

July 26, 1966

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3,262,378

ADJUSTABLE STRIKE-OFF PLATE FOR FINISHING MACHINES

Filed Oct. 25, 1963

3 Sheets-Sheet 1

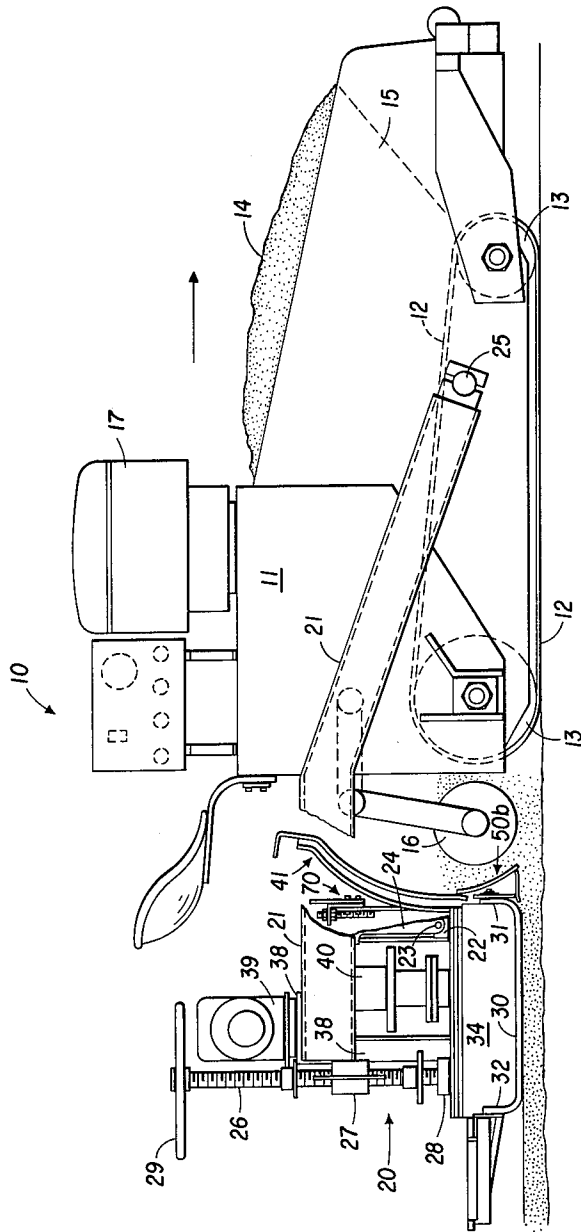


FIG 1

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3 Sheets-Sheet 2

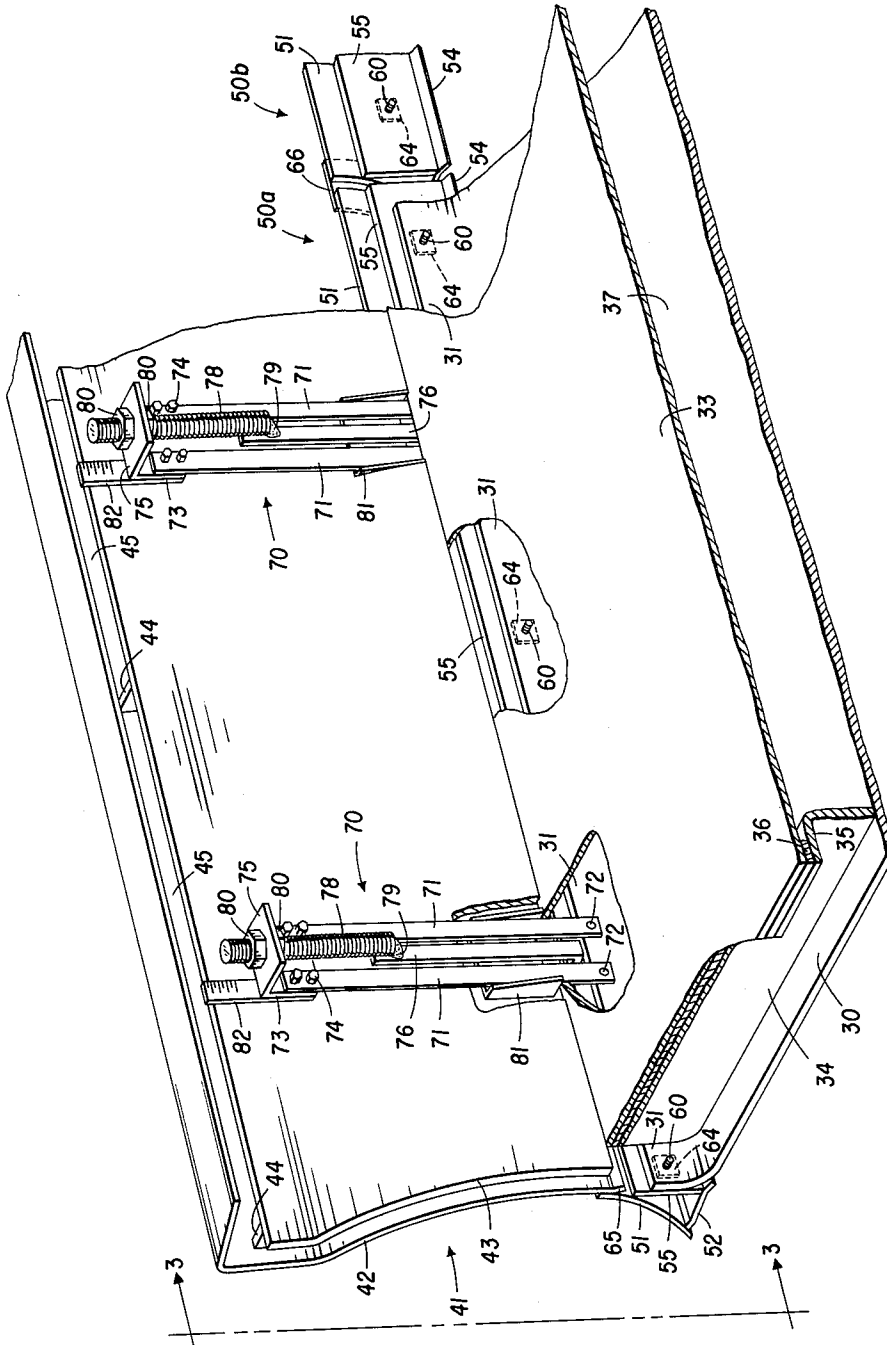


FIG 2

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3 Sheets-Sheet 3

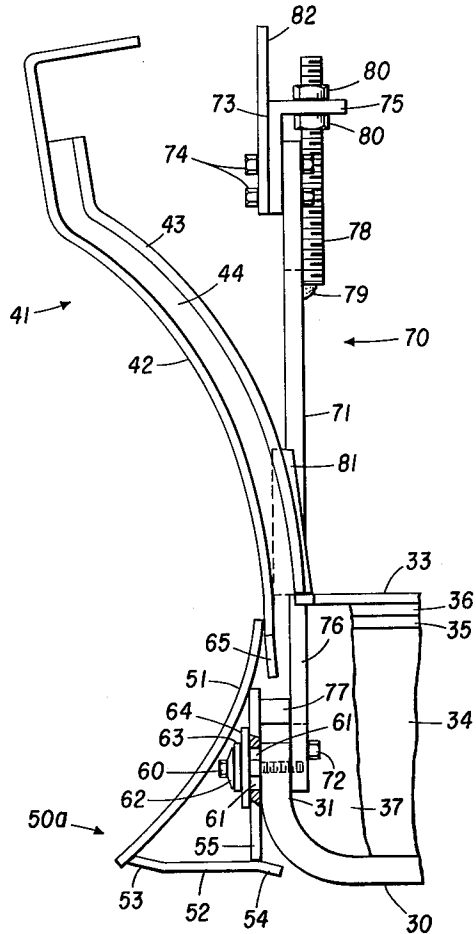


FIG 3

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3,262,378
**ADJUSTABLE STRIKE-OFF PLATE FOR
 FINISHING MACHINES**

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 Filed Oct. 25, 1963, Ser. No. 319,033
 7 Claims. (Cl. 94-46)

The present invention concerns road surfacing machines in general, and, in particular, the elimination of a persistent problem encountered during some paving operations with certain kinds of bituminous pavers.

The invention is especially designed for a type of bituminous paver utilizing a vibrating screed, such as that, for instance, described in U.S. Patent 2,757,588. In such pavers the screed assembly is of the floating kind, drawn by a pair of trailing screed arms pivoted at their forward ends to the opposite sides of the tractor unit about a transverse axis. The screed plate itself is flat and relatively thin, and is flexibly mounted to the screed frame in order to permit it to vibrate relative thereto. In one such paver vibration of the screed plate is imparted by several synchronous electrical vibrators operatively connected to the screed plate, whereupon, for the reasons explained in the aforesaid patent, excellent compaction of the bituminous mix on the roadway is achieved by the screed assembly as it passes thereover. Other means, of course, may be employed to impart suitable vibration to the screed plate, inasmuch as the present invention is not confined to pavers using any particular means therefor. Additionally, a pair of spreader screws of the customary type are employed ahead of the screed assembly in order to spread the mix, delivered to the roadway from the tractor unit, evenly and transversely of the latter as the paver proceeds along the roadway. Finally, a mold board is disposed between the screed assembly and the spreader screws in order to help confine the mix to the latter.

In the case of the paver shown in the aforesaid patent, early experience therewith proved it desirable to extend the mold board thereof downwardly by means of a plate fixed thereto and terminating substantially in the plane of the screed plate itself. The downward extension of the mold board formed a "strike-off plate," which achieved a somewhat better metering of the mix passing to the screed plate. In addition, the strike-off plate helped avoid stagnant pockets of mix that sometimes tended to collect rearward of the spreader screws against the front wall of the screed plate instead of passing thereunder. The material in such pockets cooled quickly and when and if some did in fact later work down and under the screed plate it produced imperfections or tears in the mat owing to its reduced temperature and thus its lesser plasticity. For both reasons the quality of the mat surface was thus improved.

Subsequently, even better results were obtained by curving the strike-off plate forward somewhat concentrically with the spreader screws, terminating it forward of and spaced from the leading edge of the screed plate, and detachably securing it to the mold board so that its height could be adjusted with respect thereto. A shoe plate was then welded to the lower edge of the strike-off plate and extended rearwardly part way toward the leading edge of the screed plate. The strike-off and shoe plates thus formed a kind of "nose," or strike-off assembly, adjustably extending from the lower end of the mold board just forward of the screed plate. Shortly thereafter it was found advantageous to extend the shoe plate further rearwards so that it terminated just forward of the leading edge of the screed plate and at

the same time to incline the forward edge of the shoe plate upwardly and the rear edge downwardly to provide a kind of "toe" and "heel" therefor. As a consequence, the toe provided a "pre-compaction," and the heel a more precise metering, of the mix passing to the screed plate proper, the surface of the shoe plate between the toe and heel providing a sort of pre-screeding" action as well.

Still further development resulted in the attachment of the entire strike-off assembly to the screed plate, instead of to the mold board, so that it was both free to vibrate therewith and vertically adjustable with respect thereto. This alteration had two advantages. First, the "pre-compaction" and the "pre-screeding" action of the shoe plate was increased owing to the fact that the shoe plate, as well as the entire strike-off assembly, now vibrated together with the screed plate itself. Second, adjustments for crown of the mat surface became easier. When the strike-off assembly was attached to the mold board and the crown of the screed plate was changed, it was also necessary separately to adjust the crown of the strike-off assembly in order that it be generally congruent with that of the screed plate. Locating the strike-off assembly on the screed plate permitted the crowning adjustment of the latter to serve for the strike-off assembly as well.

Although the foregoing developments completely eliminated cold pockets of material ahead of the screed and greatly increased the quality of the finished mat surface, one problem yet persisted. Throughout the foregoing development, whenever mixes of high plasticity were employed, especially those containing a high percentage of "fines" (e.g. sand), the entire screed assembly often tended to produce a wavelike pattern, or "ripple," in the finished mat, the more pronounced the thicker the mat being laid. The length of the waves or ripples varied anywhere from about 18 to 36 inches. While the depth of the waves was seemingly slight, on the order of .030 inch more or less, yet it was enough to give unacceptable results when the mat was traversed by motor vehicles, inasmuch as suspensions of the latter in phase therewith at certain road speeds tended to develop violent oscillations. No amount of adjustment of the screed controls during operation of the paver or of the strike-off assembly while the paver was inoperative seemed to have any effect on the problem, nor did any of the various developments described above diminish the problem or appear to have any bearing upon it. Finally, after much time, thought, and effort, it was discovered that if the strike-off assembly could be adjusted relative to the screed plate while the paver was in actual operation, the ripple could be completely eliminated. Theretofore, the adjustment of the strike-off assembly had to be made while the paver was stationary and free of mix, inasmuch as the adjusting means then used were way down adjacent the lower end of the mold board or at the leading edge of the screed, as the case might be, and perforce inaccessible during actual operation of the power. Indeed, it was found that vertical adjustments of the strike-off assembly as little as $\frac{1}{16}$ or $\frac{1}{32}$ of an inch while the paver was in operation often made the difference between success and failure. The fact that former adjustments of the strike-off assembly were necessarily much rougher owing to the fact that they could only be made when the paver was inoperative, undoubtedly contributed to the failure of the prior efforts to suggest or disclose any remedy for the ripple problem. It is not wholly clear or certain just why the relatively minute adjustment of the strike-off assembly produces such unexpected results, other than that such adjustment probably alters the flotation characteristics of the entire screed assembly. Accordingly,

the adjusting means of the strike-off assembly were wholly redesigned and located well above the screed plate, extending down to the strike-off assembly itself, so as to be readily accessible during actual paving operation

The principal object of the present invention, therefore, is the elimination of waves or ripples in the bituminous mat laid by pavers employing a vibrating screed and a strike-off assembly of the kind described. The means employed permit the height of the strike-off assembly, relative to the screed plate, to be readily adjusted during actual operation of the paving machine along the roadway. Briefly summarized, the invention, in its preferred form, incorporates a back plate upstanding adjacent the rear of the shoe plate of the strike-off assembly and adjustably secured to the leading edge of the screed plate so that it, and thus the entire strike-off assembly, may be adjusted vertically with respect to the screed plate. At each of several locations therealong, the back plate is provided with a control bar secured thereto and extending upright well above the screed plate so that its upper end is readily accessible during actual paving operation. To the leading edge of the screed plate, in turn, is secured a support structure for each control bar which rises upward alongside its respective control bar to approximately the same upper level as the latter. The upper end of the control bar is threaded and passed through a lip extending horizontally from the upper end of the support structure. A pair of lock nuts on the threaded portion of the control bar adjustably secure the latter to the support structure against the opposite faces of the lip thereon. Since both the strike-off assembly and the screed plate vibrate as a unit and since the control bars and their support structures are respectively carried thereby, there is no independent motion of the bars with respect to their supports. At the same time the lock nuts of each readily permit the necessary minute adjustment of the strike-off assembly at several points therealong while the paver is actually laying the bituminous mat.

Other objects, features and advantages of the present invention will become apparent from the following, more detailed description of the preferred form thereof, read in conjunction with the drawings, in which:

FIGURE 1 is a side elevational view of a bituminous paver of the kind described incorporating the present invention, certain portions being broken away for clarity;

FIGURE 2 is an upper perspective view in detail of a part of the screed assembly of the paver illustrated in FIGURE 1, portions of the screed assembly being broken away or omitted for purposes of clarity; and

FIGURE 3 is an end view taken from the line 3—3 of FIGURE 2.

Turning now to the drawings, 10 designates a bituminous paver generally which comprises two principal sub-assemblies, the first being a tractor unit 11 carried on a pair of crawlers 12 driven about a pair of sprockets 13 at each side thereof. The mix 14, dumped into a hopper 15 at the forward end of tractor 11, is transported to the rear thereof by means of a pair of adjacent, independently operable conveyors (not shown) disposed on each side of the longitudinal axis of tractor 11. The mix 14 from each conveyor is deposited upon the inner end of one of a pair of spreader screws 16 disposed in end to end relation just to the rear of tractor 11 and transversely thereof, each screw extending laterally outward to one side of tractor 11, in order to spread the mix upon the roadway evenly and transversely of the rear of tractor 11. Each spreader screw 16 is suitably driven in conjunction with its respective conveyor by a main power plant 17 which also drives crawlers 12. The other principal sub-assembly of paver 10 is a screed assembly 20 extending transversely thereof and spaced rearward of spreader screws 16. Screed assembly 20 is of the floating type drawn by a pair of

screed arms 21 secured adjacent their rear ends above and to the lateral ends of screed assembly 20 by means of a pair of hinge brackets 22 spaced along the forward edge of screed assembly 20 and pivoted about a transverse axis on hinge pins 23 which engage a complementary pair of hinge brackets 24 depending from screed arms 21. The latter extend forwardly alongside tractor 11 and are pivoted at their forward ends about a transverse axis 25, parallel to that of hinge pins 23, located between sprockets 13 at each side of tractor 11. The attitude of screed assembly 20 with respect to screed arms 21 is adjusted about hinge pins 23 by means of a pair of vertical adjusting screws 26 threadedly engaging the rearmost ends of screed arms 21 at 27, their lower ends being held captive in a pair of ball sockets 28 spaced along the rear edge of screed assembly 20 and their upper ends being provided with a pair of hand adjusting wheels 29.

Screed assembly 20 itself comprises a flat, generally rectangular screed plate 30 of relatively thin, flexible material disposed transversely of paver 10 slidably engaged with the roadway surface and turned up along its forward and rearward edges in order to provide a pair of shallow, vertical front and rear walls 31 and 32, respectively. Screed plate 30 is mounted to and spaced beneath an overbearing superstructure, including a top plate 33, by means of gusset plates 34 vertically disposed just inboard of and between the respective ends of screed plate 30 and top plate 33. Gusset plates 34 extend the full width of the ends of screed plate 30 and top plate 33 and rise well above the top of front wall 31. Gusset plates 34 are welded or otherwise secured along their lower edges to screed plate 30, being provided with horizontally turned flanges 35 along their upper edges between which and top plate 33 are disposed strips of suitable material 36 so that screed plate 30 and gusset plates 34 are together resiliently suspended with respect to the remainder of screed assembly 20. Screed plate 30, top plate 33 and gusset plates 34 thus serve in part to define a hollow chamber 37 which is heated in the customary manner by a duct system, part of which is shown at 38, feeding thereto from suitable oil-burning apparatus and blower 39 centrally disposed above top plate 33. The latter also carries several synchronous electrical vibrators 40, or other suitable means, therealong operatively connected therethrough to screed plate 30 in order to impart suitable vibration to the latter effective to compact the material on the roadway engaged by screed plate 30, all as according, for instance, to the aforesaid patent.

A mold board assembly 41 is suitably secured along the entire forward edge of screed assembly 20 and comprises a mold board 42, curved upwardly and forwardly over spreader screws 16 from adjacent the forward edge of top plate 33, and a rear shield plate 43 generally congruent therewith and spaced therefrom by upright gussets 44 in order to define several passageways 45 therebetween communicating with chamber 37 for the purposes described in U.S. Patent 2,951,426. An adjustable strike off assembly is disposed in turn beneath the entire length of the lower edge of mold board 42 and comprises two identical subassemblies 50a and 50b for reasons hereafter explained, only one of which need be described, disposed in slightly spaced, end to end relationship on each side of the longitudinal axis of paver 10. Each such subassembly consists of a strike-off plate 51 whose upper edge slightly overlaps the forward face of the lower end of its respective half of mold board 42, curving downwardly and forwardly therefrom so that it is operatively spaced aft of and generally around the lower rear portion of its respective spreader screw 16. Strike-off plate 51 terminates so that its lower edge is spaced forward of front wall 31 of screed plate 30 and generally in the plane of the latter. To the rear of the lower edge of strike off plate 51 is welded a gen-

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erally horizontal shoe plate 52 extending rearwardly therefrom to immediately adjacent the corner formed between screed plate 30 and its front wall 31. The forward margin of shoe plate 52 is bent slightly upward and the rear margin slightly downward in order to provide a pre-compacting lip 53 and a metering lip 54, respectively, on the leading and trailing edges of shoe plate 52. An inclination of both lips 53 and 54 of about 10° with respect to the horizontal has proved to give very satisfactory results. Finally, each subassembly 50a and 50b is completed by a vertical back plate 55 welded along its lower edge to shoe plate 52 adjacent the bend of metering lip 54, extending upwardly against the outer face of front wall 31 of screed plate 30 well above the top edge of the latter. The upper edge of back plate 55 is welded to the rear face of strike-off plate 51 at its intersection therewith, thus forming a generally right angled, triangular structure along the entire front edge of screed plate 30 just below mold board 42 and closing the gap between top plate 33 and front wall 31 of screed plate 30.

Each strike off subassembly 50a and 50b is adjustably secured to the outer face of front wall 31 of screed plate 30 at several spaced locations therealong so that it may be adjusted up or down about one-half inch from a central position. The means employed at each location comprise a shoulder bolt 60 threaded into front wall 31, its shoulder portion passing through a vertical slot 61 in back plate 55. Between the front face of the latter and the head of shoulder bolt 60 is stacked an assembly consisting of a spring washer 62, a flat washer 63 and a gasket 64, the latter sealing slot 61 against clogging by the bituminous mix and spring washer 62 functioning to urge back plate 55 resiliently against front wall 31. A satisfactory vertical dimension of slot 61 has proved to be about 1½ inches in order to give a full one-half inch adjustment of the strike off subassemblies 50a and 50b up or down from their central position. If necessary, the lower margin 65 of mold board 42 may be bent rearwardly to afford clearance for the upper edge of back plate 55, and the space between the adjacent, inner ends of strike off plate 51 may be closed by a plate 66 secured to the front face of one and overlapping the front face of the other. Forming the strike off assembly in two subassemblies 50a and 50b permits the employment with screed plate 30 of a crown adjustment mechanism (not shown) such as that, for instance, described in U.S. Patent 2,914,994.

The remote adjusting means for the strike off assembly consist of a pair of upright assemblies 70 for each subassembly 50a and 50b and spaced apart so as to be disposed adjacent the respective ends thereof. Each assembly 70 includes a pair of vertical, laterally spaced supporting bars 71, parallel to each other and rigidly secured at their lower ends at 72 to the inner face of front wall 31 of screed plate 30, rising therefrom, through suitable apertures in top plate 33 and shield plate 43, to a readily accessible level above top plate 33. The upper ends of supporting bars 71 are joined by one leaf of an angle bracket 73 secured at 74 thereto, the other leaf 75 of bracket 73 extending horizontally rearward. The lower end of a control bar 76 is rigidly secured at 77 to the exposed portion of the rear face of back plate 55 well above front wall 31. Control bar 76 rises vertically between supporting bars 71 and is provided at its upper end with a rearwardly offset threaded rod 78, welded thereto as at 79, and extending upwards therefrom above leaf 75 of angle bracket 73 through a suitable aperture therein. The opposite faces of leaf 75 are gripped by a pair of lock nuts 80 threaded on rod 78, thus maintaining a fixed vertical relation of supporting bars 71 relative to control bar 76 and consequently of each strike off subassembly 50a and 50b relative to screed plate 30. Since each assembly 70 is fixed, in effect, to screed plate 30 it vibrates as a unit

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therewith. At the same time the elevated location of lock nuts 80 readily permits the fine adjustments mentioned above required of each strike off subassembly 50a and 50b relative to screed plate 30 during actual operation of paver 10. If desired, the apertures in shield plate 43 for each assembly 70 may be closed by suitable cover plates 81. Likewise, an index guide 82, comprising a vertical plate also secured to the back face of each angle bracket 73 at 74 and extending upwards therefrom above the top of its threaded rod 78, may be provided in order to indicate the relative position of each strike-off subassembly 50a and 50b relative to screed plate 30. Each index guide 82 is equipped with vertically spaced, horizontal graduations thereon which may be sighted over the upper end of its associated threaded rod 78.

While the present invention has been described with reference to a particular embodiment and detailed descriptive language has been used, it is not thereby intended to be limited thereto. Instead, the following claims are to be read as encompassing all modifications and adaptations of the invention falling within the scope and spirit thereof.

We claim:

1. In a road surfacing machine having delivery means for delivering onto a roadway a surfacing mix during travel of said machine along the roadway, distributing means spaced rearwardly of said delivery means effective to distribute the mix delivered to the roadway by said delivery means transversely along the rear of said machine at a rate normally effective for maintaining the mix at a substantially uniform predetermined depth on the roadway, a screed assembly spaced rearwardly from said distributing means including a bottom screed plate extending transversely of said machine and effective to engage and smooth the mix distributed upon the roadway by said distributing means, said screed plate having means to impart vibration thereto effective to compact the mix engaged thereby, a mold board carried by said screed assembly extending transversely of said machine and downwardly between said distributing means and said screed assembly, and an adjustable strike-off plate extending downwardly adjacent the lower end of said mold board, the lower end of said strike-off plate being spaced forward of the leading edge of said screed plate, said mold board and strike-off plate together being effective both to confine the mix from said delivery means to said distributing means and to direct a continuous supply of the mix therefrom under said screed plate, said strike-off plate being operatively associated with said screed plate effective to permit vibration therewith and alteration of the height thereof relative to said screed plate and mold board, the combination therewith of adjusting means for altering the height of said strike-off plate, said means being connected to said strike-off plate and disposed at a location on said machine readily permitting alteration of said height during road surfacing operation of said machine.

2. The device of claim 1 wherein said adjusting means includes at least two adjusting members fixed to said strike-off plate at spaced positions therealong, a supporting member for each of said adjusting members carried by said screed assembly, each of said adjusting members extending upwardly from said strike-off plate and being adjustably secured to its respective supporting member effective for movement relative thereto in order to adjust the height of said strike-off plate relative to said screed plate, said means being disposed sufficiently above said screed plate to permit ready access thereto for adjustment thereof during road surfacing operation of said machine.

3. The device of claim 2 wherein said strike-off plate is provided with a bottom shoe plate secured to the lower end of said strike-off plate and extending rearward adjacent the leading edge of said screed plate in order to provide a strike-off assembly effective to slidably pre-engage the mix directed by said strike-off plate to said screed

plate, the forward marginal portion of said shoe plate being inclined upwardly and the rearward marginal portion of said shoe plate being inclined downwardly with respect to the portion of said shoe plate therebetween in order to provide, respectively, a toe portion immediately rearward of the lower edge of said strike-off plate effective to pre-compact the mix on the roadway engaged thereby and a heel portion immediately forward of the leading edge of said screed plate effective to partially control flow of the mix under said screed plate.

4. The device of claim 2 wherein the leading edge of said screed plate is provided with a vertical front wall, and wherein said adjusting means includes a vertical back plate extending the length of said shoe plate and fixed thereto, one face of said back plate being vertically slideable upon the outer face of said wall in order to permit said adjustment of said strike-off assembly, said back plate having a vertically extending adjusting slot adjacent each of said adjusting members, a guide pin secured to said front wall and extending through each of said slots, and means operative between said pins and the other face of said back plate to resiliently urge the latter against said wall.

5. In a road surfacing machine having delivery means for delivering onto a roadway a surfacing mix during travel of said machine along the roadway, distributing means spaced rearwardly of said delivery means including a pair of rotary conveyor screws disposed in end to end relation effective for distributing the mix delivered to the roadway by said delivery means transversely along the rear of said machine at a rate normally effective for maintaining the mix at a substantially uniform predetermined depth on the roadway, a screed assembly spaced rearwardly from said distributing means including a bottom screed plate extending transversely of said machine having its leading edge formed to provide an upstanding front wall and effective to engage and smooth the mix distributed upon the roadway by said distributing means, said screed plate having means to impart vibration thereto effective to compact the mix engaged thereby, a mold board carried by said screed assembly extending transversely of said machine and curving downwardly between said conveyor screws and said screed assembly, an adjustable strike-off assembly comprising a strike-off plate curving downwardly and forwardly from the lower end of said mold board, the lower end of said strike-off plate being spaced forward of said front wall, said mold board and strike-off plate together being effective both to confine the mix from said delivery means to said conveyor screws and to direct a continuous supply of the mix therefrom under said screed plate, a bottom shoe plate secured to the lower end of said strike-off plate and extending rearwardly adjacent the leading edge of said screed plate effective

to slideably pre-engage the mix directed by said strike-off plate to said screed plate, said strike-off assembly being connected to said screed plate front wall so as to vibrate therewith by means permitting vertical displacement of said strike-off assembly relative to said screed plate, and mold board, said means including an upstanding back plate rigidly secured to said shoe plate and to said front wall of said screed plate for vertical movement with respect thereto, the combination therewith of a plurality of control bars fixed to said back plate at spaced locations therealong and vertically moveable therewith, a supporting structure for each of said control bars carried by said screed plate and vibrating therewith, each of said control bars and its supporting structure extending upwardly together from said back plate and said screed plate front wall respectively and being adjustably secured to each other at their respective upper ends by means permitting vertical adjustment of said control bar relative to its supporting structure, the height of each of said control bars and its respective supporting structure relative to said screed plate being such as to permit ready access to said adjusting means during road surfacing operation of said machine.

6. The device of claim 5 wherein the forward marginal portion of said shoe plate is inclined upwardly and the rearward marginal portion of said shoe plate is inclined downwardly with respect to the portion of said shoe plate therebetween in order to provide, respectively, a toe portion immediately rearward of the lower edge of said strike-off plate effective to pre-compact the mix on the roadway engaged thereby and a heel portion immediately forward of the leading edge of said screed plate effective to partially control flow of the mix under said screed plate.

7. The device of claim 6 wherein each of said supporting structures comprises a pair of upright bars substantially straddling its respective control bar secured at their lower ends to the inner face of said screed plate front wall and joined at their upper ends by a bracket having a horizontal lip located and apertured effective to receive the upper end of said control bar therethrough, said upper end of said control bar being provided with a threaded portion and a pair of lock nuts thereon straddling said lip and effective to adjustably secure said control bar between the opposite horizontal faces of said lip.

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