March 31, 1936. J. D. WEST 2,035,627

APPARATUS FOR LAYING PAVEMENTS

Filed Sept. 13, 1933 5 Sheets-Sheet 1

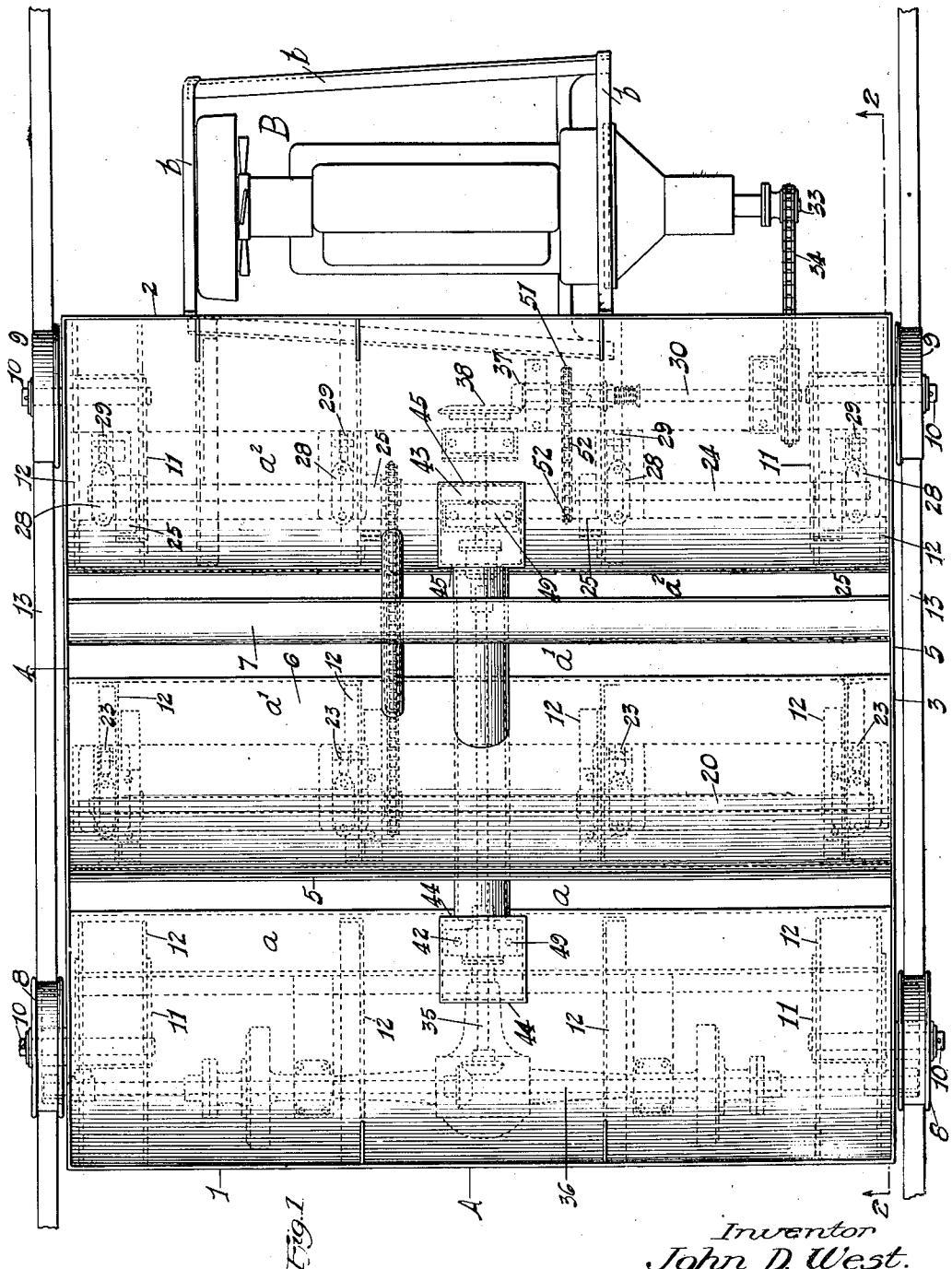


Fig. 1

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APPARATUS FOR LAYING PAVEMENTS

Filed Sept. 13, 1933 5 Sheets-Sheet 2

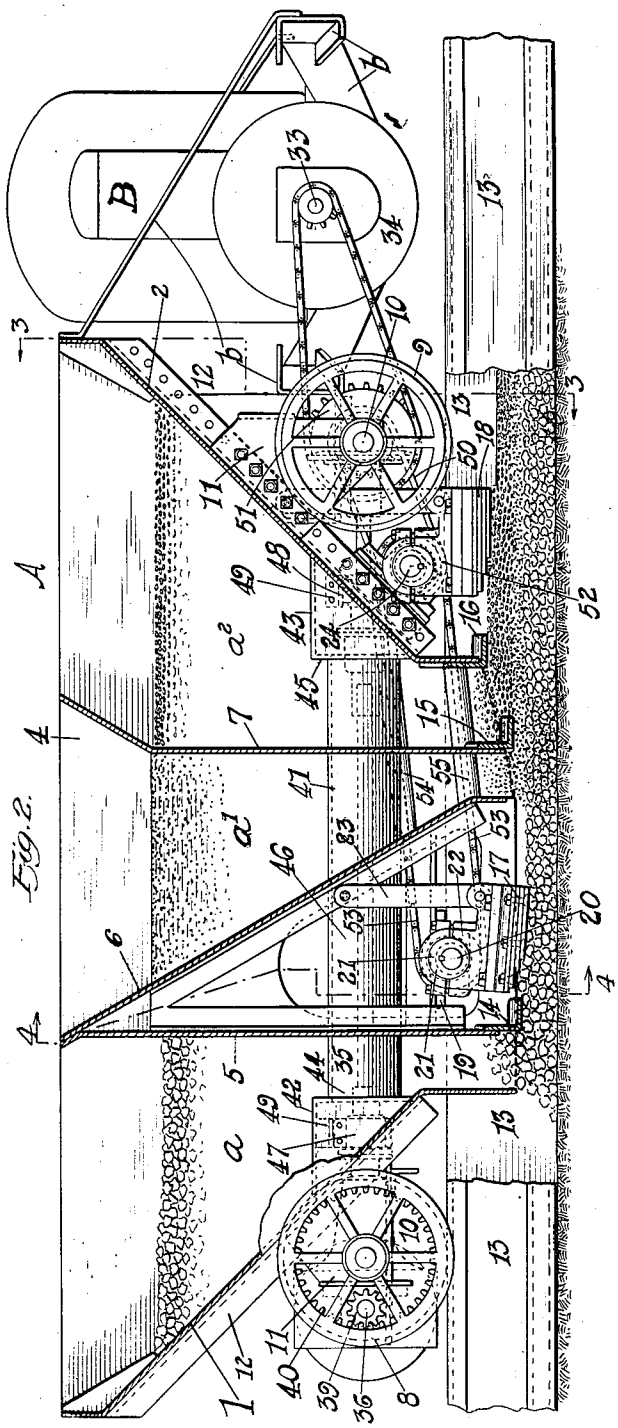


Fig. 2.

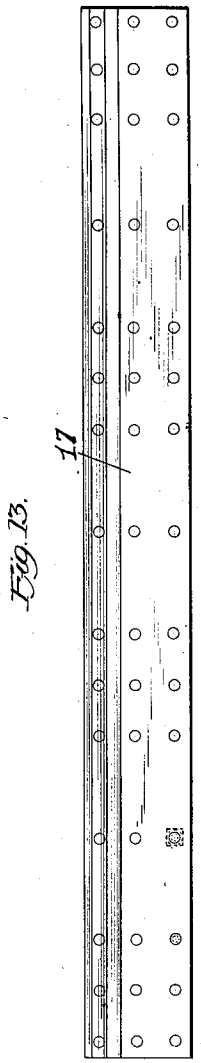


Fig. 13.

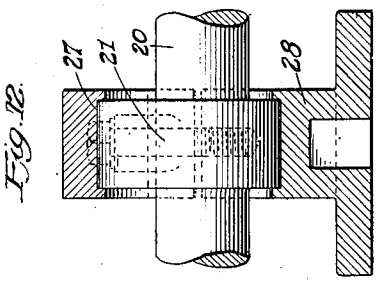


Fig. 12.

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APPARATUS FOR LAYING PAVEMENTS

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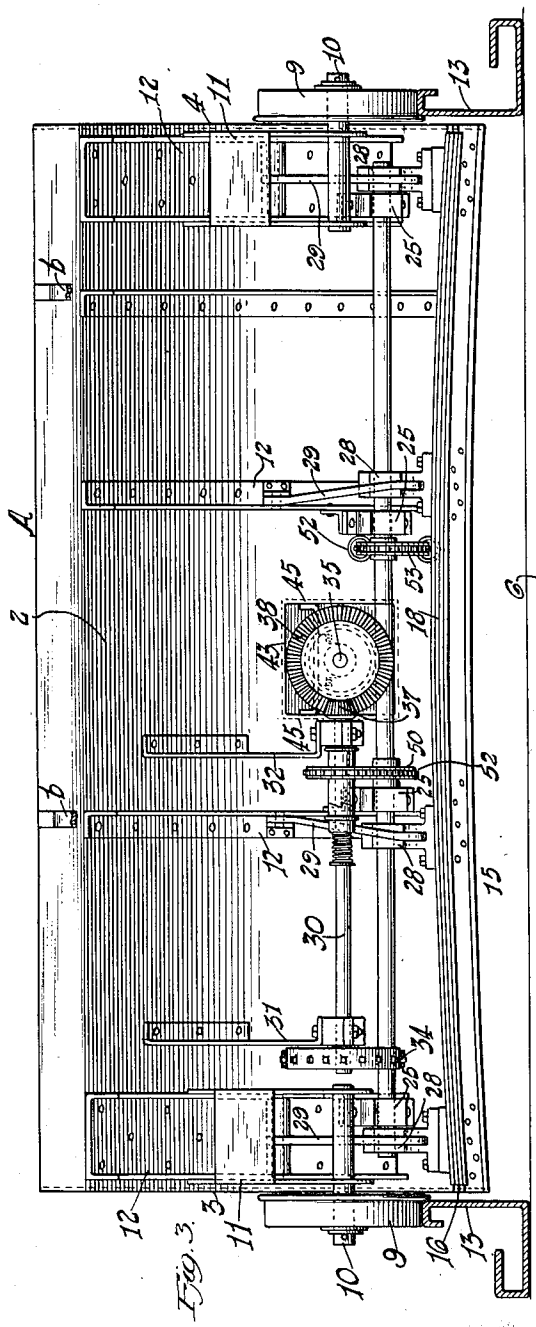


Fig. 3.

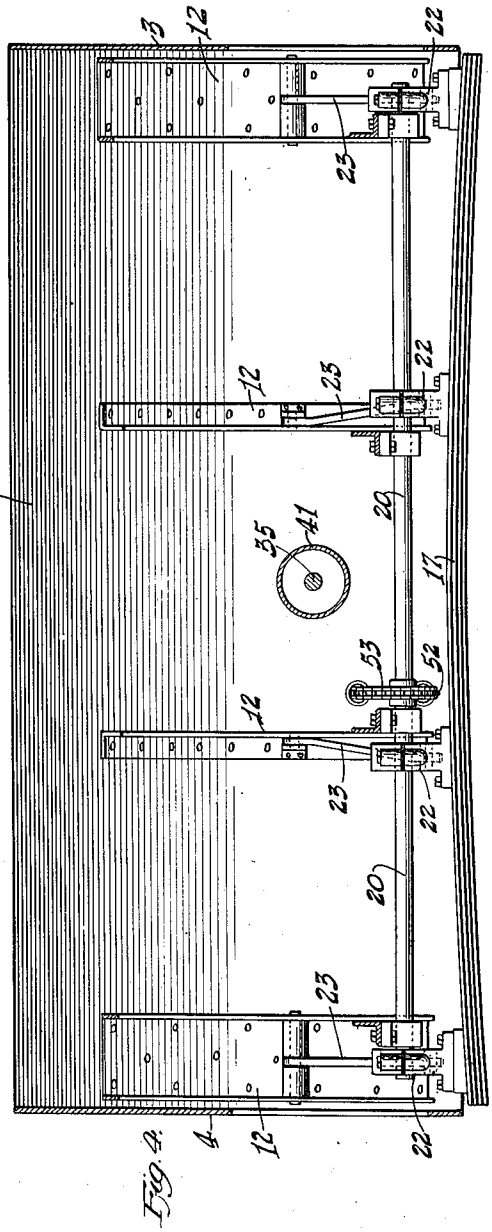


Fig. 4.

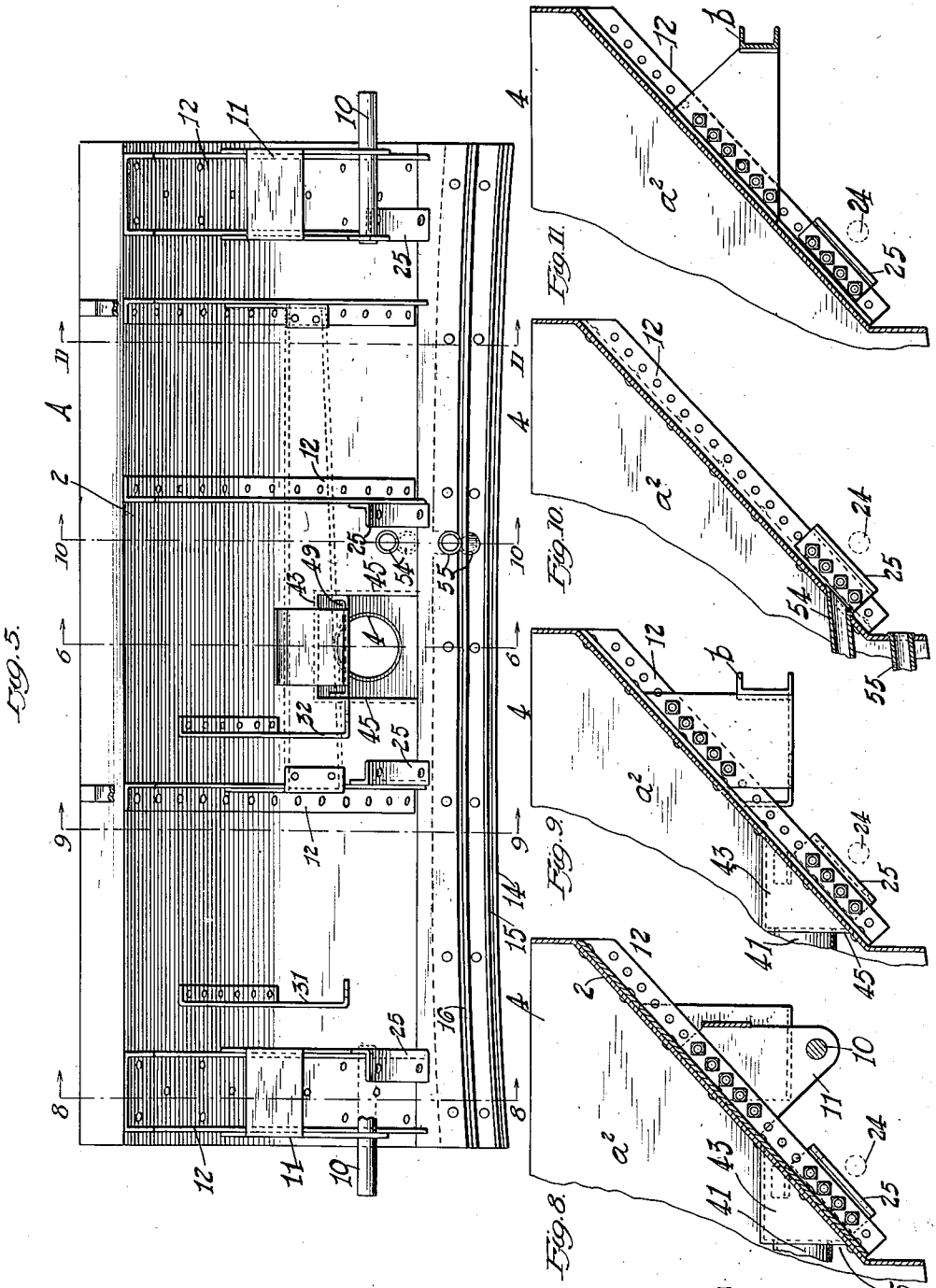
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APPARATUS FOR LAYING PAVEMENTS

Filed Sept. 13, 1933 5 Sheets-Sheet 4



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APPARATUS FOR LAYING PAVEMENTS

Filed Sept. 13, 1933 5 Sheets-Sheet 5

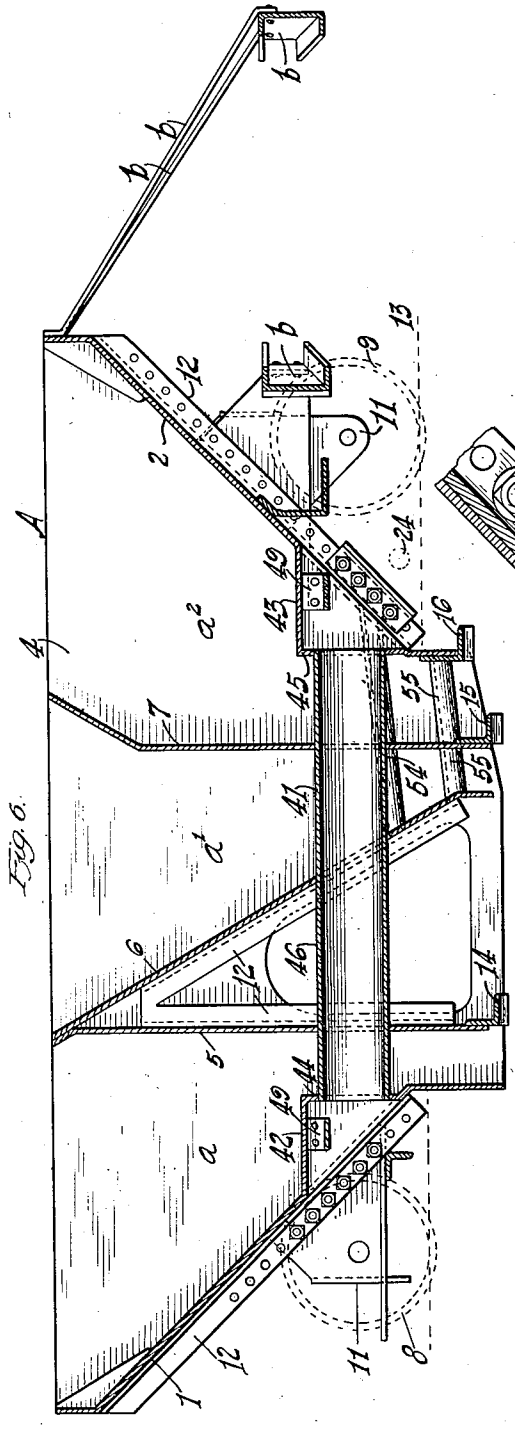


Fig. 6.

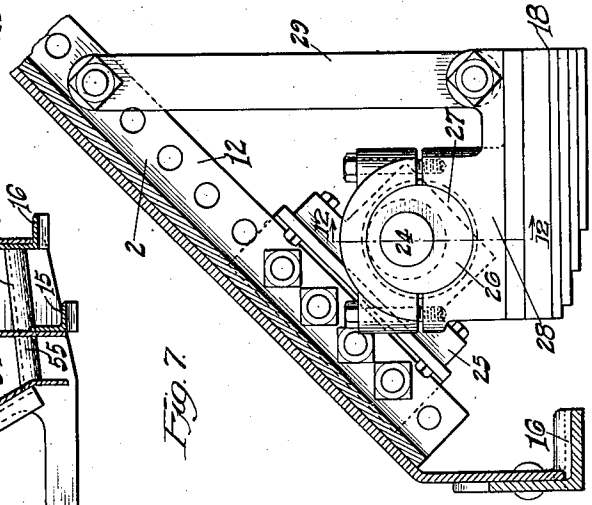


Fig. 7.

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UNITED STATES PATENT OFFICE

2,035,627

APPARATUS FOR LAYING PAVEMENTS

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Application September 13, 1933, Serial No. 689,251

11 Claims. (Cl. 94—46)

This invention relates to apparatus for laying pavement.

As the invention relates to a machine for laying pavement, the object of the invention is to provide a machine particularly designed and adapted for quickly and economically laying concrete pavement.

Other objects of the invention will hereinafter appear.

In the accompanying drawings, in which a machine embodying my invention and improvements is fully illustrated:

Fig. 1 is a top plan view of a paving machine embodying my invention and improvements.

Fig. 2 is a sectional elevation of the machine on the line 2—2 of Fig. 1.

Fig. 3 is an end elevation from the position 3—3 of Fig. 2.

Fig. 4 is a sectional elevation from the position 4—4 of Fig. 2.

Fig. 5 is a view of the body of the machine—the operating parts thereof being omitted—from the position 5—5, Fig. 2, which coincides substantially with the position 3—3 from which Fig. 3 is taken.

Fig. 6 is a vertical, longitudinal, sectional view of the body of the machine, substantially on the line 6—6 of Fig. 5.

Fig. 7 is an enlarged, fragmentary view of the rear tamper bar and means for mounting the same.

Fig. 8 is a fragmentary sectional view on the line 8—8 of Fig. 5.

Fig. 9 is a detail sectional elevation on the line 9—9 of Fig. 5.

Fig. 10 is a fragmentary, detail elevation on the line 10—10 of Fig. 5.

Fig. 11 is a fragmentary, detail elevation on the line 11—11 of Fig. 5.

Fig. 12 is an enlarged, vertical, longitudinal, sectional view of a bearing block mounting on the tamper bar provided with a bearing for an eccentric on the tamper shaft; and

Fig. 13 is a detached, enlarged, bottom plan view of the tamper bar.

Describing the invention with reference to the drawings,

Operative parts of the machine are mounted on a frame or body designated as a whole A, made of suitable sheet material, preferably boiler plate, of sufficient thickness to afford adequate strength, say for usual purposes from ¼ to ⅜ inches.

As shown, said body A comprises front and rear end walls, respectively designated 1 and 2, side walls 3 and 4, and transverse partition walls 5, 6 and 7, the lateral edges of which are secured to opposite side walls 3 and 4 of the body A, and which divide the interior of said body into hoppers designated, respectively, a, a', and a^2, the bottoms of all of which are open and unobstructed, as shown, see particularly Figs. 2 and 6.

As mounted for operation, the machine is supported on wheels 8 and 9, which, respectively, are rotatably mounted in sets at opposite ends of the machine on axles 10 secured in brackets 11 detachably secured to the flanges of channels 12 secured to the end walls 1 and 2 of the body A of the machine, preferably by bolts which are interchangeable in holes formed in the flanges of said channels, thus providing means for adjusting the position of the body of the machine towards and from the road bed to vary the thickness of the pavement. As shown, said wheels run on side supports 13, which may consist of rails laid at opposite sides of the pavement to be laid, the front wheels 8 having double flanges which embrace opposite sides of said side supports and operate to guide the machine as it advances in operation, while the rear wheels 9 have flanges at their inner edges only.

As shown, said side supports consist of tracks laid along opposite sides of the pavement to be laid. I do not, however, desire to limit the invention or the protection of the patent to the use of wheels which run on tracks—as within the scope and contemplation of the invention, I contemplate the use of wheels which run on the side forms used in laying the pavement or wheels or self-laying tracks which run on the ground.

In accordance with the invention, the paving material—crushed rock or gravel—from the front hopper a, plastic cement mortar from the intermediate hopper a' and relatively fine crushed rock or gravel from the rear hopper a^2, will be deposited on the prepared road bed, or previously deposited layers through the open lower ends of said hoppers as the machine advances, the thickness of the respective layers being controlled by the distance separating the open and lower ends thereof from the prepared road beds in the case of the front hopper a and from the tops of the succeeding layers, in the case of the rear hoppers. Obviously, the cement mortar from the intermediate hopper a', being plastic, will tend to flow into the voids of the bottom layer of road material, while the material from the rear hopper a^2 will tend to settle gradually

through the cement mortar deposited from the intermediate hopper *a'*.

As shown, the thickness of the layers deposited from the different hoppers is controlled by means of screeds **14**, **15** and **16** secured, respectively, to the lower edges of the rear walls of the hoppers *a*, *a'* and *a²*, so shaped that they will conform each layer of material deposited to a contour transversely, necessary to produce the desired contour of the top of the finished pavement. Said screeds preferably are made of heavy boiler plate in the form of angle irons, and are detachably secured to the hopper walls on which they are supported, thus providing for replacing them in case of wear or substituting for one set of screeds others of different contour in case it is desired to change the transverse contour of the top of the finished pavement.

In accordance with what I now consider a preferable relation for usual purposes, we will assume that, at its ends, the lower face of the screed **14** is spaced from the prepared road bed approximately 2¾ inches, the screed **15** about 3¾ inches, and the screed **16** about 6¼ inches.

In operation, as each layer of paving material is deposited from the hoppers *a*, *a²*, it may be subjected to pressure by means of what may be designated tamping bars **17** and **18** mounted at the rear sides of the discharge openings in the bottoms of said hoppers, respectively, to which reciprocating movement towards and from the road bed is imparted at relatively high speed by means presently described, the relation being such that at the limit of its pressure strokes, a large part of the weight of the machine and its contents will be transferred to said tamping or pressure bars.

The tamping bars **17** and **18** are mounted transversely of the machine, their length being equal to the width of pavement to be laid and their under surfaces conforming, reversely, to the transverse contour of the top surface of the finished pavement. In what I now consider preferable construction, said tamping bars are of built-up construction, consisting of a plurality of plates secured together flatwise with their front edges rearwardly and downwardly inclined, preferably being rearwardly and downwardly stepped, as shown. With such laminated construction, the desired curvature can be imparted to said tamping bars by forming holes through the same and inserting a bolt therethrough, after which they are sprung into desired transverse contour and the nuts tightened to maintain such contour.

As shown, see particularly Figs. 2, 7, and 12, the front tamping bar **17** is operatively mounted by means as follows:

Rotatably mounted in bearings formed in bearing blocks **19**, supported by and between the hopper walls **5** and **6**, is a tamper shaft **20**, keyed or otherwise secured to which are eccentrics **21** which, in turn, are fitted to rotate in bearings formed in bearing blocks **22** secured to said tamping bar, said bearing blocks **22** also being connected to a rigid part of the hopper wall **6** by links **23**, which are pivotally connected both to said bearing blocks **22** and to rigid parts of said hopper wall.

In like manner, see particularly Figs. 2, 4, and 12, the tamping bar **18** is operatively mounted by means of a tamper shaft **24** which is rotatably mounted in bearings formed in bearing blocks **25** secured to the outer side of the rear hopper wall **2**, keyed or otherwise secured to which are eccentrics **26** which, in turn, are fitted to rotate in eccentric bearings **27** formed in bearing blocks **28** secured to said tamping bar, said bearing blocks **25** also being connected to a rigid part of said hopper wall **2** by links **29** which are pivotally connected both to the bearing blocks **28** and to said rear hopper wall **2**.

In what I now consider preferable construction, the relation is such that when the eccentrics **21** and **26** are at the limit of their throw downwards, the bottom sides of the tamping bars **17** and **18** wil be substantially parallel with the contemplated top surface of the finished pavement.

As shown, see particularly Fig. 2, the eccentrics on the tamper shafts **20** and **24** are set at angles of 180° to each other and the throw of said eccentrics is such that, under contemplated operating conditions, when either eccentric passes its position of extreme downward throw, it will operate to transfer a proportional part of the weight of the machine and its contents to said tamping bars, respectively, whereby paving material underlying said tamping bars will be subjected to corresponding pressure.

As presently explained, the tamper shafts are driven at relatively high speed, say for usual purposes, about 400 to 600 R. P. M., with which relation it is obvious that both tamping bars will act on deposited material with a succession of high pressures, in simulation of a tamping action.

Preferably and as shown, the machine is self-propelling, the power for driving the same and for actuating the operative parts thereof, being furnished by a power unit designated as a whole B, which, as shown, is mounted on a suitable chassis or frame *b* supported on the rear wall **2** of the body A of the machine, which we will assume is a usual form of internal combustion engine used on automobiles, which may be purchased commercially and can readily be installed by skilled mechanics. However, the power unit indicated merely exemplifies any desired or approved form of motor suitable for the purpose.

As shown, the driving connections of the machine comprise a shaft **30**, which is mounted in bearings secured to brackets **31** and **32** on the rear wall **2** of the body of the machine which is driven directly from the shaft **33** of the motor B and which, for purposes of convenient reference, will be designated the intermediate shaft. As shown, said intermediate shaft is driven by means of a chain belt **34** adjusted to sprocket wheels secured to said shafts, respectively, the pinion on the motor shaft being relatively small as compared with the sprocket wheel on said intermediate shaft, whereby said intermediate shaft will be driven at contemplated slower speed than the engine shaft.

As shown, the driving connections of the machine also comprise a transmission shaft **35** which extends lengthwise of the machine, and a transverse drive shaft **36**.

The transmission shaft **35** is driven from the intermediate shaft **30** by means of a bevel pinion **37** secured to said intermediate shaft, which meshes with a bevel gear **38** secured to the transmission shaft, the relation being such that said transmission shaft will be driven at predetermined speed.

The front end of the transmission shaft is connected to the drive shaft **36** by means of bevel gears comprising, as shown, an intermeshing pinion and gear secured to said transmission and drive shafts, respectively, said drive shaft and

gears being mounted within a fixed housing, in a usual manner, and power being applied to the front supporting wheels 8 of the machine by pinions 39 secured to opposite ends of said drive shaft, which mesh with internal gears 40 formed in the flanges of said supporting wheels 8.

To connect the intermediate shaft 30 with the drive shaft 36, it is necessary that the transmission shaft 35 extend through the transverse walls of the body A of the machine, including the partition walls 5, 6, and 7 which form the hoppers a, a', and a^2. In accordance with the invention, this is effected by means of an open-ended housing or tunnel 41, opposite ends of which are secured in openings in the front and rear end walls 1 and 2 of the body A of the machine, through which said transmission shaft 35 extends. As shown, said tunnel comprises end sections 42 and 43 secured directly to the inner sides of the end walls 1 and 2 of the body of the machine, the sides of which are disposed substantially at right angles to each other and comprise opposed, substantially parallel walls 44 and 45, formed in which are holes or openings into which the ends of a circular intermediate section 46 of said tunnel are connected. Holes are also formed in the partition walls 5, 6 and 7 through which said intermediate section 46 of said tunnel extends.

The transmission shaft 35 is mounted in bearings 47 and 48 secured to bars 49 the ends of which are bent substantially at right angles and are riveted or otherwise secured to the side walls of the tunnel sections 42 and 43.

As shown, also, the tamper shafts 20 and 24 are driven by suitable connection with the intermediate shaft 30, the shaft 24 being directly connected thereto by a chain belt 50 adjusted to sprocket wheels 51 and 52 secured to said shafts, respectively, and the shaft 20 being driven from the shaft 24, also by a chain belt 53 adjusted to sprocket wheels secured to said shafts, respectively, the relation being such, preferably, that said shafts will rotate at the same speeds and such, also, that the major axes of the eccentrics 21 and 26 secured to said shafts, respectively, will be positioned 180° from each other.

In order for the chain belt 53 to connect the shafts 20 and 24, said chain belt must pass through the hoppers a' and a^2 and the walls thereof, and in order that the material contained in said hopper may not interfere with the movement and operation of said chain belts, and also, to prevent leakage from said hoppers, tubular housings or tunnels 54 and 55 are provided, opposite ends of which are secured in holes or openings formed in the hopper wall 6 and the rear wall 2 of the body A of the machine, and which extend through holes formed in the partition walls 7, the relation being such that said tubular housings 54 and 55 will, respectively, align with the top and bottom laps of said chain belts 50, 53, as shown see Fig. 2.

I claim:

1. In a paving machine, the combination of a body having a plurality of open-bottom hoppers arranged in series lengthwise thereof, comprising hoppers for containing paving material in sub-divided form and an intermediate hopper for containing cement mortar, means for movably supporting the machine comprising wheels mounted on the body thereof, pressure means mounted on the body of the machine at the rear sides of the open bottoms of a hopper or hoppers containing paving material, and movable towards and from the ground to subject material deposited by the machine to pressure to compact the same and to force the cement mortar into the voids of the layers of paving material, and means for actuating said pressure means.

2. In a paving machine, the combination of a body having a plurality of open-bottom hoppers arranged in series lengthwise thereof, comprising hoppers for containing paving material in subdivided form and an intermediate hopper for containing cement mortar, means for movably supporting the machine comprising wheels mounted on the body thereof, pressure means mounted on the body of the machine at the rear sides of the open bottoms of a hopper or hoppers containing paving material and movable toward and from the ground to subject material deposited by the machine to pressure to compact the same and to force the cement mortar into the voids of the layers of paving material, and means for actuating said pressure means and for propelling the machine.

3. The paving machine specified in claim 1, which also includes power means on the machine for actuating the pressure means and for propelling the machine.

4. The paving machine specified in claim 1, in which the means for mounting and actuating the pressure means is constructed and arranged to transfer a portion of the load represented by the weight of the machine and its contents to a part of said machine in contact with deposited paving material.

5. The paving machine specified in claim 1, the pressure means of which consists of a bar disposed transversely of the machine, the pressure surface of which conforms reversely to the contemplated transverse contour of the top surface of the finished pavement.

6. The paving machine specified in claim 1, the pressure means of which consists of a bar or bars disposed transversely of the machine and the means for mounting and actuating said bar or bars comprise a transverse shaft or shafts mounted in bearings on the body of the machine, eccentrics secured to said shaft or shafts, and bearings on the pressure bar or bars to which the eccentrics on said shaft or shafts are fitted, links which connect said pressure bar or bars to the body of the machine at points spaced lengthwise from the eccentric bearing or bearings for said pressure bar or bars, and means for rotating said eccentric shaft or shafts, the relation being such that the leading edge or edges of the pressure bar or bars will describe an approximate ellipse or ellipses.

7. The paving machine specified in claim 1, the pressure means of which consists of a bar or bars disposed transversely of the machine and the means for mounting and actuating said bar or bars comprise a transverse shaft or shafts mounted in bearings on the body of the machine, eccentrics secured to said shaft or shafts, and bearings on the pressure bar or bars to which the eccentrics on said shaft or shafts are fitted, links which connect said pressure bar or bars to the body of the machine at points spaced lengthwise from the eccentric bearing or bearings for said pressure bar or bars, and means for rotating said eccentric shaft or shafts, the relation being such that the trailing edge or edges of the pressure bar or bars will move approximately in a plane.

8. The paving machine specified in claim 1, in which the means for mounting the supporting wheels thereof, are constructed and arranged for separately and detachably securing said wheels

to the body of the machine and for securing them thereto in different vertical positions.

9. The paving machine specified in claim 1, in which the means for propelling the machine comprises power and drive shafts mounted transversely of the machine, a longitudinally disposed transmission shaft, gearing connecting said transmission shaft with said power and drive shafts, and gearing operatively connecting said drive shaft with a set of wheels for supporting the machine.

10. The paving machine specified in claim 1, in which the means for propelling the machine comprise power and drive shafts mounted transversely of the machine at opposite sides of the hoppers for containing paving material, a longitudinally disposed transmission shaft arranged to extend through the transverse walls which form the hoppers of the machine, gearing connecting said transmission shaft with said power and drive shafts, and gearing operatively connecting said drive shaft with a set of wheels for supporting the machine, and the body of the machine comprising an open-ended housing or tunnel in which said transmission shaft is mounted.

11. The paving machine specified in claim 1, the body of which comprises tubular housings or tunnels which extend through a hopper or hoppers of the machine and are secured in transverse walls of the machine providing an unobstructed space or spaces for power transmission means connecting operative parts of the machine mounted at opposite sides of a hopper or hoppers and of the walls thereof.

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