Nov. 19, 1929. E. H. LICHTENBERG 1,736,412

CONCRETE ROAD FINISHING MACHINE

Original Filed June 6. 1922 4 Sheets-Sheet 1

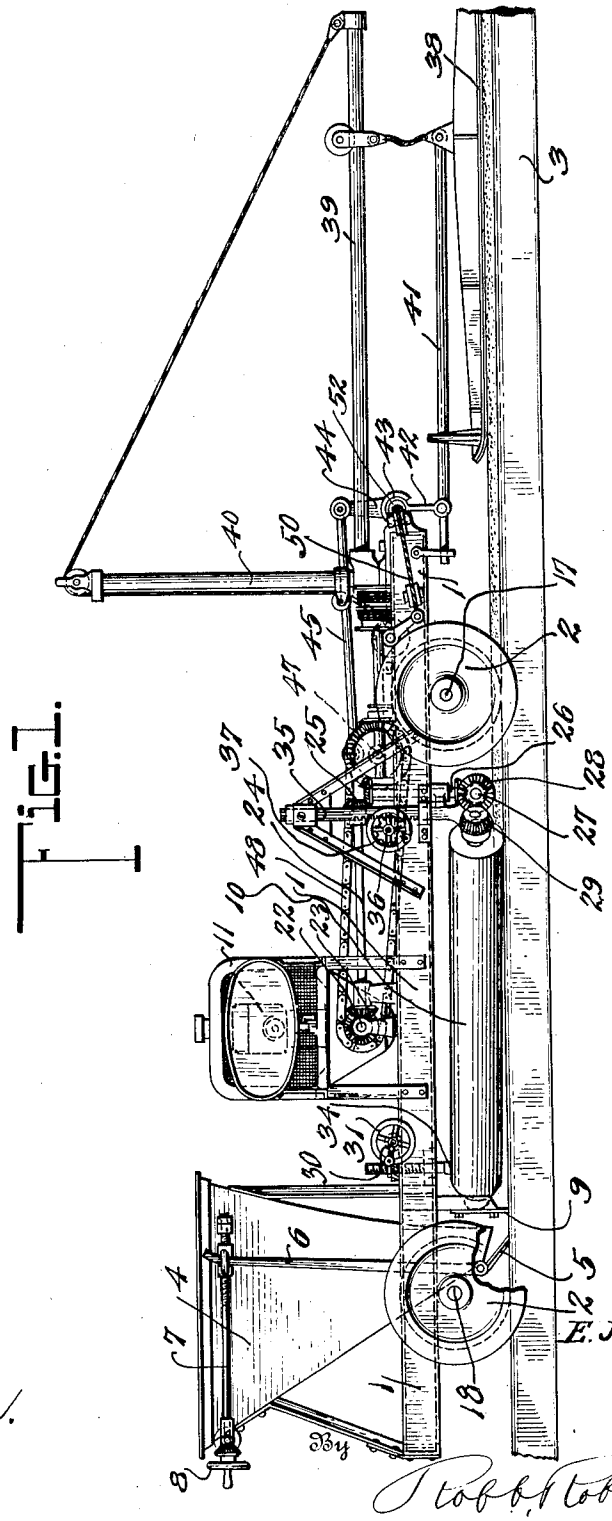


Fig. 1.

Witness:
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Inventor
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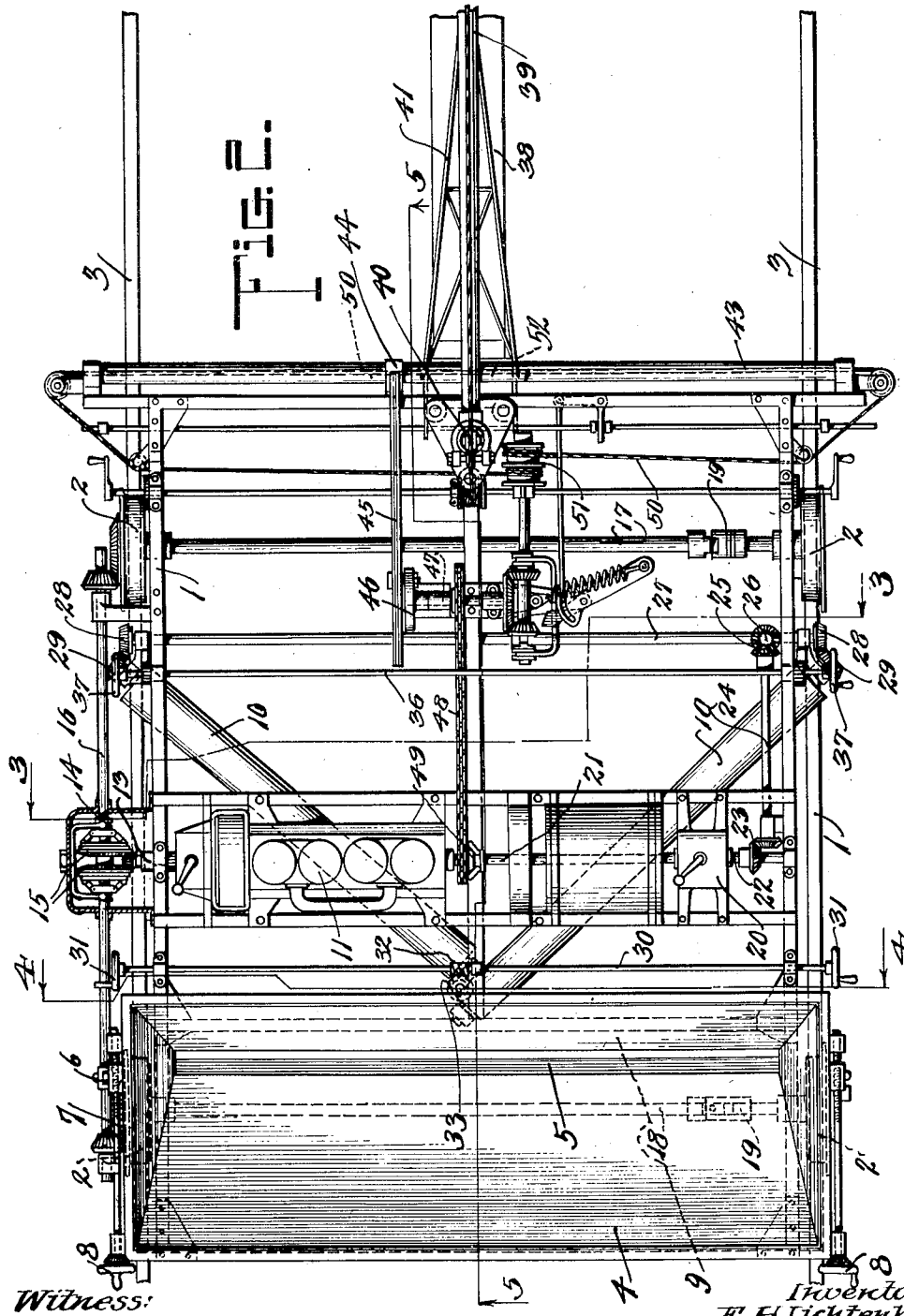
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CONCRETE ROAD FINISHING MACHINE

Original Filed June 6. 1922 4 Sheets-Sheet 2

Fig. 1



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CONCRETE ROAD FINISHING MACHINE

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Fig. 3.

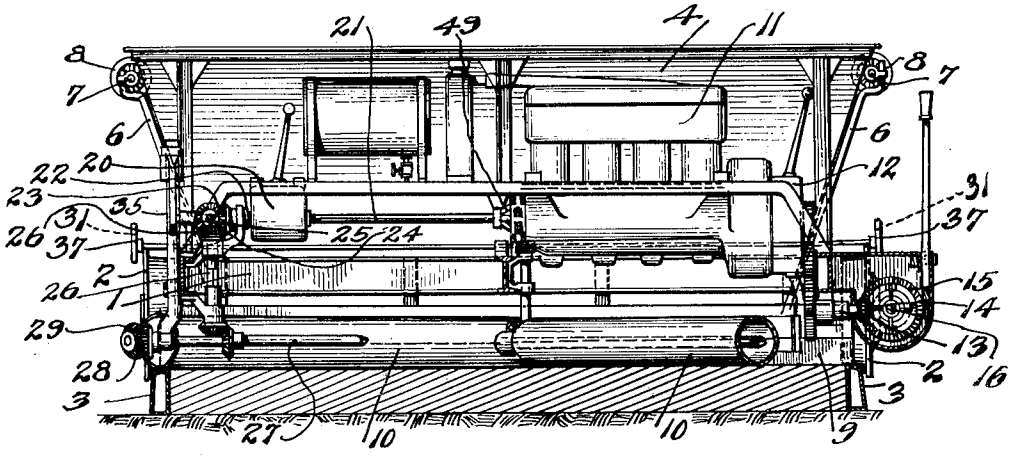
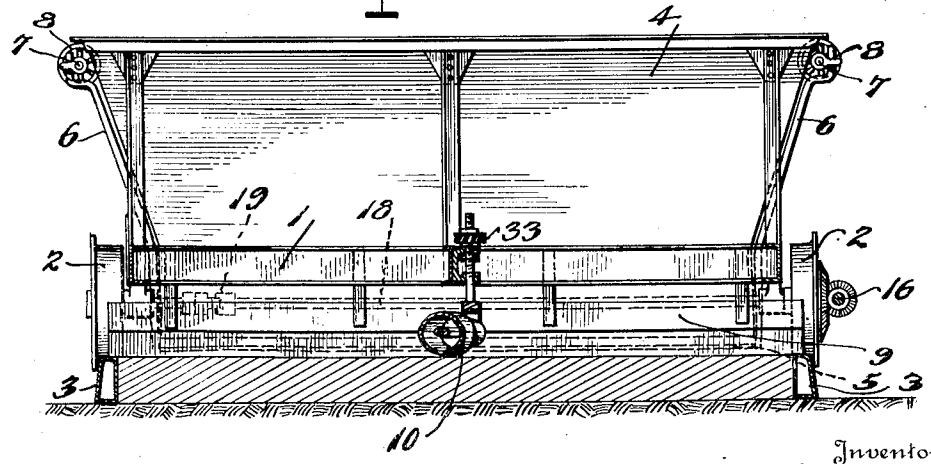


Fig. 4.



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CONCRETE ROAD FINISHING MACHINE

Original Filed June 6. 1922 4 Sheets-Sheet 4

Fig. 5.

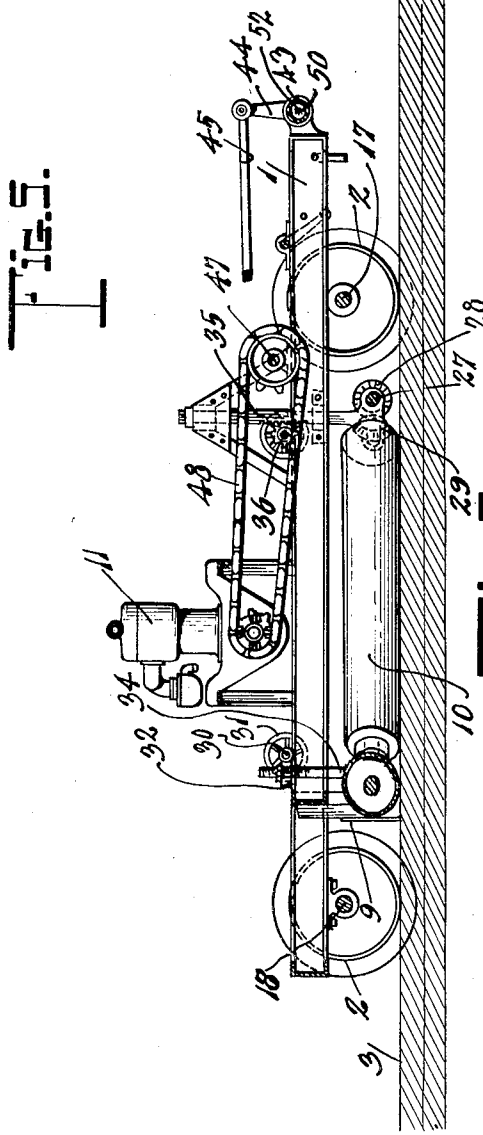


Fig. 6.

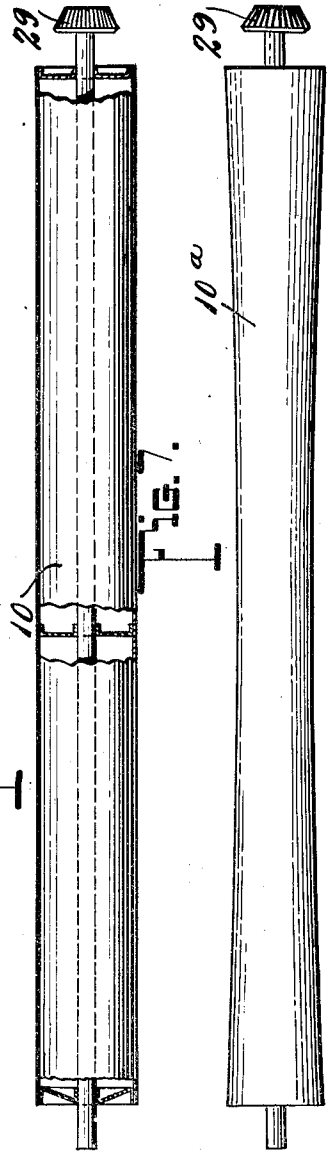


Fig. 7.

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UNITED STATES PATENT OFFICE

ERICH H. LICHTENBERG, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO KOEHRING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN

CONCRETE-ROAD-FINISHING MACHINE

Application filed June 6, 1922, Serial No. 566,363. Renewed June 5, 1929.

The invention hereof deals with machines and methods for finishing concrete pavements or roads and involves certain novel improvements in such machines and methods.

The machines at present in use for finishing or surfacing concrete laid in road and pavement construction operate primarily on the principle of tamping the surface aggregates or materials by a vibrating tamper or similar implement disposed transversely of the surface operated on. The above method of finishing has not proven altogether satisfactory for reasons known to those versed in this art, and there are engineers who disapprove of the same entirely.

In the development of my present improvements I am utilizing a roller method of finishing the concrete surface, and in so doing I arrange a roller at an angle to transverse or parallel lines of the road-bed and operate said roller rotatively in such a manner as to obtain an ironing out effect, the action of the roller at the same time being to force the water and watery surface exudations toward the side of the road and off of the surface. For a road of the width most popularly built at this time, I preferably utilize two rollers in conjunction with one another, they being arranged in diverging positions, and slightly overlapping at the middle of the road. In addition to these finishing rollers I may also employ a longitudinally disposed finishing member consisting of a board or belt structure, and by longitudinally I mean arranged lengthwise of the road; and this member is caused to move transversely of the road-bed as it operates upon the surface aggregates.

A further object of the present invention has been to design a machine which is capable of laying down the body aggregates of the road, upon the road-bed in a layer of predetermined thickness, and thereafter producing the finishing effects as regards the surface portions of said aggregates, incident to the operation of either the roller or longitudinal finishing members above referred to, or both of them together.

In the accompanying drawings;

Figure 1 is a side view of a complete machine embodying the invention.

Figure 2 is a top plan view of the same.

Figure 3 is a sectional view on the line 3—3 of Fig. 2.

Figure 4 is a corresponding sectional view about on the line 4—4 of Fig. 2.

Figure 5 is a sectional view of a modified construction of the machine, which utilizes certain features of the machine illustrated in Figure 2, and dispenses with other of said features, the section being taken as if it were approximately on the line 2—2 of the parts of Figure 2 which are used in showing the machine of Fig. 5.

Figure 6 is a detail view of one of the finishing rollers, and Figure 7 is a detail view of a modified form of finishing roller.

Referring particularly to Figures 1 and 2, it is to be noted that my machine depicted therein, comprises a portable support consisting of a main frame 1 mounted upon the wheels 2, the latter being adapted to travel upon the side road forms or rails 3, a well known expedient employed in the art. At its front end the frame 1 supports a hopper 4 equipped at its lower end with an adjustable door 5, whereby the discharge opening at the bottom of the hopper may be opened a greater or less distance to enable concrete aggregates disposed in the hopper to be fed out of the same by gravity and in a layer of predetermined thickness. The said thickness is governed by the adjustment of the door 5 which may be controlled in any suitable way, as by arms 6 capable of being adjusted pivotally by threaded shafts 7 operable by hand wheels 8 through the provision of any conventional gearing. Just in rear of the hopper 4 is disposed a strike-off 9, designed to be vertically adjustable in any well known manner.

The finishing or ironing out rollers hereinbefore referred to are located in rear of the strike-off 9 and are marked 10 in the drawings. These rollers, as seen best in Fig. 2, are disposed in rearwardly diverging relations, the adjacent ends slightly overlapping and the two rollers extending entirely across the concrete surface adapted to be operated upon thereby, and being arranged at an angle to

longitudinal and transverse lines intersecting the plane of the road-bed or road.

An engine 11 is mounted on the frame 1 at any suitable place and is connected by variable speed transmission mechanism 12, near one side of the machine with a driven shaft 13 having a bevel gear 14 engaging co-acting double gears 15 on a longitudinal propelling shaft 16. The shaft 16 is suitably geared to transverse axle shafts 17 and 18, on which the wheels 2 are mounted. The shafts 17 and 18 may be split shafts equipped with clutches 19, to enable the wheels 2 at opposite sides of the machine to travel at different speeds when the curves in the road form track are to be negotiated.

From the engine 11, rollers 10 will be driven by variable speed transmission gearing 20 connecting the engine shaft 21 with a driven shaft 22 geared at 23 to a shaft 24 which is geared at 25 to a vertical shaft 26. At its lower end vertical shaft 26 is geared to a transverse roller driving shaft 27 which extends across the frame 1 and has gears 28 at its opposite ends meshing with similar gears 29 on the outer ends of the rollers 10. By the foregoing mechanism the rollers 10 may be driven at different speeds and in opposite directions from the engine 11, the variable speed gearing 20 including a reverse gearing of any conventional type. Furthermore, the variable speed gearing 12 includes a reverse gearing of a suitable kind, and this enables a driving of the portable support of the machine forwardly at different speeds, and also in a reverse direction when desired.

For raising the outer and inner ends of the rollers 10 to throw same into and out of action, I employ a forward roller raising shaft 30 operable from either side of the machine by hand wheels 31 and having worm 32 at its central portion engaging a worm gear on a vertically threaded standard 34, the lower end of which supports in any suitable manner the said adjacent and overlapping ends of the rollers 10. As regards the outer ends of the rollers 10, it will be seen that at each side of the machine I provide a vertical standard 35, see Fig. 1, the lower end of which supports the outer end of the adjacent roller 10 and the co-operating geared end portion of the shaft 27. A raising shaft 36 operable by hand wheels 37 at its opposite ends, and at opposite sides of the machine, has gears which mesh with racks on the standards 35, and turning of either wheel 37 will raise and lower the rollers 10 simultaneously at their outer ends. The shaft 26 is a slip joint shaft, in other words made of telescoping sections, enabling the said raising and lowering movement of the outer extremities of the rollers 10 in the manner set forth.

In view of the foregoing construction it will be evident that the rollers 10 may be adjusted to occupy a lower position in which they act upon the road surface to iron out said surface by rotation at a desired speed in a forward direction, or in other words, the direction of movement of the machine. Or if desired these rollers may be operated in a rearward direction, or reversely to the direction of movement or travel of the machine, under the control of the change speed gearing 20. When the machine is to be transported or moved some distance without using the rollers 10, they may be uplifted at both ends by the operation of the shafts 30 and 36 in the manner described, and thus put out of use.

In rear of the area over which the rollers 10 operate, in respect to position upon the frame 1, I locate a final finishing member 38 which may be used in conjunction with the rollers, or not, as desired. This finishing member 38 is longitudinally disposed relatively to the machine, is supported by a boom 39 adapted to swing with a mast 40 as its axis. The finishing member 38 is reciprocated longitudinally by an actuating bar 41 pivoted to the lower arm 42 of a shaft 43. An upper arm 44 on the shaft 43 is operated by a pitman 45 connected with a pitman wheel 46 on a shaft 47 connected by a chain 48 with the engine shaft 21. A clutch 49 may be used to operatively connect the shaft 21 with the sprocket wheel thereon over which the chain 48 passes. The finishing member 38 is moved transversely across the road or pavement being operated upon by means of an actuating cable 50, which passes around suitable pulleys and has its ends winding in opposite directions about an operating drum 51. The cable 50 is attached to a sliding member 52 which operates in the hollow shaft 43 which is rocked by means of the arm 44 previously described. The drum 51 is driven from the motor or engine 11 by suitable driving connections and the drive is automatically reversed by suitable means, preferably automatic, when the finishing member 38 reaches its extremities of movement transversely of the machine. I am not describing these features of construction, because the construction of finishing member as referred to herein, forms the basis for a separate application for patent, and the details of the said construction are not material to this invention. It will be evident from the showing that the finishing member operates transversely of the road, is disposed in a longitudinal manner, and is shifted back and forth longitudinally as it acts upon the road surfaces subsequent to the ironing out of the latter by the rollers 10. The rollers 10 in their ironing out or smoothing operation rotating in a clockwise direction tend to clear off of the surface of the road superfluous water and watery portions of the aggregates by a sort of sweeping action.

In Figure 5 I have illustrated my machine

as practically a roller finishing machine alone. In this instance the frame is foreshortened and I employ the co-acting rollers and their driving mechanism, without the hopper feeding and laying means, and the auxiliary finishing means that has been described heretofore. The parts of the machine of Fig. 5 that are like those of the other figures of the drawings are correspondingly designated.

In Figure 7 I have illustrated a roller 10^a which consists of a body contracting on a wide curve toward its central portion, as distinguished from the straight sided elsewhere illustrated. I have in mind that the modified form of roller 10^a under certain conditions possesses advantages in finishing the road-bed with the surface curved in the well known manner of construction at present commonly used.

It will be apparent that my rollers 10 have the ironing out effect which I have heretofore referred to herein, said effect being incident to rolling pressure applied over a center line of the road aggregates operated upon toward the sides of the road, and more specifically in diverging directions, so to speak. This method I think is new aside from the mechanical instrumentalities which I employ for accomplishing it.

Furthermore, I note that the raising and lowering means for my rollers 10 possess the dual function of enabling the putting into and out of use of these parts and the additional important function of enabling the pressure of the rollers to be regulated as regards their effective action upon the road surfaces.

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

1. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support and arranged in divergent relation for operation upon surface aggregates of a road over which the support is moved.

2. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support and arranged in divergent relation for operation upon surface aggregates of a road over which the support is moved, and power means for moving the support and for driving the said rollers in opposite directions.

3. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support and arranged in divergent relation for operation upon surface aggregates of a road over which the support is moved, adjacent ends of said rollers having an overlapping relation.

4. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support and arranged in divergent relation for operation upon surface aggregates of a road over which the support is moved, and means for raising and lowering the said rollers at their inner and outer ends to regulate their pressure upon the surface aggregates being finished by them.

5. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support and arranged in divergent relation for operation upon surface aggregates of a road over which the support is moved, and means to raise and lower said rollers at both ends to regulate their pressure effect upon the surface acted on thereby, and to additionally raise the rollers to render them inoperative.

6. In a concrete road surface finishing machine, the combination of a portable support adapted to operate over the road surface aggregates to be finished, diverging rollers disposed transversely of the machine and extending toward opposite sides of the road over which the machine travels for engaging and finishing the road surface aggregates, a hopper arranged in advance of said rollers to feed the aggregates to the road sub-grade in a layer of predetermined thickness in advance of said rollers, and a finishing member disposed longitudinally of the road, the concrete aggregates of which are being operated upon, and disposed in rear of said rollers.

7. The method of finishing concrete roads which consists of rolling the surface of the plastic concrete aggregates in directions diverging from the center line of the road toward the side lines of the road.

8. The method of finishing concrete roads which consists in ironing out road surface aggregates by pressure applied thereto progressively from an approximate line centrally and longitudinally of the road in directions diverging toward the side lines of the road.

9. The method of finishing concrete roads which consists of applying thereto a rolling pressure effect from the center portion of the road toward both its sides with a sort of ironing out action.

10. In a finishing machine, the combination with a frame, of rollers disposed obliquely with respect to the frame and with respect to each other, and means for changing the elevations of ends of a plurality of rollers simultaneously.

11. In a finishing machine, the combination with a frame, of rollers disposed obliquely with respect to the frame and with respect to each other, means for elevating or depressing the leading ends of both rollers simultaneously, and means for elevating or depressing the trailing ends of both rollers simultaneously.

12. In a finishing machine, the combination with a frame, of rollers disposed obliquely with respect to the frame and with respect to

each other, and means for positively rotating said rollers.

13. In a finishing machine, the combination with a frame, of rollers disposed obliquely with respect to the frame and with respect to each other, means for changing the elevations of the ends of said rollers, and means for positively rotating said rollers.

14. In a finishing machine, the combinations with a frame, of rollers disposed obliquely with respect to the frame and with respect to each other, and means for changing the elevations of the ends of the rollers.

15. In a finishing machine, the combination with a frame, of rollers disposed obliquely with respect to the frame and with respect to each other, and means for rotating said rollers positively at the same speeds of relative rotation but at different speeds of actual rotation.

16. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support and arranged in divergent relation in the direction of travel of the support for operation upon surface aggregates of a road over which the support is moved.

17. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support in divergent relation for operation upon surface aggregates of a road, the said rollers being narrowed so that each tapers toward its middle portion substantially as described.

18. In a concrete road surface finishing machine, the combination of a portable support, finishing rollers disposed upon said support in divergent relation for operation upon surface aggregates of a road, the said rollers being narrowed so that each tapers toward its middle portion substantially as described, the portable support comprising a frame adapted to span a road surface upon which the concrete aggregates are being laid, and said rollers having a general arrangement in a direction transversely to the road bed.

19. In a concrete road surface finishing machine, the combination of a portable support, and finishing rollers disposed upon said support and permanently arranged in divergent relation for operation upon surface aggregates of a road over which the support is moved.

In testimony whereof I affix my signature.

ERICH H. LICHTENBERG.