

PATENT SPECIFICATION

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(54) SELF-CONTAINED MOBILE BITUMINOUS CONCRETE MIXING APPARATUS

(71) I, HAROLD MARTIN ZIMMERMAN, a Citizen of the United States of America, of R.D. 1, Ephrata, Pennsylvania 17522, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a self-contained, mobile bituminous concrete mixing apparatus for operation directly at a job site. Bituminous concrete, as this technical term is utilized herein, relates to a resilient road surfacing material commonly designated macadam, blacktop, or asphalt, as distinguished from rigid Portland cement, concrete road surfaces having a Portland cement binder.

20 Numerous roadways are in existence today which, upon occasion, require the usual maintenance and repair or "patching". For large maintenance jobs amounting to resurfacing of entire roadway sections, such maintenance can economically and feasibly be effected by large paving machines. For the smaller, relatively minor maintenance jobs amounting to patching and the like, it is not feasible to provide and transport heavy roadway building equipment to effect such maintenance.

35 As such, most road repair jobs are effected by hand. For example, a typical procedure is to load bituminous concrete on the back of a pick-up truck or other similar vehicle and then send a crew consisting of a number of men out to the road location whereat the repair is desired. The bituminous concrete is then physically shoveled into the hole or crack in the roadway to form a repair, the bituminous concrete subsequently being manually tamped into place to complete the repair.

40 This manual method has its obvious disadvantages. For example, not only must

a multi-member crew be provided, but the crew would have to know beforehand the amount of material that would be needed for the particular job, since the bituminous concrete, once mixed and placed upon the vehicle, cannot be maintained in a pliable state for a long period. The shortness of time that pre-mixed bituminous concrete remains pliable also makes it difficult to effect a repair at a location remote from the mixing plant requiring a relatively long driving time to reach. Additional problems are encountered, particularly when attempting to do winter repair work. In this respect, a hot bituminous concrete repair is, of course, preferable to a cold repair due to its better adhesion properties. Yet, such a hot repair cannot readily be utilized in winter months since the hot mixed bituminous concrete, assuming it is to be available, cannot be maintained at the elevated temperature on the truck for long. It is primarily for this reason that most winter roadway repairs utilize the cold method, which is wasteful and invariably necessitates additional subsequent repair work, since a cold repair does not stand up to wear or temperature variations as well as a hot repair.

75 Additionally, a pre-mixed bituminous concrete batch that is taken out to the repair job may not be of the same high quality and/or consistency as bituminous concrete actually mixed at the job site.

80 It should thus be apparent that a need exists in the road repair and resurfacing field by which the repair of roadways can be modernized and otherwise facilitated to thus eliminate the archaic manual methods now in use. It is the primary objective of the instant invention to provide an apparatus by which this need can be filled.

85 It is a further objective of the instant invention to provide a novel apparatus which can transport bituminous concrete ingredients in separate compartments to the

job site, whereat the apparatus can automatically proportion, and mix bituminous concrete.

5 The present invention provides an entirely self-contained continuously operable mobile bituminous concrete mixing apparatus comprising an elongate mobile frame; a storage compartment disposed on said frame for storing aggregate, a separate compartment disposed on said frame for storing liquid bitumen; an elongate hollow rotatable drum having a front end and a rear end and a burner therefor disposed on said frame for heating and drying the aggregates in the drum, the drum being provided with agitating vanes therein for moving a flow of aggregates through the drum from the front end thereof to the rear end during rotation of said drum; conveyor means disposed on said frame adjacent said aggregate storage compartment for transporting a flow of stored aggregates out from said compartment and then into said front end of said hollow drum; receiving means disposed on said frame adjacent said rear end of said hollow drum for receiving a flow of heated and dried aggregates from said hollow drum and for continuously discharging same; mixing means disposed on said frame for accepting the heated and dried aggregates from said receiving means; means coupled to said liquid bitumen storage compartment for automatically discharging a metered flow of liquid bitumen into said mixing means to effect a continuous mixing of the aggregates with the liquid bitumen to form bituminous concrete, and wherein the relative disposition of said aggregate storage compartment, said conveyor means, said hollow drum, and said mixing means is such that a flow-path of the aggregates from said storage compartment to and through said hollow drum and into said mixing means extends along substantially straight lines.

20 The aggregates are advantageously removed from the storage compartment therefor at the job site through metering gates or like metering mechanism which ensures a predetermined amount and ratio of the aggregates. The aggregates are then conveyed to a heating and drying mechanism also disposed on the mobile frame, which mechanism constitutes a rotatable heating and drying drum. The aggregates are dried and are raised preferably to a temperature of approximately 400°F. in the rotating drum mechanism and in the preferred embodiment are dropped into a hopper containing a further metering mechanism from which the ingredients are discharged into a pug mill type mixing conveyor. A liquid bitumen is added to the mixing

conveyor, the bitumen being separately maintained in a separate storage compartment which may be heated. The amount of dry aggregates as compared with the amount of liquid bitumen is carefully controlled by means of the metering mechanism associated with the hopper and by means of a bitumen metering device. In this fashion, bituminous concrete is provided having controlled consistency and quality.

70 The bituminous concrete, i.e., the mixture of the aggregates and the bitumen, may then be fed into a spreader mechanism (not forming part of the present invention) and which can be carried behind the mobile frame by which the bituminous concrete is applied to the surface of an underlying roadway. The spreader mechanism may constitute a forwardly disposed heating chamber so as to heat the underlying road surface thereby assuring good adhesion for the bituminous concrete. A plurality of auger conveyors are also provided for evenly distributing the bituminous concrete over the underlying and heated surface. The distributed bituminous concrete is then settled by means of a vibrating mechanism and finally is compacted by a roller rearwardly disposed on the spreading mechanism.

80 The bituminous concrete mixing apparatus generally described above separately stores all the ingredients of the bituminous concrete so that the problems associated with premature hardening of a pre-mixed batch are entirely eliminated. Further, a predetermined amount of bituminous concrete having a controlled consistency and quality is mixed at the job site through the utilization of the apparatus of the instant invention, therefore eliminating the prior art problems of predetermining the amount of bituminous concrete that will be needed for any given job. The mixture effected by the machine of the instant invention is hot even during winter months and, importantly, operation of the apparatus of the instant invention can be effected by one man, if so desired.

115 The invention will now be described by way of an example with reference to the accompanying drawings in which:—

Figure 1 is a side elevational view of a truck incorporating the self-contained bituminous concrete mixing apparatus of the instant invention;

Figure 2 is a top plan view of the bituminous concrete apparatus of Figure 1;

Figure 3 is a side elevational view of the apparatus of Figure 1 partially broken away and in cross-section for illustrative clarity;

Figure 4 is a front elevational view of the apparatus of Figure 3 taken along lines 4—4 thereof;

Figure 5 is an elevational view in section of the apparatus of Figure 3 taken along lines 5—5 thereof;

Figure 6 is an elevational view in section of the portion of the apparatus of the instant invention taken along lines 6—6 of Figure 3;

Figure 7 is a rear elevational view of the bituminous concrete apparatus depicted in Figure 1;

Figure 8 is a top plan view of a bituminous concrete spreading mechanism carried behind the apparatus as depicted in Figures 1 and 3 of the drawings; and

Figure 9 is an elevational view, in section for clarity, of the auger or spreading conveyor of the bituminous concrete spreading apparatus depicted in Figure 8, taken along lines 9—9 thereof.

Referring now to the drawings, and particularly to Figure 1 thereof, the bituminous concrete apparatus of the instant invention can be seen including the bed or mobile frame 20 of a truck generally designated by the reference numeral 22. The bituminous concrete apparatus comprises a first storage compartment generally designated by the reference numeral 24 see Fig. 3 for storing coarse and fine aggregates such as sand and gravel, and a second storage compartment generally designated by reference numeral 26 see Fig. 5 for storing liquid bitumen, such as liquid asphalt or tar. The aggregates within the first storage compartment 24 are removed and dispensed therefrom through a first metering means generally designated by reference numeral 28 (see Figure 3) via a conveyor mechanism having a first substantially horizontal section generally designated by reference numeral 30 and a second substantially vertical section generally designated by reference numeral 32, into a heating and drying drum generally designated by reference numeral 34 wherein the aggregates are dried and are raised to an elevated temperature and transported towards the rear or left-hand side of the apparatus as viewed in Figures 1 and 3. The aggregates are then dispensed into a hopper generally designated by reference numeral 36 containing a further metering mechanism from which the aggregates are discharged into a pug mill type mixing means 116—118 into which the bitumen is likewise metered so as to form bituminous concrete therein of controlled quality and consistency. The bituminous concrete so formed is then discharged into a spreading means generally designated by reference numeral 38 disposed rearwardly of the mobile frame, spreading means 38 depositing the bituminous concrete onto the surface of the underlying roadway so as to effect a proper repair of the roadway.

In a preferred embodiment, the first storage compartment generally designated by reference numeral 24 comprises a plurality of separate chambers such as chambers 40 and 42 as can best be seen from the top plan view of the apparatus depicted in Figure 2. The chambers 40 and 42 are substantially rectilinear with the outside walls 44 and 46 thereof (see Figure 5) being downwardly and inwardly inclined much in the manner of a hopper. Separate coarse and fine aggregates, such as sand and gravel are separately stored within the individual storage chambers 40 and 42.

The bottom sides of each of the separate storage chambers 40 and 42 are open and are disposed immediately above an elongated substantially horizontal conveyor section generally designated 30, which conveyor 30 can, for example, comprise a belt conveyor driven in a clockwise manner when viewing Figure 3 by any suitable drive mechanism which has not been illustrated for purposes of illustrative clarity. In this respect, the drive mechanism 30 could be coupled via a gearing arrangement to a conveyor section 32 which preferably is slightly inclined to the vertical, details of the construction of the conveyor section 32 to be described hereinbelow.

Due to this construction, the aggregates such as sand and gravel rest directly upon the surface of the horizontal conveyor section 30 and, in operation thereof, the aggregates are carried forwardly towards the front or right-hand side of the apparatus as viewed in Figures 1 and 3. The actual amount and the ratio of various aggregates that are dispensed from the storage chambers 40 and 42 is controlled by a first metering means generally designated by reference numeral 28. Attention is directed to Figure 5 of the drawings wherein the detailed construction of the first metering means 28 can be seen. In the preferred inventive embodiment, the first metering means 28 comprises vertically slidable gates 48 and 50 respectively associated with chambers 40 and 42. The vertically slidable gates 48 and 50 are disposed within channels or guides 52 and the vertical position of the respective gates 48 and 50 and thus the degree or amount of opening of the gates can readily be controlled.

For example, and in a preferred inventive embodiment, each of the gates 48 and 50 have a gear rack 54 associated therewith, each gear rack 54 being coupled to pinion gears 56 disposed on shafts 58 which can be rotated by the external hand wheels 60. It should further be noted that the shaft 58 of the control mechanism for gate 48 is a flexible shaft, though it should be appreciated by those skilled in the art

that other control mechanism could readily be substituted for that specifically depicted in Figure 5 of the drawings.

5 Thus, through rotation of the individual hand wheels 60, the amount and ratio of the aggregates, such as sand and gravel, that is dispensed from the individual or separate chambers 40 and 42 can volumetrically be controlled.

10 The aggregates thus dispensed by the horizontal conveyor section 30 are discharged from conveyor section 30 into a trough or well 62 disposed forwardly of the apparatus. From this trough or well 62, the
15 discharge aggregates are carried upwardly by the slightly inclined conveyor section 32. In the preferred inventive embodiment, conveyor section 32 comprises a bucket conveyor which incorporates a plurality of
20 buckets such as designated by reference numeral 64 disposed upon a chain 66, the chain 66 and thus the conveyor section 32 being driven by a gearing arrangement 68 which may constitute a power-take
25 off from the truck upon which the bituminous concrete apparatus is mounted. The conveyor section 32 therefore serves to lift and carry upwardly the aggregates dispensed into the trough or
30 well 62 from the individual storage chambers 40 and 42. At the top of the conveyor 32, the lifted aggregates are discharged into an underlying auger or screw generally designated by reference
35 numeral 70. The auger or screw 70 serves to carry the discharge ingredients rearwardly, i.e., from right to left when viewing Figures 1 and 3, for example, into a heating and drying drum 34 whereat the aggregates are
40 dried and are raised to an elevated temperature as will be further described. The auger or screw 70 can be driven directly from the conveyor 32 by means of a chain or belt drive 72 as is depicted in
45 Figure 4, the chain or belt 72 being disposed about an idler pulley 74 as is indicated. In the preferred inventive embodiment, the slightly inclined conveyor section 32 is covered by a shroud 76 and it should further
50 be noted that conveyor section 32 leans towards the rear of the apparatus so as to facilitate discharge of the aggregates into the heating and drying drum 34 and so as to facilitate the mechanical gearing and other
55 coupling arrangements between the heating and drying drum 34, as will be described.

The function of the heating and drying drum 34 is to dry and to raise the temperature of the aggregates deposited
60 therein to approximately 400°F. and further to convey or transport the aggregates towards the rear of the apparatus for subsequent discharge. To this end, the heating and drying drum will be seen to
65 constitute an elongated hollow drum 78,

preferably constructed of steel and being reinforced with a plurality of ribs 80 which further extend into the interior of the hollow drum, and by a forwardly disposed
70 cross-brace 82. The hollow drum 78 is rotatable and is journaled for rotation at its rearward end by a journal bearing generally designated by reference numeral 84. At the forward end of the elongated hollow drum
75 78, a shaft 86 is attached to the cross-brace 82, the shaft being journaled as at reference numeral 88 and being coupled for driving rotation to the idler pulley 74 of the slightly inclined conveyor section 32 by a chain or
80 belt drive 90. Therefore, as the slightly inclined conveyor section 32 is operated, rotation of the elongated hollow drum 78 is effected.

Disposed at the rear end of the hollow rotating drum 78 is a burner, such as a
85 forced air oil burner generally designated by reference numeral 92. A source of air is coupled to the burner 92 by a line 94 as depicted in Figure 7, which line runs to a blower 96 disposed on the side of the
90 apparatus as is depicted in Figure 1. A non-illustrated oil line for supplying the burner 92 is coupled to an oil tank 98 also disposed on the mobile frame or bed 20 of the truck 22. Of course, fuel other than oil can be
95 utilized to effect operation of the burner 92. The heated air from the heating mechanism or burner 92 passes through the hollow rotating drum 78 from the rear towards the front thereof, the rotation of the drum
100 particularly in conjunction with the protruding vanes or ribs 80 serving to agitate the aggregates so as to effect a more even heating thereof and serving to transport or convey the aggregates from the
105 front of the drum towards the rear thereof. To this end, and so as to assist in this transport process, it should be noted that the hollow drum 78 is not disposed exactly on the horizontal in the preferred inventive
110 embodiment, but is slightly inclined from front to rear to effectively make a right angle with the nearly vertical conveyor section 32.

The hot air blown into the rotating drum
115 78 is discharged through an air channel means 100 communicating between the hollow drum 78 and each of the storage chambers 40 and 42. The air channel means 100 is partially formed by internal duct
120 work leading to each of the storage chambers 40 and 42 and is further formed by a shroud or cover 102 (see Fig. 1) which runs the length of the elongated hollow drum 78 and is disposed immediately above.
125 Air flow into the drum 78 therefore follows arrow 104 as can best be seen in Figure 3 into each of the storage chambers 40 and 42, which air flow serves to pre-dry the ingredients in the compartments and carries
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with it any dust that may occur through operation of the rotating drum 78, this dust being conducted to the storage chambers 40 and 42 whereat the dust would be settled.

5 This air flow can be further assisted by the provision of fans 106 in the channel means communicating between each of the chambers 40 and 42 and the hollow rotating drum 78. The drive for each of the fans 106
10 can be taken off the various gears provided for the conveyor 32 which, as has been described, is itself driven from the power takeoff 68 of the truck.

15 The now-heated aggregates moving rearwardly through the hollow rotating drum 78 are discharged therefrom through an outlet 108 provided at the rear end thereof into a hopper assembly 36 as can best be seen from a review of Figures 1, 3,
20 and 7. The aggregates discharged into the hopper assembly 36 are dispensed or metered therefrom by the provision of a further gate 110 in association with a rotating drum or conveyor 112 which is contemplated to rotate in a clock-wise
25 direction as appears in Figure 7. Thus, the heated aggregates discharged into the hopper assembly onto the rotating conveyor 112 are dispensed from the hopper assembly through the slidable gate 110, whereby the
30 aggregates fall down a chute 114 into a pug mill type mixing means defined by a funnel mechanism 116 and an underlying lateral conveyor or auger 118 to be described hereinbelow. Also discharged into the
35 funnel mechanism 116 and thereafter into the lateral conveyor 118 is the liquid bitumen which has been stored in storage compartment 26 and discharged through a
40 pipe 120 through a metering valve 122 as can be seen in Figure 7. Further, the liquid bitumen within the storage compartment or tank 26 may likewise have been raised to an
45 elevated temperature through the provision of a further oil burner 124 which is fueled from the general supply tank 98.

50 The ratio of the dry ingredients to the liquid ingredients discharged into the lateral conveyor or auger 118 can closely be controlled whereby the consistency and quality of the asphalt formed can be selected. In this respect, it should be noted
55 that the hopper assembly and underlying rotating wheel or drum 112 are mounted on a pivotally disposed and spring-loaded lever or support arm 124. Specifically, the support arm 124 is pivoted to the truck
60 frame around bearing 126 and the other end of support arm 124 is coupled to the body of the truck by a spring mechanism 128. In this fashion, the entire hopper assembly will move downwardly as aggregates
65 accumulate therein, and, when empty, the hopper assembly would move upwardly, much as is shown in Figure 7. This

movement of the hopper assembly and specifically of the lever or support arm 124 can be monitored as an indication of the amount of aggregates discharged from the heater and drying drum 34. To this end, it
70 should be noted that operation of the rotating conveyor 112 is effected by an electric motor 130 which itself is controlled through mechanical linkage generally designated by reference numeral 132
75 coupled to the lever arm 124. Thus, as the lever arm 124 swings downwardly, i.e., counterclockwise about its pivot 126 when viewing Figure 7, the electric motor 130 will be turned on by the linkage means 132. Similarly, when the hopper assembly is empty, the electric motor 130 will be turned off, thus effecting a selective control over the rotation of the conveyor 112.

80 The metering means or valve 122 disposed in the line 120 through which the liquid bitumen is discharged is likewise controlled via the mechanical linkage 132 by the position of the support or lever arm 124. Thus, when the conveyor 112 is in
85 operation effecting discharge of aggregates down the chute 114 into the funnel 116, a controlled amount of liquid bitumen is likewise being dispensed or metered into the funnel 116. Additional control over the
90 quality and consistency of the bituminous concrete being produced can be effected by operation of the gate 110 controlling the volume amount of aggregates dispensed, as has been mentioned above. Of course, and
95 as should be apparent to those skilled in the art, various other synchronization mechanisms can be utilized in place of the mechanical linkage 132 so as to control the aggregates and liquid bitumen dispensed
100 into the funnel 116.

105 The ingredients dispensed into funnel 116, both wet and dry, are mixed in the lateral conveyor or auger 118 to thereby form what is termed herein bituminous concrete. Of course, it should be appreciated that the operation of the apparatus as abovedescribed can essentially be continuous until the amount of bituminous concrete produced fits the
110 requirements of the particular job at hand. From the lateral auger or conveyor 118, the bituminous concrete is dispensed into a spreading means 38 disposed at the rear of the mobile frame 30 and carried along
115 behind.

120 The spreading means or apparatus 38 comprises a heat chamber means 134 disposed forwardly of the mechanism to which is coupled an additional oil burner or other heater 136, also fueled from the fuel
125 supply tank 98. In this fashion, the surface of a roadway underlying the spreading means or mechanism 38 can be heated. Two such burners or heaters 136 are provided to
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either side of the apparatus as can best be seen from a review of Figure 8.

The lateral conveyor means generally designated by reference numeral 138 is disposed rearwardly of the heat chamber means 134 for receiving the bituminous concrete from the lateral auger or screw conveyor 118 and for evenly distributing the bituminous concrete over the heated underlying road surface. The detailed construction of the lateral conveyor means 138 is best illustrated in Figure 9 of the appended drawings, the lateral conveyor means comprising two elongated augers 142 and 144 disposed one above the other, with auger 144 conveying the bituminous concrete outwardly towards either side of the apparatus and with auger 142 conveying the bituminous concrete inwardly from either side of the apparatus towards the centre thereof. In this fashion, the even distribution of the bituminous concrete over the underlying roadway is assured.

A vibrating plate generally designated by reference numeral 146 is disposed rearwardly of the conveyor means 138 for settling the distributed bituminous concrete. Specifically, and in the preferred inventive embodiment, the vibrating means 146 will be seen to comprise in cross-section a triangularly shaped plate defining an inner chamber, to which plate a vibrator 150 is attached. It should further be noted that a hollow tube or duct 152a communicates between the interior of the heat chamber means 134 and the vibrator chamber 146 so as to further heat the bituminous concrete being settled, thus further assuring good adhesion properties and preventing the bituminous concrete from sticking to the chamber. The plate 148 of the vibrating means 146 is preferably hingeably mounted such as at pivot point 152 so as to provide an automatic adjustment therefor and so as to ensure good contact with the underlying bituminous concrete.

A compacting means generally designated by reference numeral 154 is disposed at the rear of the spreader means 38 for compacting the now settled bituminous concrete. The compacting means 154 constitutes a weighted roller, as is shown.

The spreader means 38, or perhaps more accurately the mechanism for actually applying the bituminous concrete to the underlying roadway, is attached to the rear of the truck 22 by mounting means generally designated by reference numeral 156. Such mounting means constitutes three hydraulic cylinders. In the preferred inventive embodiment, a cylinder such as cylinder 158 is disposed to either side of the spreader apparatus 38. In addition a cylinder such as cylinder 160 is disposed

centrally of the spreading apparatus 38, the hydraulic cylinders coupling the spreader apparatus to the mobile frame 20 of the truck 22 in a fashion such that the height of the spreader means 38 above the ground as well as its angle relative to the underlying ground surface can readily be controlled. Of course, the rear of the spreader means 38 is supported by virtue of the compacting means or roller 154.

For illustrative clarity, a number of details of construction of the instant invention have not been illustrated in the drawings, though the fabrication of same can readily be effected by those skilled in the art. For example, each of the various burners or heaters provided are contemplated to have associated therewith electrical temperature sensors so that the temperatures thereof can carefully be controlled. Further, the positioning of the various metering gates above-described can be controlled through various well-known hydraulic means and, to this end, the novel invention is contemplated to include, if desired, hydraulic pump and suitable automatic controls therefor coupled to the power take-off of the truck. Similar automatic controls and gearing can be provided to control the relative speeds of the various conveyors and drives so that the entire operation of the bituminous concrete producing apparatus can be automated.

WHAT I CLAIM IS:—

1. An entirely self-contained continuously operable mobile bituminous concrete mixing apparatus comprising an elongate mobile frame; a storage compartment disposed on said frame for storing aggregate, a separate compartment disposed on said frame for storing liquid bitumen; an elongate hollow rotatable drum having a front end and a rear end and a burner therefor disposed on said frame for heating and drying the aggregates in the drum, the drum being provided with agitating vanes therein for moving a flow of aggregates through the drum from the front end thereof to the rear end during rotation of said drum; conveyor means disposed on said frame adjacent said aggregate storage compartment for transporting a flow of stored aggregates out from said compartment and then into said front end of said hollow drum; receiving means disposed on said frame adjacent said rear end of said hollow drum for receiving a flow of heated and dried aggregates from said hollow drum and for continuously discharging same; mixing means disposed on said frame for accepting the heated and dried aggregates from said receiving means; means coupled to said liquid bitumen storage compartment for automatically

either side of the apparatus as can best be seen from a review of Figure 8.

The lateral conveyor means generally designated by reference numeral 138 is disposed rearwardly of the heat chamber means 134 for receiving the bituminous concrete from the lateral auger or screw conveyor 118 and for evenly distributing the bituminous concrete over the heated underlying road surface. The detailed construction of the lateral conveyor means 138 is best illustrated in Figure 9 of the appended drawings, the lateral conveyor means comprising two elongated augers 142 and 144 disposed one above the other, with auger 144 conveying the bituminous concrete outwardly towards either side of the apparatus and with auger 142 conveying the bituminous concrete inwardly from either side of the apparatus towards the centre thereof. In this fashion, the even distribution of the bituminous concrete over the underlying roadway is assured.

A vibrating plate generally designated by reference numeral 146 is disposed rearwardly of the conveyor means 138 for settling the distributed bituminous concrete. Specifically, and in the preferred inventive embodiment, the vibrating means 146 will be seen to comprise in cross-section a triangularly shaped plate defining an inner chamber, to which plate a vibrator 150 is attached. It should further be noted that a hollow tube or duct 152a communicates between the interior of the heat chamber means 134 and the vibrator chamber 146 so as to further heat the bituminous concrete being settled, thus further assuring good adhesion properties and preventing the bituminous concrete from sticking to the chamber. The plate 148 of the vibrating means 146 is preferably hingeably mounted such as at pivot point 152 so as to provide an automatic adjustment therefor and so as to ensure good contact with the underlying bituminous concrete.

A compacting means generally designated by reference numeral 154 is disposed at the rear of the spreader means 38 for compacting the now settled bituminous concrete. The compacting means 154 constitutes a weighted roller, as is shown.

The spreader means 38, or perhaps more accurately the mechanism for actually applying the bituminous concrete to the underlying roadway, is attached to the rear of the truck 22 by mounting means generally designated by reference numeral 156. Such mounting means constitutes three hydraulic cylinders. In the preferred inventive embodiment, a cylinder such as cylinder 158 is disposed to either side of the spreader apparatus 38. In addition a cylinder such as cylinder 160 is disposed

centrally of the spreading apparatus 38, the hydraulic cylinders coupling the spreader apparatus to the mobile frame 20 of the truck 22 in a fashion such that the height of the spreader means 38 above the ground as well as its angle relative to the underlying ground surface can readily be controlled. Of course, the rear of the spreader means 38 is supported by virtue of the compacting means or roller 154.

For illustrative clarity, a number of details of construction of the instant invention have not been illustrated in the drawings, though the fabrication of same can readily be effected by those skilled in the art. For example, each of the various burners or heaters provided are contemplated to have associated therewith electrical temperature sensors so that the temperatures thereof can carefully be controlled. Further, the positioning of the various metering gates above-described can be controlled through various well-known hydraulic means and, to this end, the novel invention is contemplated to include, if desired, hydraulic pump and suitable automatic controls therefor coupled to the power take-off of the truck. Similar automatic controls and gearing can be provided to control the relative speeds of the various conveyors and drives so that the entire operation of the bituminous concrete producing apparatus can be automated.

WHAT I CLAIM IS:—

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discharging a metered flow of liquid bitumen into said mixing means to effect a continuous mixing of the aggregates with the liquid bitumen to form bituminous concrete, and wherein the relative disposition of said aggregate storage compartment, said conveyor means, said hollow drum, and said mixing means is such that a flow-path of the aggregates from said storage compartment to and through said hollow drum and into said mixing means extends along substantially straight lines.

2. An apparatus as claimed in Claim 1, wherein a plurality of chambers are provided in the aggregate storing compartment for separately storing a plurality of different aggregates.

3. Apparatus as claimed in Claim 2, wherein a metering means is operatively associated with each said chamber for the storage of different aggregates so that pre-determined amounts and ratios of said different aggregates can be discharged to said conveyor means.

4. Apparatus as claimed in Claim 3, further including a heater means for maintaining the bitumen within its storage compartment at an elevated temperature.

5. An apparatus as claimed in any one of Claims 1 to 4, wherein said burner is disposed at said rear end of said drum and wherein said drum is tilted from the front end thereof to said rear end to facilitate movement of the aggregates within the drum from the front of the drum to the rear thereof.

6. Apparatus as claimed in Claim 5, wherein said storage compartment for said aggregates includes a plurality of separate chambers for separately storing aggregates, said chambers being disposed substantially along the length of the frame in a location to either side of and substantially immediately below said hollow drum, said conveyor means including an elongate substantially horizontal section thereof disposed immediately below said separate chambers for feeding the aggregates therein in a direction toward the front of said mobile frame.

7. Apparatus as claimed in Claim 5, wherein said burner associated with said hollow drum is a forced-air burner for effecting a flow of heated air through said hollow drum and about the aggregates therein.

8. Apparatus as claimed in Claim 7, further including air channels communicating with said hollow drum through which a flow of air from said drum can be channeled for removing dust.

9. Apparatus as claimed in any preceding Claim, wherein said receiving means includes a hopper for receiving the heated aggregates from said drum and a first dispensing means for controlling the amount of aggregates discharged from said hopper into said mixing means, and wherein means is provided for synchronizing the operation of said first dispensing means with the discharge means for said liquid bitumen.

10. Apparatus as claimed in any preceding Claim, wherein said mixing means includes an auger conveyor.

11. Apparatus as claimed in Claim 9, wherein said first dispensing means comprises a conveyor which is disposed at the bottom of said hopper for carrying aggregates therein towards a discharge point whereat metering gates are provided.

12. Apparatus as defined in Claim 11, wherein the amount of aggregates discharged into said mixing means and the amount of discharged bitumen is correlated and synchronized by an apparatus for sensing the weight of the aggregates within said hopper to control operation of said conveyor disposed at the bottom of said hopper and to control operation of said bitumen discharging means.

13. Apparatus as claimed in Claim 6, wherein said conveyor means further includes an upwardly extending section defined by a bucket conveyor for carrying aggregates discharged by said substantially horizontal section upwardly and into said hollow drum.

14. Apparatus as defined in Claim 8, further including blower means disposed in said air channels for assisting the flow of air from said drum.

15. An entirely self-contained continuously operable mobile bituminous concrete mixing apparatus as claimed in Claim 1 and substantially as herein described with reference to Figs. 1 to 7 of the accompanying drawings.

MARKS & CLERK.

