Oct. 24, 1961 D. T. HELTZEL ET AL 3,005,387

APPARATUS FOR BUILDING ROADWAYS AND THE LIKE

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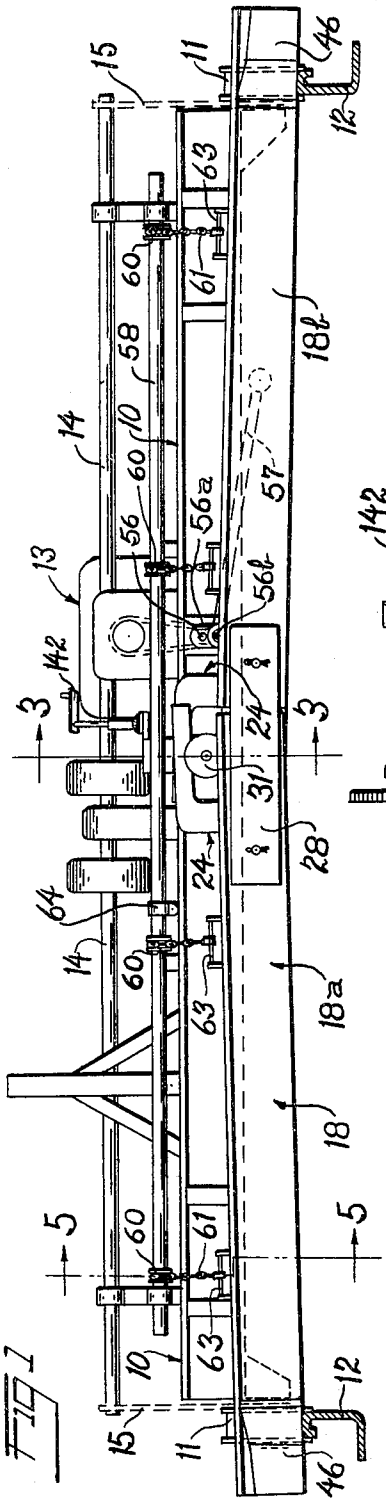


FIG 1

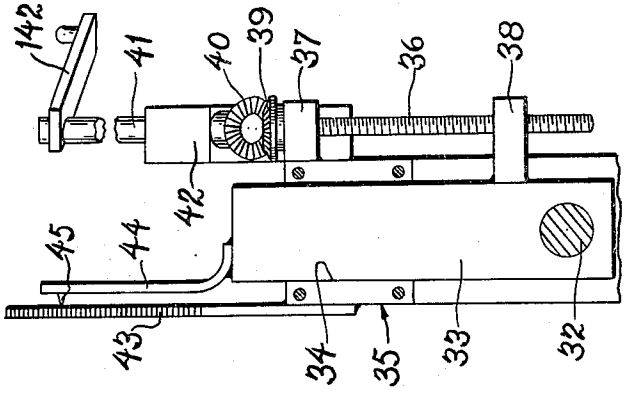


FIG 4

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APPARATUS FOR BUILDING ROADWAYS AND THE LIKE

Filed Aug. 26, 1954 6 Sheets-Sheet 2

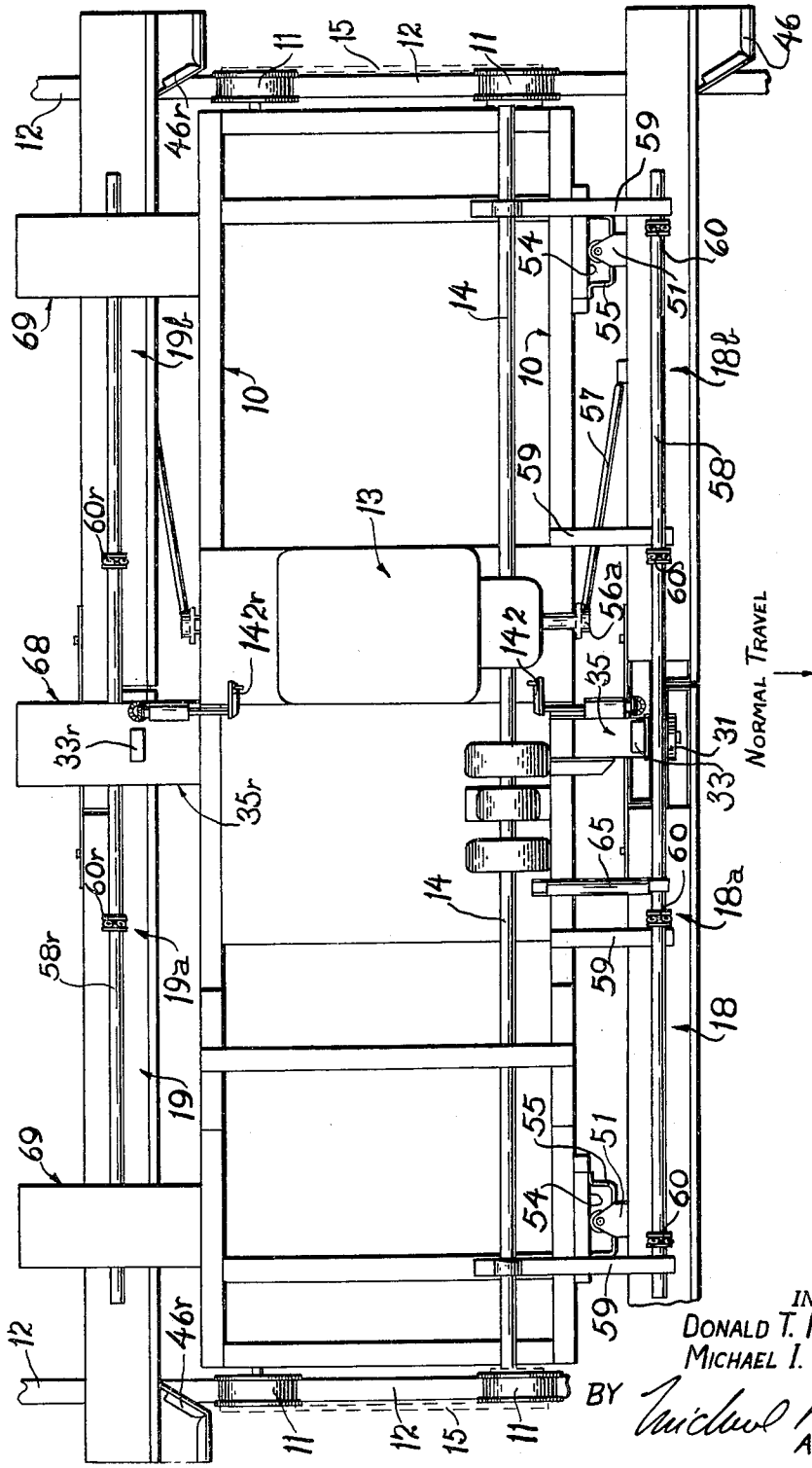


FIG 2

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APPARATUS FOR BUILDING ROADWAYS AND THE LIKE

Filed Aug. 26, 1954 6 Sheets-Sheet 3

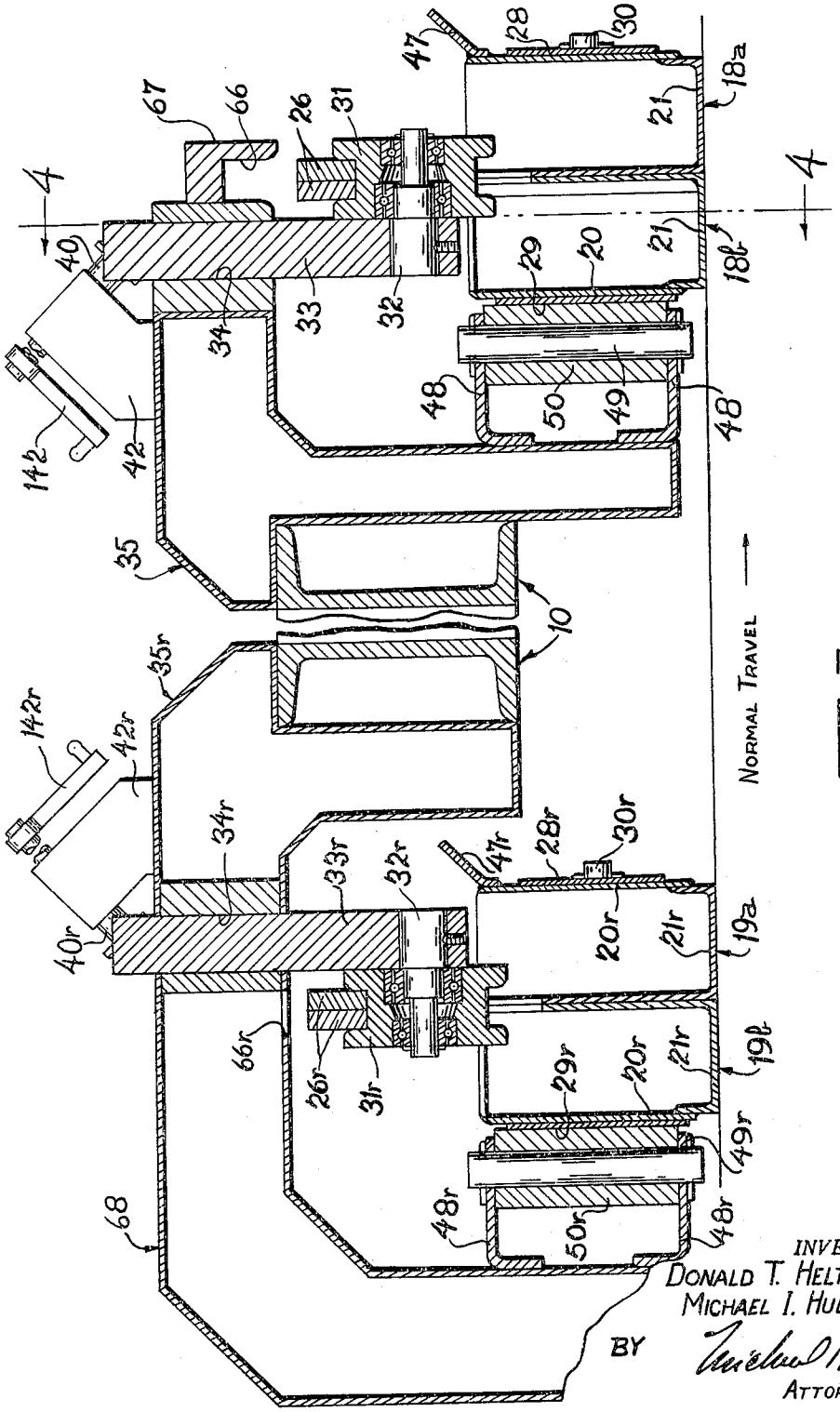


FIG 3

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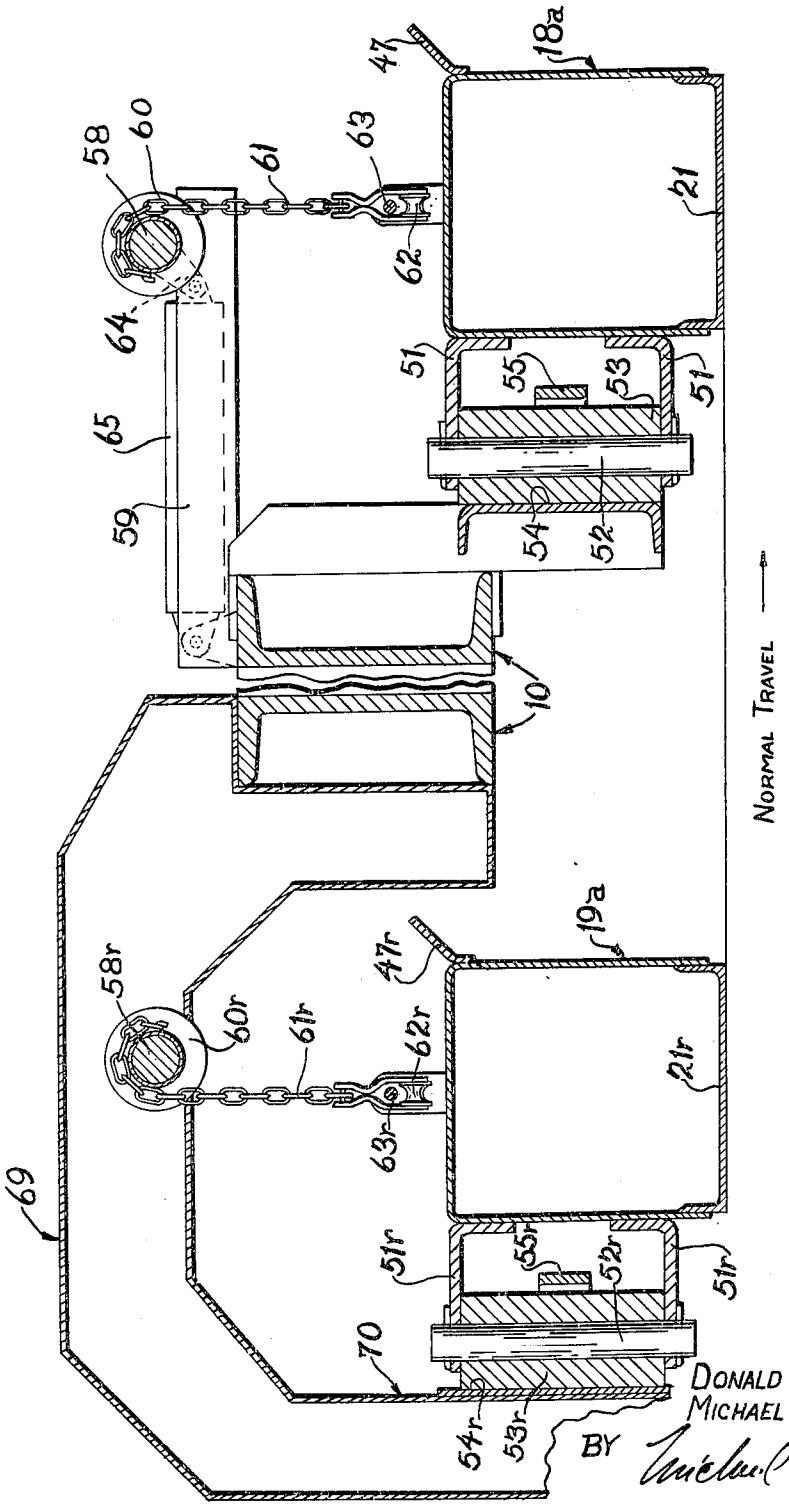


FIG 5

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APPARATUS FOR BUILDING ROADWAYS AND THE LIKE

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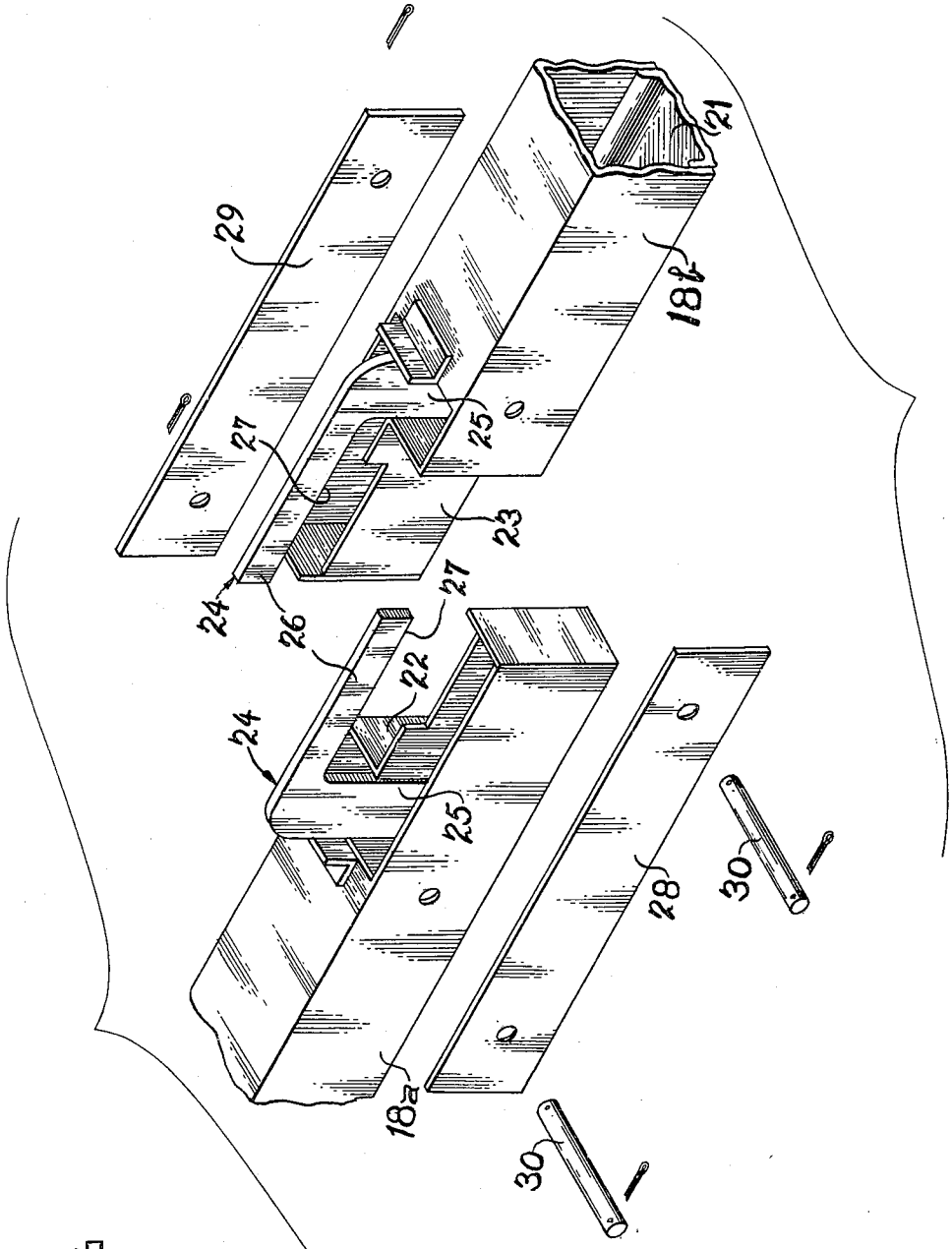


Fig 6

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APPARATUS FOR BUILDING ROADWAYS AND THE LIKE

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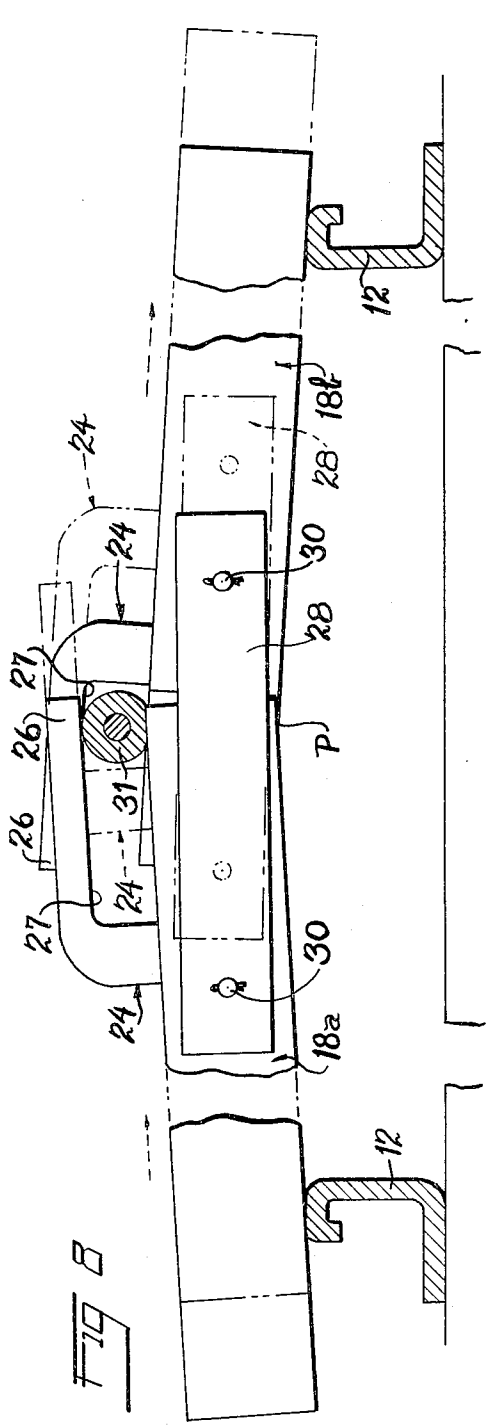


FIG 8

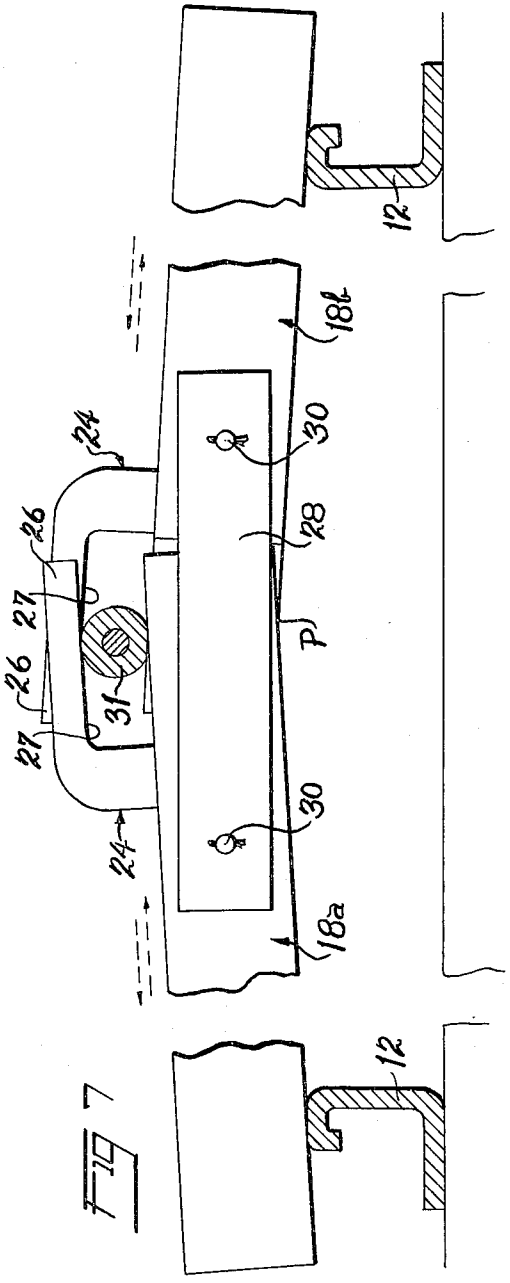


FIG 7

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United States Patent Office 3,005,387 Patented Oct. 24, 1961

3,005,387

APPARATUS FOR BUILDING ROADWAYS AND THE LIKE

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Filed Aug. 26, 1954, Ser. No. 452,314
1 Claim. (Cl. 94—45)

The present invention relates to road building, more particularly to methods of and apparatus for forming the upper surface of roadways and the like to a predetermined transverse profile, and the principal object of our invention is to provide new and improved methods and apparatus of the character described.

In the art of building roads, it has long been known that the upper surface of the road must be sloped transversely to provide for drainage. This requirement has been met in the past by curving the upper surface of the road transversely so that it is higher in the center than at the sides. However, this construction has not been entirely satisfactory since the curvature at the center of the road was often so slight that drainage was incomplete.

In the interest of providing improved drainage and for other reasons, it has been proposed that the upper surface of the road be formed to a peaked, transverse profile wherein one portion of the upper surface slopes upwardly from one side of the road toward the center thereof and another portion of the upper surface slopes upwardly from the other side of the road toward the center, such portions intersecting at a point intermediate the sides of the road to form the peak. This peaked, transversely profiled road surface has proven satisfactory from a drainage standpoint; however, in practice, it has been very difficult and expensive to accomplish this desirable result.

By way of example, when constructing concrete roads it has been customary to pour a wet concrete mixture along the intended roadway and to thereafter employ finishing machines which transversely span the intended roadway and which travel longitudinally therealong to spread the wet concrete and form the upper surface thereof to the desired transverse profile. However, it has been impractical to employ conventional finishing machines in the usual manner to form the upper surface of the road to a peaked, transverse profile.

One way in which the desired profile may be achieved is by pouring one half of the road and thereafter employing a conventional finishing machine to so form the upper surface that it slopes downwardly from one side to the other. After this half of the road hardens, the other half is poured adjacent the one side and then finished in the same manner so that the upper surface slopes upwardly to meet the previously formed half of the road. This procedure produces a road having the desired peaked, transverse profile; however, since the road halves are not finished simultaneously, junction of the road halves at the peak is often rough and uneven. Additionally, the necessity of pouring and finishing only one half of the road at one time greatly increases the costs of construction.

Our invention includes practical and economical means and methods for forming the upper surface of a roadway to an accurate, peaked, transverse profile. Furthermore, our invention also permits the entire width of the roadway to be poured and finished at one time, with resultant savings in cost. These and other advantages of the present invention will become apparent from a study of the following description and from the drawings appended hereto.

In the drawings accompanying this specification and

forming a part of this application there is shown, for purpose of illustration, an embodiment which our invention may assume, and in these drawings:

FIGURE 1 is a front elevational view of concrete finishing apparatus embodying our invention,

FIGURE 2 is a top plan view of the apparatus illustrated in FIGURE 1,

FIGURE 3 is an enlarged, fragmentary sectional view generally corresponding to the line 3—3 of FIGURE 1,

FIGURE 4 is a fragmentary sectional view generally corresponding to the line 4—4 of FIGURE 3,

FIGURE 5 is an enlarged, fragmentary sectional view generally corresponding to the line 5—5 of FIGURE 1,

FIGURE 6 is an enlarged, fragmentary, exploded perspective view of certain details, and

FIGURES 7 and 8 are enlarged, fragmentary, generally diagrammatic views of portions of the apparatus shown in FIGURE 1.

As best shown in FIGURES 1 and 2, the present invention is herein illustrated in combination with a concrete distributing, or finishing, machine. While machines of this general type are old in the art, it is believed that a brief description of their use in road building will be advantageous in comprehending the instant invention.

The usual practice followed in building concrete roadways and the like is to prepare a suitable roadbed bounded by spaced-apart forms which extend longitudinally of the intended road and which define the sides thereof. The forms usually extend upwardly from the roadbed a distance equal to the desired thickness of the road at its sides and the forms are usually held in position by means of stakes which are driven through apertures in the forms and into the roadbed.

The space between the forms is adapted to be filled with a suitable mixture of cement, sand, aggregate, water and the like and a finishing machine, adapted to run along on the tops of the forms, distributes the mixture evenly between the forms and contours the upper surface of the mixture so that the road will have the desired transverse profile.

As will become clear, the present invention is shown and described in combination with certain features of well-known finishing machines; however, it is to be understood that we do not wish to be limited to such combination since the invention is capable of use with apparatus other than concrete finishers.

Referring particularly to FIGURES 1 and 2, there is illustrated concrete finishing apparatus which presently comprises a rectangular main frame **10** which rotatably supports a plurality of wheels **11**. These wheels are engageable with and are adapted to roll along the usual spaced-apart road forms **12** which define the width of the intended road.

Also carried by the main frame of the apparatus is a suitable source of motive power which may be a gasoline engine **13**. Engine **13** is adapted to drive the wheels **11** by means of shafts **14**, chains **15** and suitable sprockets. As will be understood, other necessary mechanisms such as the usual clutches, transmissions and the like will be interposed in the drive train between the engine **13** and the wheels **11**.

Positioned on one side of the main frame **10** is a front screed, or strike-off member, **18** for a purpose to be shown. Also, positioned on the other side of main frame **10** is a rear screed **19**. Since these screeds are similar, only one will be described in detail; however, since each screed is supported somewhat differently, appropriate portions of the construction will be described in turn.

As most clearly shown in FIGURES 2 and 3, front screed **18** comprises a pair of screed members **18***a* and

18*b* normally positioned in generally end-to-end relation, each member being generally square in cross section and each preferably being formed of two channel-like members 20 and 21 welded or otherwise secured together to provide a unitary assembly. The adjoining ends of members 18*a*, 18*b* are of notch-like formation, as seen at 22 and 23, respectively (see particularly FIGURE 6), so that such ends are complementary with each other for a purpose to be disclosed.

Respective adjoining end portions of each screed member 18*a*, 18*b* are open at the top and each has an L-shaped member 24 welded or oherwise secured thereto adjacent such end portions. Each member 24 has one leg 25 secured to its respective screed member and another leg 26 which extends longitudinally in a direction toward the adjoining end portion of its screed member. It should be pointed out that the undersurface 27 of each leg 26 and the undersurface of channel member 21 of respective screed members are parallel.

Screed members 18*a*, 18*b* are adapted to be positioned in generally end-to-end relation wherein the notched-out portions 22, 23 interfit with each other and wherein the legs 26 of respective L-shaped members 24 are in side-by-side relation. Means are provided for bridging the gap between the adjoining ends of the members 18*a*, 18*b* and for connecting the members together; and, such means presently comprises a pair of plates 28 and 29 which are disposed on opposite sides of the screed members, as shown, and pivotally secured in position by means of pins 30 which pass through aligned apertures formed in the plates and in respective screed members.

The lapped notched-out portions of screed members 18*a*, 18*b* are adapted to be supported by the main frame 10 of the apparatus by means of a roller 31 which is grooved to receive and laterally restrain both legs 26 of respective members 24; and, as best shown in FIGURE 3, roller 31 is rotatably secured to a stub shaft 32 which is affixed to a slide bar 33. Slide bar 33 is vertically reciprocable within a slideway 34 carried by a bracket structure 35 which is welded or otherwise secured to the main frame 10.

Means are provided for selectively raising and lowering the slide bar 33 in accordance with requirements; and, as best shown in FIGURE 4, a shaft 36 is journaled in a lug 37 which is welded to the bracket structure 35. The lower portion of shaft 36 is threaded and such lower portion passes through a complementarily threaded aperture in a lug 38 which is welded to slide bar 33. The upper end of shaft 36 has a gear 39 secured thereto and this gear meshes with a gear 40 which is secured to a shaft 41 rotatably carried by a journal box 42 carried by bracket structure 35. Shaft 41 angles upwardly toward the center of the machine and terminates in a crank 142 which is positioned within easy reach of the operator who usually rides upon the machine during operation thereof.

When crank 142 is rotated by the operator, shaft 36 will be rotated and this will effect raising or lowering of slide bar 33 and consequent raising or lowering of the adjoining notched-out portions of screed members 18*a*, 18*b*.

Any suitable means may be provided for indicating to the operator the position of the screed members; for example, a bar 43 having suitable indicia thereon may be carried by the bracket structure 35 and a bar 44 having a pointer 45 may be carried by the slide bar 33.

During normal operation and as hereinbefore described, the adjoining notched-out portions of screed members 18*a*, 18*b* are supported by roller 31; and, in the present embodiment, the opposite free ends of the screed members are adapted to rest upon and to be supported by respective forms 12 (see FIGURES 1, 7 and 8). These ends of the screed members have winged portions 46 secured thereto (see FIGURE 2) for the purpose of preventing the concrete mixture, which normally piles up in front of the screed during operation, from escaping over the top of or outwardly from the forms. Additionally, each screed member 18*a*, 18*b* has a plate 47 secured to the top of the forward face thereof to prevent the mixture of concrete from piling up over the top of the screed members.

In order to push the screed members 18*a*, 18*b* longitudinally of the intended roadway and against the resistance of the piled-up concrete mixture, a plurality of rollers are employed. As shown in FIGURE 3, bracket structure 35 has a pair of vertically aligned, spaced-apart ears 48 secured thereto directly rearward of the lapped notched-out portions of the screed members and a pin 49 extends through aligned apertures formed in the ears. A roller 50 is rotatably carried between the ears 48 by the pin 49 and this roller engages plate 29 to back up the adjoining portions of the screed members against the pushing force.

As best shown in FIGURE 5, a pair of vertically spaced ears 51 are secured to and positioned inwardly of the outer end of each screed member and a pin 52 extends through aligned apertures formed in the ears. A roller 53 is rotatably carried between the ears 51 by the pin 52, this roller engaging a thrust plate 54, which is welded or otherwise secured to the frame 10, to back up the end portions of the screed members against the pushing force. As best seen in FIGURE 2, a U-shaped strap 55 is secured to each thrust plate 54, the bight of strap 55 holding the outer ends of the screed members in position even though the machine is moved down the forms 12 in a reverse direction.

Means are provided for reciprocating the screed members crosswise of the intended roadway along a path coincident with respective road defining surfaces and such means presently comprises a shaft 56 (see especially FIGURE 1) to which a crank arm 56*a* is secured. One end of a rod 57 is pivotally secured to arm 56*a* at a point spaced radially from the axis of shaft 56 by means of a pin 56*b* and the other end of rod 57 is secured to screed member 18*b* by means of a universal joint or other suitable means.

Shaft 56 is adapted to be rotated by engine 13 through a suitable power train which may include a clutch and a transmission, rotation of shaft 56 effecting reciprocation of screed member 18*b* through the described crank and rod connection. Since plates 28 and 29 connect the screed members together, it will be understood that reciprocation of screed member 18*b* will also effect reciprocation of screed member 18*a*.

While the presently disclosed embodiment illustrates reciprocating the screed members by means of mechanical connection with the engine, it is to be understood that means other than that shown could be employed. Fluid pressure could be alternately admitted to first one side of the piston and then the other to effect reciprocation of the screed members.

Referring now to FIGURE 7 wherein the screed members 18*a* and 18*b* are more or less diagrammatically shown, it will be noted that screed member 18*a* is supported at one end by one of the forms 12 and is supported at the other end by means of an arm 26 of member 24 resting on roller 31. Screed member 18*b* is supported at one end by means of the other form 12 and its other end is also supported by arm 26 resting on roller 31. With roller 31 in the position illustrated, the undersurface of each screed member slopes upwardly from a respective form 12. The undersurfaces of the screed members 18*a*, 18*b* intersect at a point "p" directly beneath the roller 31, this point being the peak of the intended roadway.

When the screed members 18*a*, 18*b* are reciprocated transversely of the intended roadway by means of the engine-driven crank 56*a*, each member will move in a straight line path (see FIGURE 8 wherein the screed members are shown at one extreme position in full lines and at the other extreme position by dot-dash lines). It will be noted that the angularity of the lower surfaces

of the screed members **18***a*, **18***b* will remain constant during reciprocation at that point "*p*," the point at which the lower surfaces of the members intersect, will remain in alignment directly below roller **31**.

Operation of the apparatus thus far described will be as follows: Assuming that the apparatus is positioned upon the forms **12** as shown and assuming that the space between the forms is filled with a suitable concrete mixture or other road building material, the operator will first adjust the height of roller **31** by means of crank **142** and, in accordance with the information imparted by pointer **45** and the indicia carried by bar **43**, so that the lower surfaces of the screed members **18***a*, **18***b* intersect at the desired angle. He will then effect driving engagement between engine **13** and shaft **56** and crank arm **56***a* to reciprocate the screed members in the manner hereinbefore described and he will also effect driving engagement between engine **13** and the form engaging wheels **11** whereby the machine will move along the forms in the direction indicated (FIGURES 2 and 3), during the time the screed members are reciprocated crosswise of the roadway.

As the screed members are reciprocated and moved longitudinally of the intended roadway, they will distribute the concrete mixture evenly between the forms **12** and the lower surfaces of the members will compact and iron the upper surface of the concrete mixture and form it to the desired, peaked, transverse profile.

The operator may readily observe the amount of concrete in advance of the screeds **18***a*, **18***b* from his position on the apparatus. When the amount of concrete diminishes to a predeterminable amount, about two or three inches, for example, the operator halts forward movement of the apparatus. The screed members **18***a*, **18***b* may be lifted from the roadway in a manner to be described and the apparatus backed up to permit a fresh charge of concrete to be deposited in advance of the screed members and in partly overlying relation to the terminal edge of the roadway just finished to provide for smooth continuity of the roadway.

Sometimes it is advantageous to lift the screed members from the roadway following finishing operation of a portion of the concrete and reverse the direction of movement of the apparatus along the forms **12** a selected amount and make another pass over such concrete portion to insure smoothness and filling of any voids.

It is an important feature of the present invention that the height of the peak formed in the intended road may be quickly adjusted without interrupting the progress of the machine along the forms. This is done by turning the crank **142** which will change the angularity of the lower surfaces of the screed members. The importance of this features will readily become apparent when it is pointed out that the upper surface of the road must be gradually flattened out as an intersection or a curve is approached and the upper surface gradually returned to its normal peaked contour after the intersection or curve has been passed.

Any suitable means may be employed to raise the screed members **18***a*, **18***b* bodily when it is desired to move the machine in reverse or to transport the machine from one site to another. In the present embodiment, an elongated shaft **58** is positioned transversely of the apparatus and is rotatably carried by brackets **59** which are secured to the frame **10**. Shaft **58** is spaced above screed members **18***a*, **18***b* and extends longitudinally thereof and is provided with a plurality of drums **60** upon which chains **61** are adapted to be wound.

Each chain **61** terminates in a pulley **62** (see FIGURE 5) which is engageable under respective bars **63** secured to respective screed members. An arm **64** is secured to shaft **58** and extends radially therefrom, the free end of this arm being pivotally secured to one end of a fluid cylinder **65** which is carried by the main frame **10**.

When fluid under pressure is admitted to cylinder **65**, shaft **58** will be rotated in a direction to wind chains **61** upon their respective drums **60** to thereupon bodily raise the screed members **18***a*, **18***b*. Referring to FIGURE 3, it will be noted that when the screed members are raised by the chains **61**, legs **26** of members **24** of the respective screed members will enter a slot **66** provided between a portion defining the slideway **34** and an L-shaped lug **67** secured to such portion. This will hold the screed members in position and prevent them from swaying as they are suspended by the chains **61**.

As previously mentioned, in addition to front screed **18** formed of members **18***a*, **18***b*, the presently disclosed machine is provided with a rear screed formed of members **19***a*, **19***b*. Screed members **19***a*, **19***b* are similar in all respects to screed members **18***a*, **18***b*. Moreover, the parts associated with screed members **19***a*, **19***b* are similar to those hereinbefore described. Accordingly, similar parts will be identified with the same reference numerals but the suffix "*r*" added.

Since the rear screed members **19***a*, **19***b* are also adapted to be pushed against the resistance of the concrete mixture and since these members are positioned at the rear of the machine, means are provided to support the thrust rollers **50***r*, **53***r* at the rear of the screed members.

Referring to FIGURES 2 and 3, bracket structure **35***r* is similar to bracket structure **35** in that it supports the adjoining lapped portions of its associated screed members. However, bracket structure **35***r* is generally U-shaped and has a portion **68** which rotatably carries thrust roller **50***r* in position to back up the adjoining portions of screed members **19***a*, **19***b* against the pushing force.

As shown in FIGURES 2 and 5, U-shaped brackets **69** are secured to the main frame **10** adjacent the outer ends of the rear screed members **19***a*, **19***b*. Each bracket **69** has a leg **70** to which respective thrust plates **54***r* and respective straps **55***r* are secured. The outer end of each screed member **19***a*, **19***b* rotatably carried a thrust roller **43***r*, each thrust roller being engageable with a respective plate **54***r* to back up the outer ends of these screed members against the pushing force. Shaft **58***r* (similar to shaft **58**) is rotatably carried by brackets **69**; and, although not shown, means similar to that employed with shaft **58** may be employed to rotate shaft **58***r* and raise the rear screed members **19***a*, **19***b*.

In view of the foregoing it will be apparent to those skilled in the art that we have accomplished at least the principal object of our invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advatnages not herein specifically described, hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that our invention is not limited thereto.

We claim:

Apparatus for forming the upper surface of a roadway and the like to a peaked, transverse profile, comprising screed means extending transversely of the intended roadway and including a pair of screed members in generally end-to-end relation, the adjoining end portions of said members being formed to interfit one with the other to provide a lapped joint, screed support guides carried by the interfitting ends of said screeds, each screed member having a road defining surface corresponding to the desired transverse configuration of a portion of the upper surface of the intended roadway, roller means positioned above the peak of the intended roadway and supporting the screed support guides of the lapped end portions of said screed members, link means pivotally connecting said lapped end portions to permit relative angular movement and reciprocation of said screed members in unison, the other ends of said screed members adapted to be freely suspended to rest on the side forms so that respective road defining surfaces thereof form an angle with each other, the apex of such angle coinciding with the peak of

the intended roadway, means for reciprocating said screed members transversely of the intended roadway each along a path coincident with its road defining surface, means for moving said screed means longitudinally of the intended roadway to spread road surfacing material therealong in peaked, transverse profile, and means for shifting said roller means toward and away from the intended roadway to vary the angularity of the road defining surfaces of said screed members to thereby vary the height of the peak formed in the upper surface of the roadway.

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