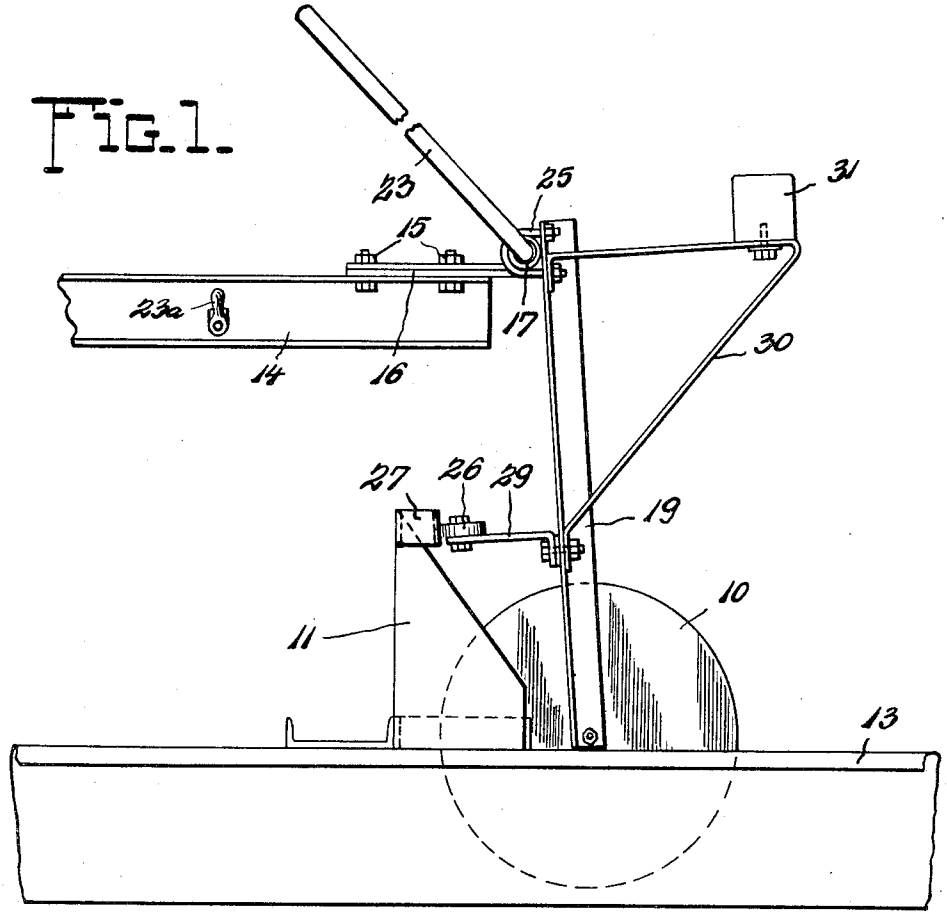
Nov. 7, 1933. A. A. McCREE 1,934,550

PAVEMENT FORM SPADER

Filed Sept. 24, 1930 4 Sheets-Sheet 1

Fig. 1.



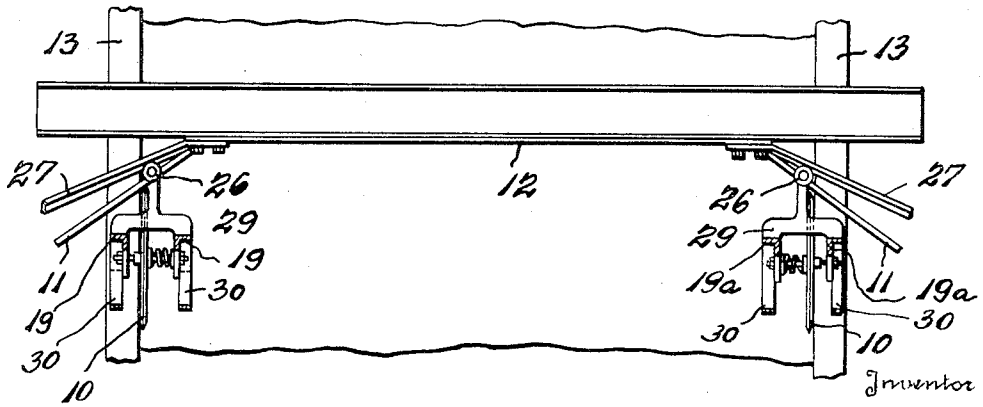


Fig. 2.

Inventor

A. A. McCree.

By Robert Cobb

Attorneys

Nov. 7, 1933. A. A. McCREE 1,934,550

PAVEMENT FORM SPADER

Filed Sept. 24, 1930 4 Sheets-Sheet 2

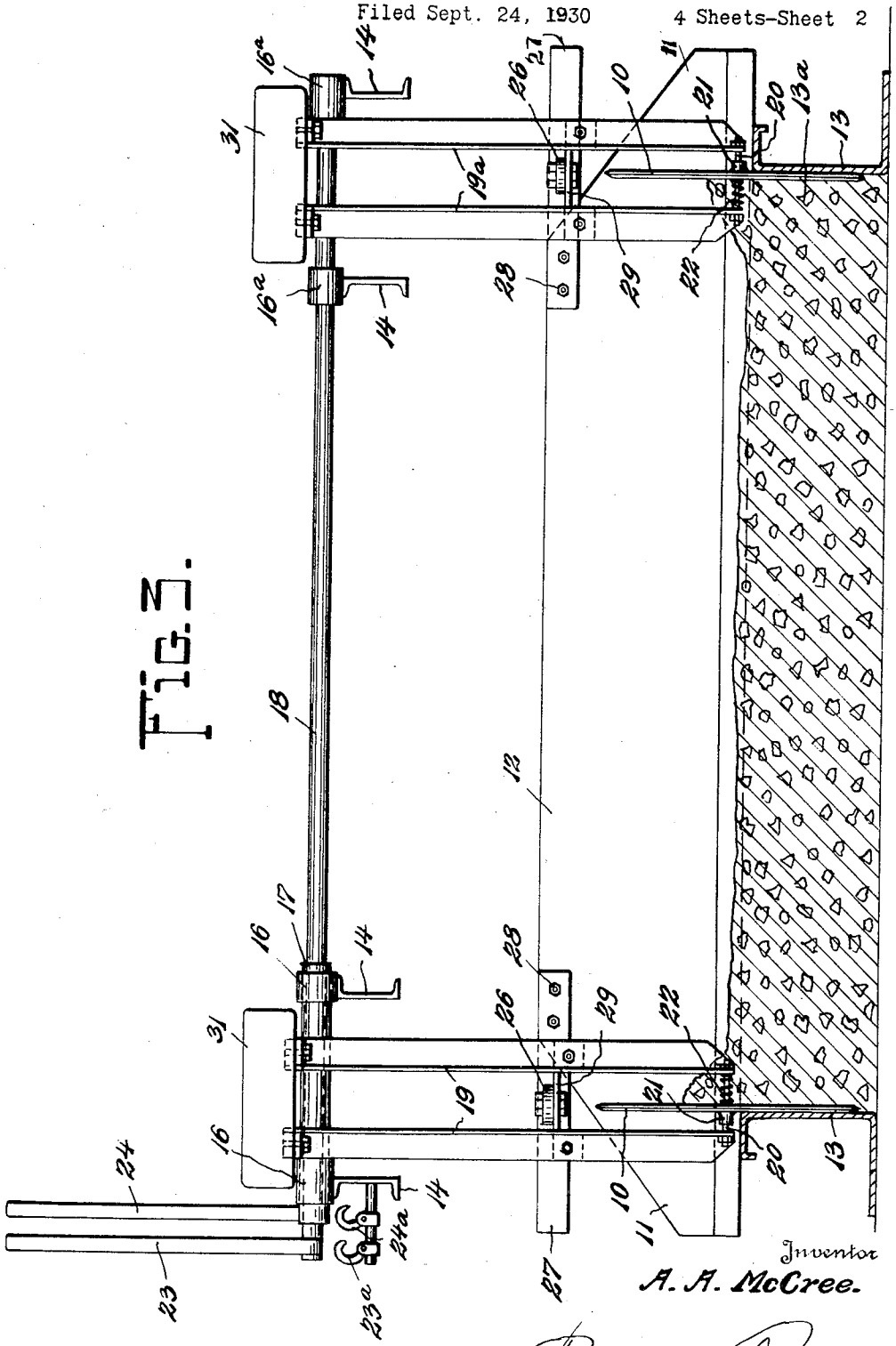


Fig. 1.

Inventor
A. A. McCree.

By Robertson Cobb
Attorneys

Nov. 7, 1933. A. A. McCREE 1,934,550

PAVEMENT FORM SPADER

Filed Sept. 24, 1930 4 Sheets-Sheet 3

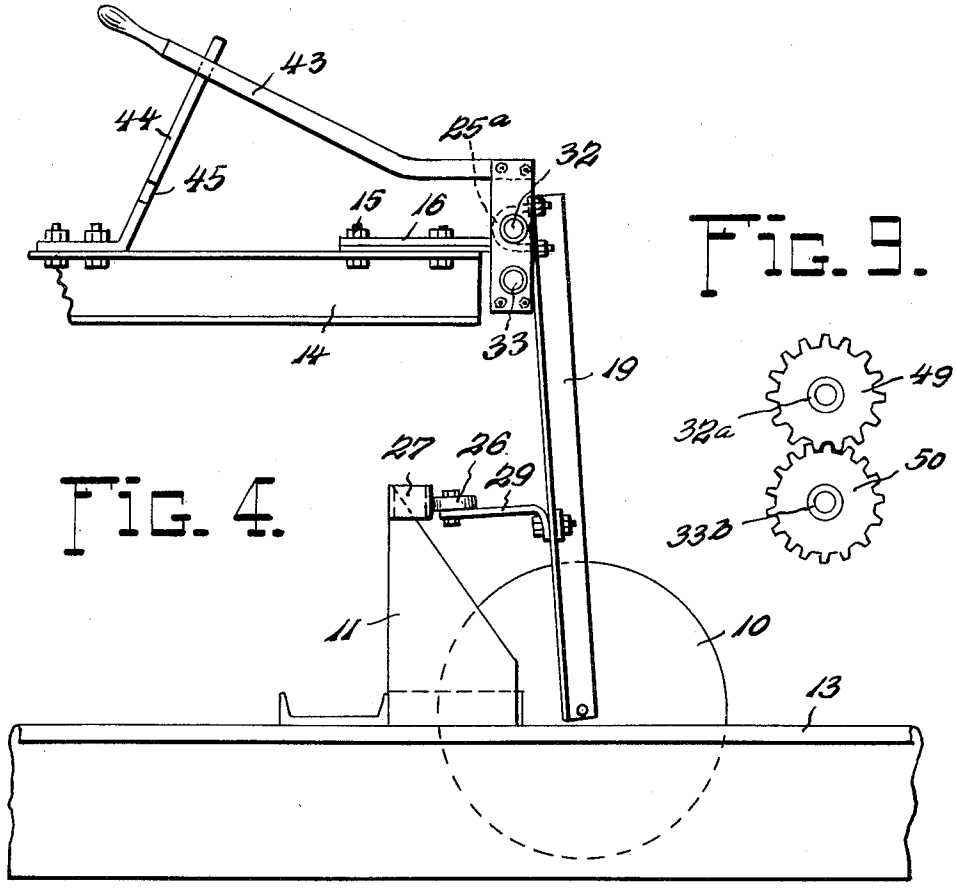


Fig. 4.

Fig. 9.

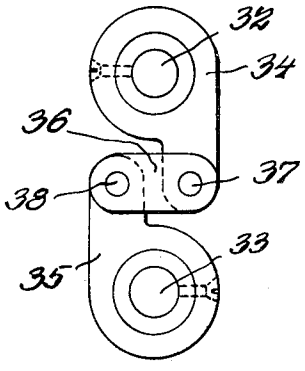


Fig. 5.

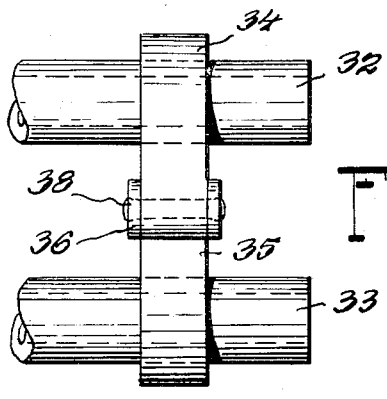


Fig. 6.

Inventor

A. A. McCREE.

By Robbins & Robb

Attorneys

Nov. 7, 1933. A. A. McCREE 1,934,550

PAVEMENT FORM SPADER

Filed Sept. 24, 1930 4 Sheets-Sheet 4

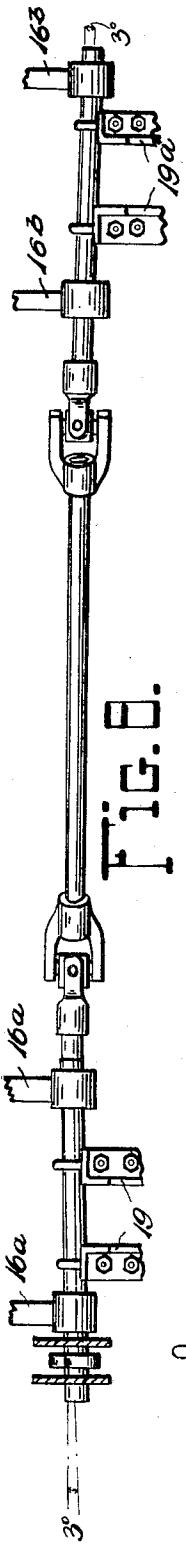


Fig. 8.

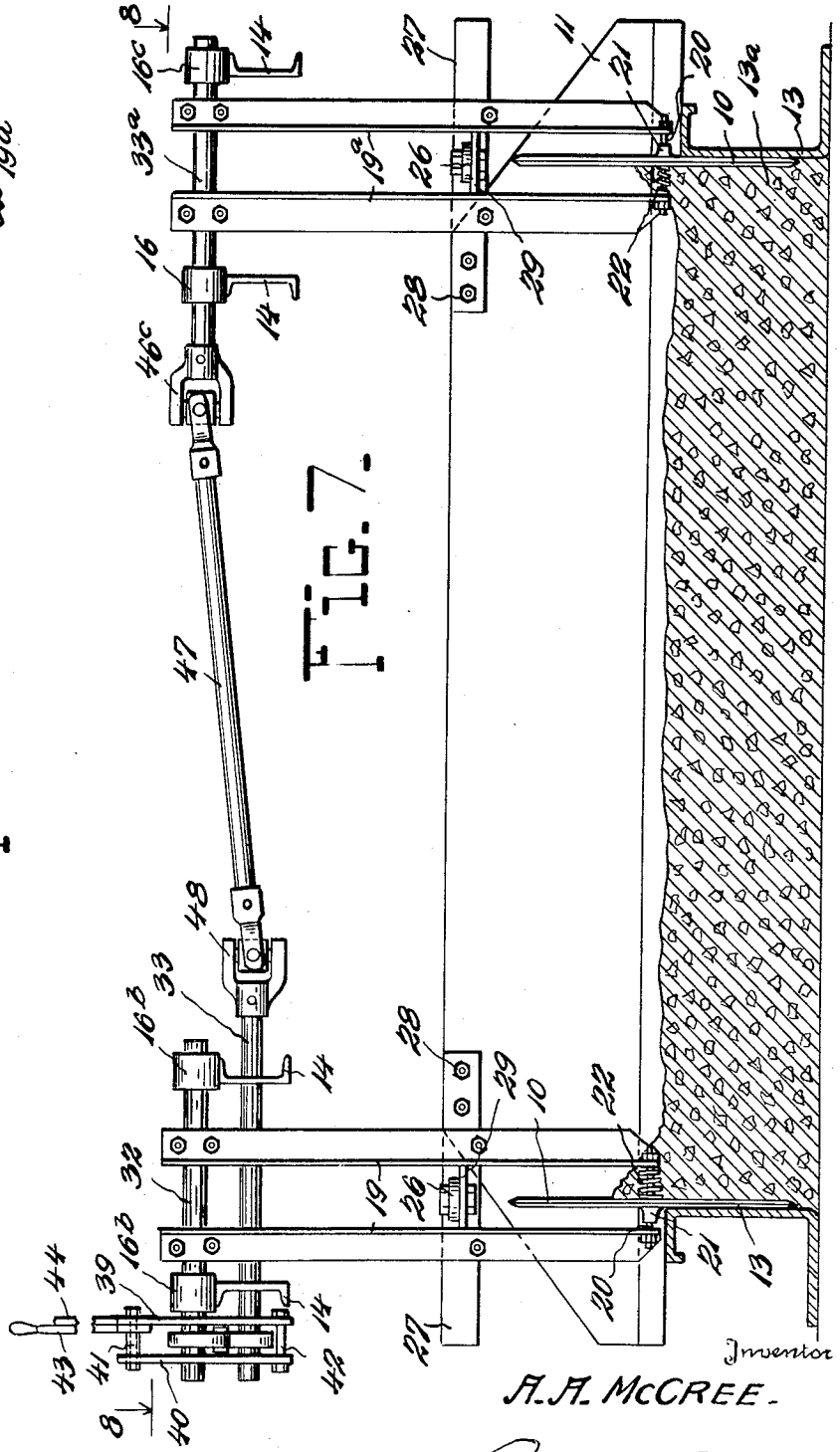


Fig. 7.

Inventor

A. A. McCREE.

By Robb & Robb

Attorneys

Patented Nov. 7, 1933 1,934,550

UNITED STATES PATENT OFFICE

1,934,550

PAVEMENT FORM SPADER

Andrew A. McCree, St. Paul, Minn.

Application September 24, 1930
Serial No. 484,117

21 Claims. (Cl. 94—45)

In the laying of concrete pavements, it is customary to place metal forms along the sides of the roadway, and to fill between these forms with an appropriate paving mix until the desired depth of pavement has been reached, this depth being usually the depth of the lateral forms defining the edge of the roadway. It is then customary to finish off smoothly the surface of the mix by employing finishing machines which are propelled longitudinally over the mix, and which are provided with a transversely oscillating member known as a screed, which engages the rough surface of the mix and smooths it out. In this smoothing operation the excess mix is pushed along the front of the screed, and will be shoved over the top of the forms unless prevented from doing so. In order to guide this surplus mix and prevent its being shoved off over the edge of the pavement, the front screed is provided with flared ends, the flares serving as guides to retain this mix on the pavement. Usually the finishing machine is provided with two screeds, each of these screeds oscillating transversely over the pavement as the machine is propelled thereover longitudinally, the screeds giving an initial smoothness to the surface, as previously mentioned.

It is found that in many instances there will be formed between the mix and the lateral forms irregularities such as unfilled spaces and other imperfections due to irregular filling of the complete area between the sides of the roadbed with the concrete mix, these holes or voids causing a weakening of the pavement with attendant possibility of distortion. It is therefore desirable to insure the complete filling of all spaces between the lateral road forms and the bed of paving mix placed therebetween; and this invention contemplates an attachment to finishing machines usually employed for this work, the attachment being such that will permit the utilization of at least a portion of the excess mix in filling any voids which may exist between the bed of mix and the lateral road forms.

More specifically, the invention contemplates providing a conventional type of finishing machine with at least a pair of spaders, preferably in the form of discs, located in advance of the forward screed and adjacent the flared ends thereof, the spaders being adapted to cut a channel through the paving mix adjacent the lateral road forms, which channel is then filled with mix shoved off by the spader as the machine is propelled along the pavement, so that after the screed has passed, this channel will be uniformly filled by the surplus mix directed into it through the agency of the flared ends of the screed.

While the present invention is illustrated as taking the form of rotating discs, it will be understood that any device serving a similar purpose and attached in similar manner may be regarded as functionally equivalent to the discs, and therefore the invention is not to be limited necessarily to a disc member, though this is the preferred form which the attachment will take.

The invention also includes novel means supporting the discs on the frame of the finisher.

The invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the attachment secured in position.

Figure 2 is a top plan view, and

Figure 3 is a front elevation of the attachment in position, parts of the finisher being omitted for the sake of clearness, such parts being immaterial to an understanding of this invention.

Figure 4 is a side elevation of a modified form of attachment secured in position.

Figure 5 is a detail front elevation of the shaft carrying levers and connection therefor, as employed in this modification.

Figure 6 is a side elevation of the devices of Figure 5, showing the shafts in position.

Figure 7 is a view similar to Figure 3, but showing the modification of Figures 4, 5, and 6.

Figure 8 is a partial top view of the assembly of Figure 7, and

Figure 9 illustrates a pair of cog wheels which may be employed instead of the device of Figure 5.

It will be seen that the invention contemplates the provision of spader members, such as discs 10 positioned somewhat in advance of but adjacent to the flared ends 11 of the screed 12. The discs 10 are clearly shown in Figures 1 and 3 as passing through the paving mix adjacent the lateral road forms 13, forming a channel along the inner surfaces of these forms, which channel is readily and uniformly filled by excess mix scraped from the top of the pavement by the screed 12, this surplus material being directed into the channels through the agency of the flared ends 11, these ends thereby serving as guides for the material.

The discs 10 are carried by the frame of the finishing machine through instrumentalities which will now be described. A portion of the front frame of the finishing machine is shown at 14. Secured to this frame, as by bolts 15, are brackets 16 and 16a and as the elements to be

described are duplicated at each end of the frame 14, only one assembly will be described in particular it being understood that the description will fit equally the other assembly. The brackets 16 have a relatively short shaft 17 mounted thereon, the shaft 17 being hollow and having a longer shaft 18 passed therethrough, the shaft 18 extending across the entire width of the finishing machine, and supported at its end by the brackets 16*a*. The shaft 17 is loosely carried on the shaft 18, the two shafts being rotatably mounted and rotative respectively to each other. Carried by the shaft 17 is a pair of standards 19, a corresponding pair of standards 19*a* being carried by the shaft 18. These standards are the direct carrying means for the disk 10, the disc being mounted between them on the axle 20, this axle being sufficiently longer than the hub 21 of the disc 10 so that there is a chance for movement of the disc along the axle. Bearing against one side of one of the standards, the standards being conveniently angular in cross section, is a spring 22, which also bears against the disc 10, to normally hold the disc against the outward standard of the pair 19, so that the disc 10 will be held in substantial engagement with the inner surface of the road form 13. But this spring will of course permit lateral movement of the disc along the axle 20 to compensate for any irregularities which may be encountered in its course along the road form 13.

It will be noted that the spaders 10 are mounted on independent shafts, this being necessary because as the screed moves crosswise over the pavement, one spader goes up and the other goes down. It is also necessary at times to lift the spaders either together or selectively out of engagement with the mix, as when reinforcing bars extended transversely of the pavement are met, and for this purpose levers 23 and 24 are provided, these levers being readily operable by an operator stationed on the finishing machine, movement of the lever 23 as shown rotating the shaft 18 to lift the spader attached thereto out of engagement with the paving mix, the operation of lever 24 rotating the shaft to lift the other spader out of engagement with the mix. Operation of the levers 23 and 24 simultaneously will of course lift both spaders out of the mix at the same time. Hooks 23*a* and 24*a* are adapted to secure the levers 23 and 24 in depressed position, if desired, the hooks 23*a* and 24*a* being mounted on the frame 14 shown in Figure 3. To secure the standards 19 and 19*a* to the shafts, there are employed U-bolts 25, one for each standard.

As the screed 12 oscillates transversely of the pavement, the bed of which is indicated in Figure 3 at 13*a*, the flared ends 11 would be brought into engagement with the spader discs 10, but for the provision of a roller 26 mounted upon a roller guide 27 which is secured to the top of the screed 12, as indicated at 28. The purpose of this roller and roller guide is to maintain the spader discs 10 in substantially the same position relatively to the flared ends 11 of the screed at all times during movement of the screed. The action of the roller and its guide is indicated in Figure 2 and it will be seen that because the roller guide is closer to the shaft 18 than the axle 20 of the disc 10, the roller guide is bent at a lesser angle than the flared end 11 of the screed. The roller guide is bent at such an angle that it just keeps the disk 10 from touching the screed, and in order to maintain the face of the roller parallel to the face of the guide in all of their positions, so that there will be contact between the surface of the roller and the guide over the entire cross sectional area of the front of the roller, the surface of the guide 27 is warped somewhat, the resulting curvature bringing the surface of the guide into close contact with the roller at all times. It will be seen that the roller is supported by a member 29 secured to the standards 19, to which also is secured a bracket 30 extending upwardly above the spader disc 10, the bracket supporting a weight 31. The roller 26, rolling along the roller guide 27, shoves the spader disc 10 forward and upward because it travels on an arc, and the weight 31 shoves the spader disc 10 backward and downward. The weight 31 is adjustable in its position along the top of bracket 30, and the farther the weight is shoved upon the shaft 18, the harder it will press the spader disc 10 down, which action is necessary for very stiff concrete mixes, while, for lighter mixes, the weight 31 may be moved closer to the shaft 10, which makes it easier for the operator to raise the spader discs out of the concrete.

It will be seen that the discs 10 are loosely mounted upon their axles, and revolve as they are pushed along the pavement. Spading action is caused by the movement of the discs along the forms 13, thus eliminating voids on the edge of the pavement because of the agitation of the paving mix adjacent to the forms, and because of the fact that as the spader discs 10 move along the forms, the mortar which has risen to the top of the pavement because of the screed action of the finishing machine flows into the space previously occupied by the discs and the result is a dense, smooth side to the pavement. Thus the filling of this space by the screed completely assures even and smooth contact between the mix and the road forms after passage of the screed. In addition to spading the sides of the forms, the discs act as bulkheads and scrapers which prevent any paving mix which may have piled up in front of the screed from flowing out over the sides of the forms, thus resulting in a considerable saving of material and increased production of pavement.

In the modifications shown in Figures 4 to 8 inclusive, it will be seen that the device of this modification is similar to the device of Figures 1 to 3 inclusive, except for the arrangement of the shafts controlling the raising and lowering of the spaders.

As before stated, the discs 10 are carried by the frame of the finishing machine in the manner as above described. A portion of the front frame of the finishing machine is shown at 14, as also in Figures 1 to 3. Secured to this frame, as by bolts 15, are brackets 16*b* and 16*c*. The brackets 16*b* have a relatively short shaft 32 mounted thereon, a relatively longer shaft 33 being placed substantially beneath the shaft 32 and adjacent thereto, as shown in Figure 7. Shafts 32 and 33 are mounted so as to revolve one around the other, as will be hereinafter more definitely described. The shaft 32 carries a pair of standards 19, a corresponding pair of standards 19*a* being similarly carried by the shaft 33*a*. These standards are the direct carrying means of the discs 10, each disc being mounted between its respective pair of standards on the axle 20, this axle being sufficiently longer than the hub 21 of the disc 10 so that there is a chance for movement of the disc along the axle. The details of this construction and the operation of each

disc along its axle are the same as previously described.

It will be noted that the spaders 10 are mounted on independent shafts, as above described, and for similar reasons, the modification illustrated in Figures 4 to 8 inclusive being designed for lifting the spaders out of engagement with the mix, and also to assure at all times when in operation, close engagement between the spaders 10 and the road forms 13.

It was mentioned before that there are provided, in accordance with this modification, two shafts, 32 and 33, one of the spaders 10 being carried by the shaft 32, the other spader being carried by the shaft 33*a*.

As will be seen particularly from Figures 4 and 5, shafts 32 and 33 are provided adjacent their ends with members 34 and 35, which are connected together by the link 36, each member being pivoted to the link as indicated at 37 and 38 respectively. The end of each shaft passes through a pair of plates indicated at 39 and 40, spaced apart by the spacers 41 and 42. The members 34 and 35 are situated between these plates, which plates form bearings for the shafts 32 and 33. Secured to the plates is the handle 43, operation of which will produce the rotation of the shafts to control the depth of the spader in the paving mix. A segment 44 is also provided and secured in the frame 14, the segment being provided with notches adjacent each end, or at any desired points along its length, these notches being adapted to receive the lever 43 to hold it in desired position. One of these notches is shown at 45, the lever 43 being shown, in Figure 4, as being in engagement with the upper notch.

As shown, the shaft 33*a* is provided with a universal joint 46 into which is fitted a shaft 47, the other end of the shaft being fitted into a universal joint 48 on the shaft 33. These joints relieve inequalities in strains which would be impressed upon a single shaft, if such were employed in this modification, although the device may be constructed so that only one of these joints is required. In either instance, however, the result would be similar, so that as one spader is forced up by the screed, the crank member attached to the shaft of that spader forces the other crank member to rotate the shaft of the other spader in the opposite direction to force the other spader down into the concrete. If, therefore, the left-hand spader of Figure 7 is forced up by the screed, the crank member 34 attached to the shaft 32 of that spader forces the crank member 35 to rotate the shaft 33 in the other direction, this rotation being transmitted through the joint 48, shaft 47, and joint 46, to shaft 33*a*, to force the right-hand spader 10 down into the concrete paving mix.

As above mentioned, both shafts 32 and 33 pass through side plates 39 and 40, to which plates is fastened the lever 43. When the lever 43 is pressed downwardly, it produces in effect a distortion of the plates 39 and 40 so as to cause the shaft 33 to tend to rotate around the shaft 32. This motion lifts the shaft 33 with its left-hand spader 10, and will be transmitted to the shaft 33*a* and its spader to raise them both out of the concrete. When the lever 43 is raised it forces both rollers 26 into contact with the roller guides 27 and forces the spaders into the concrete. As before mentioned, the lever 43 is held in desired position by the notches on the segment 44.

As indicated in Figure 8, the shafts about which the spaders rotate are placed at an angle of approximately 3° with the front of the machine. By this means, when the spaders are lowered into the concrete, the bottom of the spaders will be, for instance, one inch inside of the forms 13 when the bottom of the disc spaders is just level with the top of the forms, and when the discs are shoved down as far as they go, they will touch the forms. This device assures the spader discs going into the concrete even though they were set a little wider than the distance between the forms, otherwise they might strike the top of the forms and not penetrate into the mix without being shoved by hand.

The arrangement of the shafts through the side plates means that operation of the lever 43 will revolve the shaft 33 about the shaft 32, and as the shaft 33 so revolves, it rotates the shaft 32 and is itself rotated so that both spaders are withdrawn from, or lowered into, the mix as desired.

In Figure 9 there is shown a pair of cog wheels 49 and 50, which may be employed instead of the lever members 34 and 35. It will be understood that the cog wheels function similarly to the lever members 34 and 35, the position of the shafts being indicated at 32*a* and 33*b*, respectively, in Figure 9.

It will be apparent that the illustrated form of the attachment may be altered in many ways in general use without departing from the principles herein involved. It will therefore become apparent that such alterations would not depart from the underlying inventive concept and it will be therefore understood that it is intended and desired to embrace within the scope of this invention such modifications and changes as may be necessary to adapt it to varying conditions and uses.

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

1. In a pavement finishing machine having a screed provided with flared ends, spaders carried by the machine and extending in front of but adjacent to the flared ends of the screed, the spaders being adapted to pass through the pavement mix along the edges thereof to assure even contact between the mix and its lateral road forms after passage of the screed.

2. In a pavement finishing machine, including a screed, the combination with a frame, of spader discs carried by the machine and extending in front of but adjacent to the screed, the discs being rotatively mounted and adapted to pass through the pavement mix along the edges thereof to assure even contact between the mix and its lateral road forms after passage of the screed.

3. In a pavement finishing machine, the combination with a screed transversely oscillatable over the pavement as the machine is propelled longitudinally over the pavement, of means mounted on the machine and extending in front of the ends of the screed and oscillatable incident to oscillation of the screed for passing through the pavement mix along the edges thereof to assure even contact between the mix and its lateral road forms.

4. In a pavement finishing machine, the combination with a frame having a screed carried thereby, of means adjacent to the ends of the frame and in advance of the screed for passing through the pavement mix along the edges thereof as the machine passes over the pavement to assure even contact between the mix and its lateral road forms after passage of the screed, and means for lifting the said means out of engagement with the mix as desired.

5. In a pavement finishing machine, the combination with a screed, of a spader member extending in front of but adjacent to each end of the screed for passing through the pavement mix along the edges thereof as the machine passes over the pavement to assure even contact between the mix and its lateral road forms after passage of the screed, and means for selectively lifting each spader member out of engagement with the mix, as desired.

6. In a pavement finishing machine, the combination with a frame, of a spader disc extending in front of but adjacent to each end of the frame for passing through the pavement mix along the edges thereof as the machine passes over the pavement to assure even contact between the mix and its lateral road forms after passage of the screed, and means for supporting each disc, the said means comprising a member rotatably mounted upon the framework of the machine, a pair of standards, an axle between the standards about which the disc turns, and resilient means for pressing the disc outwardly toward the outer standard, there being also provided means for rotating the rotatably mounted member for lifting the disc out of contact with the paving mix.

7. In a pavement finishing machine, the combination with a screed, having flared ends, of spader discs positioned in front of and adjacent each end of the screed, the screed being transversely oscillatable over the pavement as the machine is propelled longitudinally thereover, the discs being oscillatable therewith and passing through the pavement mix along the edges thereof to assure even contact between the mix and its lateral road forms after passage of the screed, and means for guiding the discs in substantially the same position relatively to the flared ends during oscillation of the screed and discs.

8. In a pavement finishing machine, the combination with a screed having flared ends, of spader discs positioned in front of and adjacent to the screed, the screed being transversely operable over the pavement as the machine is propelled longitudinally thereover, the discs being oscillatable with the screed, and means for guiding and holding the discs in substantially the same position at all times with reference to the flanged ends of the screed, the said means comprising a roller, a guide for the roller mounted on top of the screed and being bent at an angle less than that of the flare of the end of the screed.

9. In a pavement finishing machine, the combination with a screed carried by the machine, of standards also carried by the machine, spaders carried by the standards and positioned adjacent to the screed for assuring even contact between the paving mix and its lateral retaining road forms, means secured to the standards for lifting the spaders out of engagement with the mix, and means for regulating the force of engagement between the spaders and the mix, the means comprising a bracket secured to the standard and projecting over the spaders, and a weight adapted to be placed in selected predetermined positions along the brackets.

10. In a pavement finishing machine, the combination with a transversely oscillatable screed having flared ends, of spaders positioned adjacent to the flared ends of the screed, and means spacing the screed from the spaders for preventing engagement of the ends of the screed with the spaders during oscillation of the screed.

11. In a pavement finishing machine, the combination with a transversely oscillatable screed having flared ends, and mounted upon the frame of the machine, of standards secured to the frame, spader discs carried by the standards in normal engagement with a paving mix spread between lateral forms to make a pavement, the discs being in relatively close proximity to the flared ends of the screed, means carried by the standards to prevent engagement between a flared end and its adjacent disc, the means comprising a roller carrying member secured to one of the standards, a roller on the bracket, and a roller guide for the roller, the guide being bent at an angle less than that of the flared end, and having a warped surface to permit continuous and close engagement between the roller and guide irrespective of the relative position of the screed and spaders, the roller maintaining substantially the same distance between a flared end of the screed and its spader under all conditions.

12. A pavement finishing machine, comprising the combination with a frame, of spaders mounted adjacent the frame for assuring even contact between the paving mix and its lateral retaining road forms, and means for controlling the engagement of the spaders with the mix, the said means comprising a pair of rotative shafts, one for each spader, the shafts being revolvable one about the other for lifting and lowering the spaders, and means for operating the shafts.

13. A pavement finishing machine, comprising the combination with a frame, of spaders mounted adjacent the frame for assuring even contact between the paving mix and its lateral retaining road forms, and means for controlling the engagement of the spaders with the mix, the said means comprising a pair of rotative shafts, interconnected revolvable members forming a bearing for each shaft, the members being revolvable in opposite directions to produce a revolution of the shafts one about the other, and means for revolving and rotating the shafts to raise and lower the spaders.

14. A pavement finishing machine comprising the combination with a screed, of a spader mounted adjacent each end of the screed for assuring even contact between the paving mix and its lateral retaining road forms, and means for controlling the engagement of the spaders with the mix, the means comprising a pair of shafts disposed one above the other, one longer than the other, the shorter shaft carrying one of the spaders, a third shaft carrying the other spader, the interconnected oppositely revolvable members forming a bearing for each of the shafts of the pair, the members being thereby adapted to produce revolution of the pair of shafts, one about the other, means for transmitting motion from the pair of shafts to the third shaft, and lever means for rotating and revolving the shafts to raise and lower the spaders.

15. A pavement finishing machine comprising the combination with a screed, of a spader mounted adjacent each end of the screed for assuring even contact between the paving mix and its lateral retaining road forms, and means comprising a system of shafts for controlling the engagement of the spaders with the mix, the shafts being slightly inclined to the screed to assure engagement of the spaders with the mix along the inner surfaces of the forms irrespective of the spaders having a set slightly wider than the distance between the forms.

16. A pavement finishing machine comprising, in combination, a pair of spader discs longitudinally movable of the machine in opposite di-

rections, a shaft system for controlling the engagement of the discs with a pavement, and a single lever for operating the shaft system to adjust the discs with respect to the pavement and irrespective of their respective positions relatively to the pavement.

17. A pavement finishing machine comprising the combination with a frame, of spaders mounted adjacent the frame for assuring even contact between the paving mix and its lateral retaining road forms, and means for controlling the engagement of the spaders with the mix, the said means comprising a shaft system operably connected with the spaders and including a pair rotative shafts mounted to revolve one around the other as the shafts rotate, and a single lever for revolving and rotating the shafts for raising and lowering the spaders.

18. A pavement finishing machine comprising the combination with a screed, of a spader mounted adjacent each end of the screed for assuring even contact between the paving mix and its lateral retaining road forms, means for controlling the engagement of the spaders with the mix, the means including a shaft system comprising a pair of shafts disposed one above the other, the lower shaft being the longer of the pair, the shorter shaft carrying one of the spaders, a third shaft carrying the other spader, means comprising a universal joint for conveying motion from the pair of shafts to the third shaft, a single lever for rotating and revolving the shaft for raising and lowering the spaders, and a segment adjacent the lever and provided with notches to hold the lever in selected positions to retain the spaders in corresponding position relatively to the pavement.

19. In a pavement finishing machine, the combination with a screed transversely reciprocable over the pavement as the machine is moved longitudinally over the pavement, of spading means mounted on the machine forwardly of the screed for acting upon the pavement mix at the edges thereof, said means being longitudinally oscillatable by the screed.

20. In a pavement finishing machine, the combination with a screed transversely reciprocable over the pavement as the machine is moved longitudinally over the pavement, of spading means mounted on the machine at opposite sides thereof forwardly of the screed for acting upon the pavement mix at the edges thereof, said means being longitudinally oscillatable in opposite directions respectively by the screed.

21. In a pavement finishing machine, the combination with a screed transversely reciprocable over the pavement as the machine is moved longitudinally over the pavement, of spading means mounted on the machine at opposite sides thereof forwardly of the screed for acting upon the pavement mix at the edges thereof, said means being longitudinally oscillatable in opposite directions respectively by the screed, and means for selectively controlling the oscillating movements of said means.

ANDREW A. McCREE.