United States Patent

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[54] **ROAD SURFACING MACHINES**

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[51] **Int. Cl.**.....**E01c 19/48**

[58] **Field of Search**.....94/40, 44, 45, 46

[56] **References Cited**

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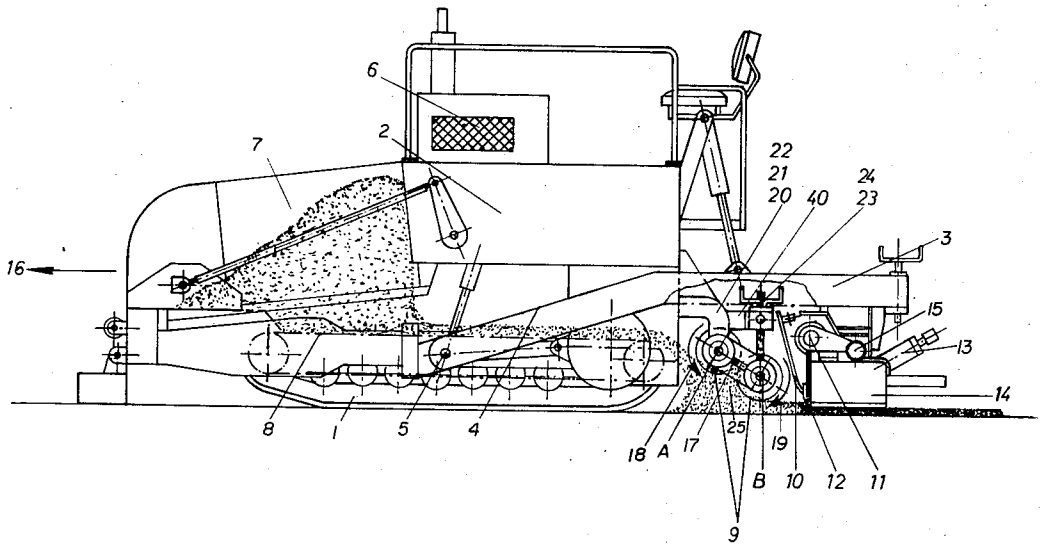
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[57] **ABSTRACT**

A road surfacing machine having two parallel material distributing screws provided one behind the other driven from their ends with the trailing screw coupled to the forwardly disposed screw and the two screws consisting of a single work unit for distributing material in the same direction. One of the two screws is vertically displaceable relative to the other.

6 Claims, 3 Drawing Figures



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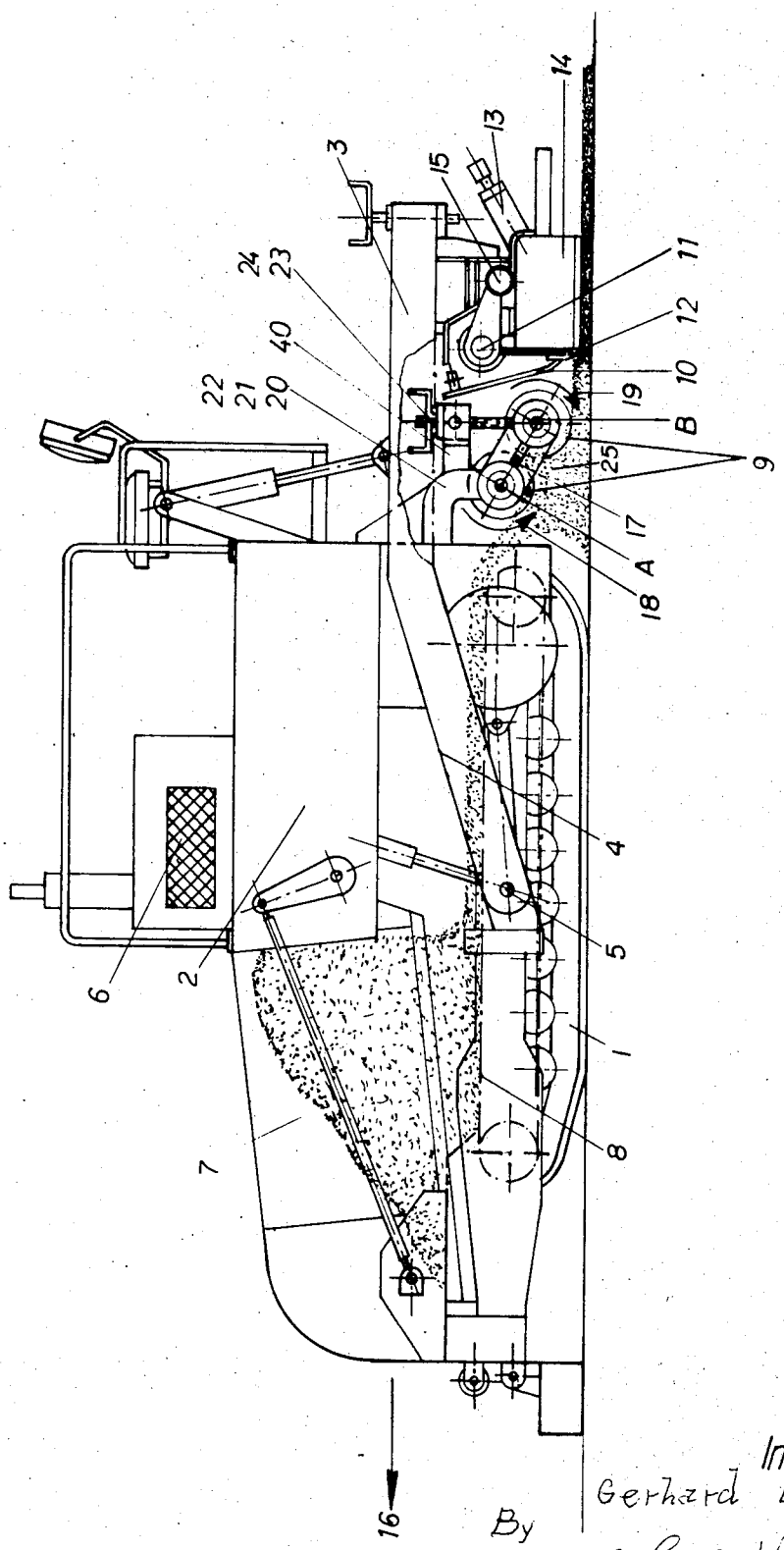


Fig. 1

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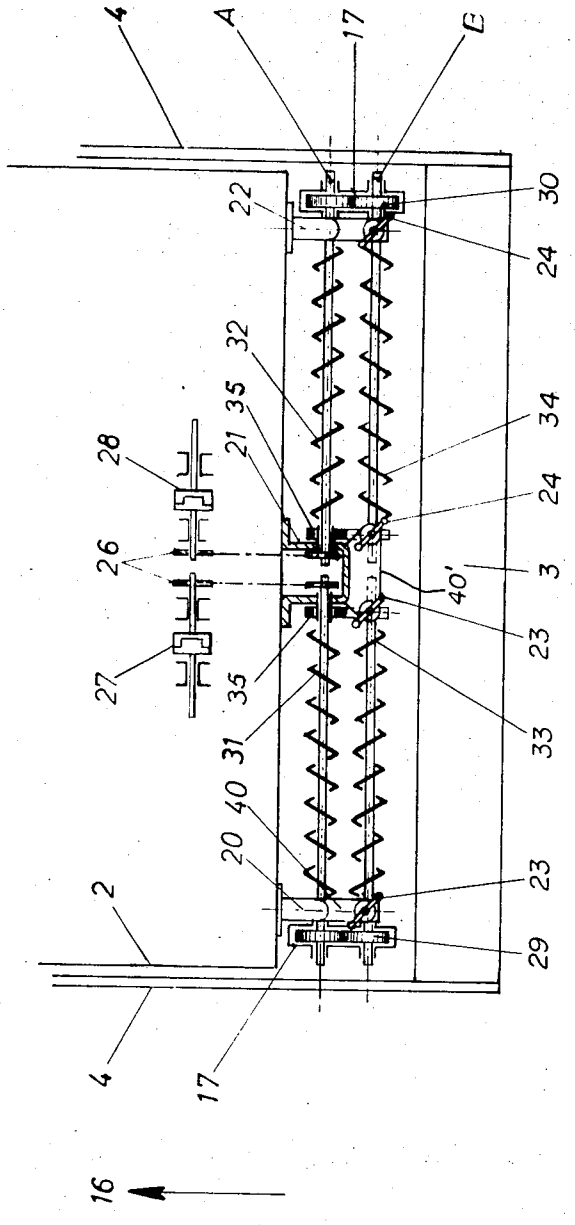
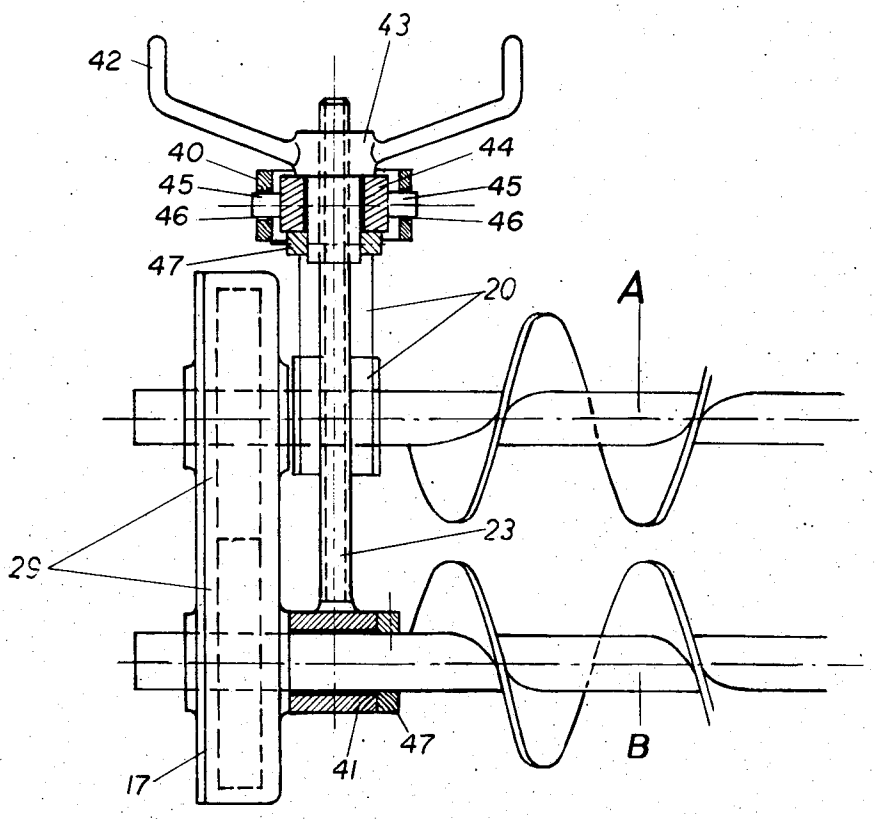


Fig. 2

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Fig. 3



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ROAD SURFACING MACHINES

The invention relates to road-surfacing machines, comprising two parallel material distributing screws, disposed one behind the other, are vertically displaceable relative to each other and are driven from their ends.

In known equipment of this kind, the material distributing screws are encased in completely separate compartments and the material is presented to the right-hand side of the machine in heaps. The presented material is then distributed over the entire width of the machine by the front screw which rotates in a separate housing. The material is thus moved to the left, and the excess material at the end is moved leftwards by so-called paddles and through an opening in a front smoothing board into the separate compartment containing the rear distributing screw, which in turn distributes the delivered quantity of material to the right and then ejects the excess material through an opening. Thus, the two material-distributing screws, disposed one behind the other, act successively in distributing the material. This system of moving excess material involves the use of considerable power and of necessity results in heavy expensive mechanisms.

The present invention is based upon the idea of limiting the distribution or displacement of material to the amount effectively required for making a good road-surface. In other words, the quantities of material moved are matched to requirements so as to enable the power of the drive mechanism to be reduced and, for practical purposes, to obviate the need for shifting excess quantities.

In accordance with the invention, it is proposed to achieve this object by hinging the trailing screw to the forwardly disposed screw, and by constituting the two screws as a single working unit for distributing the material in the same direction. The two screws form one working unit by co-operating in moving and distributing the material in the same direction. For this purpose, the turns of the distributing screws are of opposite hand and the screws rotate in opposite directions.

In a preferred embodiment of the invention, the distributing screws are coupled one to the other by means of common bearing housing in which are also accommodated meshing gears for driving the distributing screws.

In a particular embodiment of the invention, the twin screw is divided into two separately operating working units by dividing both feed screws of the twin arrangement into halves and by each of the oppositely disposed halves of the screws having opposite threads and being driven in opposite directions. In this arrangement, the halves of the screw lying to the rear of the assembly is hinged to the halves of the forwardly disposed screw.

For the purpose of vertically displacing the halves of the rearwardly disposed screw there are provided independent adjusting means which, depending upon the size of the road-surfacing machine, can be operated manually or driven by suitable mechanical, hydraulic, pneumatic or electrical means.

The working units of the twin screw arrangement are driven by way of the inner ends of the forwardly disposed screw which is mounted on the main body and which at its outer carries carrier gear wheels which

mesh with gear wheels on the outer ends of the halves of the rearwardly disposed screw. The meshing gear wheels are accommodated in end housing mounted to swing about the axis of the forwardly disposed screw.

Road-surfacing equipment embodying the invention offers the advantage that the two working units comprising the twin screw arrangement can be readily adjusted to suit the particular surfacing conditions. The height of the vertically displaceable half-screws disposed towards the rear of the support for the equipment will depend upon the particular thickness of surface to be laid. When varying amounts of surfacing materials are required, the working units constituted by the twin screws can be set at different heights.

Further details and advantages of the invention will appear from the following description of a preferred embodiment given by way of example and, illustrated in the accompanying drawings, in which:

FIG. 1 is a side-view of a machine for laying a black-top surface and shows the twin screw of the invention in the operating position for laying the surface,

FIG. 2 is a schematic plan view of the twin screw, and

FIG. 3 is a sectional view of a height-adjusting means on one of the halves of the trailing screw.

The machine for laying black top surfaces illustrated in FIG. 1 is carried by a tracked vehicle **1**, and its two main groups consist of the main body **2** and a structure **3** for supporting the equipment which is linked to the main body by means of two beams **4** pivoted as at **5** on both sides of the body, the height of which can be adjusted.

In addition to the track **1**, the main body **2** contains further principal parts, namely a drive motor **6** together with gears and transmission elements disposed within the frame of the machine, a container **7** for the surfacing material, a conveyor belt **8** and, at the end of the machine-frame, a twin screw **9** for the transverse distribution of the surfacing material in front of the surfacing implements carried by the support **3**.

The components and implements of importance in the surfacing operation are suspended from the support **3** and can be set in positions to suit the cross-section of the surface to be laid. These components and implements are an inclined front wall **10**, a tamping board or impact blade **12** which is moved upwards and downwards by means of an eccentric shaft **11**, and a smoothing board **14** which is heated by a burner **13** and which is also caused to vibrate by a vibrating mechanism **15**.

The mixed material used for the surfacing is delivered into the container **7** from a supply vehicle, not illustrated, but which may conveniently be a dump truck. While the tracked vehicle **1** moves the surfacing machine in the direction **16** in which the surface is to be applied, the conveyor belt **8** continuously draws material from the container **7** and deposits it on the ground behind the main body **2** and in front of the twin screw **9**.

The twin screw **9** consists of two screws A and B arranged parallel to, and alongside, each other, these screws also being illustrated in FIG. **2**. Both screws are divided at the middle. The height of the forwardly disposed screw A is fixed to match the greatest possible thickness of surface material. Its two halves are secured to the frame of the main body **2** by means of brackets

20, 21 and 22. Provided at both outer ends of the screw A are end housings 17 which also contain the transmission elements by which the trailing screw B is rotated at the same speed as, but in the opposite direction to, the forward screw A, as shown by the arrows 18 and 19. The two halves of screw B are adapted to be adjusted vertically upwards and downwards, relative to the two corresponding halves of the forward screw A, being supported at their inner ends the screw B halves being supported at their outer ends in the two end housings 17 and by means of bearing brackets 35 which are swingably mounted further inwards on both sides of the middle bracket 21. For the purpose of obtaining the required vertical setting of the halves of the screw B, elevating spindles 23 and 24, supported at the outer ends of screw halves B by cantilever arms 40 and at the inner ends of screw halves B by cantilever arm 40' secured to bracket 22 (FIG. 3), secured to the equipment, are provided at both ends of the halves, the spindles having at their lower ends bottom bearings in which the half-screws B are rotatably mounted, while the upper ends of the spindles co-operate with nuts 43 carrying grips or hand-wheels 42 and held in hinge-pin rings 44. The pins 45 on these hinge-pin rings pass through holes 46 in the cantilever arms 40 and 40' secured to the equipment. Adjusting rings 47 are used for longitudinally positioning the nuts 43 and for fixing the lateral positions of the spindle bottom bearings 41. In this way, the half-screws can be vertically set by rotating the nuts 43, the half-screws B being raised or lowered depending upon the direction of rotation. The nuts 43 and spindles 23, 24 can participate in the swinging movement of the half-screws B about the half-screws A because of the pivotal mounting of the nuts 43 spindles 23 and 24 therefore pivot about pins 45 during vertical adjustment of screw halves B to accommodate engaging gears 29. Any other suitable mechanical, hydraulic, pneumatic or electromechanical actuating means can of course be used to adjust the height of the two halves of the rear screw B independently, to suit the thickness of the required surfacing layer.

In the embodiment illustrated in FIG. 1, the screw B is shown moved to a low position on the assumption that a small thickness of surfacing material is to be laid. As illustrated in the drawing, the transverse movement of the surfacing material deposited on the ground is achieved in the space 25 between the two screws A and B. The screw B allows only as much material to pass beneath it as is required for a surface layer of the intended thickness. In this way, the hitherto usual large heap of material in front of the front wall 10 of the support 3 for the equipment is avoided, and the tractive forces required in the drive for advancing the road-surfacing machine are advantageously reduced, and this leads to improved use of the machine particularly when the working widths are great and the sub-soil is unreliable.

In the schematic illustration provided by FIG. 2, the arrangement of the twin screw 9 is shown in plan view. Both halves of the screw A are driven individually in the same direction by a motor, not shown, and through gearing 26, and can be engaged and disengaged as required by means of clutches 27 and 28. The two halves of the vertically adjustable screw B, arranged parallel to the screw A, can each be driven in opposite directions, as indicated by the corresponding halves of the screw A through pairs of gears 29 and 30 disposed at the ends in the housings 17. FIG. 2 also shows that the threads 31 and 32 of the two halves of the front screw A are of opposite hand. The threads 33 and 34 of each of the parallel halves of the screw B again are of opposite hand to the threads 31 and 32, i.e., the hand of the thread 33 is opposite to that of the thread 31, and the hand of the thread 34 is opposite to that of the thread 32. As a result of these opposite directions of the threads of the screws, the surfacing material passed to the middle of the equipment in front of the two halves of the twin screws is moved away from the middle of the equipment on both sides of the road-surfacing machine and is distributed uniformly over the width of the surfacing run since it is dispensed at a rate corresponding to the vertical setting of the rear screw B.

What is claimed is:

1. A road surfacing machine including a frame and two parallel material distributing screws constituting an operating unit for the distribution of surfacing material in the same direction, a gear wheel mounted at opposite ends of each said screw, respective pairs of said gear wheels being in meshing engagement at said opposite ends, means for rotating said screws, one of said screws being disposed behind the other in the direction of machine travel, means for mounting said one screw for vertical adjustment relative to said other screw, so that said one screw will distribute surfacing material at a different level as compared to said other screw, said means including a spindle pivotally mounted at one end near opposite ends of said one screw, the other end of each said spindle being pivotally mounted to said frame, and means cooperating with each said spindle for effecting the vertical adjustment of said one screw relative to said other screw.

2. The machine according to claim 1 wherein each said distributing screw has screw threads of opposite pitch with respect to one another.

3. The machine according to claim 1 wherein a common housing is provided for each said pair of gear wheels.

4. The machine according to claim 1 wherein each of said screws comprises a pair of screw sections, bearing bracket means on said frame being provided for the inner ends of each said section.

5. The machine according to claim 4 wherein another spindle is pivotally mounted at one end near said inner ends of each said section of said one screw whereby each said section of said one screw is independently adjustable vertically relative to their respective sections of said other screw.

6. The machine according to claim 5 wherein said drive means include means for driving each pair of said screw sections independently of one another.

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