April 22, 1930. P. A. KOEHRING 1,755,653

SUBGRADE PREPARING, CONCRETE DISTRIBUTING, AND FINISHING MACHINE

Filed July 21, 1928 3 Sheets-Sheet 1

Fig. 1.

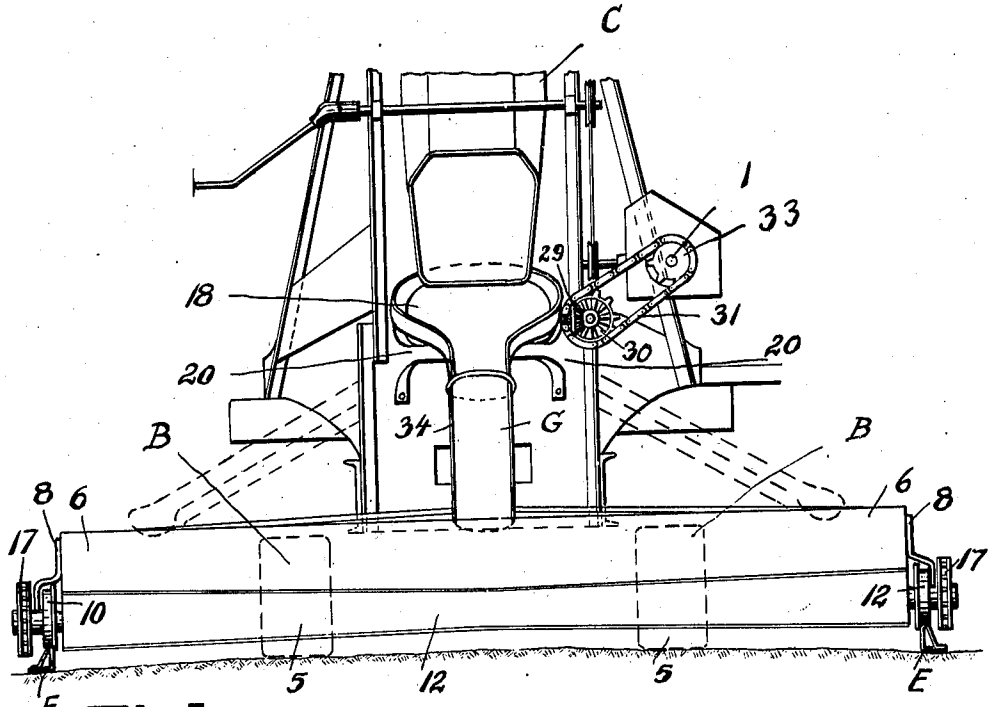
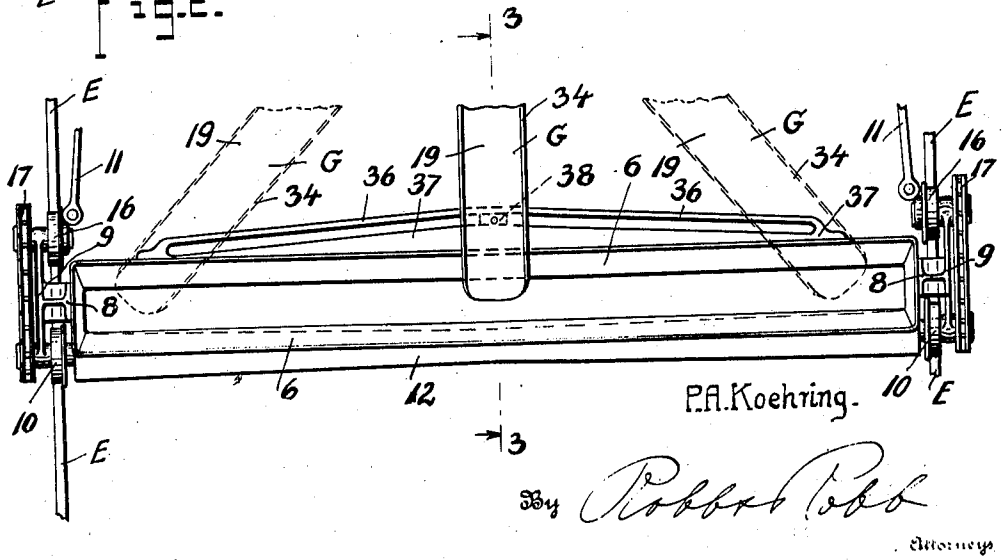


Fig. 2.



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Filed July 21, 1928 3 Sheets-Sheet 2

Fig. 3.

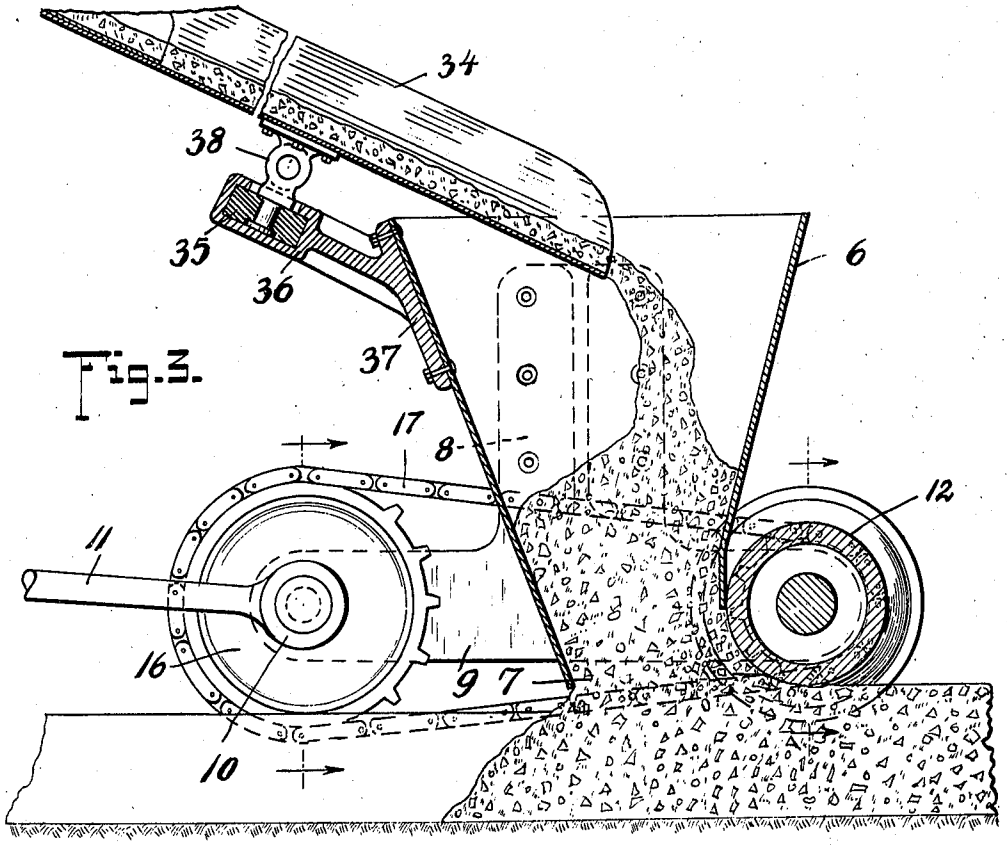


Fig. 4.

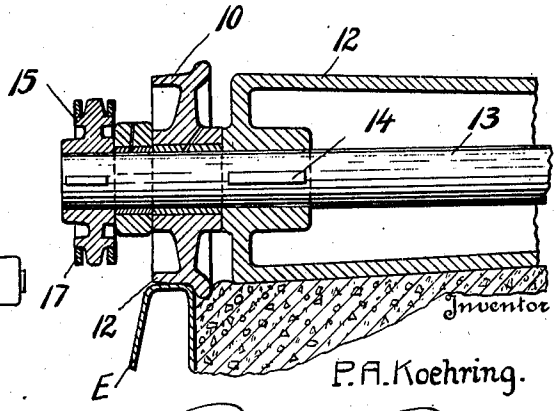
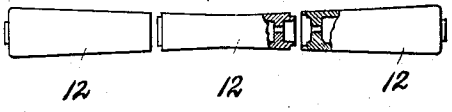


Fig. 8.



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Filed July 21, 1928 3 Sheets-Sheet 3

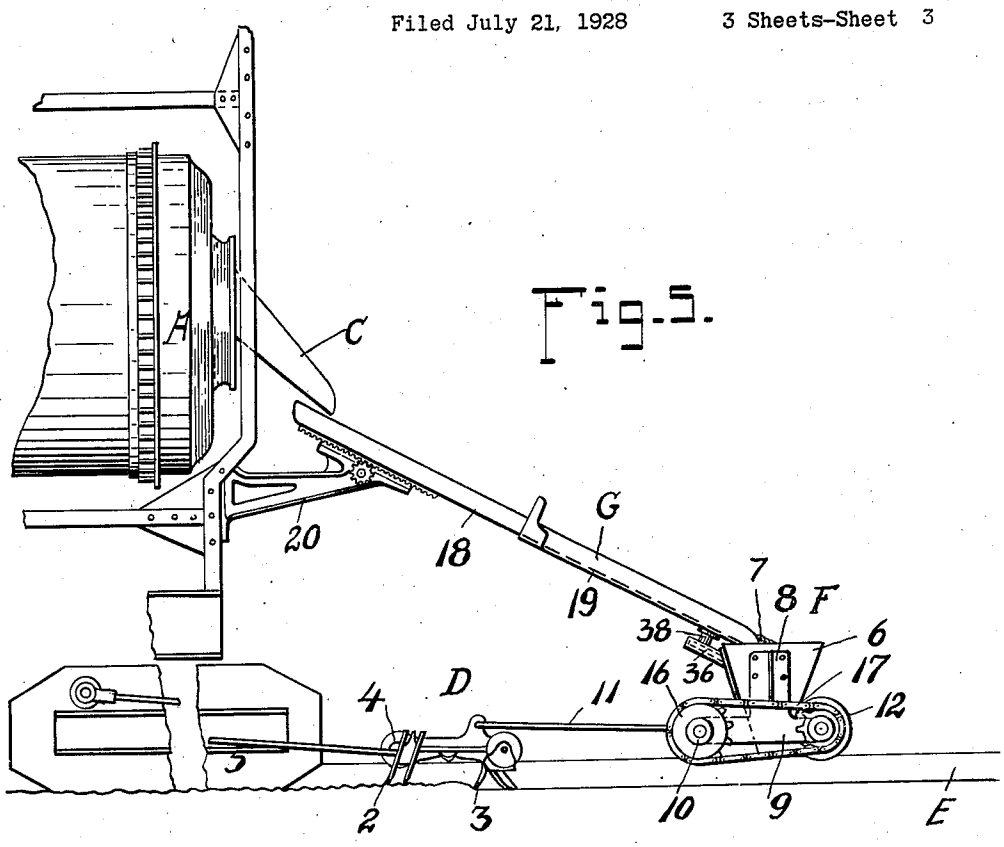


Fig. 5.

Fig. 6.

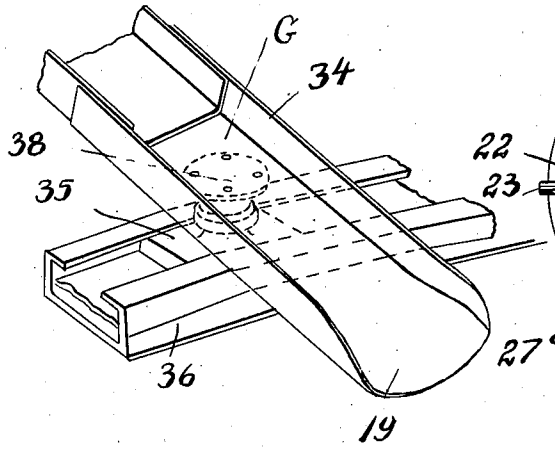
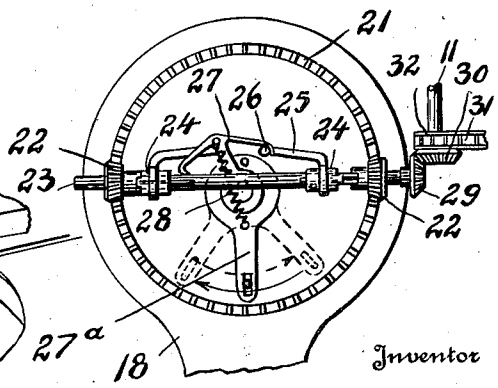


Fig. 7.



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Patented Apr. 22. 1930 1,755,653

UNITED STATES PATENT OFFICE

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SUBGRADE PREPARING, CONCRETE DISTRIBUTING, AND FINISHING MACHINE

Application filed July 21, 1928. Serial No. 294,553.

The art of road building is today receiving a large amount of attention from engineers and inventors who are making improvements following the trend of simplifying to as great extent as possible the methods of construction of concrete roads, and this invention is directed to the above end. The conventional practice today is to avail of a machine for finishing or leveling the subgrade prior to the depositing of concrete thereon, another machine is employed for mixing and depositing the concrete on the surface, and still further instrumentalities are brought into operation for finishing the concrete road. The universal custom is to have these machines operate separately and independently of one another. It is an object of this invention to provide road building machinery of the class noted, in which the mixing plant, subgrade finishing means, concrete spreading instrumentalities, and road finishing devices are all combined and moved as a unit along the subgrade in the construction of the road.

Inasmuch as the modern type of paving machine is of such construction that one end thereof must be accessible from trucks and other carriers employed to charge the loading skip thereof, it is an essential in a combined unitary assemblage, such as above described, that the subgrade preparing means follow the mixing plant in its movement along the subgrade; but it is just as much an essential that these preparing or leveling means operate on the subgrade prior to the depositing of the mixed aggregates thereon. In order to meet these conditions, I avail of concrete spreading instrumentalities, which are somewhat removed from the mixing plant, together with suitable devices for conveying the mixed concrete to the spreading instrumentalities. Interposed between these spreading instrumentalities and the mixing plant, are the subgrade finishing means, which may comprise the usual scarifiers and scrapers or screeds. In the rear of the concrete spreading instrumentalities, I position the road finishing devices, which in this instance may comprise a properly shaped roller, together with its operating instrumentalities.

An assemblage of this type particularly adapts itself to the utilizing of its forward movement for the spreading of the concrete, and for this reason, as well as others, such as the simplicity and ease of operation, I avail of a transverse hopper construction as the concrete spreading instrumentality. Generally speaking, this hopper comprises a large receptacle having a wide top and a comparatively restricted opening in the bottom thereof through which the concrete passes in being deposited on the road bed. Suitable traction mounting for the hopper is necessarily provided. Inasmuch as this hopper is spaced from the mixing plant, as hereinbefore noted, an essential feature of the invention lies in the means for carrying concrete from the mixing drum to the distributing hopper.

In devising a practical construction for carrying out this object, I employ a telescoping chute which has one end affixed in a guide way running along the hopper, while its other end is pivotally supported beneath the discharge chute of the mixing drum. Suitable operating instrumentalities are provided in the construction of the mixer for causing oscillation of this telescopic conveying chute. The reason for this oscillation is that proper functioning in discharging a hopper of this character is dependent on the even distribution of concrete throughout the length thereof, and it is a particular object of this invention to provide suitable means for so depositing the prepared concrete therein and to this end the oscillating chute above noted has been provided.

Particular features of the invention reside in the pivotal mounting of the conveying chute together with the operating instrumentalities for causing the oscillation thereof, also in the mounting of the end of the chute in the guide way along the hopper.

Proper operation of the road finishing devices of the type employed in this instance, namely, the roller, entails the revolution thereof at a speed faster than that which would naturally be engendered by rolling movement of the roller along the road. It is therefore an object to provide suitable instrumentalities for rotating this roller at the relative speed indicated. In carrying out

this thought, the roller is freely mounted on wheels which move along the customary road rails, and has keyed thereto a sprocket which is driven by a chain that passes over a somewhat larger sprocket carried by a wheel also driven along the road rail, and which wheel is substantially of the same dimensions as the wheel in which the finishing roller is mounted.

A detail object in view is to arrange the finishing roller so that it also functions as a wiper for the discharge opening of the distributing hopper, and this is achieved by positioning this roller directly behind the distributing hopper so that the face thereof substantially wipes the rear of the hopper. In this manner the collection of any aggregates around the edge of the discharge opening is inhibited. A highly important object of the invention is to provide subgrade finishing means, concrete spreading instrumentalities, and road finishing devices of the character hereinbefore described, which may be readily adapted and used in conjunction with the present type of road paver now commonly in vogue. In this connection, it is noted that all of these devices may readily be applied to modern road pavers with slight alteration to the latter. Practically speaking, they might be substituted for the ordinary boom and bucket constructions.

With these and other objects in view, as will in part become apparent, and in part be hereinafter stated, the invention comprises certain novel constructions, arrangements and combinations of parts, as will be subsequently specified and claimed.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawings, in which

Figure 1 is an end view of a mixing plant with the attachments provided by this invention applied thereto, the mixing plant being shown fragmentarily.

Figure 2 is a plan view of the distributing hopper together with the finishing roller.

Figure 3 is a section taken about on the line 3—3 of Figure 2, bringing out the construction and mode of operation of the concrete spreading instrumentalities as well as the road finishing roller.

Figure 4 is a detail illustration in section of one end of the finishing roller together with its driving means.

Figure 5 is a side view somewhat diagrammatic of the assembly comprising the mixing plant, subgrade finishing means, operating instrumentalities, and road finishing devices.

Figure 6 is a detailed showing in perspective of the mounting of the end of the conveying chute on the distributing hopper, and

Figure 7 is a bottom plan view that brings out the pivotal mounting of the end of the conveying chute disposed beneath the discharge chute of the concrete mixer, together with the instrumentalities for oscillating said conveying chute.

Figure 8 is a showing, somewhat diagrammatic of a modified form of the road finishing roller.

While a preferred specific embodiment of the invention is herein set forth, it is to be understood I am not to be limited to the exact constructions, illustrated and described, because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

A mixing plant such as heretofore used with paving machines of the type shown by my Patent Reissue No. 13,617, issued September 16th, 1913, is indicated generally by the reference character A, and includes traction devices B, and a discharge chute C for the mixing drum, also a constantly driven shaft designated 1. This shaft 1 is driven from the power source of the mixer, (not shown). It is readily appreciable that the various devices provided and assembled by this invention are particularly adapted for use with a known type of mixing plant.

The subgrade finishing means is referred to generally by the reference character D and may include scarifying teeth shown at 2, and a screed or blade indicated at 3, and which members are properly included in the construction of a framework which moves along road rails designated E, on account of being supported by small wheels or rollers 4. The subgrade finishing means D is connected to the mixer A by suitable draw bar construction, such as indicated at 5, and is positioned directly in the rear of the mixer.

The concrete spreading instrumentalities, together with road finishing means, are denoted generally by the reference character F. They comprise a hopper 6, having a comparatively wide top and narrow bottom, in which is the discharge opening or slot 7. This hopper is supported at each end by side frame or bracket members 8, which are fastened to the hopper in any suitable manner such as by rivets, and which side members 8 include longitudinally extending portions 9, which carry at each end small wheels or rollers 10 that run along road rails E. The concrete spreading instrumentalities F are connected with the mixer by a draw bar arrangement indicated at 11 which, through the subgrade finishing means D disposes the mixer, subgrade finishing means, and concrete spreading instrumentalities in a unitary relation so that they move together along the subgrade.

A road finishing roller 12, which preferably is of smaller diameter at its center than at its extremities is keyed to a shaft 13 as shown at 14. This shaft is freely mounted at each end in the wheels 10, and has keyed to its outer end a sprocket 15 of comparatively small diameter. The wheels 10, which are re-

moved from those wheels 10 in which the shaft 13 is mounted, have keyed thereto sprockets 16 of comparatively large diameter, which are connected with the sprockets 15 by a chain 17. It will be readily seen that inasmuch as the wheels 10 are of a uniform size and due to the difference in dimension of the sprockets 15 and 16, the roller 12 will be rotated at a peripheral speed greater than that which would ordinarily be entailed by rolling movement over the concrete.

This action causes a nicety in the finishing operations made by the roller upon the concrete road. Attention is directed to Figure 3 wherein the roller is shown as positioned very close to the hopper 6 so that it functions as a wiper for the rear of the discharge opening thereof, preventing any accumulation of concrete thereabout.

The discharging hopper 6 receives concrete from the discharge chute C of the mixer A through the medium of a conveying chute G comprising telescopic sections 18 and 19. The section 18 is in effect a distributing pan which is pivotally mounted on brackets 20, which are secured to the framework of the mixer A. The under side of the distributing pan 18 is provided with a circular gear 21 with which mesh pinions 22, carried by a shaft 23, which has proper mounting in the brackets 20. Clutch members 24 are slidably mounted on the shaft 23 and are adapted to move into clutching engagement with the pinions 22 so as to clutch either one of these pinions to the shaft. Arms 25 are attached to the members 24 and have at their ends projections 26, which are adapted to be engaged by the fingers of a clutch throwover arm 27, which is rotated coincident with rotation of the pan 18. A spring 28 has one end fastened to the throwover device 27, and its other end is made fast to the bottom of the pan so that it holds the clutch members in either of their positions. The device 27 is integral with an arm 27^a mounted on the lower face of the member 18. The shaft 23 has at one end a bevelled gear 29 which is in engagement with a complemental bevelled gear 30, that is driven by a chain 31, passing over a pinion 32 operative integral with pivotal gear 30, and a second pinion 33 keyed to the constantly rotating shaft 1.

The operation of the foregoing construction for the oscillation of the chute is thought to be obvious. Briefly summing up, driving of the circular gear 21 by one of the pinions 22 causes rotation in one direction, while driving of the gear by the other pinion causes rotation in the opposite direction. The clutch arrangement is such that only one of these gears is operatively connected with the shaft 23 at the same time, and first one and then the other is brought into operation by the clutch shifting devices comprising parts 25, 26, 27, 27^a and 28, which are operated by the rotation of the pan. It will swing in one direction to a certain extent, whereupon the clutch is shifted so that it swings back in the opposite direction, whereupon the clutch is again shifted. In this manner the chute is constantly oscillated.

The section 19 of the chute has an end member 34 telescopically connected thereto, and which member 34 is mounted on a carriage 35 that is movable in a guideway 36, carried by a bracket 37, which is fastened to the hopper 6. A universal joint 38 is interposed between carriage 35 and chute end 34 to accommodate variations in angular relation between these parts. It is obvious that the telescopic construction of the chute provides for the disposition of the chute end in the middle of the hopper regardless of the angular relation of the distributing chute with respect to the hopper 6. In one position the chute will be elongated, while in another it will be contracted.

The mixing plant A discharges prepared concrete through the discharge chute C onto the conveying chute G, which member evenly deposits the mixed concrete in the hopper 6 from one end to the other. This hopper 6 extends transversely across the entire width of the road, and coincident with forward movement of the entire assemblage, spreads the concrete through the opening 7 onto the subgrade which has been properly prepared for the reception of aggregates by the subgrade finishing means D. The roller 12 finishes the road by its rotation due to its driving means. Any irregularities or unevenness are accommodated by the telescopic chute G.

The roller 12 may be of sectional construction as indicated in Figure 8. This construction facilitates the handling of the apparatus in transporting it from one place to another and in some instances might allow for roads of varying widths. As shown the various sections are interlocked together by detachable connections.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States is:—

1. In road building apparatus of the class described, the combination with a mixing plant, of instrumentalities for depositing and spreading concrete on a subgrade, and means for finishing the surface of the subgrade and interposed between the mixing plant and the spreading instrumentalities, said instrumentalities and means being simultaneously operable to perform their respective functions while continuously moving along the roadbed.

2. In road building machinery of the class described, the combination with a mixer, of subgrade finishing means, connections between said subgrade finishing means and the mixer, concrete spreading instrumentalities connected to the subgrade finishing means,

and a road finishing device associated with the spreading instrumentalities, whereby all the concrete is spread under continuous forward movement of said instrumentalities.

3. In road building machinery of the class described, the combination with a mixing plant, of instrumentalities for depositing and spreading concrete on a subgrade, said instrumentalities being removed from the mixing plant, and an extensible conveying means for conveying concrete from the mixing plant to the instrumentalities aforesaid.

4. In road building apparatus of the class described, the combination with a mixing plant, of instrumentalities for spreading concrete on a subgrade, subgrade finishing means intermediate the spreading instrumentalities and the mixing plant, and means for conveying concrete from the mixing plant to the spreading instrumentalities, said last named means extending over the subgrade finishing means and comprising an extensible chute.

5. Road building machinery of the class described, comprising in combination, a portable mixing plant, a distributing hopper adapted to extend transversely across a road to be built, subgrade finishing means interposed between the discharging hopper and the mixing plant, and means for conveying prepared concrete from the mixing plant to the discharging hopper, said means also functioning to distribute the concrete evenly throughout the distributing hopper.

6. Road building machinery of the class described, comprising, in combination, a portable mixing plant, concrete spreading instrumentalities, an oscillating chute for conveying prepared concrete from the mixing plant to the spreading instrumentalities, and means for automatically oscillating said chute.

7. Road building apparatus of the class described, comprising, in combination, subgrade finishing means, concrete spreading instrumentalities, a road finishing roller, and means for connecting the spreading instrumentalities with the subgrade finishing means, said roller being associated with the spreading instrumentalities and functioning as a wiper therefor.

8. Road building machinery of the class described, comprising, in combination, a distributing hopper adapted to extend transversely across a road, said hopper having a discharge opening at the bottom thereof, and a finishing roller associated with the hopper and positioned so that it functions as a wiper for one side of the discharge opening.

9. Road building machinery of the class described, comprising, in combination, a portable mixing plant, a distributing hopper portably mounted and connected with the mixing plant, means for conveying concrete from the mixing plant to the hopper, said hopper having a discharge opening at the bottom thereof for permitting concrete to pass onto the surface of a subgrade, a finishing roller positioned adjacent to one side of the discharge opening, and means for rotating the finishing roller at a speed greater than that at which it would ordinarily rotate due to rolling movement.

10. Apparatus of the class described, comprising, in combination, a portable mixing plant, spreading instrumentalities, an oscillating conveyor chute for conveying concrete from the mixing plant to the spreading instrumentalities, and gear and clutch mechanisms for causing automatic oscillation of the chute.

11. In road building machinery of the class described, the combination, with a mixer, of a conveying chute having one end pivotally mounted on the mixer beneath the discharge chute of the latter, a ring gear on said conveyor chute, pinions included in the construction of the paver and in engagement with the ring gear, one of said pinions being adapted to swing the chute in one direction, the other pinion being adapted to swing the chute in the opposite direction, and clutch means for clutching either one of the pinions to a driving means.

12. In road building machinery of the class described, the combination with a portable mixing plant, of a distributing hopper spaced therefrom, and a telescopic conveying chute for conveying concrete from the mixing plant to the distributing hopper and pivotally mounted in the mixing plant.

13. In concrete road building apparatus of the class described, the combination with a mixer having a discharge chute, of a distributing hopper for spreading concrete aggregates on a subgrade surface, a telescopic conveying chute for conveying concrete from the discharge chute to the distributing hopper, means connecting one end of the discharging chute with the distributing hopper by permitting a movement of the end of the chute along the hopper and a pivotal mounting for the other end of the chute on the mixer.

14. Road building apparatus of the class described, comprising, in combination, subgrade finishing means, concrete spreading instrumentalities, a road finishing roller, and means for connecting the spreading instrumentalities with the subgrade finishing means, said roller being of sectional construction to facilitate its handling.

15. Road building machinery of the class described, comprising, in combination, a portable mixing plant adapted to move along a subgrade during the construction of a road, instrumentalities extending across a width of the road for distributing and spreading concrete thereon, and means for conveying concrete from the mixing plant to the spread-

ing instrumentalities, said conveying means being extensible permitting the same to deposit prepared concrete at any point along the length of the spreading instrumentalities.

16. Road building apparatus of the class described, comprising, in combination, a portable mixing plant, a distributing and spreading hopper extending transversely across the road which is being constructed, said hopper being removed from the mixing plant, and extensible means between the mixing plant and hopper for conveying concrete from the former to the latter, said means being adapted to deliver concrete at any point along the hopper.

17. Road building apparatus of the class described, comprising, in combination, a portable mixing plant, a distributing and spreading hopper extending transversely across the road which is being constructed, said hopper being removed from the mixing plant, extensible means between the mixing plant and hopper for conveying concrete from the former to the latter, and means for oscillating the extensible conveying means to cause the same to distribute concrete evenly along the hopper.

In testimony whereof I affix my signature.

PHILIP A. KOEHRING.