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F. A. BROWNE

MIXING MACHINERY

Filed May 9, 1922

FIG. I.

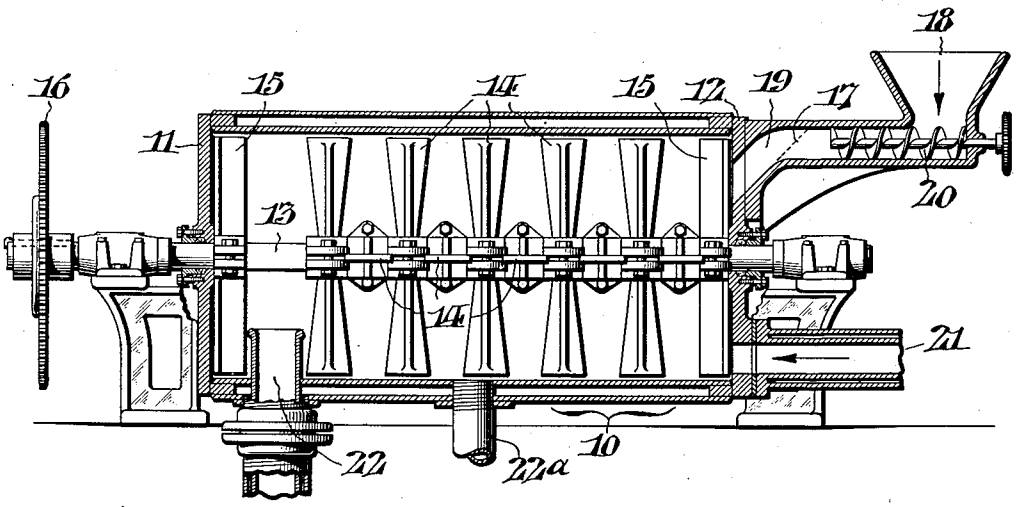
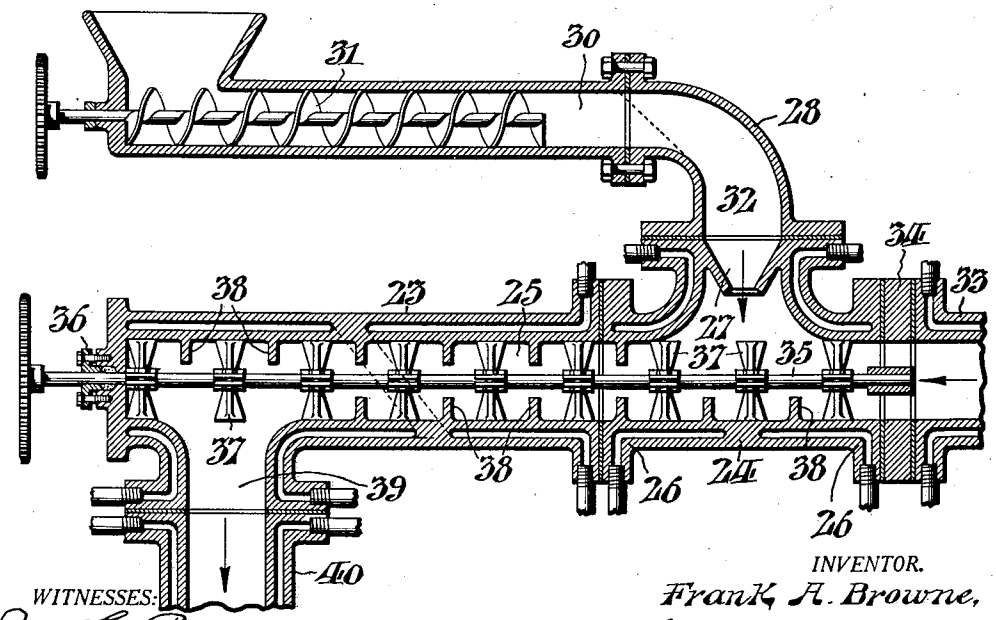


FIG. II.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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MIXING MACHINERY.

Application filed May 9, 1922. Serial No. 559,560.

To all whom it may concern:

Be it known that I, FRANK A. BROWNE, a citizen of the United States, residing at Wayne, county of Delaware, and State of Pennsylvania, have invented certain new and useful Improvements in Mixing Machinery, whereof the following is a specification, reference being had to the accompanying drawings.

This invention relates to mixing machinery, particularly to that type used in forming mixtures of asphaltum with granular substances in such proportions as to retain a fluent condition in the aggregate.

An object of the invention is to provide improvements in a mixer of this type which are calculated to permit incorporation of the granular material with the fluent ingredient while the latter is en route from the source of supply to the point of utilization, so as to avoid the necessity of temporarily arresting the flow of the fluent ingredient as a prerequisite to the act of mixing.

Another object of the invention is to provide a mixing machine embodying improvements designed to permit formaton of the aggregate while the fluent ingredient is conducted through the machine under pressure and to supply the other ingredients to the fluid stream against the pressure thereof, while creating a continuous seal by accumulation of granular material to check back flow or loss of the mixture.

In addition to the foregoing this invention comprehends improvements in the detials of construction and arrangement of the correlated parts to be hereinafter set forth and particularly pointed out in the appended claims.

In the accompanying drawings, Fig. I is a view in longitudinal section of a typical form of mixer illustrating the embodiment therein of my improvements; and

Fig. II is a view in longitudinal section of a mixing machine embodying my improvements and shown as constituting a section of a conduit for the continuous transportation of a fluent substance.

With reference to Fig. I of the drawings, 10 indicates a cylindrical casing enclosing a mixing chamber, suitably jacketed for the circulation of a heating medium. The ends of the casing are closed by virtue of end plates 11 and 12, apertured for the passage of a shaft 13 forming a mounting for a series of intermediate paddles or agitator elements 14, and a pair of end propellers 15 designed to throw the material from either end of the chamber to the center. The shaft is suitably journaled for rotation and supplied with a spur gear 16 or other power transmission element. The end plate 12 is apertured at its upper periphery for registration with the horizontal channel 17 of a feeding device, the channel communicating at one end with a hopper 18 and terminating at its other end in a downwardly directed passage 19 leading into the mixing chamber. A spiral conveyor 20 is located in the channel 17 and journalled at one end in the wall of the hopper, whereby upon rotation in the proper direction to convey material from the hopper and discharge the same into the mixing chamber. It is to be noted that the discharge end of the spiral element terminates short of the upper end of the inclined passage 19 to form a space for the accumulation of the material fed by the conveyor so that the presence of a constant accumulation may function as a seal for a purpose to be presently noted. A second aperture is formed in the lower periphery of the end plate 12 for the entrance of fluid material conducted by a jacketed conduit 21 coupled to said end plate in the manner illustrated. An outlet from the chamber is provided in the stand pipe 22 which extends perpendicularly through the bottom of the casing 10 and terminates at a point spaced above the bottom so as to maintain a predetermined level of material in the chamber. When desired the chamber may be completely drained through the medium of the drain pipe 22^a, the mouth of which is flush with the bottom of the chamber.

In practice the fluent material, such as asphaltum, is conducted through the conduit 21 and discharged under pressure into the mixing chamber. Concurrently therewith the granular material is fed from the hopper 18 by continuous rotation of the spiral conveyor 20 and discharged into the mixing chamber for incorporation into the fluent ingredient through the influence of rapid whirling of the agitator elements 14 and the propellers 15, the latter augmenting the action by continuously throwing the material from the ends of the chamber in opposite directions toward the center. The process is continuous however so that during the pas-

sage of any portion of the aggregate from the inlet to the discharge end the ingredients will have been thoroughly mingled to form a uniform mixture, prior to the continuous discharge of the aggregate into the leading off conduit 22. The constant presence of a mass of granular material at the discharge end of the feeding channel 17, either during operation of the conveyor or while the same is at rest, serves as a seal to prevent the discharge of the mixture through said channel under the influence of internal pressure within the chamber.

Since the conduits 21 and 22 are in direct communication by virtue of the mixing chamber the latter actually constitutes a connecting channel for the conduits so that the passage of the material from conduit 21 to conduit 22 is continuous and uninterrupted, the material being subjected in the interim of its passage to agitation.

This retardation is reduced to a minimum in the form of apparatus shown in Fig. II, wherein 23 and 24 designate two tubular sections of a casing enclosing a mixing chamber or channel 25. The section 24 is in the form of a T-connection including aligned ends 26 and a vertical branch 27, the latter being flanged and coupled to one end of an elbow 28, the other end of the latter being coupled to one end of a horizontal casing constituting part of the feeding element and enclosing a channel 30 in which a spiral conveyor 31 is located and mounted for rotation. A suitable hopper surmounts the casing to conduct material thereinto. As in the first instance, the discharge end of the spiral conveyor terminates short of the discharge end of the channel 30 to promote the formation of a seal by accumulation of material. The throat of the branch 27 is constricted by the integral formation therein of a downwardly directed nozzle 32. The adjacent ends of the sections 23 and 24 are flanged for convenient coupling, and the opposite end of the section 24 is likewise flanged for coupling connection to a conduit 33 through the interposition of a spider 34 having a central journal adapted to support one end of a shaft 35,which extends through the channel 25 and is journalled at its other end in a packing gland 36 embodied in the end wall of the section 23. A series of agitator elements 37 are fixed to the shaft and arranged along the same in spaced relation from end to end, a series of lugs 38 being cast upon the inner walls of the sections 23 and 24 and arranged in pairs and each pair interposed between an adjacent pair of agitator elements to cooperate therewith in breaking up the current in the stream of material and thereby promote the formation of a homogenous mixture. The discharge end of the section 23 is formed with a downwardly directed branch 39, flanged for coupling connection to a conduit 40 by which the aggregate is conveyed to the point of utilization. The sections 23 and 24 and the conduits 33 and 40 are jacketed for the circulation of a heating medium and the spiral conveyor and agitator shaft are driven in any manner found convenient or desirable.

The fluent ingredient, passing from the conduit 33 enters the channel 25 and discharges through the conduit 40 in a continuous stream. As in the first instance mentioned, the granular material is fed from the hopper along the channel 30 of the feeding mechanism and discharged through the nozzle 32 into the channel 25 or mixing chamber for incorporation into the fluid stream. The intimate mixture of the ingredients will be complete by the time any portion of the aggregate reaches the discharge end of the mixing chamber.

While I have illustrated as one instance the employment of a spiral conveyor, it will be apparent that any other kind of feeding means may be substituted that is capable of forcibly discharging granular material into the fluid stream against internal pressure while preventing back flow or leakage of the fluent material.

Having thus described my invention, I claim:

1. A mixing apparatus comprising a jacketed mixing chamber for the circulation of a heating medium, means similarly jacketed for introducing viscous material thereto under pressure, means for introducing granular material into the chamber against internal pressure and to simultaneously create a seal preventing back flow through said second introducing means, rotary agitators and reversely operating propellers for mixing the materials, and means for maintaining a predetermined mixture level below the axis of rotation of the agitators and propellers in the aforesaid chamber, said means also serving as the normal outlet for the aggregate.

2. A mixing apparatus comprising a jacketed mixing chamber for the circulation of a heating medium, means similarly jacketed for introducing viscous material thereto under pressure, a feeding mechanism for granular material including a channel and a spiral conveyor operating therein adapted to permit a constant accumulation of material in the channel to form a seal preventing escape of material from the chamber, rotary agitators and opposedly operating propellers for mixing the material, and means for maintaining a predetermined mixture level below the axis of rotation of the agitators and propellers in the aforesaid chamber, said means also serving as the normal outlet for the aggregate.

3. In a mixing apparatus for mixing viscous and granular ingredients under pres-

sure, means for introducing the granular material including a horizontal channel having a down-turned discharge end and a spiral conveyor operating in the channel, the end of said conveyor terminating short of the down-turned portion of the channel to permit the constant retention of an accumulation of material in the channel to form a seal preventing back-flow of material from the apparatus, rotary agitators and oppositely operating propellers for mixing the material, and means for maintaining a predetermined level below the axis of rotation of the agitators and propellers of the aggregate mixture in the apparatus, said means functioning as the normal outlet for the aggregate.

4. In a mixing apparatus, a jacketed chamber having inlet and outlet ports adapted to receive viscous material under pressure, means for introducing a heating medium to circulate about said chamber, a hopper and channel in communication with the chamber adapted to feed granular material thereinto, a spiral conveyor mounted in the channel and cooperating therewith to permit the accumulation of granular material in substantial amount beyond the conveyor to form a seal preventing back flow of said granular material, rotary agitators and oppositely operating propellers for mixing the material, and a stand pipe for maintaining a predetermined mixture level of the aggregate mixture below the axis of rotation of the agitators and propellers in the aforesaid chamber, said stand pipe serving as the normal outlet for the aggregate.

5. In a mixing apparatus for asphaltum and granular material, a jacketed section adapted to be interposed in the interrupted portion of a conduit to convey the asphaltum under pressure, a hopper and feeding channel in communication with said section to feed the granular material into said conduit, a spiral conveyor in the channel having its discharge end spaced from the end of the channel to permit the accumulation in said space of granular material in substantial quantity effecting a seal to prevent back-flow of said granular material, in combination with rotary agitators and oppositely operating propellers for mixing the material, a stand pipe for maintaining a predetermined mixture level of the aggregate mixture below the axis of rotation of the agitators and propellers in the aforesaid chamber, and an auxiliary outlet for completely draining the apparatus when desired.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this fifth day of May, 1922.

FRANK A. BROWNE.

Witnesses:
JAMES H. BELL,
E. L. FULLERTON.