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AGGREGATE COATING APPARATUS

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Fig. 1.

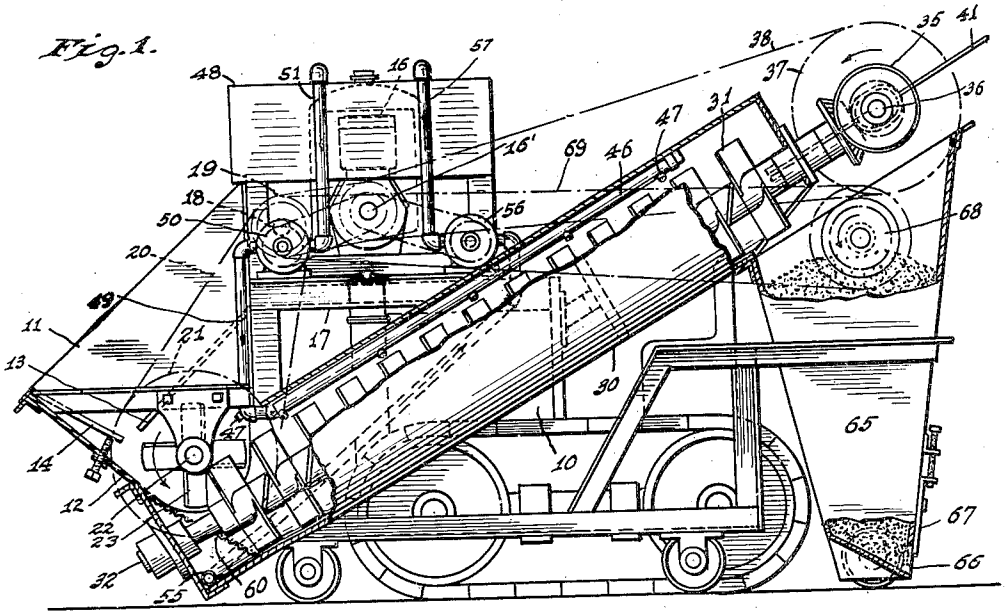
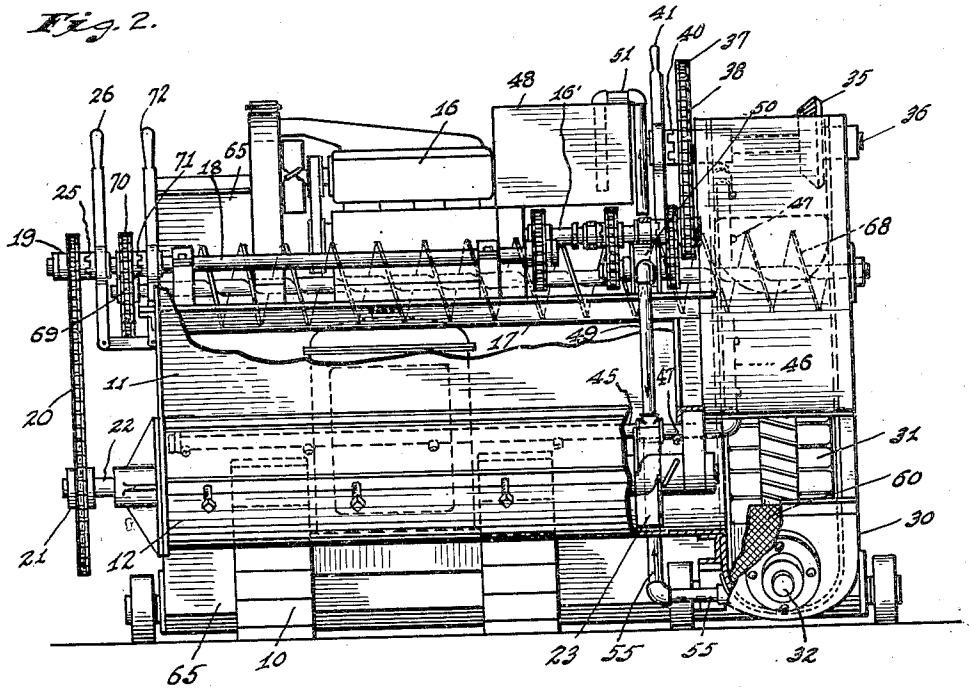


Fig. 2.



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AGGREGATE COATING APPARATUS

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4 Claims. (Cl. 94—40)

It is the object of my invention to produce a machine for coating aggregate with bitumen to produce a composition suitable for paving. More specifically, it is my object to produce a machine in which the thickness of the bitumen coating applied to the aggregate particles may be varied as desired and in which aggregate particles of various sizes may be satisfactorily coated. A further object of my invention is to produce a machine of this type which will be simple in construction and economical to manufacture.

In carrying out my invention, I feed the aggregate from a bin at a regulated rate into a mixer-conveyor, preferably a pug-mill mixer or screw-conveyor. As the aggregate passes through the mixer-conveyor, the bitumen is applied to it from a series of spray nozzles located along the path the aggregate travels and individually adjustable to regulate the quantity of bitumen applied. Conveniently, the mixer-conveyor is arranged in two sections, one extending generally horizontally beneath an aggregate hopper or bin and the second positioned to receive aggregate discharged from the first and inclined upwardly to elevate the finished product into a storage bin or other container. To prevent an accumulation of liquefied bitumen, which might interfere with the desired regulation of the thickness of the bitumen coating, I provide means for removing any excess bitumen from the bottom of the second section of the mixer-conveyor, such bitumen being returned to the supply tank.

The accompanying drawing illustrates my invention: Fig. 1 is a side elevation of a portable machine on which is mounted aggregate-coating apparatus in accordance with my invention, parts of the device being broken away to illustrate the construction more clearly; and Fig. 2 is a front elevation of the machine shown in Fig. 1.

As illustrated in the drawing, the machine is arranged to be portable, and to this end the various elements of the aggregate-coating apparatus are supported upon a tractor 10. Although the apparatus will be described as mounted on a tractor, it is to be understood that in its broader aspects my invention is not limited to a portable machine.

Across the front end of the tractor 10 shown in the drawing I provide an aggregate hopper 11 beneath which is the trough 12 of a mixer-conveyor such as a pug-mill. The bottom of the hopper 11 is formed by a forwardly and downwardly inclined partition 13, the front edge of which is spaced from the front wall of the hopper to provide an opening through which aggregate may feed into the trough 12. Desirably, there is associated with this opening some form of adjustable gate 14 by means of which the rate of aggregate-feed may be regulated.

The aggregate-coating apparatus includes an engine 16 which supplies the power necessary to drive the moving parts of the mechanism. As shown, the engine 16 is mounted in a transverse position on a frame 17 which is supported from the tractor 10. Driven from the engine 16 I provide a main shaft 16' and a counter-shaft 18 which extends transversely of the machine in front of the engine 10 and which, at its outer end, carries a sprocket 19 connected by a chain 20 to a sprocket 21 on the end of the shaft 22 that extends through the trough 12. Within the trough 12, the shaft 22 is provided with helically inclined blades 23 which operate, in the rotation of the shaft, to move the aggregate from left to right in Fig. 2. A jaw-clutch 25, operated by a suitable operating lever 26, controls the operative connection of the sprocket 19 to the shaft 18.

The material delivered from the right-hand end of the trough 12 is received in the lower end of a trough 30 which slopes upwardly and rearwardly to an elevated point of discharge. Within the trough 30 I provide mixing conveying means which are shown as in the form of helically inclined blades 31 mounted on a rotatable shaft 32 extending through the length of the trough 30. For the purpose of driving the shaft 32 its upper end may be connected through mitre gears 35 with a transversely extending shaft 36 carrying a sprocket 37 which is connected through a chain 38 with the shaft 16'. A jaw-clutch 40, operated by a hand lever 41, may be employed to control the operative connection between the sprocket 37 and the shaft 36.

To supply bitumen to the aggregate moving through the troughs 12 and 30, I provide spray pipes 45 and 46 which extend longitudinally of such troughs near the tops thereof. Each of the pipes 45 and 46 is provided with a series of longitudinally spaced discharge nozzles 47 through which the bitumen is discharged. I prefer to make the nozzles individually adjustable to regulate the quantity of bitumen discharged from each.

The bitumen supply for the pipes 45 and 46 is contained in a tank 48, conveniently supported from the frame 17. The pipes 45 and 46 are connected together and to the discharge pipe 49 of a pump 50 the inlet side of which is connected through a pipe 51 with the tank 48. The pump

50 may conveniently be driven through a chain-and-sprocket drive from the shaft 16'.

To prevent the accumulation of a supply of liquid bitumen in the lower end of the trough 30, I provide a pipe 55 which communicates with such trough near its lower end and which leads to the inlet side of a pump 56 that discharges through a pipe 57 into the bitumen tank 48. Like the pump 50, the pump 56 may be driven from the shaft 16'. To prevent small aggregate particles from being drawn into the pipe 55, and also to prevent any aggregate from falling into bitumen that may be in the lower end of the trough 30, I provide a screen 60 which extends across the lower end of the trough 30 above the opening in the pipe 55.

The mixing and coating apparatus as so far described can be employed as a stationary unit to produce a bituminous paving composition, the composition discharged from the upper end of the trough 30 falling either on to the ground into a storage pile or into a suitable storage bin. When the portable arrangement illustrated in the drawing is used, however, I prefer to discharge the material from the upper end of the trough 30 into a hopper 65 from which it can be distributed on to the road surface as the machine progresses. To this end, the hopper 65 is supported from the tractor 10 and has at the bottom of its rear wall a discharge opening 66 the effective size of which can be regulated by an adjustable gate 67. Since the material emerging from the upper end of the trough 30 will be discharged into one end of the hopper 65, I prefer to employ means for preventing such material from overflowing the hopper before the hopper is completely full. As indicated in the drawing, this means may take the form of a screw-conveyor 68 which extends longitudinally of the hopper 65 near the top thereof. The conveyor 68 may be driven through a chain 69 from a sprocket 70 loosely mounted on the counter-shaft 18 and adapted to be operatively connected thereto by a jaw-clutch 71 under the control of a suitable hand lever 72.

In the operation of the machine, the bin 11 is filled with aggregate and the tank 48 with bitumen in liquid form, preferably an emulsified bitumen. When the machine is in operation, aggregate feeds at a regulated rate through the opening between the bottom wall 13 of the hopper 11 and the gate 14 into the trough 12. As the shaft 22 rotates, the aggregate is moved along the trough 12 and discharged into the lower end of the inclined trough 30. During its passage through the trough 12, the aggregate receives bitumen sprayed from the nozzles 47. Any bitumen supplied in excess to the quantity which will adhere to the aggregate moves through the trough 12 with the aggregate, passes through the screen 60, and is returned through the pipe 55 to the tank 48 by the pump 56.

The aggregate discharged into the trough 30 from the trough 12 is elevated in the former by the action of the helical blades 31 on the shaft 32 and, at the upper end of the trough 30, is discharged, into the hopper 65 if such hopper is provided. As the trough 65 fills to the level of the screw 68, the aggregate therein is evened off so as to prevent its accumulation at one end of the hopper. As the machine moves along the road, the treated aggregate is discharged through the opening 66, at a rate determined by the position of the gate 67 and is distributed on the road surface.

By proper regulation of the nozzles 47, the character of the coating applied to the aggregate may be made to vary widely. If the coating to be applied is of the same general character as that obtained through the simple immersion process of my prior Patent No. 1,975,902, the bitumen may, if desired, be supplied in excess to the aggregate in the trough 12 or even to aggregate in the lower end of the inclined trough 30, the excess bitumen draining from the aggregate as it is elevated to the upper end of the trough 30. If lighter aggregate coatings than this are desired, the entire quantity of bitumen supplied may be delivered through the nozzles of the pipe 45, and this quantity may be proportioned to the rate of aggregate-feed to produce a coating of desired thickness. If an exceedingly heavy coating, such as is sometimes desired on large-particle aggregate, is to be produced, all the nozzles on both pipes 45 and 46 may be used; but, for ordinary purposes if any of the nozzles of the pipe 46 are used at all, they are only the nozzles near the lower end thereof.

I claim as my invention:

1. Aggregate coating apparatus, comprising a generally horizontal trough arranged to discharge at one end, means for agitating and moving aggregate through said trough and discharging it from the discharge end thereof, a second trough positioned to receive aggregate discharged from said first trough and inclined upwardly, means for moving aggregate upwardly in said second trough, a plurality of bitumen discharge nozzles located at spaced intervals along said troughs to discharge upon aggregate therein; means for supplying bitumen in liquid form to said nozzles, and means for withdrawing excess bitumen from the lowermost point of said second trough to prevent any accumulation of bitumen therein.

2. Aggregate coating apparatus as set forth in claim 1, with the addition of a foraminous screen extending across said second trough above the lowermost point thereof.

3. Aggregate coating apparatus, comprising a generally horizontal trough arranged to discharge at one end, means for agitating and moving aggregate through said trough and discharging it from the discharge end thereof, a receptacle positioned to receive aggregate discharged from said trough, means for supplying liquid bitumen to aggregate in said trough, said receptacle having near its lowermost point a discharge opening for liquid bitumen, a foraminous screen disposed above said opening to prevent aggregate from entering thereinto, and means for elevating aggregate from said receptacle.

4. Aggregate coating apparatus, comprising a vehicle, a trough disposed transversely across the front of said vehicle, a second trough disposed in an inclined position at one side of the vehicle and having its lower end positioned to receive aggregate discharged from said first trough, means for moving aggregate successively through said two troughs, means for supplying bitumen to aggregate as it is moved by said moving means, a hopper extending transversely across the rear of said vehicle and positioned to receive at one end aggregate discharged from said second trough, said hopper having an aggregate-discharge opening near its bottom, and means for distributing along said hopper aggregate discharged from said second trough.

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