Dec. 13, 1949

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2,491,275

LEVELING MEANS OR MECHANISM
FOR ROAD SURFACING MACHINES

Filed Sept. 26, 1945

3 Sheets-Sheet 1

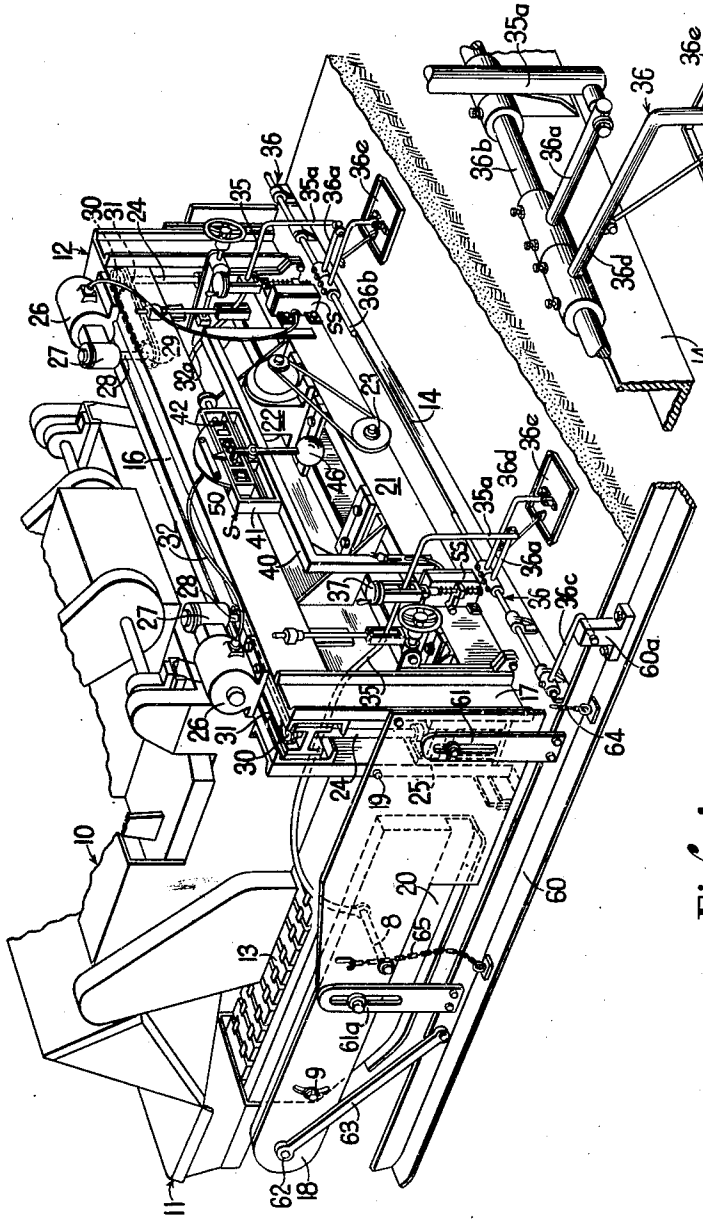

Fig. 1a

Fig. 1

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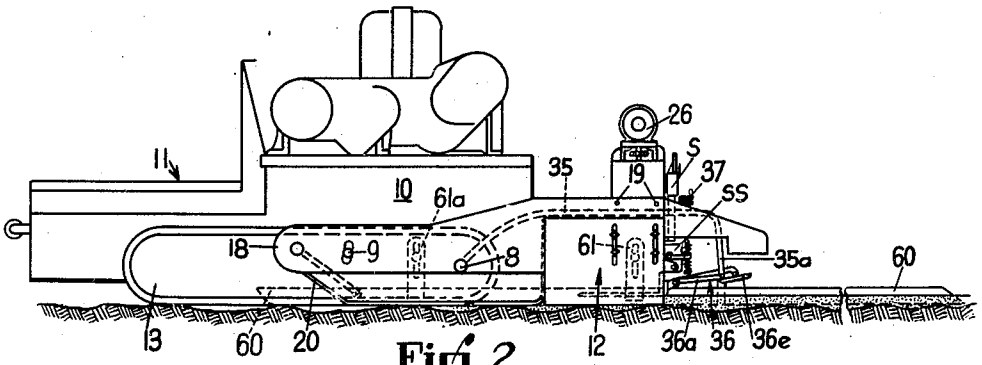

Fig. 2

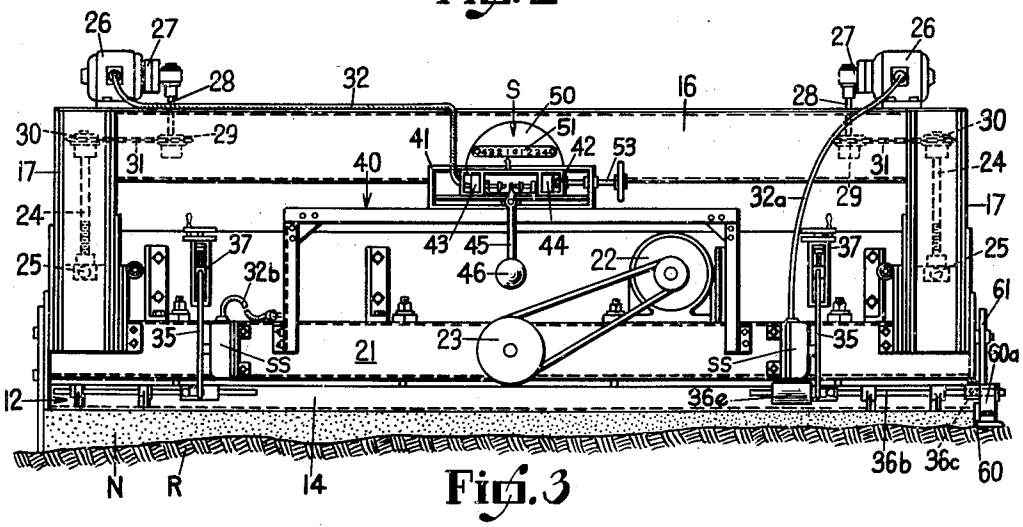

Fig. 3

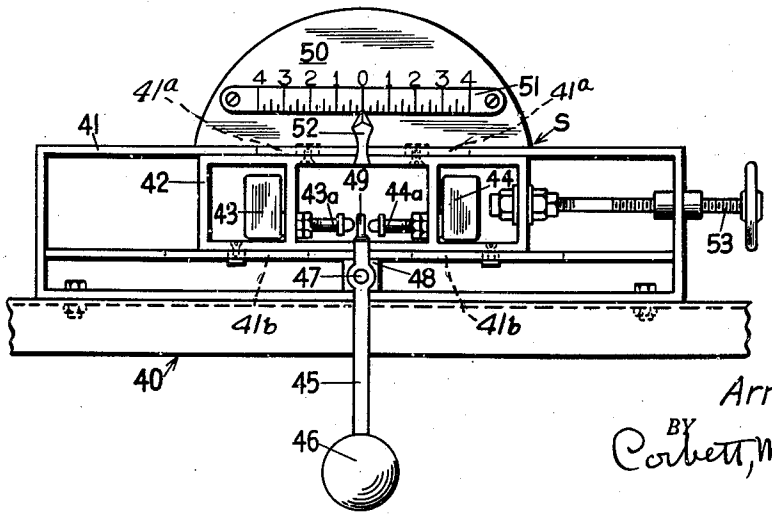

Fig. 4

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Filed Sept. 26, 1945 3 Sheets-Sheet 3

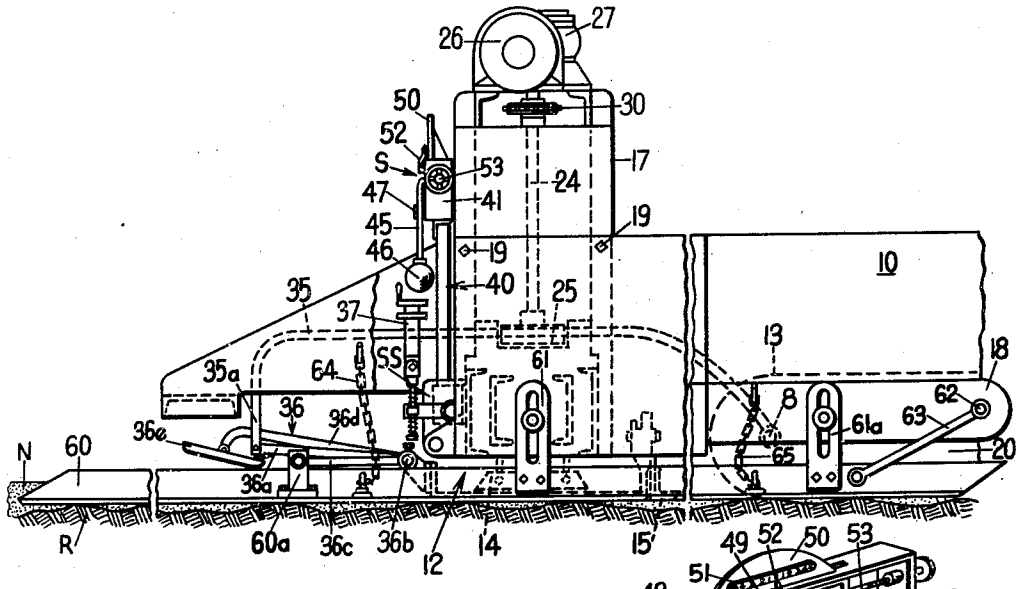

Fig. 5

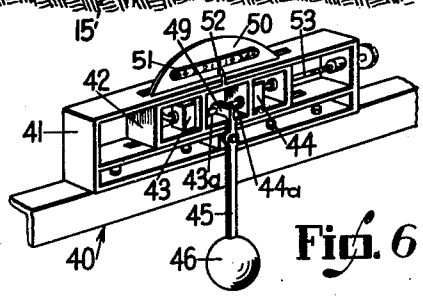

Fig. 6

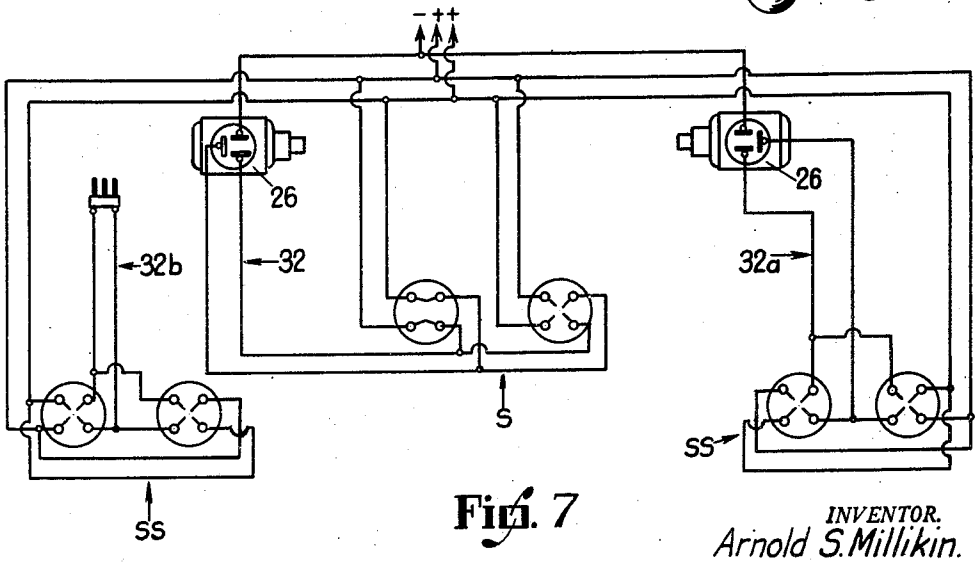

Fig. 7

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UNITED STATES PATENT OFFICE

2,491,275

LEVELING MEANS OR MECHANISM FOR ROAD SURFACING MACHINES

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Application September 26, 1945, Serial No. 618,672

16 Claims. (Cl. 94—46)

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The present invention relates to leveling means or mechanism for road surfacing machines. It has to do particularly, although not exclusively, with transverse leveling means or mechanism which may be mounted upon or attached to the leveling and finishing unit or assembly which includes a screed, or compactor, of a road surfacing or re-surfacing machine such, for example, as a bituminous paver.

In re-surfacing bituminous roads, it is often desirable, where the center line is reasonably accurate and true, to grade and thus correct the outside edge of the road which may be rough and in most instances, low. In re-surfacing old roads, where it is desired to increase or decrease the transverse elevation, it is desirable to perform this operation by mechanical means which may be controlled electrically, so as to automatically produce or accomplish the desired result.

When a bituminous paver, for example, is employed to carry out the aforementioned operation, it is preferable to carry or provide a uniform thickness on one end of the screed of the leveling and finishing unit and a variable thickness on the other end of the screed. In accordance with the present invention, this is effectively and accurately accomplished preferably by means of an electrically operated unit in accordance with the present invention which functions to raise and/or lower the screed on the end thereof where the variable thickness is to occur. In accordance with the present invention, the electrically operated unit, which preferably controls the electric screed lift motor at the end of the screed where said variable thickness is to occur consists, preferably, of a pair of normally open electric switches which, when actuated, cause the operation of the electric motor for raising or lowering the end portion of the screed. These normally open electric switches are preferably operated by a switch actuating member which may be in the form of a pendulum-like member having a portion which is interposed between the movable contacts or actuators whenever the screed changes position relative to the horizontal. It will be understood that the electric motors are so positioned and arranged that when the screed moves into a position at an angle to the horizontal, the pendulum-like member actuates one or the other of the switches to raise or lower the screed in the desired direction and the desired amount. The leveling means or mechanism is preferably mounted upon the screed assembly with the pendulum-like member having its pivot fixed relative to the screed and with the pair of switches,

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constituting the switch assembly being adjustable in a horizontal, or substantially horizontal plane relative to the pendulum-like member's pivot point. In accordance with the present invention certain manually controlled means is preferably provided for moving the switch assembly or unit relatively to the said pivot point. An indicating finger or hand is preferably carried by the switch assembly and is adapted to register or align with a graduated scale which is preferably calibrated to indicate the amount of screed angularity relative to the horizontal, in inches.

One of the objects of the present invention is to provide improved automatically operated mechanical means which may be electrically controlled, for use with a leveling and finishing unit of a road surfacing machine, for automatically maintaining the screed at a predetermined level and in a predetermined position to thereby produce and maintain the desired transverse elevation or grade of the newly laid material.

Another object of the invention is to provide means in accordance with the preceding paragraph which is capable of manual adjustment to effect the control or position of the screed to increase or decrease the transverse elevation of the newly laid surface.

A further object of the present invention is to provide improved means or mechanism of the foregoing character which is capable of being quickly and easily applied to the screed unit or assembly of a road surfacing machine, such as a bituminous paver; it being another object of the invention to provide improved transverse leveling means or mechanism which is of relatively simple construction involving but few and relatively inexpensive parts or elements.

Another object of the invention is to provide improved control means for the screed of the leveling and finishing unit of a road surfacing machine which functions to raise or lower one end portion of the screed in accordance with variations in the old road surface which are encountered by the forward portion, such as the material receiving and feeding unit of the machine, and improved transverse leveling means or mechanism which functions to raise or lower the opposite end portion of the screed when said screed portion encounters variations in the desired transverse elevation of the newly laid material or surface; it being a further and important object of the present invention to provide control means and transverse leveling means which may be connected or associated with either or both ends of the screed so that irregularities

encountered either by the forward portion of the machine or the screed thereof, will be reflected in the up and down movement or shifting of either end portion of the screed, dependent upon which end portion is associated with either the control means or the transverse leveling means.

A further object of the invention is to provide improved automatically operable transverse leveling means or mechanism which may be associated with one or both end portions of a screed so as to effect the desired raising or lowering of either or both ends of the screed; it being a further object of the invention to provide relatively simple and effective electrical connecting means for plugging in the control means or the transverse leveling means referred to in the preceding paragraph, so as to effect the desired up and down movement of the screed in accordance with the particular requirements of the surfacing or re-surfacing job which is being performed by the machine; it being another object of the invention to provide an elongated runner at either side of the machine in contact with and adapted to be moved over the old road surface, or on the surface of the first half of the newly laid material, said runner being operatively associated with the screed elevator means at one end of the screed so as to govern or control the up and down adjusting movement of the screed at said end.

The foregoing and other objects and advantages of the invention will appear from the following description and appended claims when considered in connection with the accompanying drawings forming a part of this specification wherein like reference characters designate similar parts in the several views.

In said drawings:

Figure 1 is a perspective view of a machine embodying my invention.

Figure 1*a* is an enlarged perspective view of a portion of the screed level controlling mechanism of the machine.

Fig. 2 is a left side elevational view of a machine or apparatus embodying the present invention.

Fig. 3 is a rear elevational view of the structure shown in Fig. 2.

Fig. 4 is an enlarged elevational view of the electrical switch unit or assembly of the present invention.

Fig. 5 is an enlarged fragmentary right side elevation of the leveling and finishing unit and associated parts embodying the present invention.

Fig. 6 is a perspective view of the switch unit or assembly of Figs. 2 to 5, inclusive; and

Fig. 7 is a diagrammatic view of an electrical circuit for electrically connecting together the switch unit or assembly, the control means and the electrically operable elevator means of the structure embodying the present invention.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. It is to be understood also that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawings there is shown, by way of example, a road finishing machine or apparatus

embodying the present invention. The structure embodying said invention is shown in association with the leveling and finishing unit of one type of road surfacing machine.

Referring now to the drawings and particularly to Figs. 1 to 5, inclusive, thereof, one type of machine or apparatus for surfacing roads to which the present invention is applicable, is shown as a whole at **10**. As shown, it comprises a material receiving and feeding unit, shown as a whole at **11** and a following leveling and finishing unit, shown as a whole at **12**. The leveling and finishing unit is drawn along behind the material receiving and feeding unit.

The machine or apparatus **10** is carried by a pair of relatively long endless traction units **13**, one such being shown. These traction units or members will pass over small irregularities of the sub-grade or old road surface without causing any appreciable vertical movement of the unit **11**.

The leveling and finishing unit **12** comprises a screed **14** which may be of any suitable type and may also include a following cut-off bar or compactor **15** (Fig. 5). The leveling and finishing unit is mounted upon frame work including transverse frame members **16** and upright frame members **17**, see Fig. 3.

The machine **10** is provided with longitudinal side frame members **18** which, as shown, are fastened at **19** (Fig. 2) to the upright frame members **17**. Each frame member **18** carries a runner **20**, see particularly Fig. 2, which is pivotally mounted at **8** for oscillating or rocking movement relative to the frame member **18**. The forward end of the runner **20** is also connected to the frame member **18** by a pin and slot connection, shown at **9**. Thus, when the traction members **13** are driven, the material leveling and finishing unit **12** will be drawn along behind the material receiving and feeding unit **11**.

The frame structure also comprises a pair of transverse frame members **21** (Figs. 1 and 3) which carry an electric motor **22** drivingly connected to a drive shaft **23** which serves to oscillate the cut-off bar or compactor **15** by suitable means (not shown). Moreover, the upright frame members **17** carry means for supporting and raising and lowering the leveling and finishing unit **12**. As shown, such supporting means comprises a vertically extending screw threaded shaft **24**, one such being located between each pair of the upright frame members **17**. The lower ends of the rods or shafts **24** carry hanger blocks **25**, see particularly Figs. 1, 3 and 5. The leveling and finishing unit **12** is in turn supported and carried adjacent its opposite ends by these hanger blocks.

Carried by and adjacent opposite ends of the transverse frame members **16** are electric motors **26** to each of which is attached, in driving relationship, gear reduction mechanism within a gear box **27**. It will be understood that the gears within the boxes **27** are driven by the motor shaft in each instance. The gear reduction mechanism includes a depending upright driving shaft **28** which carries at its lower end a sprocket **29**. The upper end of each shaft **24** carries a sprocket **30** which is driven from the sprocket **29** through the medium of a sprocket chain **31**. As clearly seen in Fig. 3, a power-operable unit consisting of the electric motor, gear reduction mechanism, driving and driven sprockets and chain is located adjacent each end of the frame members

16. The motor 26 at the left of Fig. 3 is shown connected by a conduit or cable 32 to an electric pendulum-operated switch unit or assembly S to be described below, whereas the electric motor 26 at the right side of Fig. 3 is shown connected by a conduit or cable 32a to another and separate electric switch unit SS also to be described below. It will be understood that each of the motors 26 is preferably of the reversible type so as to drive the driving sprocket 29 and its associated driven sprocket 30 and chain 31 in opposite directions. When the electric motor 26 at the right of Fig. 3 is driven, the leveling and finishing unit 12 will be raised or lowered at its right end, dependent upon the direction in which the electric motor is running. With the parts connected as they are shown in Fig. 3, the electric motor 26 at the right of this figure is under the control of the switch unit SS at the right, the electric motor 26 at the left of this figure being under the control of the electric pendulum-actuated switch unit S. It will be seen in this figure that a second switch unit SS is associated with the transverse frame member 21 in the vicinity of its left end and that this switch unit is provided with a conduit or cable 32b, which may, if desired, be plugged into the electric motor 26 at the left side of Fig. 3 when conduit 32 is disconnected therefrom so as to place this electric motor under the control of the second-named switch unit SS at the left. With both electric motors being electrically connected with the two switch units SS and with switch S being disconnected from such motors, the leveling and finishing unit 12 may be rapidly and easily raised or lowered relative to the newly laid material N under the control of switch units SS. This is an alternative arrangement of connecting the motors and switch units or assemblies from that in which one of the motors is connected with the right hand or left hand switch unit SS and the other motor with the substantially centrally disposed switch unit or assembly S. Thus, it will be seen, that electrically operable means for raising and lowering the leveling and finishing unit 12 is carried by the frame work above said unit.

Each of the switch units SS is actuated through the medium of a longitudinally and rearwardly extending control bar or member 35, shown best in Figs. 1, 1a, 2 and 5 which is located adjacent a side of the machine or apparatus. The forward end portion of each bar or member 35 is down-turned and pivotally or oscillatably connected to the pivot 8 at the inside of the runner 20. The member 35 extends rearwardly beneath the transverse frame members 16 and terminates in a rear down-turned end portion 35a. This end portion is pivotally attached to an arm 36a which forms a part of a leveling pan or runner attaching assembly, shown as a whole at 36, which assembly is suitably mounted upon the rear portion of the screed 14.

In the present instance, by way of example, the assembly 36 includes a rockable cross shaft 36b to which the inner end of the arm 36a is connected by a normally fixed but adjustable connection. The shaft 36b may carry, by a normally fixed but adjustable connection, at either or both of its outer ends a rearwardly extending arm 36c whose rear end portion is pivotally or swingably connected to a bracket or bearing 60a (Figs. 1 and 5) carried by an elongated auxiliary runner 60 preferably of angle iron or L-shaped cross section. The bracket 60a and arm connection are preferably located at a point midway between the front and rear ends of the runner 60. The shaft 36b also carries a normally fixed but adjustable rearwardly extending arm 36d which preferably has a down-turned rear end portion upon which is rigidly mounted a leveling pan or member 36e. As seen in Fig. 5, the pan 36e may be held in raised position and out of contact with the newly laid surface N. In accordance with the showing in this figure, the pan 36e is not being used in the operation of the road surfacing machine but in lieu thereof, the elongated runner 60 is in operative connection with the cross shaft 36b and is resting upon the old road surface R adjacent one edge of the newly laid material N.

As clearly seen in Figs. 1, 2 and 5, the runner 60 is provided with a slotted bracket 61 which serves as means for mounting the runner upon the side framework of the machine to permit its limited up and down movement. A similar bracket 61a is carried by the runner 60 adjacent the forward end of the machine, this bracket being suitably and slidably connected to the longitudinal side frame member 18. The forward end of the runner 60 is also connected at 62 to the frame member 18 adjacent the forward end thereof, by means of a link or swingable connecting member 63. The auxiliary elongated runner 60 is so attached to the machine that it will follow a course parallel to the machine and be free to move vertically independent of the machine for a distance of several inches. The runner 60 is arranged to travel on the old road surface R (Fig. 5). It may be used, as shown, without the leveling pan 36e at the adjacent side of the screed 14, or, if desired, it may be used in conjunction with said leveling pan, with the latter traveling on the newly laid surface N. The auxiliary runner 60 is so mounted upon the machine that when the screed 14 is elevated out of contact with the surface when the machine is not in operation but is traveling, it will be raised with the screed to clear the surface. For this purpose, a pair of chains 64 and 65 may be provided, see Fig. 5.

Associated with each of the arms 35 and the switch assemblies SS is an adjustable coupling unit, shown as a whole at 37. The attaching assembly 37 is used to connect or attach the auxiliary runner 60 with the apparatus, or to support the leveling pan 36e in operative position, or to support both the auxiliary runner 60 and the leveling pan 36e in operative positions for simultaneous use. In other words, in accordance with the present invention, the auxiliary runner 60 may be employed as a part of the leveling mechanism, or the leveling pan 36e may be so employed in lieu of the use of the runner; or, as suggested above, both the runner 60 and the leveling pan 36e may be employed together to perform the desired leveling function. Moreover, if desired, an additional leveling pan 36e may be employed at the opposite side of the apparatus in conjunction with either the runner 60 or the right hand leveling pan 36e, or in conjunction with both of the latter. Furthermore, while the runner 60 has been shown as positioned at the right side of the apparatus, it is to be understood that if the occasion arises, this runner or a similar runner may be supported at the left side of the apparatus. If desirable, runners, such as the runner 60, may be used on both sides of the machine and without employing the transverse

leveling unit or assembly, indicated as a whole at S.

It is to be understood that the runner 60 is preferably employed, in lieu of one or more of the leveling pans 36e, or in conjunction with one or more of said pans, when it is desirable to provide a more accurate surface along the center line of the road.

The switch mechanism or unit SS, shown at the right end of Fig. 3 serves to control the elevation or grade of the newly laid material at the right end of the screed and functions to actuate the electric motor and screed elevator at that end to raise or lower this end of the screed in accordance with any variations in the grade level.

It will be understood that hydraulically actuated elevator means may be employed in place of the electric lift motors 26 for raising and/or lowering the screed 14. Moreover, it may be desirable to employ a double acting hydraulic valve in place of each of the snap-action mechanisms or units SS. In this case, the screed would be actuated to effect the desired leveling by hydraulic means such, for example, as that disclosed in the patent to Millikin and Pickard No. 2,295,519 patented September 8, 1942, instead of by the electrical means described and shown herein.

For the purpose of maintaining a constant transverse grade level of the newly laid material, improved transverse leveling means or mechanism in the form of the pendulum-actuated switch unit or assembly S, is provided. As seen in Figs. 1 and 3, an auxiliary frame, shown as a whole at 40, is mounted upon the screed frame members 21 and serves to support the switch unit or mechanism S. As shown, the switch assembly comprises a main frame portion 41 and an auxiliary and longitudinally adjustable sub-frame portion 42. The sub-frame portion 42 carries a pair of opposed normally open snap-action switches 43 and 44 whose contact points or members 43a and 44a are in closely spaced opposed relationship, see Figs. 4 and 6. The fixed or main frame 41 of the assembly carries a pendulum-like switch actuating member, shown as a whole at 45. This member comprises a depending arm having a weight at 46 at its lower end and being pivotally mounted at 47 for swinging movement upon a fixed block or member 48. The arm extends above the pivot and has an inturned end portion 49 which normally lies in a position between the opposed switch contact members 43a and 44a. It will be seen that when the screed 14 is in a horizontal position, with the auxiliary frame 40 in a likewise horizontal position, the arm of the pendulum-like member remains in a vertical position with its upper end portion 49 positioned between and spaced from or out of contact with the switch contacts 43a and 44a. The main frame member 41 carries an arcuate plate 50 having a graduated scale 51 attached to the face thereof. The auxiliary or movable frame member 42 of the switch assembly carries an indicating finger or pointer 52 which is adapted to register with the graduations on the scale. The auxiliary frame 42 is mounted on frame 41 by pin and slot connections 41a and 41b at both its upper and lower sides, as shown in Fig. 4, may be adjusted longitudinally with relation to the main frame 41 by means of a threaded shaft and operating handle or wheel, shown as a whole at 53.

The switch mechanism with its pointer 52 is

preferably adjusted so that the pointer registers with the desired indication on the graduated scale 51, the setting corresponding to the desired elevation which is to be achieved and maintained in the newly laid road surface or material. As seen in Fig. 3, the switch assembly has been set with the pointer 52 registering with the numeral 1 at the left of zero (0) on the graduated scale 51. In this position the pendulum contact portion 49 is in engagement with the switch contact 44a and as the result, the electric motor 26 at the left end of this figure will be energized to operate the screed elevator mechanism to raise or lower the screed until the desired grade level has been reached. The pendulum-like member 45 remains at all times, in its normal vertical position and does not move until the screed moves out of its normal horizontal position. Thus, as the angle of the screed changes, the member 45 moves and its portion 49 engages either of the switch contacts 43a or 44a to actuate one of the switches 43 or 44. Likewise, any tilting or angular movement of the left end of the screed 14 from its normally set position to maintain the desired grade level for which the switch assembly S has been set, causes movement of the pendulum-like member 45 into engagement with one or the other of the contacts 43a or 44a to operate the switch whose contact is engaged. This will effect the operation of the electric motor 26 to raise or lower the screed until it resumes the normal position for which it has been set to maintain the desired transverse grade level of the newly laid surface.

The setting of the switches in accordance with the showing in Fig. 3 of the drawings is such that the elongated runner 60 and its associated switch SS and other associated parts will tend to maintain the grade level at the right end of Fig. 3 constant, while at the same time the transverse leveling switch assembly S functions to maintain the transverse grade level at the left of the screed normally constant in accordance with the setting of the last-named switch assembly. If desired, however, the cable or conduit 32 may be disconnected from the left hand motor 26 and the cable 32b plugged into this motor, thus connecting the switch SS at the left with said motor. In that event, a leveling pan, such as the pan 36e will be applied to the attaching assembly 36 at the left end of the screed 14 and this pan, together with the auxiliary runner 60, or a leveling pan 36e, as the case may be, located at the right end of the screed, will function to control the switches SS, the electric motors and the screed elevators so as to raise or lower the entire screed in accordance with any variations in the grade level of the newly laid surface to maintain said level constant. Moreover, if desired, a runner 60, or if desired, a pan 36e, may be used at the left end of the screed and the runner 60 or pan 36e at the right either removed or moved out of contact with the surface of the newly laid material. In this case, the conduit or cable 32b will be plugged into the motor 26 at the left and the cable 32 from the switch assembly S will be plugged into the electric motor 26 at the right end of Fig. 3. Thus, the electric switch assembly S will control the motor and its associated elevator at the right end of the screed while the switch assembly SS at the left end of the screed is controlling the motor 26 at that end.

The operation of the mechanism or apparatus of the invention to accomplish the desired leveling of the newly laid road surface and in accord-

ance with the arrangement of parts as illustrated, merely by way of example, in the drawings, is substantially as follows: Assuming that the outside edge of the road, namely that section of the newly laid material at the left of Fig. 3, is to be raised one (1) inch higher than the thickness of material laid at the center line, namely at the right end of Fig. 3, the end of the screed at said center line of the road is set so as to lay the given thickness. The switch unit or assembly, S, namely the auxiliary or movable frame portion **42** thereof, is moved horizontally by turning the hand wheel **53** until the end of the screed along the outside edge of the road (at the left of Fig. 3) is raised enough by the screed lift motor **26** at that side to lay the desired thickness. From this point on, vertical movement of the machine will be reflected in movement of the pendulum actuator **45** which actuates the screed lift motor switches **43** and **44**, thus raising or lowering the outside or left end of the screed to maintain the desired level. When using this system of leveling, the switch unit SS at the left of Fig. 3 and the leveling pan or runner attaching assembly **36** are disconnected from the screed lift motor **26**, which controls the elevator at the left end of the screed as seen in Fig. 3, and the transverse leveling control mechanism, namely the transverse leveling switch unit S, is connected to the left side screed lift motor **26**. As also explained above, the electrical circuits are so arranged that they can be changed to operate one end or the other of the screed **14** by simply disconnecting the auxiliary runner or leveling pan switch SS by pulling out the plug and substituting the plug for the transverse leveling switch unit or assembly S.

In Fig. 7 of the drawings there is illustrated a diagram of a conventional electrical circuit for connecting the snap-action switches of the switch units SS with one or both of the electric lift motors **26** and the snap-action switches **43** and **44** with either of the screed lift motors **26**, in accordance with the particular job which is to be performed by the road surfacing machine or apparatus.

Having thus described my invention, what I claim is:

1. A road surfacing machine comprising a leveling and finishing unit including a screed, electrically operable elevator means carried by the leveling and finishing unit for raising and lowering the screed at predetermined times, control means carried at the rear of the machine having a portion adapted to ride upon the newly laid road surface and operatively connected with the electrically operable elevator means to actuate the same for raising or lowering said screed to compensate for vertical movement of said unit caused by contact of a portion of the machine with a variation in the road surface, and separate means carried by the leveling and finishing unit for actuating the electrically operable elevator means at predetermined times when said leveling and finishing unit is tilted transversely as the machine moves along the surface over which it operates whereby to adjust the transverse elevation of said screed and thereby maintain the transverse grade level of the newly laid surface substantially constant at all times, said separate means comprising a normally open electric switch carried by said leveling and finishing unit and electrically connected to said elevator means and a switch-actuating member carried by said unit in close proximity to said switch and being mounted for free movement by gravity force upon transverse tilting of said unit for closing the switch to actuate the electrically operable elevator means at predetermined times in accordance with the transverse tilting of said unit.

2. A structure according to claim 1, wherein said separate means comprises a pair of the normally open electric switches which are opposed to each other and are electrically connected to the elevator means and wherein said switch-actuating member is disposed between said switches and is adapted to engage and close said switches at predetermined times in accordance with the transverse tilting of said leveling and finishing unit.

3. Structure according to claim 1, wherein said separate means comprises a unitary switch structure carried by the leveling and finishing unit, said unitary switch structure including a pair of transversely spaced and opposed normally open electric switches electrically connected to the elevator means, and wherein said switch-actuating member is a freely pivoted pendulum having a portion disposed between the switches and swingable transversely for closing one or the other of said switches in accordance with the tilting of said unit.

4. Structure according to claim 1, wherein said separate means comprises a unitary switch structure carried by the leveling and finishing unit, said unitary switch structure including a pair of transversely spaced and opposed normally open electric switches electrically connected to the elevator means, and wherein said switch-actuating member is a freely pivoted pendulum having a portion disposed between the switches and swingable transversely for closing one or the other of said switches in accordance with the tilting of said unit and means for adjusting the unitary switch structure transversely relative to the pivot of the pendulum whereby to accommodate the said separate means to a desired increased or decreased transverse elevation of the newly laid material and to maintain said elevation substantially constant.

5. Structure according to claim 1, wherein said separate means comprises a unitary switch structure carried by the leveling and finishing unit, said switch structure including a pair of transversely spaced and opposed normally open electric switches electrically connected to the elevator means, and wherein said switch-actuating member is a freely pivoted pendulum having a portion disposed between the switches and swingable transversely for closing one or the other of said switches in accordance with the tilting of said unit, means for adjusting the unitary switch structure transversely relative to the pivot of the pendulum whereby to accommodate the said separate means to a desired increased or decreased transverse elevation of the newly laid material and to maintain said elevation substantially constant, and indicating means associated with the unitary switch structure for indicating the setting of said switch unit to obtain the desired transverse elevation of the material being laid.

6. A road surfacing machine comprising a leveling and finishing unit disposed at the trailing end of the machine, said unit including a screed, electrically operable elevator means for raising and lowering the screed at predetermined times, a normally open electric switch unit carried by said unit and electrically connected with the electrically operable elevator means for effecting

the operation of said elevator means when the switch is closed, and a member movably mounted on said unit and in close proximity with the electric switch unit for closing the same at predetermined times, said movable member being mounted for free movement by gravity force created when the leveling and finishing unit tilts transversely as the machine encounters variations in the transverse grade level of the surface over which it operates to automatically raise or lower the screed to adjust its transverse elevation and to thereby maintain the transverse grade level of the newly laid surface substantially constant.

7. A structure according to claim 6, wherein the electric switch unit comprises a pair of transversely spaced normally open electric switches, and wherein said movable member comprises a pendulum disposed between the switches and having an operating arm swingable transversely into engagement with either of said switches for closing one or the other thereof at predetermined times.

8. A structure according to claim 6, wherein the electric switch unit comprises a pair of transversely spaced normally open electric switches, wherein said movable means comprises a freely swingable pendulum disposed between the switches and having an operating arm swingable transversely into engagement with either of said switches for closing one or the other thereof at predetermined times, and wherein said switches are adjustable transversely relative to said pendulum.

9. A road surfacing machine comprising a leveling and finishing unit disposed at the trailing end of the machine, said unit including a main frame and a subframe adjustable up and down relatively to one another and a screed carried by the subframe, electrically operable elevator means connected with the main and subframe for raising and lowering the screed at predetermined times, a pair of normally open electric switches electrically connected with the electrically operable elevator means for effecting the operation of said elevator means when either of the switches is closed, said switches being carried by said subframe, and a pendulum pivotally mounted on the subframe having a portion disposed between the switches for closing one or the other thereof at predetermined times in accordance with tilting movement of the finishing unit as the machine moves along.

10. A road surfacing machine including power-driven tractor means and comprising a material receiving and feeding unit adapted to travel over a surface to be paved, a leveling and finishing unit connected with said material receiving and feeding unit and including a screed mounted for vertical movement on said unit, electrically operable elevator means for raising and lowering the screed relative to said leveling and finishing unit, normally open electric switch means electrically connected with the elevator means for operating the same when the switch is closed, means for closing the electric switch at predetermined times to compensate for vertical movement of said leveling and finishing unit caused when the machine encounters variations in the old road surface to automatically raise or lower the screed of said leveling and finishing unit dependent upon whether or not the variation in said road surface is a raised portion or a depression, a pair of normally open electric switches carried by the leveling and finishing unit, and a pendulum carried by the leveling and finishing unit for free transverse pivotal movement and having a portion disposed between the switches for closing one or the other of said switches to actuate the electrically operable elevator means at predetermined times when the screed is tilted transversely because of transverse tilting of said leveling and finishing unit as the machine moves along the surface to be paved.

11. A road surfacing machine including power-driven tractor means and comprising a material receiving and feeding unit adapted to travel over a surface to be paved, a leveling and finishing unit including a screed mounted for vertical movement on said material receiving and feeding unit, separate electrically operable elevator means carried by said leveling and finishing unit and connected to said screed for raising and lowering said screed relative to said unit at predetermined times, control means including an elongated surface contacting runner located at one side of the machine and cooperable with one of said electrically operable elevator means for operating the same at predetermined times to raise or lower the screed as the machine encounters variations in the surface over which it travels, a pair of normally open electric switches carried by the leveling and finishing unit, and a pendulum switch-actuating member pivotally carried by said leveling and finishing unit for transverse swinging movement and having a portion thereof disposed between the switches for closing one or the other of said switches to actuate the other of said electrically operable means for raising or lowering the screed at predetermined times in accordance with transverse tilting engagement of said leveling and finishing unit as the machine moves along.

12. Structure according to claim 11, wherein the runner is detachably connected midway of its ends with the leveling and finishing unit and wherein said runner extends beyond the front and rear ends of said leveling and finishing unit.

13. Transverse leveling means for application to the leveling and finishing unit of a road surfacing machine for maintaining a predetermined transverse position of the screed of said leveling and finishing unit whereby to maintain the desired transverse grade level of a surface being laid by the machine; said leveling means comprising electrically operable elevators disposed adjacent opposite ends of the leveling and finishing unit for raising and lowering the screed of said unit, and a unitary electric switch assembly carried by said unit and including a pair of transversely spaced and opposed normally open electric switches, said switch assembly including a switch operating member having a portion thereof disposed between said normally open switches and freely movable transversely by gravity force in opposite directions for closing one or the other of said switches to actuate one of said electrically operable elevators in response to transverse tilting of said unit.

14. A road surfacing machine comprising a frame supported for movement along the surface to be covered, a transversely extending material leveling member carried by the frame, means for supporting and adjusting said leveling member on the frame and including electrically operable means connected to said frame and to said material leveling member and adapted to be actuated to move said leveling member to various vertical positions on the frame, means for actuating said electrically operable means to automatically

change the vertical position of said leveling member on said frame as the frame moves vertically while the machine is passing along over the surface to be covered, said means comprising a control member supported by said frame for vertical movement relative to the leveling member and adapted to ride on a surface having a certain grade line, an electric switch carried by the machine for actuating said electrically operable means and being electrically connected thereto, means for operatively connecting said control member to said switch so that said switch will be actuated to operate said electrically operable means to move said leveling member vertically whenever the leveling member moves vertically relative to the control member, and additional means for actuating said electrically operable means to automatically change the transverse elevation of said leveling member to maintain a predetermined transverse grade level on the surface being laid by the machine, said means including an electric switch carried by the machine and electrically connected to said electrically operable means, and a freely movable switch-operating member carried by the frame and responsive to transverse tilting of said frame for actuating said switch to operate said electrically operable means to adjust the transverse elevation of said leveling member.

15. A road surfacing machine comprising a frame supported for movement along the surface to be covered, a transversely extending material leveling member carried by the frame, means for supporting and adjusting said leveling member on the frame and including electrically operable means connected to said frame and to said material leveling member and adapted to be actuated to move said leveling member to various vertical positions on the frame, and means for actuating said electrical operable means to automatically change the transverse elevation of said leveling

member to maintain a predetermined transverse grade level on the surface being laid by the machine, said means including an electric switch carried by the machine and electrically connected to said electrically operable means, and a freely movable switch-operating member carried by the frame and responsive to transverse tilting of said frame for actuating said switch to operate said electrically operable means to adjust the transverse elevation of said leveling member.

16. A road surfacing machine comprising a frame supported for movement along the surface to be covered, a transversely extending material leveling member carried by the frame, means for supporting and adjusting said leveling member on the frame and including adjusting means connected to said frame and to said material leveling member and adapted to be actuated to move said leveling member to various vertical positions on the frame, and means for actuating said adjusting means to automatically change the transverse elevation of said leveling member to maintain a predetermined transverse grade level on the surface being laid by the machine, said last-named means including a control unit operatively connected to said adjusting means, and means for actuating said control unit in response to transverse tilting of said frame and comprising an actuating member carried on said frame for free movement in accordance with transverse tilting of said frame.

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