May 27, 1930. J. F. ROBB 1,760,442

FINISHING MACHINE

Original Filed June 1, 1923 3 Sheets-Sheet 1

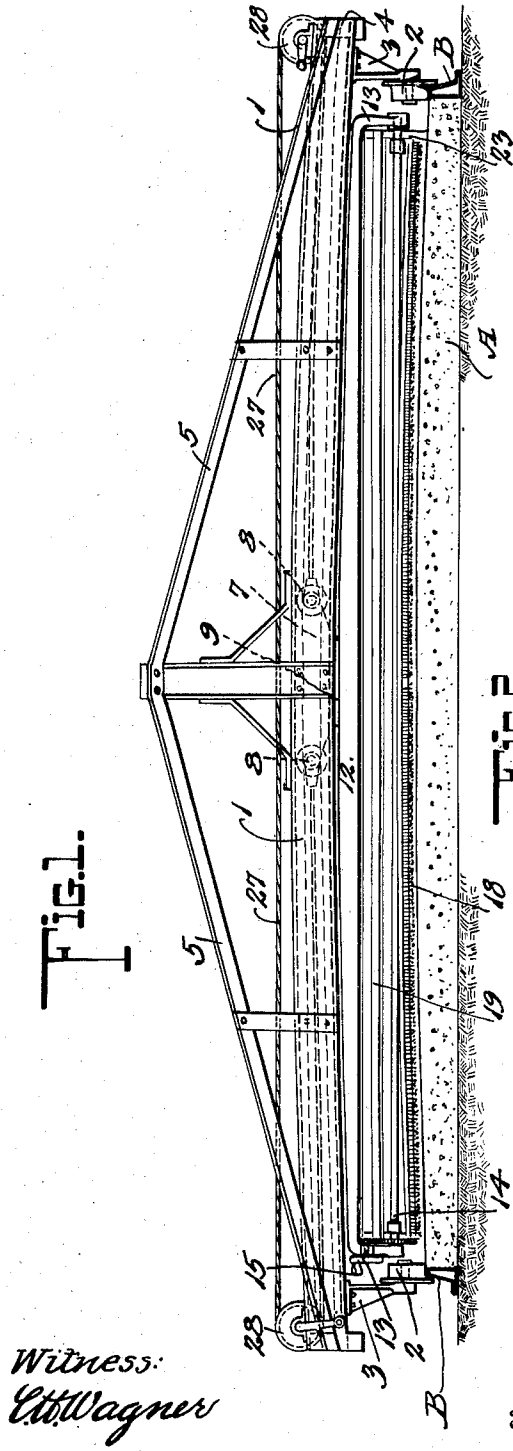


Fig. 1.

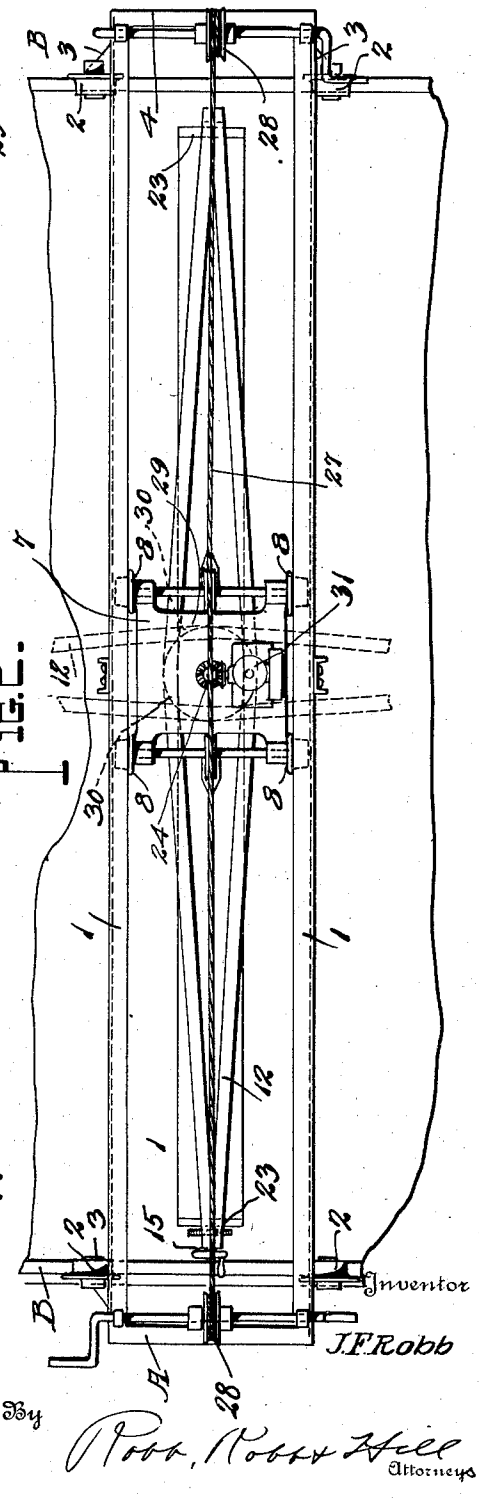


Fig. 2.

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Fig. 3.

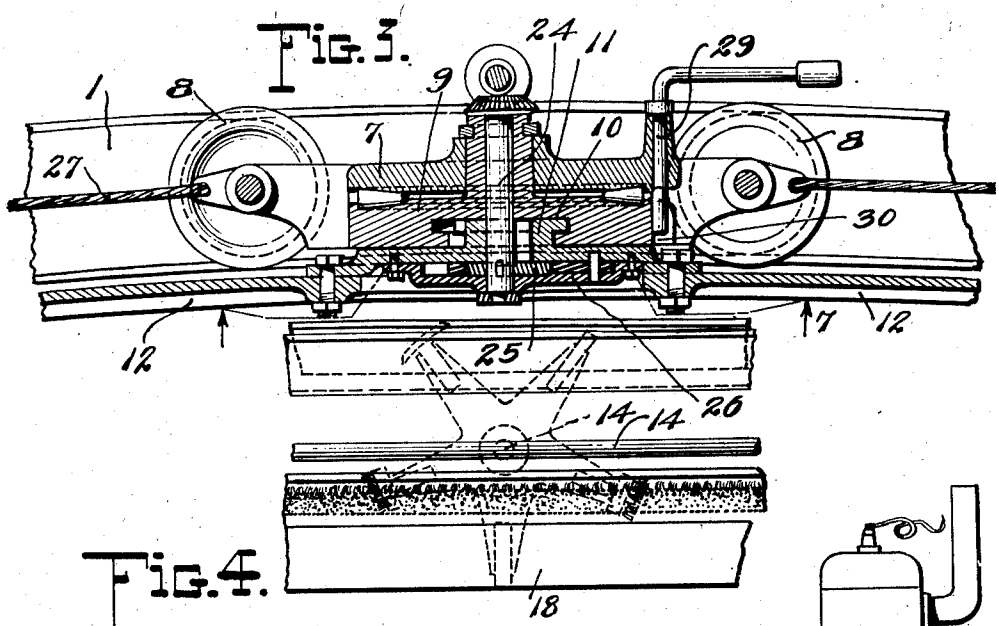


Fig. 4.

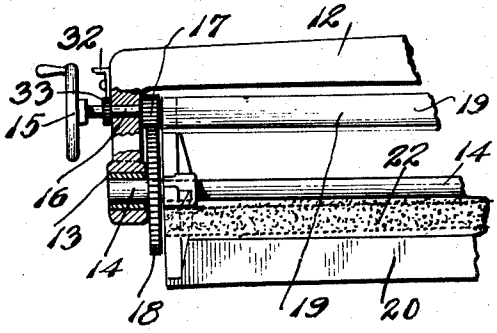


Fig. 6.

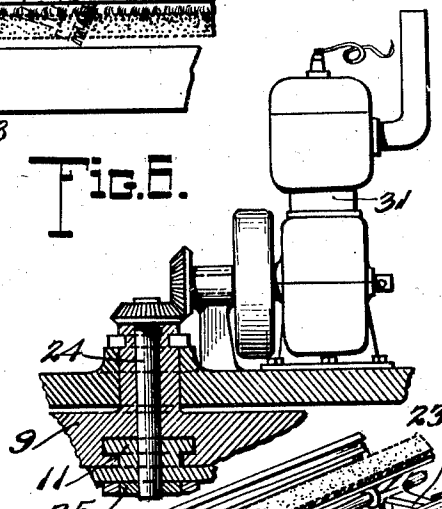


Fig. 5.

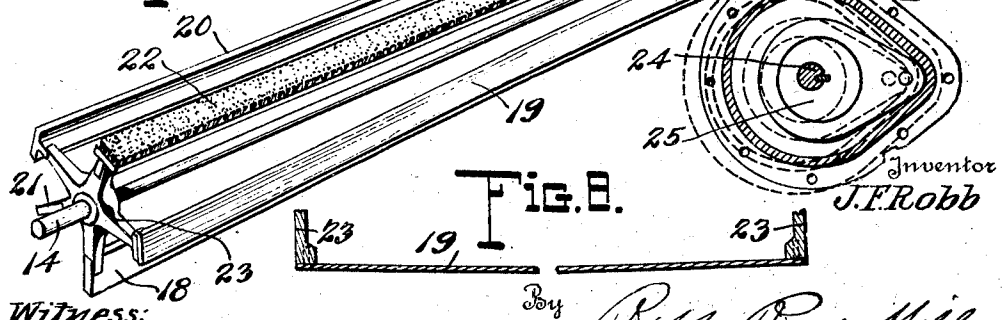


Fig. 7.

Fig. 8.

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FINISHING MACHINE

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Fig.9.

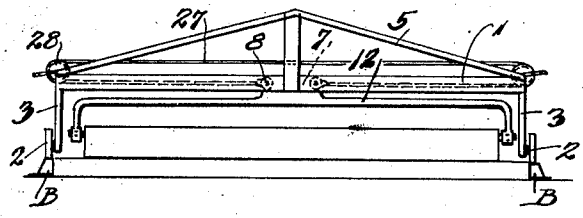


Fig.10.

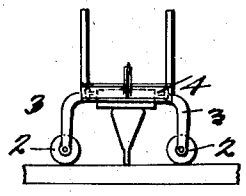


Fig.11.

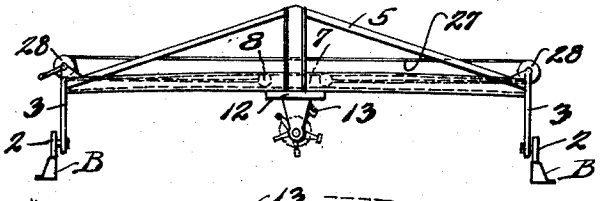
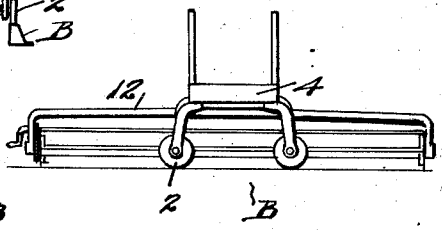


Fig.12.



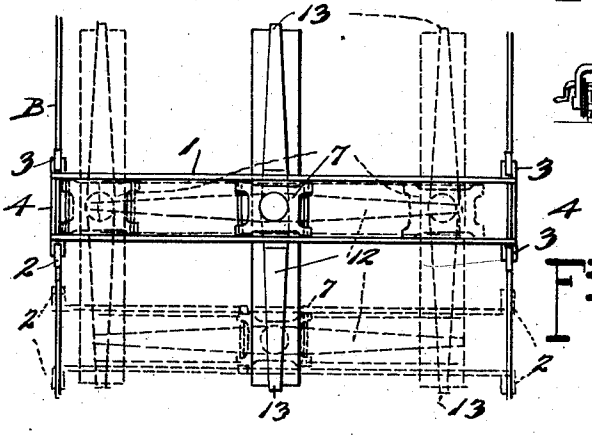
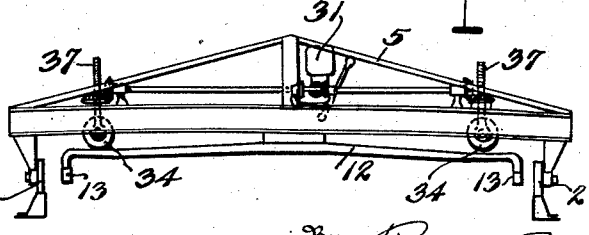


Fig.13.

Fig.14.



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Patented May 27, 1930 1,760,442

UNITED STATES PATENT OFFICE

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FINISHING MACHINE

Original application filed June 1, 1923, Serial No. 642,832. Divided and this application filed September 2, 1924. Serial No. 735,527.

Quite a few types of finishing machines for the finishing of concrete pavement in street and road work, especially the latter, have been put into use. The present invention involves a type of finishing machine of simplified construction and of more universal adaptation than those heretofore projected.

Present types of finishing machines largely comprise heavy body frames mounted on wheels that operate along the road forms, there being carried by the said body frame a fairly powerful engine by which are driven certain tamping devices, and striking off and finishing instrumentalities.

I propose to employ a finishing machine designed to perform primarily strike-off and surfacing functions, not including the tamping operation, in order that the machine may be comparatively light in its construction as a first essential to its production at a relatively small cost.

Additionally, I propose to utilize a finishing device mounted on a portable frame involving multiple finishing elements, the said finishing elements being adapted to be brought into play under different conditions for different kinds of finishing operations, and being utilized successively or interchangeably dependent upon the finishing operation that is to be performed by a certain element.

More clearly exemplifying the action of my multiple finishing member, it is known that in different parts of the country, and on different jobs, pavement specifications call for finishing operations of different sorts. For instance, in one place a longitudinal finishing device may be required to be used, whereas in another place a transverse finishing device may be specified. In practically all places a transverse striking off of the work is required as well as the use of a finishing float, the latter being usually of wood or belting. Again in some places a final finishing is put on the work by a brush. In many instances the above finishing operations are performed by hand, most frequently by instruments manipulated by two men working at the ends thereof, whether the finishing member is mounted transversely of the pavement or whether it is disposed longitudinally. In the latter case the two men are compelled to walk across little bridges erected across the pavement on the sub-grade and slightly elevated so as not to touch the surface. What I propose to do, and perhaps the broadest phase of my invention, is to provide a simple finishing machine embodying a finishing element that may be moved to assume a proper position transversely of the pavement being finished, or longitudinally of said pavement, and when so positioned, suitably held adjusted to perform its work.

Separate from the foregoing, my finishing device is composed of multiple finishing elements, or in other words I utilize one element for strike-off action upon the pavement aggregates while fresh, a second element in the form of a float to perform the float finishing operation as it is called, and third I utilize a brush or some other kind of finishing element by which a final uniform finish may be applied to the surface of the pavement being completed.

Subsidiary still to the foregoing, I utilize duplicated finishing elements so that my finishing means may be used equally well transversely of the road on which the pavement is being laid, or longitudinally of said pavement, phases of finishing operation now well known in the art. I prefer to use these duplicated finishing elements, because the condition arises in practice that a finishing element operating transversely of the roadbed must be formed with a curved operating edge or surface, as the case may be, to conform with the crown of the road being finished. On the other hand, when my finishing device is working longitudinally of a roadbed, it must be straight edged or have a straight surface, relatively speaking. Under some conditions a single finishing element such as I use may be employed as satisfactorily for both the transverse or crowned road finishing, or the longitudinal finishing where the operating portion must be straight.

It will be apparent that since I use finishing elements in both longitudinal and transverse positions, it is necessary to use an operating mechanism of a special nature to op-

erate such elements, and I have devised such a mechanism. In practice it is customary to vibrate or reciprocate the finishing element as it is in contact with the surface being finished. My operating means, therefore, performs the above function, and I utilize a single means preferably that will do this work when my finishing device is adjusted to its longitudinal position, and when it is adjusted to operate in a transverse position, speaking in relation to the direction or line of the road being constructed.

More specifically speaking, my whole machine comprises a portable or wheeled frame adapted to move along the road being constructed after the manner of the ordinary finishing machine commonly known. Upon my portable support referred to, I have a centrally pivoted finishing device that may be turned to a position transverse to the road or to a position longitudinally of a road, and when adjusted in either of said positions, said finishing device is adapted to be turned about a horizontal axis so as to bring into play any one of a series of finishing elements, which I have heretofore termed to be the multiple finishing means of my invention. My finishing device, therefore, turns about a vertical axis to adjust it to its main finishing position respecting the road to be constructed, and it turns about a horizontal axis to bring into play a selected one of said finishing elements.

In the accompanying drawings:

Figure 1 is a view in front elevation of a finishing machine embodying my invention.

Figure 2 is a top plan view.

Figure 3 is a partial longitudinal cross section showing the leveling or strike-off finishing element.

Figure 4 is a fragmentary view in elevation of the means for turning the finishing device about its horizontal axis.

Figure 5 is a detail perspective view of the multiple finishing device.

Figure 6 is a fragmentary sectional view showing more fully the method of mounting the explosive engine which is designed to reciprocate the finishing devices.

Figure 7 is a horizontal sectional view showing more clearly how the driving eccentric and floating pitman establish connection between the engine driven shaft and the finishing device.

Figure 8 is a sectional view of the flexible finishing float which may be of light board or similar material, or of belting, or the like, in order that it may be flexible.

Figure 9 is a diagrammatic view showing a multiple finishing device in accordance with the invention, usable only for transverse operation.

Figure 10 is an end view of the same also diagrammatic.

Figure 11 is a diagrammatic view showing such a finishing device of the type designed for both transverse and lonigtudinal work.

Figure 12 is an end view of the same with the multiple finishing device arranged in its longitudinal position.

Figure 13 is a diagrammatic view of the device of Figs. 11 and 12, dotted lines showing the range of movement of the finishing means when disposed either transverse or longitudinally.

Figure 14 is a sort of diagrammatic view illustrating how the finishing machine may be equipped with special rollers operable to support it when not being used on the road, but for transportation purposes to new locations.

Describing my machine specifically in conjunction with the drawings and referring to the latter, I have illustrated at A a concrete pavement in process of being laid. The road rails or forms B are located at opposite sides of the pavement, and on these forms my machine travels.

My machine comprises a portable support, preferably consisting of two channels 1 spaced apart horizontally and curving longitudinally to a slight degree in conformance with the arc or contour of the crown of a road. If desired, I contemplate the employment of means for lengthening and shortening the channels or main frame members of my machine to adapt the machine to operate upon different widths of road work. The foregoing may be accomplished by an adjustable mounting of the supporting wheels 2 through the provision of fastenings to adjustably secure the brackets 3 in which said wheels are carried, to the said members 1. The frame members 1 are connected at the ends by short horizontal beams 4, and the whole machine frame is braced lenthwise thereof by suitable truss rods 5. It is intended that the portable support or frame shall be relatively light and inexpensive in its construction, since the multiple finishing devices which I utilize are not very heavy. Mounted to traverse lengthwise of the frame members or channels 1 is a carrier 7, see Figs. 1 to 3. This carrier 7 is a sort of trolley equipped with wheels 8 that operate in the channels of the members 1. The carrier 7 supports a small turntable 9, the under side of which is formed with a T groove or recess 10 in which is mounted the slide-head 11. The slide-head 11 is mounted on a supporting frame 12, having downwardly extending arms 13 at its ends, in which arms my multiple finishing device is mounted. The support for my multiple finishing device comprises a rotatable axis or shaft 14, which is susceptible of being turned by a hand wheel 15 mounted on a shaft 16 on either or both end arms 13, the shaft 16 having a pinion 17 meshing with a gear 18 carried by said shaft 14.

The multiple finishing device carried by

the frame 12 comprises a main strike-off element 18, an adjacent main float finishing element 19, and the main brush finishing element 20. Said finishing device also includes an auxiliary straight edge strike-off element 21, and an auxiliary brush 22. The main strike-off element 18 and the main brush element 20 are curved longitudinally so as to conform with the crown of the road, because these elements are used when my finishing device is arranged transverse to the road being finished. The auxiliary strike-off 21 and auxiliary brush element 22, however, are straight, because they are used for finishing the road surface when my finishing device is disposed longitudinally of the road. The main float finishing element 19 is a piece of belting, thin wood, etc., which is attached at its opposite ends to arms which form parts or spiders 23, the latter carried by the shaft 14, and supporting the various finishing elements that I have described. Since the float finishing element 19 is adapted to flex between its supports, namely the spiders 23, it is obvious that it is susceptible of being used for either straight finishing work when disposed longitudinally of the roadbed, or transverse finishing work when it is arranged transversely of the roadbed, the latter condition requiring a finishing element that curves to conform to the road crown.

The prerequisite that my finishing device must be susceptible of being vibrated or reciprocated when any one of its finishing elements is brought into play, gives rise to the provision of a means for doing this, shown best in Fig. 3. In this figure it will be seen that the turntable 9 is mounted to rotate about a vertical shaft 24 as its axis. This shaft carries an eccentric 25 near its lower end, held in place on the shaft by a housing plate 26 applied to the under side of the frame 13. The eccentric 25 is keyed to the shaft 24, and said shaft 24 forms an axis for my finishing device as a whole. If desired, suitable bearings may be interposed between the carrier 7 and the turntable 9. Owing to the slide-head mounting at 11 between the finishing device and the turntable, a rotation of the shaft 24 and its eccentric 25 will impart a reciprocal movement to the frame 12 and to the finishing device supported upon said frame, in an obvious manner.

If the machine is to be manually operated, a manually actuated drive gearing may be mounted upon the carrier 7 to be operated to turn the shaft 24. I prefer, however, to employ a small engine, preferably one of an explosive type, arranged on the carrier 7, and having a suitable geared connection with the shaft 24 to drive the latter all the time that the machine is in use. The reason why I mount this engine on the carrier 7 is because when the machine is being used to do certain work while the finishing device is arranged longitudinally of the road, the carrier is designed to move longitudinally of the channels or frame members 1 of my main portable support, all to be later more fully set forth. To propel the carrier 7 lengthwise of the channels 1, I provide an endless cable operating means, the cable of which is designated 27, and an operating wheel or wheels to actuate which are designated 28. These wheels may be located at opposite ends of the machine.

With the above description of construction in mind, the several adjustments of parts and the mode of operation of the machine when adjusted will now be set forth.

Supposing the work to be done by the finishing member is transverse work, or in other words, that the finishing elements are to work transversely of the road being laid. The parts of the machine under these conditions will be adjusted practically as shown in Fig. 1. The frame 12 supporting the finishing device is held in such transverse position by a locking bolt 29, see Fig. 3, the latter being mounted on the carrier 7 and adapted to engage in either one of two locking notches 30 disposed at an interval of 90 degrees apart in the periphery of the turntable 9. With the motor 31 in operation, and assuming that the finishing operation is just started, the main strike-off 18 will be used because it is curved and matches the crown of the road. This strike-off is therefore turned to the most downward position for contact with the road surface aggregates, and it reciprocates longitudinally of itself and transversely of the road as an incident to the drive connected to the frame 12 by the eccentric member 25. In this action the head 11 slides in the turntable 9. After the strike-off operation is performed, the wheel 15 may be turned to rotate the finishing device, and bring the finishing float 19 to the lowermost position in operative contact with the road surface. Then the float finishing operation is performed. Next, should a soft uniform finish be desired for the road surface, the shaft 14 may be rotated further to bring into play the curved main brush 20, and this will perform the necessary function referred to in its reciprocation.

When the finishing device is adjusted to work transversely of the road, it is advanced progressively by moving the machine bodily owing to the turning of the main supporting wheels 2. This movement may be caused manually, but if desired, the motor of the machine may be geared to the wheels 2 to drive them. As I prefer to maintain my machine of very light construction, I preferably move it along the road forms manually.

Supposing now that the specifications for the particular road require, or it is desirable for some other reason to finish the road by

operation of the finishing member longitudinally of the latter. This condition is met by simply raising the locking device or bolt 29 and pushing on the frame 12 so as to turn it at right angles to the position previously held thereby, then dropping the bolt 29 into the other notch 30 of the turntable 9. The finishing device is then ready to be used for longitudinal work. It is assumed that the engine 31 is operating the shaft 24 and the striking off of the road surface may be performed by turning the hand wheel 28 which may be located at either or both ends of the machine. The auxiliary strike-off 21 will be in place for the above work and will act on the surface aggregates in a longitudinal position, being equipped with a straight lower operating edge or surface. As it reciprocates under the action of the engine 31, the turning of the wheel 28 moves the carrier 7 longitudinally of the main frame of my machine, and transversely of the road. Since the members 1 are curved to conform with the road surface contour or crown, the striking off will be performed in this manner. After struck-off, the road surface may be finished by the float finishing member 19, which is used if the finishing operation both longitudinally and transversely of the road. Thereafter, if desired, the uniform brush finish may be applied to the road surface by using the auxiliary straight brush 22. There are, therefore, preferably used five elements for my multiple finishing device, but these elements may be increased in number or decreased according to the requirements of the surface.

In one kind of finishing operation, my machine moves progressively forward along the road as the finishing element operates transversely of the road, in the other operation my machine remains stationary temporarily as the finishing member moves longitudinally on and over the road, then when a certain section or panel of the road has been finished, the machine may be set forward a little distance and the longitudinal finishing action continued.

Where the road is laid in panels my auxiliary finishing elements 21 and 22 that operate longitudinally may be notched at a central point so as to straddle the joint between the panels.

I wish it to be understood that my machine may be built in different modifications, as for instance, one in which the finishing device simply comprises a member substantially as shown in Fig. 9, mounted on a frame and having several finishing elements alone. Or again the machine may be constructed so that the finishing device may be rotated to assume longitudinal or transverse positions in performing its finishing functions respecting the road. See Fig. 11. Then the more complicated constructions of the invention somewhat as illustrated may be adopted. Obviously with my invention the road may be finished both transversely and longitudinally by one or more of the finishing elements of my multiple finishing device.

It will be noted that a suitable locking means such as a dog 32 may cooperate with a gear 33 on the shaft 16 to lock the shaft 14 against unauthorized turning.

It is also notable that if desired I may connect my motor 31 to a series of screw jacks 37 so as to turn the latter, and lower a series of rollers 34 carried by the lower ends of said jacks. In this way the machine and wheels 2 may be raised off of the road forms and supported by the wheels 34, and thus readily moved off of the subgrade to be put out of use, or preliminary to transportation to some other place, or moved forward to a new location by being pushed while carried by the rollers 34. Under the last condition the machine may move in the direction of its greatest dimension and will be easily caused to travel along even a narrow road without interference with traffic. Where a motor is used to propel the machine, by its wheels 2, something old in the art, it would be contemplated to use the same motor to drive the rollers or wheels 34 to supply locomotion for the machine off the work. I do not illustrate such a motor drive simply because I am setting forth a simple embodiment of my invention. (Note Fig. 14 in this connection.)

In handling the customary hand finishers two men at least are usually employed, one at each end of the finishing device. Their manual powers are limited as obvious, for it is not easy work to move a finishing device over a road surface all day. But with my most simple embodiment of my machine, even when pushed by them, or actuated through the cable 27, many times the work that they can manually perform, may be done. This is largely due to the fact that the hardest part of the work is the reciprocating of the finishing element used, and this work in my machine is done by an engine. Moreover, the time lost in substituting a different kind of finishing element is saved with my machine.

Obviously I may use a pressure or ironing out roller as the, or one of the, finishing elements of my machine.

It will be understood that the motor 31 may be connected up to the cable 27 to operate the latter instead of using manual means, in which event automatic reverse mechanism may be employed to reverse the travel of the carrier 7 at its extremes of movement.

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

1. A machine for finishing concrete pavements, the same comprising a multiple fin-

ishing device including a series of finishing elements having different finishing functions and adapted to be brought into play one at a time, and means to reciprocate each finishing element when in use.

2. A machine for finishing concrete pavements, the same comprising a rotative multiple finishing device including a series of finishing elements adapted to be brought into operative position by rotation of said device, and means to vibrate said finishing device when one of its finishing elements is operative.

3. A machine for finishing concrete pavements, the same comprising a multiple finishing device of much greater length than width, including a series of finishing elements constructed so as to do different kinds of work and adapted to be brought into play at different times, and means supporting the finishing device to turn to positions transverse or longitudinally of a road being operated upon.

4. A machine for finishing concrete pavements, the same comprising a rotative multiple finishing device including a series of finishing elements each to be set for operative use when it is to do the finishing use; and adapted to be brought into operative position by rotation of said device, and a rotative support for the finishing device enabling it to be turned to assume a position either longitudinal or transverse to road operated upon.

5. A machine for finishing concrete pavements, the same comprising a multiple finishing device of much greater length than width, including a series of finishing elements adapted to be brought into play one at a time, means supporting the finishing device to turn to positions transverse or longitudinal of a road being operated upon, and means for reciprocating the finishing device in either of its longitudinal or transverse positions stated.

6. A machine for finishing concrete pavements, the same comprising a rotative multiple finishing device including a series of finishing elements adapted to be brought into operative position by rotation of said device, a rotative support for the finishing device enabling it to be turned to assume a position either longitudinal or transverse to the road operated upon, and means to vibrate the finishing device back and forth when a finishing element thereof is disposed in operative position whether when arranged either longitudinally or transversely of the road being finished.

7. A machine for finishing concrete, the same comprising a portable support movable over the road surface being finished, and a finishing device of much greater length than width mounted on said support and movable to assume a working position either transverse to the road or longitudinal of the road.

8. A machine for finishing concrete roads, the same comprising a portable support adapted to be advanced over the road surface to be finished, a finishing device of much greater length than width disposed on said support and rotative in a horizontal plane to assume positions either longitudinal or transverse to the road being operated on, said device embodying a plurality of different functioning finishing elements.

9. A machine for finishing concrete roads, the same comprising a portable support adapted to be advanced over the road surface to be finished, a finishing device disposed on said support and movable in a horizontal plane to assume positions either longitudinal or transverse to the road being operated on, said device embodying a plurality of different kinds of finishing elements, and means for bringing any selected one of said finishing elements into play at will.

10. A machine for finishing concrete pavements, the same comprising a multiple finishing device including a series of interchangeably usable different kinds of finishing elements, and means to move the finishing device back and forth when it is in either longitudinal or transverse positions.

11. A machine for finishing concrete roads, the same comprising a portable support adapted to be advanced over the road surface to be finished, a finishing device of much greater length than width disposed on said support and rotative in a horizontal plane to assume positions either longitudinal or transverse to the road being operated on, said device embodying a plurality of finishing elements, means to lock the finishing device in either of the positions to which it may be adjusted, and means to adjust the finishing elements of said device to bring any one of the same into play at will and hold them in an adjusted position.

12. A machine for finishing concrete comprising a portable support adapted to be advanced along the road surface to be finished thereby, a turntable on said support, and a finishing device carried by said support and movable to assume different positions relatively to the support and to the road surface being operated upon.

13. A machine for finishing concrete comprising a portable support, a finishing device mounted thereon and comprising a series of different kinds of finishing elements and means for imparting to said finishing device a bodily rotation to adjust it to assume different working relations respecting the road.

14. A machine for finishing concrete comprising a portable support, a finishing device mounted thereon and comprising a series of different kinds of finishing elements and means for imparting to said finishing device a bodily rotation to adjust it to assume dif-

ferent working relations respecting the road, and comprising mechanism for rotating the finishing device in a horizontal plane, and means for rendering operative any one of said finishing elements.

15. A machine for finishing concrete, the same comprising a finishing device including finishing elements of one kind, adapted to do finishing work longitudinally, finishing elements of another kind to do work and transversely of a road, means for adjusting the finishing device so that it will work transversely or longitudinally of the road, and means for bringing either of the finishing elements into play according to the proper adjustment of said finishing device.

16. A machine for finishing concrete pavements, the same comprising a multiple finishing device including a series of different finishing elements each adapted to be adjusted to be brought into play continuously for a particular period and driving means to move back and forth each finishing element when selectively brought into play.

17. A machine for finishing concrete roads, the same comprising a portable support adapted to be advanced over the road surface to be finished, a finishing device disposed on said support and rotative in a horizontal plane to assume positions either longitudinal or transverse to the road being operated on, said device embodying a plurality of finishing elements, and means whereby the finishing device may be moved crosswise of the road when disposed longitudinally thereof, the portable support enabling it to be moved lengthwise of the road when it is disposed transversely thereto.

18. A machine for finishing concrete, the same comprising a portable support movable over the road surface being finished, and a finishing device mounted on said support and movable to assume a working position either transverse to the road or longitudinal of the road, and means to vibrate the finishing device when in either of said positions.

19. A machine for finishing concrete, the same comprising a portable support movable over the road surface being finished, a long narrow finishing device mounted on said support and movable to assume a working position either transverse to the road or longitudinal of the road, and a single actuator adapted to reciprocate the finishing device in either of said positions.

20. A machine for finishing concrete, the same comprising a portable support movable over the road surface being finished, a finishing device mounted on said support and movable to assume a working position either transverse to the road or longitudinal of the road, and means to lock the device in either of said positions, and to impart movement to the device when so locked.

21. A machine for finishing concrete, the same comprising a portable support movable over the road surface being finished, a long narrow finishing device mounted on said support and movable to assume a working position either transverse to the road or longitudinal of the road, and means to carry the device across the road surface when arranged longitudinally thereof, and lengthwise of the road when disposed transversely thereto.

22. In a finishing machine of the class described, in combination, a portable support adapted to travel over the plastic materials which are to constitute a pavement, a finishing member mounted thereon and adapted to be swung from a position transverse to the road, to a position longitudinal with it, and a pivotal axis for the said finishing member to permit its swinging movements, a reciprocating means operable by said pivotal axis to reciprocate the member, and means for transmission of power through the axis to said reciprocating means.

23. A machine for finishing concrete pavements, the same comprising a multiple finishing device including a strike-off finishing element for contact with the concrete of the road, and a float finishing element for similar contact, and means movably supporting said elements so that they may be rendered interchangeably operative to act upon the surface of concrete aggregates.

24. A machine for finishing concrete pavements, the same comprising a multiple finishing device including a plurality of finishing elements one of which is shaped to conform with the crown of a road when said element is arranged transversely of the latter to act upon concrete aggregates on the road subgrade, the other finishing element being straight so as to work on the surface of the concrete aggregates when it is disposed longitudinally of the road, and means for moving the finishing device to bring the first mentioned finishing element into a position transversely of the road, and to bring the second mentioned finishing element into a position longitudinally of the road.

25. A concrete finishing machine comprising a finishing element having a curved finishing portion to work on road surfaces when said element is transverse to the road, a second finishing element having a straight finishing portion to work on surfaces when said element is longitudinal of the road, a third finishing element of flexible form to work on surfaces when it is disposed longitudinally or transversely to the road, a support common to all these elements, and means for selectively bringing any of these elements into operative use on road surface aggregates.

26. A concrete finishing machine comprising a finishing element having a curved finishing portion to work on road surfaces when said element is transverse to the road, a second finishing element having a straight fin-

ishing portion to work on surfaces when said element is longitudinal of the road, a third finishing element a flexible form to work on surfaces when it is disposed longitudinally or transversely to the road, a support common to all these elements, means for selectively bringing any of these elements into operative use on road surface aggregates, and means to reciprocate each element when it is in operative position for use.

27. A machine for finishing concrete, comprising a finishing device having different kinds of finishing elements, means for supporting said finishing device for rotation in a horizontal plane to adjust the same to work in different directions in respect to the road surface aggregates to be operated on, and means for rotating said finishing device about a horizontal axis to selectively bring any one of its finishing elements into active position in relation to concrete surface aggregates on the road bed.

In testimony whereof I affix my signature.

JOHN F. ROBB.