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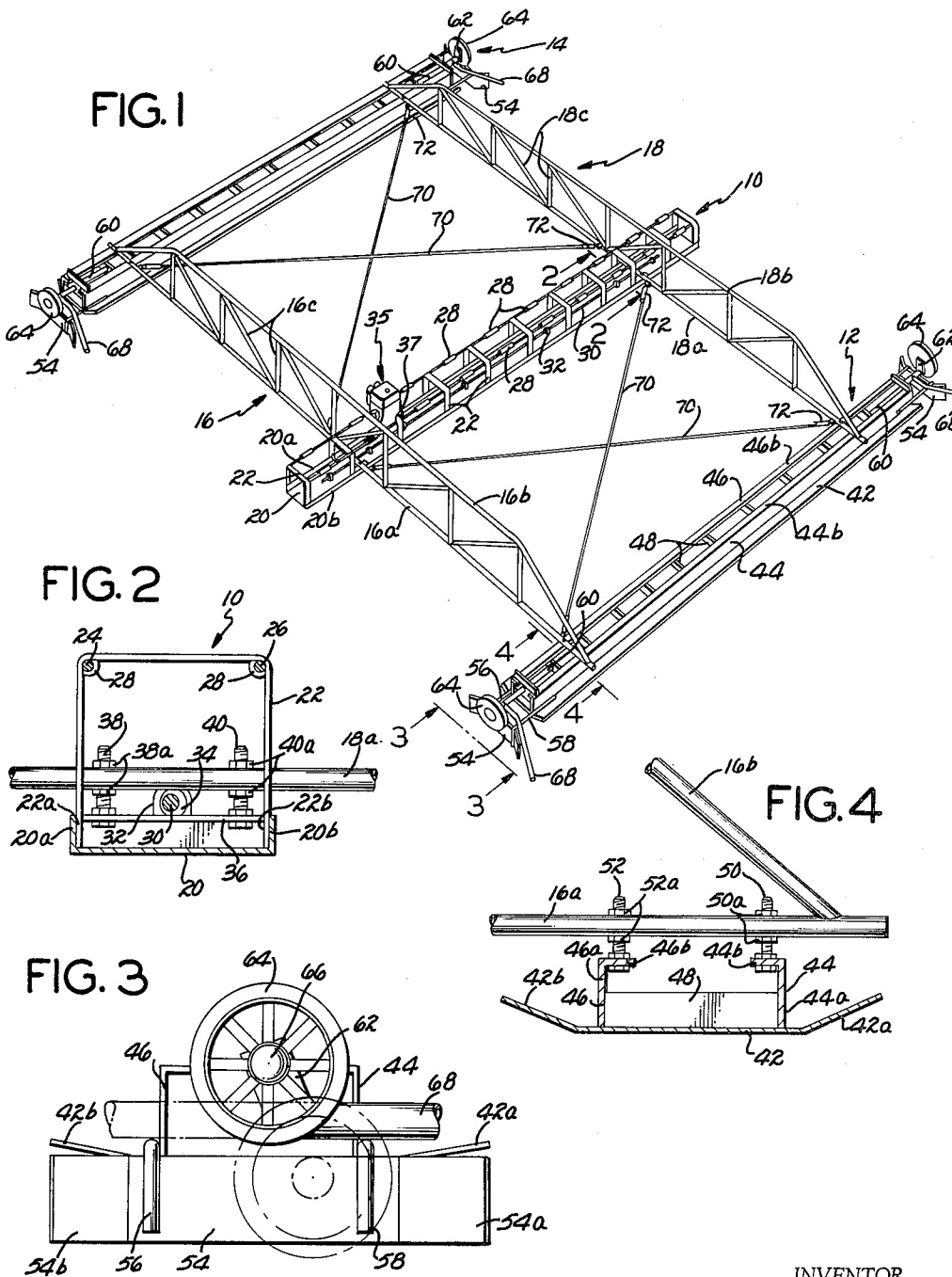
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3,220,322

PAVEMENT SURFACING MACHINE

Filed Aug. 28, 1962

2 Sheets-Sheet 1



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FIG. 5

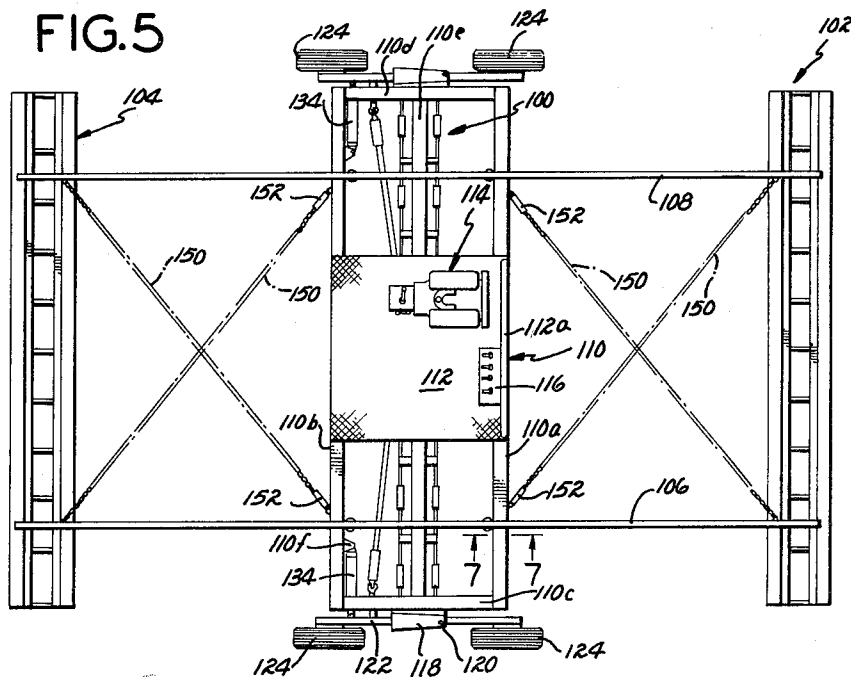
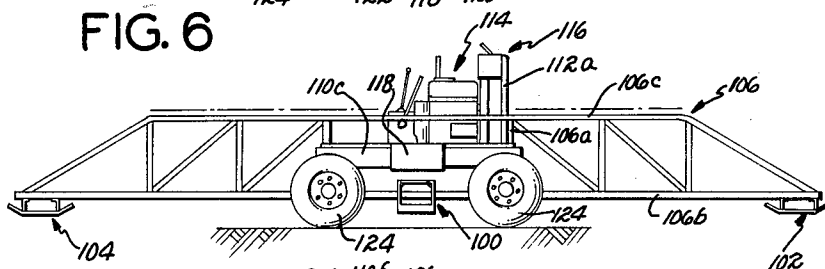
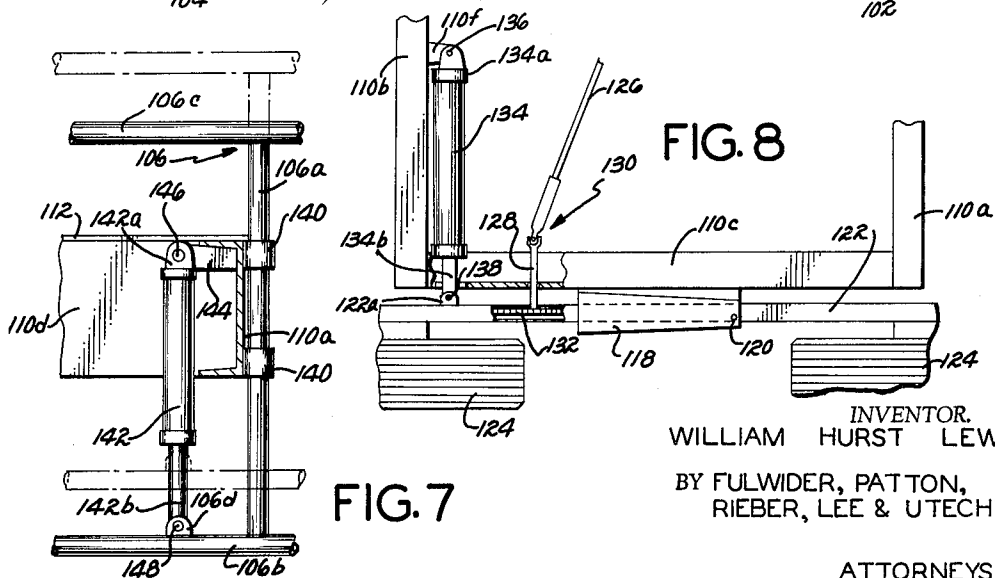


FIG. 6



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PAVEMENT SURFACING MACHINE

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4 Claims. (Cl. 94-45)

The present invention relates to pavement surfacing machines, and more particularly to machines for automatically removing relatively large irregularities in freshly laid concrete.

In order to provide roadways and other large expanses of concrete, it has been found most desirable to employ various different pieces of machinery each of which performs a different function. That is, due to the many varied operations that must be performed on the concrete from the time that it is laid until it is "cured", it has been found most efficient to segregate such operations to various different pieces of apparatus. For instance, it is desirable to employ paving machinery for initially "working" the concrete after it has been laid. Such paving apparatus performs the initial functions of generally leveling the concrete and removing unwanted air pockets and accumulations of aggregate therein. Thereafter, it is desirable to employ a machine which is referred to generally as a "bump cutter" which further levels the concrete by removing large irregularities in the surface thereof.

Such a bump cutter may be attached to the paving apparatus so as to be drawn thereby over the section of concrete, or it may be self-propelled, in which latter event it can be used any time after the paving apparatus has performed its operation.

In order to provide the necessary functions, a bump cutter should be so constructed as to be adjustable for variations in the height and contour of the section of concrete being worked.

The present invention has as one of its objects, the provision of a surfacing machine having means for effectively removing or eliminating irregularities in the surface of fluid concrete.

Another object of the present invention is to provide a surfacing machine which includes leveling means for providing a smooth surface for the concrete.

Another object of the present invention is to provide a surfacing machine as characterized above which is adapted to be pulled over the section of concrete by other paving apparatus.

Another object of the present invention is to provide a surfacing machine as characterized above which is self-propelled so as to be operable irrespective of the use of other apparatus.

Another object of the present invention is to provide a surfacing machine as characterized above having movable side forms which are part of the machine and which surface the side edges of the section of concrete.

Another object of the present invention is to provide in a surfacing machine as characterized above adjustment means for varying the vertical position of surfacing plates and screeds.

Another object of the present invention is to provide in a self-powered surfacing machine as characterized above having control means for manipulating the machine as desired.

Another object of the present invention is to provide surfacing machines as characterized above which are simple and inexpensive to manufacture and which are rugged and dependable in operation.

The novel features which I consider characteristic of my invention are set forth with particularity in the appended claims. The device itself, however, both as to its organization and mode of operation, together with additional objects and advantages thereof, will best be

2

understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a surfacing machine according to the present invention;

FIGURE 2 is a fragmentary sectional view taken substantially along line 2-2 of FIGURE 1;

FIGURE 3 is a fragmentary elevational view taken substantially along line 3-3 of FIGURE 1;

FIGURE 4 is a fragmentary sectional view taken substantially along line 4-4 of FIGURE 1;

FIGURE 5 is a top plan view of a second embodiment of the present invention;

FIGURE 6 is a side elevational view of the embodiment of FIGURE 5;

FIGURE 7 is a fragmentary sectional view taken substantially along line 7-7 of FIGURE 5; and

FIGURE 8 is a fragmentary top plan view of a portion of the drive means for the embodiment shown in FIGURE 5.

Like reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to FIGURE 1 of the drawings, there is shown therein a first embodiment of the present invention. This embodiment comprises a transverse vibratory screed 10 and a pair of non-vibratory leveling structures 12 and 14. Such structures 12 and 14 are disposed on opposite sides of screed 10 and are held in spaced relation thereto by a pair of transversely spaced longitudinal frame elements or support trusses 16 and 18. Each truss comprises a lower horizontal member as shown at 16a and 18a respectively, and an upper member having offset end portions as shown respectively at 16b and 18b. The opposite ends of the members 16b and 18b are joined to the adjacent ends of the corresponding lower members 16a and 18a, and a plurality of structural members are interposed therebetween as identified by the reference characters 16c and 18c in said trusses respectively. The trusses 16 and 18 may be formed of any appropriate material as for instance steel pipe and the like. Such members, of course, can be welded in assembled relation to provide the desired trusses having the necessary strength and rigidity.

As shown most clearly in FIGURE 2, the vibratory screed 10 comprises a horizontally disposed vibratory plate 20 for contact with and movement along the surface of the concrete. Plate 20 is provided with a pair of side flanges or upturned edges 20a and 20b which extend the entire length of the vibratory screed.

Disposed in spaced relation along the length of plate 20 is a plurality of U-shaped brackets 22 in inverted position and having their end portions 22a and 22b fastened to flanges 20a and 20b respectively of plate 20 by any appropriate means such as welding, brazing or the like.

Connected to each bracket 22 within the corners afforded by the U-shaped configuration thereof are a pair of adjustment rods 24 and 26. A turnbuckle 28 is operatively connected to the contiguously arranged adjacent adjustment rods, substantially equidistant between the adjacent brackets 22. As such, since each adjustment rod 24 and 26 is welded to the respective bracket, means is thereby provided whereby the shape or contour of the vibratory screed 10 can be varied as desired. By suitable adjustment of the various turnbuckles 28 it is possible to alter the distance between the upper portion of the adjacent brackets 22 as compared to the distance between the lower portions thereof, the latter distance being fixed by the vibratory plate 20. Due to this arrangement, it is possible to adjust the turnbuckles 28 such as to cause the central portion of plate 20 to be at a higher elevation than the ends thereof. This, of course, may be desirable for

operation on roadways or the like which are to be provided with a "crown."

A rotatable rod 30 is disposed longitudinally of the vibratory plate 20, and a plurality of appropriate bearing members 32 are attached to the upper surface of the plate 20 in spaced relation thereon. Such bearings 32 are firmly secured to plate 20 by any appropriate means and carry the rotatable rod 30.

A plurality of weights 34 are eccentrically mounted on shaft 30 for rotation therewith to impart a vibratory action to plate 20. For rotation of shaft 30, there is provided motive power means which may take the form of an internal combustion engine 35, there being appropriate pulleys and transmission means in the form of a belt 37 for transmitting the output of engine 35 to shaft 30. Thus, operation of internal combustion engine 35 causes shaft 30 to rotate so as to cause the eccentrically arranged weights 34 to impart a vibratory action to plate 20.

To facilitate attachment of screed 10 to the trusses 16 and 18, there is provided between the upturned flanges 20a and 20b of plate 20 a pair of mounting straps 36 each of which is disposed beneath a separate one of said trusses. Appropriate fastening bolts 38 and 40 are mounted on each strap 36 and extend upwardly through suitable transverse openings found in the lower horizontal member of the corresponding truss. Fastening nuts 30a and 40a are provided as shown in FIGURE 2 to facilitate vertical positioning of screed 10.

The forward and rearward support or leveling structures 12 and 14 respectively are substantially identical in construction, and hence only structure 12 will be hereinafter described in detail.

The forward leveling structure 12 comprises a leveling plate 42 having its lowermost surface located below the trusses 16 and 18 and further having beveled or upturned leading and trailing edges 42a and 42b. Firmly secured to plate 42 as by welding, brazing or the like, is a pair of oppositely disposed elongated mounting plates 44 and 46, each of which is provided with a vertical portion as shown at 44a and 46a respectively, and a horizontally disposed elongated flange as shown at 44b and 46b respectively. A plurality of stiffening plates 48 are welded to the upper surface of plate 42 and to the vertically disposed portions of mounting plates 44 and 46 as shown in FIGURES 1 and 4.

Appropriate mounting bolts 50 and 52 are secured to the opposed elongated flanges 44b and 46b and extend upwardly through suitable openings formed in the lower horizontal member of each of the trusses 16 and 18. Appropriate fastening nuts as shown at 50a and 52a are mounted on bolts 50 and 52 respectively on opposite sides of such horizontal member to facilitate vertical positioning of the leveling structure 12.

Attached to the opposite ends of each of the leveling structures 12 and 14 is a side form 54 which is held in spaced relation to the leveling plate by a pair of L-shaped brackets 56 and 58. The horizontally disposed portions of such L-shaped brackets are secured to the upper surface of the corresponding leveling plate, adjacent the mounting plates 44 and 46. The depending or vertically disposed portion of each such bracket is welded to the corresponding side form whereby the latter is held in vertical position with respect to the leveling plate. The leading and trailing end portions 54a and 54b respectively of each side form 54 is beveled outwardly to facilitate the leveling action of the side form along the edge of the section of concrete.

Also disposed at the opposite ends of each of the leveling structures 12 and 14 is a traction member or retractable wheel for transporting the surfacing machine from job site to job site. Since each of such wheel structures is of substantially identical construction, only the structure at the right-hand end of the forward leveling structure 12 will be described in detail.

A horizontally disposed shaft 60 is suitably journaled in the two stiffening plates 48 at the end of the adjacent

leveling structure. Such relationship may be provided in any number of ways within the scope of the present invention, and may, in its simplest form comprise suitable through openings in such stiffening plates for receiving the shaft 60.

Shaft 60 must be of such length as to extend beyond the adjacent side form 54. An offset mounting plate 62 is rigidly secured to the end of shaft 60 which extends beyond the side form 54. A wheel 64 having an axle 66 is then rotatably mounted on plate 62 in spaced relation to the axis of rotation of the shaft 60.

To facilitate manual rotation of shaft 60, an operating lever 68 is welded to shaft 60. Due to this arrangement, when lever 68 is in the solid line position shown in FIGURE 3 the wheel 64 is in retracted position as also shown in solid lines. On the other hand, rotation of lever 68 to its broken line position of FIGURE 3 places wheel 64 in its operative position, also shown in broken lines therein. In the latter position, it will be noted, wheel 64 extends beneath the side form 54. Also, with wheel 64 in its operating position the weight of the surfacing machine urges mounting plate 62 in a counterclockwise direction as viewed in said FIGURE 3. However, such movement will not take place due to interference of operating lever 68 with L-shaped bracket 56. Thus wheel 64 will be firmly held in its operating position.

When in retracted position, the weight of lever 68 retains wheel 64 in its solid line position as shown in FIGURE 3.

To provide additional rigidity and strength to the machine shown in FIGURE 1, tensioning bars or chains 70 can be arranged diagonally between the vibratory screed 10 and the leveling structures 12 and 14. Appropriate turnbuckles 72 may be operatively interposed in such tensioning rods to facilitate adjustment of the shape of the machine.

The first embodiment of the present invention as shown in FIGURE 1 is constructed to be pulled over the section of concrete to be leveled. Any appropriate attachment means such as chains, cables or the like may be used for connecting this machine to other paving apparatus.

In transporting the machine of FIGURE 1 to the job site, the four wheels 64 are actuated to their operating positions. As such, the entire machine is easily pulled over a roadway or the like.

When the machine is properly positioned for commencing its leveling operation on the section of concrete, the wheels are retracted so that the entire weight of the machine rests on the concrete and is guided by the side forms 54. The internal combustion engine 35 is then put into operation so as to rotate shaft 30 and thereby vibrate plate 20.

As the machine is transported over a section of fluid concrete, the forward leveling structure 12 levels the upper surface of the concrete. At the same time, the side forms 54, which are being pulled along the ground on either side of the section of concrete, effectively level the side edges of such section.

Subsequently the upper surface of the concrete is "worked" by the vibratory plate 20, the vibratory action thereof tending to bring the finer aggregate of the concrete mixture to the surface so as to provide a smooth surface. Ultimately, the surface of the concrete is engaged by the rearward leveling structure 14 and the side forms 54 located at either end thereof so as to provide additional leveling operation on the concrete.

Referring to FIGURES 5, 6, 7 and 8 of the drawings, there is shown therein a second embodiment of the present invention. This embodiment comprises a substantially centrally located vibratory screed 100 and a pair of leveling structures 102 and 104 on either side thereof. Screed 100 is substantially identical in construction with the vibratory screed 10 of the embodiment shown in FIGURE 1. Also, the forward and rearward leveling structures 102 and 104 respectively are con-

structed substantially identically with the leveling structures 12 and 14 of FIGURE 1, except that the structures 102 and 104 do not include the side forms 54, brackets 56 and 58 therefor, and the retractable wheel assemblies. Accordingly, the screed 100 and the leveling structures 102 and 104 will not be described in detail, reference being available to the description of corresponding members shown in FIGURE 1.

To maintain the leveling structures 102 and 104 in proper assembled relation to the vibratory screed 100, a pair of trusses 106 and 108 are provided. Such trusses are substantially identical to the trusses 16 and 18 of the first embodiment, and are attached to screed 100 and leveling structures 102 and 104 in the same manner as trusses 16 and 18 are attached to corresponding units as shown in FIGURES 2 and 4.

The embodiment of the present invention shown in FIGURE 5 is self-powered, and hence is provided with a rectangularly shaped chassis 110 which is formed of structural members 110a, 110b, 110c and 110d which may have any appropriate cross sectional configuration in accordance with good engineering principles, and which may be welded together to form the chassis 110.

Chassis 110 carries or supports the screed 100 and leveling structures 102 and 104, as will hereinafter be explained in detail. A catwalk or operating platform 112 is provided across structural members 110a and 110b of chassis 110, and may be provided with a suitable hand rail 112a. To provide additional support for platform 112, and to further strengthen chassis 110, the latter may include an intermediate structural member 110e interposed between and fastened to the side members 110c and 110d.

Suitable motive power means such as an internal combustion engine 114 is mounted on platform 112, there being suitable control means mounted on a control panel 116 for proper operation of the surfacing machine of FIGURE 5. Associated with engine 114 is a compressor for developing fluid pressure for operation of pressure responsive actuators to be hereinafter described.

Attached to the opposite sides of the chassis 110 are wheel structures for transporting the surfacing machine over the section of concrete. Each such wheel structure comprises a mounting bracket 118 welded or secured in any other appropriate manner to the adjacent structural member 110c or 110d. Pivotaly mounted on bracket 118 as by a pivot pin 120 is a horizontal member 122 which may be formed with a substantially square cross section.

A drive wheel 124 is attached to each end of horizontal member 122 for rotation thereon. Suitable power transmission means comprising a drive shaft 126 and an intermediate shaft 128 are employed for transmitting the power of engine 114 to either or both of the wheels 124 on opposite sides of chassis 110. One end of drive shaft 126, of course, is operatively associated with engine 114 whereas the shafts 126 and 128 are connected together by a universal joint 130. Shaft 128 extends through a suitable opening in structural member 110c and carries a drive gear within structural member 122 for cooperation with an endless chain 132. Also mounted within structural member 122 for cooperation with chain 132 and the axles of the corresponding drive wheels 124, are appropriate gears for transmitting the power from the chain to the drive wheels.

To enable the operator of the machine to control the direction of travel thereof, fluid pressure actuators 134 are operatively associated with the pivotal members 122. Each of such actuators is provided with a relatively stationary end portion 134a which is pivotally mounted with respect to structural member 110b by means of a tab 110f welded to the latter and a pivot pin 136 which interconnects end 134a of actuator 134 and tab 110f. The other end 134b of actuator 134 is connected to a tab 122a carried by pivotal member 122. A pivot pin 138 com-

pletes the connection between end 134b of actuator 134 and tab 122a. Suitable fluid pressure lines (not shown) extend between the compressor on platform 112 and the actuators 134, and appropriate valve means are interposed in such lines for controlling the operation of such actuators.

To adjustably support the vibratory screed 100 and the leveling structures 102 and 104 on chassis 110, two pairs of vertically spaced sleeves 140 are provided on each of the structural members 110a and 110b. Each pair of sleeves 140 is located on the respective structural member at the point where the corresponding truss contacts the chassis 110. As shown most clearly in FIGURE 7 of the drawings, each of the trusses 106 and 108 is formed such that a vertical member thereof is positioned within each of the sleeves 140.

A fluid pressure actuator 142 is operatively interposed between the structural members 110a and 110b and the trusses 106 and 108 which cooperate therewith. As shown in FIGURE 7, each of said actuators 142 has a relatively stationary end portion 142a which is attached to a relatively stationary tab 144 by means of a pivot pin 146. Tab 144, of course, is secured to structural member 110a as by welding, brazing or the like. The movable end portion 142b of such actuator is pivotally secured to truss 106 by means of a tab 106d welded to member 106b and a pivot pin 148.

Suitable fluid pressure conduits and control valves connect each of the actuators 142 with the compressor or other source of fluid pressure. Due to this arrangement, it is possible for the operator on platform 112 to adjust the vertical position of the vibratory screed 100 and the leveling structures 102 and 104 as desired.

By suitable manipulation of the controls, the operator can cause the engine 114 to drive the wheels 124 so as to drive the surfacing machine of FIGURE 5 over the section of concrete to be worked. Such operation, of course, is independent of the operation of any other paving apparatus. By suitable operation of actuators 134, it is possible for the entire machine to be turned, as for instance to accommodate a curve in the section of fluid concrete. Throughout such operation the wheels 124 straddle the section of concrete.

By simultaneously operating the pressure responsive actuators 142, it is possible for the operator on platform 112 to position the forward leveling structure 102, the vibratory screed 100 and the rearward leveling structure 104 at the proper height with respect to the surface of the concrete.

In order to further strengthen the structure of FIGURE 5, appropriate tension members such as chains 150 may be diagonally arranged between the chassis 110 and the forward and rearward leveling structures 102 and 104. Suitable turnbuckles 152 may be interposed in each of such chains to facilitate varying the tension thereof as desired.

It is thus seen that the present invention provides a surfacing machine which is continually operable to properly condition the surface of a section of concrete. Further, such invention teaches the construction of such a machine to be pulled over the section of concrete, and one which is self-propelled.

Although I have shown and described certain specific embodiments of my invention I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim:

1. A pavement surfacing machine to eliminate local surface irregularities in an elongated strip of concrete unbounded by side forms and which has already been generally leveled by conventional means, said machine comprising:

a pair of longitudinally spaced, transverse leveling plates, each having an upturned leading edge adapted

7

- to smoothly engage the surface of said strip of concrete, said leveling plates being adapted to span the width of said strip of concrete and slide upon said strip of concrete for supporting said machine during a surfacing operation thereof;
- transversely spaced longitudinal frame elements extending between and rigidly connected at their opposite extremities to said leveling plates above the lowermost surfaces of said plates; and
- a transverse vibrating screed connected to and suspended beneath said frame elements intermediate said leveling plates for operation upon surface irregularities of said strip of concrete.
2. A pavement surfacing machine according to claim 1 and including side forms mounted to the extremities of said plates and adapted to engage the vertical sides of said strip of concrete.
3. A pavement surfacing machine according to claim 1 and including transporting means having traction members adapted to engage the ground or other surface outwardly of both side margins of said strip of concrete whereby said machine is longitudinally transportable, and further having means vertically movably connecting said traction members to said frame elements whereby said plates are freely movable vertically relative to said traction members for accommodation to the surface of said strip of concrete regardless of the contour of the surface engaged by said traction members.
4. A pavement surfacing machine according to claim 1 and including a plurality of wheels and a corresponding plurality of means retractably mounting said wheels to the opposite extremities of said plates whereby said wheels are extendable to raise said plates off said strip of con-

8

crete for transportation of said machine out of engagement with said strip of concrete.

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