. A water pump 34 is arranged beneath the tank T for constant suction and the outlet pipe 35 of the pump is run upwardly and rearwardly to a connection at 37 with the side or end portion of the header pipe 22 opposite the aforesaid pipe 21. A meter 38 is arranged in the pipe 36 to meter the water flowing therethrough. The suction line 35 of the water pump 34 runs through a strainer 43 to a three-way valve 44 which makes connection at 45 with the pipe 29. When the valve 44 is opened and valve 28 closed the water pump may obviously draw water from the tank at outlet 19. A valve 46 in the pipe 22 adjacent the coupling 37 is opened when spraying water but closed (along with valve 44) when the bituminous binder is used to thus isolate water handling parts of the system.

With connections thus made it is apparent that, by proper manipulation of the valves, the feed from the bitumen feeder pipe 21 may be cut off and water pumped by the water pump 34 will be carried to the spray pipes 24 and from there sprayed upon the material in the pug mill.

It sometimes is desirable to spray the road or material thereon behind the machine and water for this purpose is provided for by connection of a pipe 39 to the outlet pipe 36 through a shut-off valve 40. The pipe 39 runs rearwardly to an end of a transversely extending perforated spray bar 41 from which the water will be sprayed onto the road when said valve 40 is opened. The spray bar 41 is of course located rearwardly and beneath the machine as indicated in Fig. 1.

All of the pumps are provided with drive means such as sprockets 42 and may be operated by the power unit I by suitable connections, not here shown.

A three-way valve 47 is placed at the junction of the pipes 18 and 35 with the outlet 19 and when pumping oil or bituminous binder to the spray manifold this valve connects the feeder pump intake line to the tank outlet 19. On the other hand when pumping water to the spray manifold this valve connects the intake line of the water pump 34 to this outlet. When recirculating a bituminous binder through the pumps the valve connects the outlet 19 to both pipes 18 and 29.

A similar valve 48 is placed in the outlet pipe 16 of the transfer pump 14 and normally this valve is adjusted to permit fluid flow from pump to tank as has been previously described, the remaining outlet port of the valve being plugged as designated at 49 in Fig. 2. If it is desired to drain the tank this plug may be removed and the valve adjusted to shut off the flow through pipe 16 to tank and direct it through the opening formed when the plug is removed. By then adjusting the valve 28 to connect pipes 11 and 29 the transfer pump 14 may draw out the contents of the tank through the outlet 19 and discharge them to a container or pipe connected to valve 49.

The spray bars 24 as shown in Fig. 3 particularly are provided with elbow-shaped spray nozzles 50 screwed into suitable openings 51 on upper sides of the bars and turned first upwardly and then downwardly therefrom. Thus the nozzles 50 are at the highest points of the spraying system and when the feed of binder material to the manifold is shut off the spray from the spray bars will immediately cease. This feature constitutes a distinct improvement in the spray manifold disclosed in our previous application in which the spray bars were lower than parts of the piping resulting in considerable drainage and dripping. Inasmuch as it is necessary to nicely and correctly proportion the binder to the aggregate such dripping was a hindrance as an excess of binder in a part of the mix would result each time the machine was shut down and restarted.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described our invention, what we claim to be new and desire to protect by Letters Patent is:

In a machine for preparing road building materials and having a liquid storage tank, a liquid receiving means and operative in conjunction with a liquid supply source, a liquid supply system comprising a transfer pump having its inlet normally connected to the liquid supply source and its outlet connected to the tank, a feeder pump having its inlet connected to the tank and its outlet normally connected to the liquid receiving means, means for shifting the outlet of the feeder pump from the receiving means to the tank for recirculating liquid through the pump, the said tank having an outlet connected to the inlet of the feeder pump, means for connecting said tank outlet also to the inlet of the transfer pump for recirculating liquid through that pump, and means for disconnecting the transfer pump inlet from the liquid supply source while said inlet is connected to the outlet of the tank.

EGON G. BERG.
MELVIN OVESTRUD.