Jan. 17, 1967 J. D. LAYTON 3,298,291

PAVER SCREED ASSEMBLY

Filed Dec. 28, 1965 2 Sheets-Sheet 1

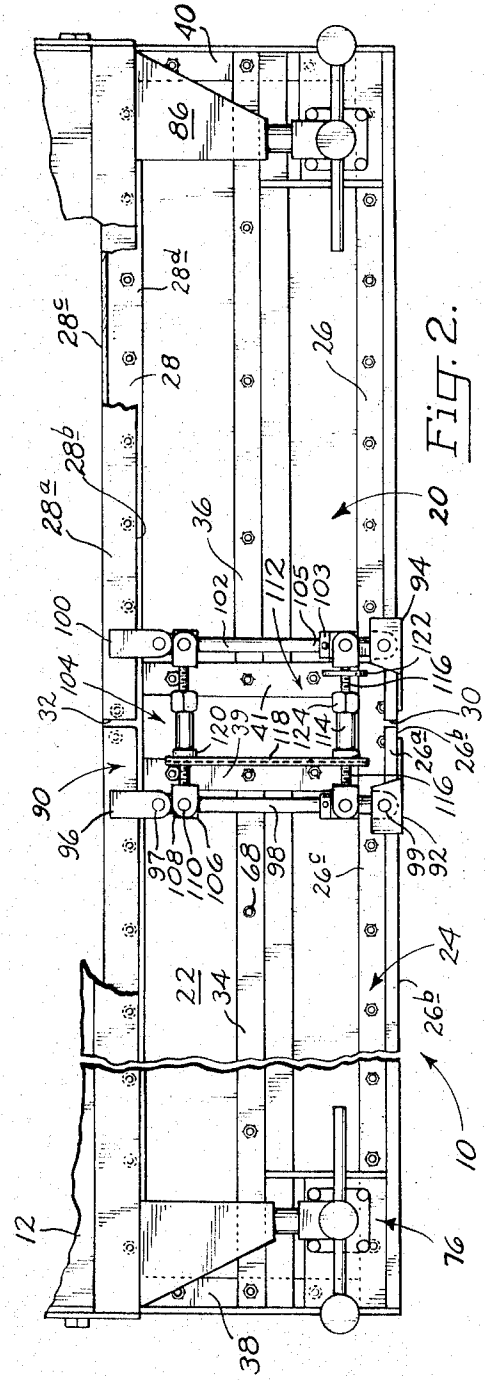


Fig. 2.

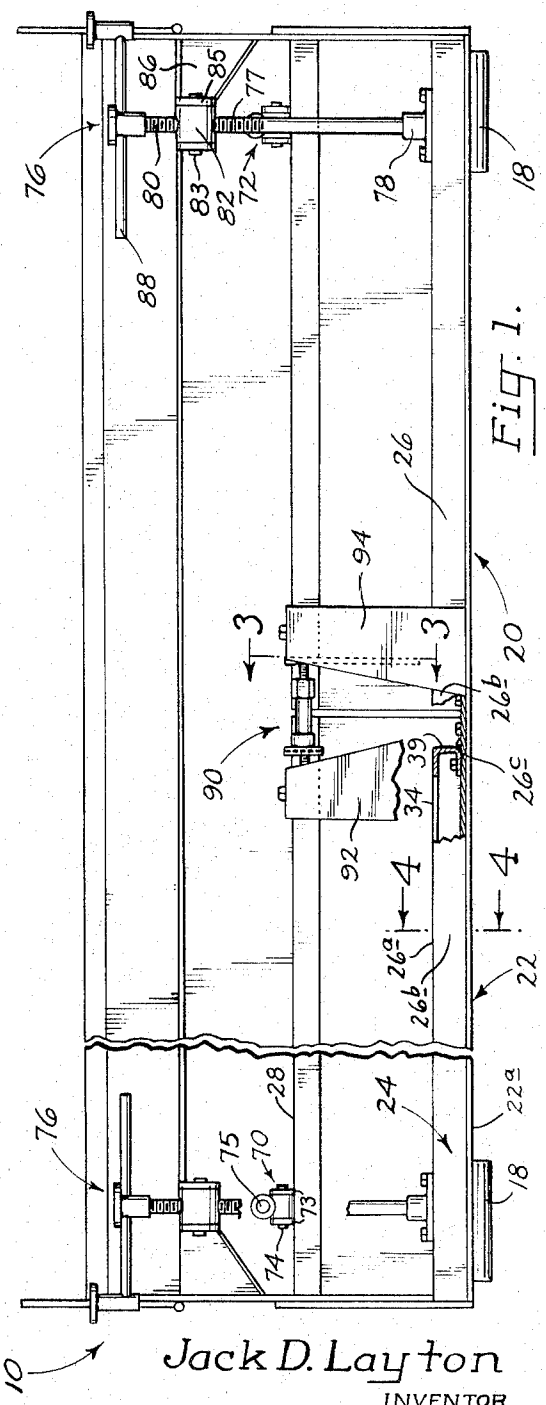


Fig. 1.

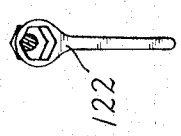


Fig. 3.

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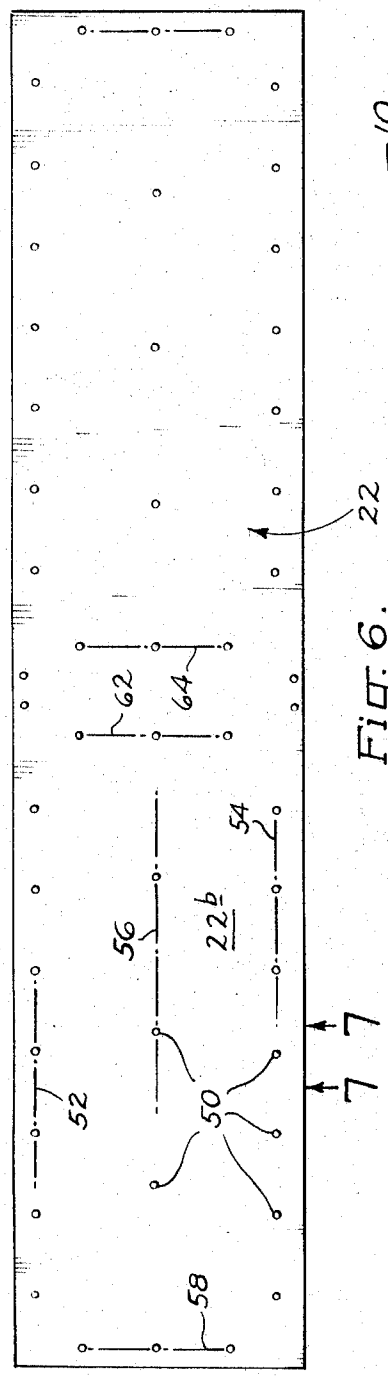



Fig. 6.

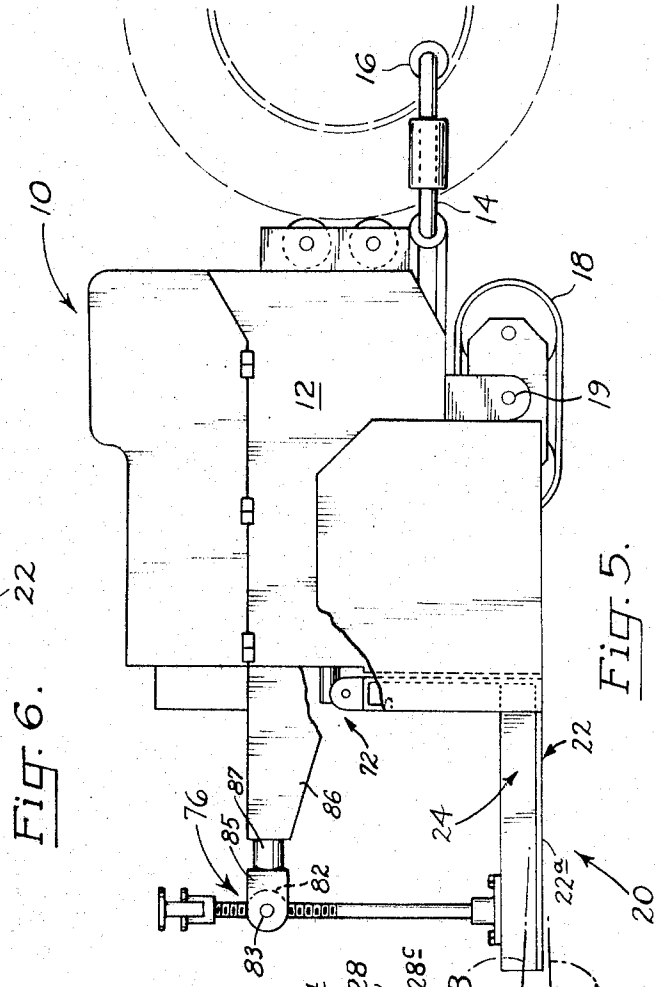



Fig. 5.

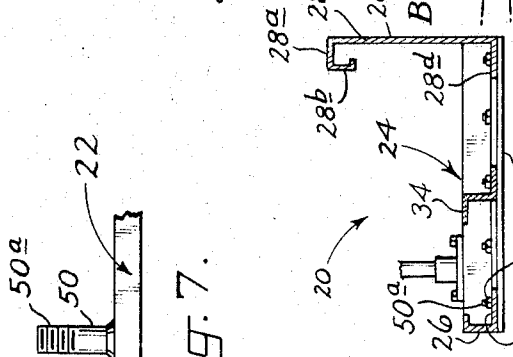



Fig. 4.




Fig. 7.

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3,298,291

# PAVER SCREED ASSEMBLY

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This invention relates to pavers, or spreaders as they are sometimes called, such as are used in depositing paving material over an area, and in smoothing and initially compacting such material.

For performing such smoothing and compacting, a paver typically may be provided with what is known as a screed assembly, which includes a screed plate that slides over and presses down on freshly laid material. Any such screed plate is subjected to considerable abrasive action while in use, which is to be expected, as it slides over the paving material in producing the preliminary compaction. This abrasive action may not be evenly distributed over the plate, but instead pronounced in certain regions, as for example, in pavers where the screed assembly, in a manner of speaking, floats on the freshly laid material, and maximum pressure is exerted on the trailing edge of the screed plate which trailing edge, as a consequence, receives the most wear.

A general object of this invention is to provide an improved screed assembly which facilitates the removal of the screed plate after wear, and the substitution therefor of a new plate.

More specifically, an object is to provide such a screed assembly where the screed plate is removable and such can be done without cutting torches, or introducing high heat in localized regions, whereby warping occurs in the plate. In this way the screed plate may be kept relatively flat when removed, and it is returnable, after turning it end for end while maintaining the bottom face down, to substitute for the trailing edge in the plate what formerly was the leading edge. The construction is ideally suited, therefore, for pavers of the type described, having screed plate assemblies that tend to float and where major wearing action is experienced along the rear margin of the plate.

Another object of the invention is to provide such a screed assembly with a detachable screed plate where the means attaching the plate into the screed assembly is done without any diminution in thickness in the plate, or other weakening, such as would tend to limit the useful life of the plate.

In a screed assembly with a detachable plate, special steel alloys may be used having considerably greater hardness than ordinary steels. For instance, plates having a Brinell hardness within the range of 360–400 have been employed. Such plates are difficult to manufacture in a completely flat state, and may come delivered to the paver manufacturer slightly twisted. This invention further contemplates a novel construction which accommodates the incorporation of such a plate into a screed assembly with the plate being flattened out on being installed.

Yet a further object of the invention is to provide a screed assembly having a degree of flexibility, wherein a controlled amount of curvature may be produced in the plate. For instance, sometimes a slight crown is desired (or maybe the reverse which is known as an invert) in the paving material load, and to produce such shaping the screed plate must have a slight concavity (or convexity, depending upon the result desired) viewing the bottom face. Further, as will be explained, the amount of curvature in the plate oftentimes should be greater nearer the lead edge of the plate than the trailing edge. In still other paving operations, it is desirable that the screed plate have an evenly distributed twist between its ends, whereby viewing the plate from one end (or from



the side of the paver) one end portion occupies a plane disposed at a slight angle relative to the end portion of the plate opposite. The construction of the invention accommodates controlled shaping of the screed plate, with substantial elimination of other curvature.

These and other objects and advantages are attained by the invention, and the same is described hereinbelow in conjunction with the accompanying drawings, wherein:

FIG. 1 is an elevation viewing the rear end of a paver constructed according to one embodiment of this invention;

FIG. 2 is a top plan view of rear portions of the paver shown in FIG. 1;

FIG. 3 illustrates a handle employed in adjusting a crown and valley adjustment mechanism provided in the apparatus;

FIG. 4 is a cross-sectional view, taken generally along the line 4—4 in FIG. 1;

FIG. 5 is a side elevation of the paver shown in FIGS. 1 and 2;

FIG. 6 is a view looking at the top face of a screed plate with the plate removed from the screed assembly, and

FIG. 7 is a view, somewhat enlarged, from the line 7—7 in FIG. 6.

Referring now to the drawings, a paver of the type that might be employed to lay paving material over a surface is indicated at **10**. The paver includes a hopper **12** utilized in collecting paving material cascading from the rear end of the dump body in a dump truck. The paver is coupled to the rear of such a dump truck through hitch arms such as the one shown at **14** having rollers, such as the roller shown at **16**, journaled on the front extremities of the arms adapted to be fitted within the rims of the rear wheel assemblies of the dump truck. Track assemblies such as track assembly **18** support the front of the paver as the same is towed over the ground. Each assembly is pivotable relative to the paver, about pivot connection **19**. A screed assembly **20** provides support for the rear end of the paver.

During the paving operation, paving material flows from hopper **12** onto the ground immediately in advance of the screed assembly, through an elongated opening (not shown) extending between the sides of the paver at the base of the hopper. The screed assembly on moving over such paving material smooths and produces preliminary compaction of the material, the compaction being promoted by reason of the fact that a substantial portion of the weight of the paver (and part of the weight of the paving material) is supported by the screed assembly. Pavers of the above-indicated general description are disclosed in further detail in my prior filed application entitled, "Coupling Mechanism," having Serial No. 454,906, filed May 11, 1965, and United States Patent 3,237,539.

Considering now the construction of the screed assembly, and the specific improvements in the construction of this assembly to which my invention relates, the base of the assembly is formed by an elongated substantially rectangular screed plate **22**. The plate is positioned with its longitudinal axis extending between the sides of the paver, or transversely of the paver, when the paver's ends are considered to be at the front and back of the paver with the paver operated in its normal fashion. Bottom face **22***a* of the screed plate (see FIG. 7) slides over paving material dumped from the hopper. Top face **22***b* of the screed plate is disposed against the underside of a screed frame, indicated generally at **24**.

The screed frame viewing the frame in plan, as shown in FIG. 2, has a substantially rectangular outline, which outline substantially matches the outline of the screed plate. Making up the screed frame is an elongated, chan-

nel-iron-shaped piece 26, extending along the rear of the screed assembly, and an elongated, channel-iron-shaped piece 28, extending along the front of the screed assembly. Top flange 26*a* and intermediate web 26*b* of piece 26 midway between the ends of the piece are cut, as at 30, to impart a degree of flexibility to piece 26 (bottom flange 26*c* remaining intact), permitting bending about an axis extending transversely of the screed plate. Referring to FIGS. 2 and 4, channel-iron-shaped piece 28 is similarly cut, at 32, through top flange 28*a*, top depending flange 28*b*, and intermediate web 28*c* (bottom flange 28*d* remining intact).

Screed frame 24 also includes longitudinal stiffeners 34, 36 of approximate Z-shaped cross section, in substantial longitudinal alignment extending over opposite end portions of the screed plate, central transverse stiffeners 39, 41 joined to the longitudinal stiffeners and to pieces 26, 28, and transverse stiffeners 38, 40 joined to adjacent ends of the longitudinal stiffeners, and also joined at their ends to channel-iron-shaped pieces 26, 28.

Screed plate 22, which may be made of a relatively hard steel and, as a typical example, may have a hardness ranging from 360–400 Brinell, is fastened to the screed frame by detachably connecting it against the undersides of the channel-shaped pieces and stiffeners described in the screed frame. More specifically, and referring to FIGS. 6 and 7, it will be noted that screed plate 22 is provided with a plurality of studs 50 which abut the top face of the plate and project upwardly from this top face. Each of the studs 50 has its base secured to the top face of the plate as by welding. In this way the stud and plate become integral, but there is no substantial diminution in the thickness of the plate or other weakening thereof in the region of the stud. This is an important point as it promotes maximum wear in the bottom of the screed plate, the construction being readily distinguishable from a construction where for example bolts extend upwardly through bores which would introduce weakened areas in the plate.

The studs are arranged in longitudinally extending rows 52, 54 which are adjacent the longitudinal margins of the screed plate, and longitudinal row 56 which row is substantially midway between the longitudinal margins. With the screed plate assembled against the bottom of the screed frame, these rows of studs become aligned with bottom flange 26*c* of channel-shaped piece 26, on bottom flange 28*d* of channel-shaped piece 28, and longitudinal stiffeners 34, 36. Also shown are studs 50 in a row 58 along one end margin of the screed plate, and studs 50 in a row 60 along the opposite margin. Between the ends of the plate are two parallel rows of studs 62, 64. These rows of studs with the plate assembled become aligned with transverse stiffeners 38, 40 and central transverse stiffeners 39, 41.

The various pieces and stiffeners in the screed frame are all provided with suitable accommodating bores which receive the studs with threaded upper ends 50*a* of the studs in an exposed position. Nuts, such as those shown at 68, screwed onto the threaded upper ends of the studs, serve to secure the plate securely against the screed frame. The connection, of course, is detachable, and permits removal of the plate merely by the removal of the nuts and subsequent dropping the plate downwardly from the base of the screed frame.

The placement of the rows of studs and the bores that receive them is such that the plate may be turned end for end while maintaining the bottom face of the plate down, to place that margin of the plate which formerly was nearest the hopper (referred to herein as the leading margin of the plate) where the margin of the plate which trailed the machine formerly was (referred to as the trailing margin), and to place the just-mentioned trailing margin of the plate in the position formerly occupied by the leading margin of the plate, with the studs after this positioning of the plate again being registrable with the various bores in the screed frame. As will later be described, the type of paver herein disclosed includes a screed which floats on the material being spread, and maximum pressures are generated usually adjacent the rear edge of the screed plate, resulting in maximum wear in this region. With the construction described permitting the plate to be turned while maintaining the bottom face down, the screed in effect has a double life. Because the connection of the plate with the frame is not by welds or similar means requiring cutting and high heats for removal of the plate, no warping or bending of the plate is introduced by the removal, and the turning of the plate in the manner described is readily accomplished with the plate on being returned having substantially the same degree of flatness as it originally had.



The screed assembly is mounted on the rear of the hopper in the paver through a pair of spaced universals shown at 70, 72 (see FIG. 1). The construction of each universal comprises ears 73 joined to and extending upwardly from the top flange of channel-shaped piece 28, which ears are journaled on a bar 74 mounted through a swivel connection 75 on the rear of the hopper. The construction enables the screed assembly to be pivoted about an axis extending generally horizontally between the sides of the paver and also permits flexing of the screed plate about a transverse axis, as when sharpening the plate for the purpose of laying a crown in the paving material spread by the paver.

It has been noted that the screed plate tends to float over paving material, while occupying a substantially horizontal position. Thus, and referring to FIG. 5, placing the screed plate so that its bottom relative to the hopper in the paver extends in the plane indicated at A in FIG. 5 results in a relatively thick spread of pavement being laid, whereas placing the screed plate with its bottom relative to the hopper in the paver extending in the plane indicated at B in FIG. 5 results in a thinner spread of pavement.

The screed assembly including the screed plate is adjusted to various positions relative to the hopper in the paver by proper adjustment of turn screw mechanism 76, one of which is provided adjacent each side of the paver. Each of these turn screw mechanisms includes a threaded shaft 77 with its base journaled in a self-aligning bearing assembly 78 mounted on the screed frame. Threaded portion 80 of the shaft passes through a nut 82 journaled at 83 on a yoke 85 for rocking movement about a horizontal axis extending between the sides of the paver. Yoke 85 is mounted on a post 86 extending rearwardly from the back of the hopper through a journal 87 permitting swiveling of the yoke about a horizontal axis extending between the front and rear ends, or longitudinally of the paver. The top of each turn screw mounts a turn handle 88.

To produce a change in the amount of crown or invert prepared in pavement laid by the paver, crown and valley adjustment mechanism 90 is provided, best illustrated in FIGS. 1 and 2. Describing this mechanism in more detail, 92, 94 indicate a pair of posts joined to and extending upwardly from channel-shaped piece 26 in the screed frame, on either side of cut 30. Extending between post 92 and a mounting 96 joined to channel-shaped piece 28 is a tension and compression-transmitting link 98, and similarly, extending between post 94 and a mounting 100 on channel-shaped piece 28 is a link 102. As seen with reference to link 98, each link has its ends pivotally connected to its respective post and mounting, as at 97, 99. A turnbuckle mechanism or extensible-contractible tension and compression transmitting means 104 connected to links 98, 102 adjacent channel-shaped piece 28, by means such as collars 106 journaled on the links for rotation about the longitudinal axis of the links and yokes 108 pivotally mounted at 110 on the collars for pivotal movement about upright axes, spaces forward portions of the links. Collars 106 and yokes 108 afford a universal type

of joint or connection between the ends of the turnbuckle mechanism and the links. A similar turnbuckle mechanism shown at **112**, spaces rear portions of the links.

Each turnbuckle mechanism includes an internally threaded sleeve **114** receiving the threaded ends of shafts **116**. On turning of the sleeve in one direction, the two shafts are caused to be retracted simultaneously into the sleeve, and rotation of the sleeve in the opposite direction produces simultaneous extension of these shafts. The sleeves for the two turnbuckle mechanisms are interconnected by simultaneous adjustment by a chain **118**, trained over sprockets, such as sprocket **120**, joined to the two sleeves. At **122** (see also FIG. 3) is a handle which may be fitted over a squared portion **124** of a sleeve, to facilitate turning of the sleeve. With the construction described, on turning one sleeve both sleeves are caused to rotate whereby there is simultaneous spreading apart or drawing together of the two links adjacent their ends.

The collars which mount the yokes **108** for turnbuckle mechanism **104** on links **98**, **102** are held from movement along the lengths of links **98**, **102**. However, the collars which mount the yokes **108** for turnbuckle mechanism **112** on links **98**, **102** may be adjusted in position along links **98**, **102** by loosening anchoring collars **103** which are clamped to the links by set screws **105**. This particular feature enables the tension in chain **118** to be adjusted.

As already mentioned, in preparing pavement a slight crown may be desired in the pavement spread, meaning that viewing the base of the screed plate the same should exhibit a slight concavity between the ends thereof. Such concavity is produced in the degree desired by proper adjustment of the crown and valley adjustment mechanism **90** just described. This results in flexing of the screed plate about an axis extending transversely of the plate located between the two links described. While this flexing is permitted, at the same time the screed frame introduces a stiffening inhibiting undesired bending in the other portions of the screed plate.

With the floating-type screed described, the rear margin of the screed plate bears against the paving material with greater pressure than the lead margin. It will be noted that the screed frame along its rear margin is braced against the hopper of the paver at regions adjacent the sides of the paver only, and is not so braced midway between its ends. The pressure exerted by the plate on paving material, and the fact that the plate is braced along its rear edge adjacent the sides of the paver only, results in some natural concavity being produced in central portions of the plate with the paver laying material, such deformation because of stressing being more noticeable in the rear margin of the screed plate than the front margin, which does not support as much weight. As a consequence, when producing a crown, the screed plate with the assembly lifted from the ground should be adjusted to have a somewhat greater concavity along its forward margin than rear margin, whereby when the plate rests on the ground and during laying of paving material, the concavity in the two regions will tend to equalize. The necessity for such difference in curvature requires that some twisting action be accommodated in the screed plate, which twisting is permitted in the type of screed frame assembly described, including as it does longitudinal stiffeners, and transverse stiffeners adjacent end margins and central portions of the plate.

In the event that the screed assembly is to be adjusted whereby a thicker spread is produced adjacent one end of the screed plate than the plate's opposite end, then the screed plate must be twisted whereby one end portion extends at a different angle relative to the rear of the hopper in the paver than the end portion of the plate opposite. To accomplish this, a removable link in the chain connecting the two turnbuckle mechanisms is removed to enable each to be adjusted independently of the other. The turn screw mechanisms connected to the ends of the screed frame are adjusted to place opposite end portions of the screed plate in proper respective angular positions relative to the hopper in the paver. The turnbuckle mechanisms are adjusted to produce a smooth transitional twisting in the plate made necessary by the difference in relative angular positions of the end portions of the screed plate. Such adjustment in the screed assembly without the introduction of undesired ripples or other bending in the screed plate is readily accomplished with the construction contemplated by the invention.

While an embodiment of the invention has been described, it should be obvious that changes and variations are possible without departing therefrom. It is desired to cover all such modifications as would be apparent to one skilled in the art, and that come within the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In a paver including a hopper for holding paving material, an elongated screed assembly for leveling paving material by movement of the assembly transversely of its length over such material; said screed assembly comprising an elongated substantially horizontal screed frame with a degree of flexibility in that it may be flexed by bending it about a transverse axis whereby its ends tend to be swung toward each other and also may be twisted about its longitudinal axis whereby adjacent one of its longitudinal side margins one of its ends may be displaced downwardly relative to its opposite end, an elongated screed plate joined to the underside of said frame, a pair of tension and compression transmitting links elevated above the screed plate extending transversely of said screed plate and frame in a region intermediate the ends of the frame, said links being spaced from each other in a direction extending longitudinally of the frame, said links having one set of adjacent ends adjacent one longitudinal side margin of the plate and an opposite set of ends adjacent the opposite longitudinal side margin of the plate, means substantially rigid with the frame connecting said sets of ends of the links to said side margins of the plate, and a tension-compression transmitting device interconnecting each set of ends of the links, at least one of said devices being extensible and contractible.

2. The paver of claim 1, wherein the screed plate has a top face facing the underside of the frame and a working face facing downwardly, and the plate is joined to the frame through multiple studs secured at their bases to the top face of the screed plate without substantial diminution in the thickness of the plate, which studs project upwardly from the top face of the plate and are disposed in at least two rows with one row containing plural studs extending along one longitudinal side margin of the plate and another row containing plural studs extending along the opposite side margin of the plate, said frame includes rows of bores receiving said multiple studs, and said studs and bores are so disposed as to enable removal and turning of the plate end-for-end while maintaining its working face down with the studs then realigning with the bores in said frame.

3. The paver of claim 1, wherein both of said devices are extensible and contractible, and each device is connected at opposite ends to the ends of the links by universal type joints.

4. In a paver including a hopper for holding paving material, an elongated screed assembly for leveling paving material by movement of the assembly transversely of its length over such material, said screed assembly including an elongated substantially horizontal screed frame and an elongated screed plate joined to the underside of said frame, means mounting said screed assembly on said hopper with one longitudinal side margin of the assembly adjacent the hopper and its opposite longitudinal side margin disposed rearwardly of its said one side margin, said means including means extending from the hopper to each of the ends of the screed assembly adja-

cent the latter's said other longitudinal side margin permitting up and down adjustment in said screed assembly, said assembly further comprising a pair of tension and compression transmitting links elevated above the screed assembly in a region intermediate the ends of the assembly extending transversely of said screed plate and frame, said links being spaced from each other in a direction extending longitudinally of the frame, said links having one set of ends adjacent said one longitudinal side margin of the assembly and an opposite set of ends adjacent the opposite longitudinal side margin of the assembly, means substantially rigid with the frame connecting said sets of ends of the links to said side margins of the screed assembly, and a tension and compression transmitting device interconnecting each set of ends of the links, said devices being connected to the links through universal type joints



and at least one of said devices being extensible and contractible.

**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,479,299 | 1/1924 | Heltzel | 94—46 |
| 1,591,593 | 7/1926 | Weller | 94—45 |
| 1,600,242 | 9/1926 | Ord | 94—45 |
| 1,990,931 | 2/1935 | Colbert | 94—45 |
| 2,342,445 | 2/1944 | Allen | 94—45 |
| 2,890,632 | 6/1959 | Madison | 94—46 |
| 2,902,909 | 9/1959 | Reissinger | 94—44 |
| 2,951,426 | 9/1960 | Pollitz | 94—46 |
| 3,041,946 | 7/1962 | Watters | 94—46 |

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