Nov. 24, 1931. T. THORSON 1,832,951

TROWELING MACHINE FOR PAVING

Filed Oct. 14, 1929 3 Sheets-Sheet 1

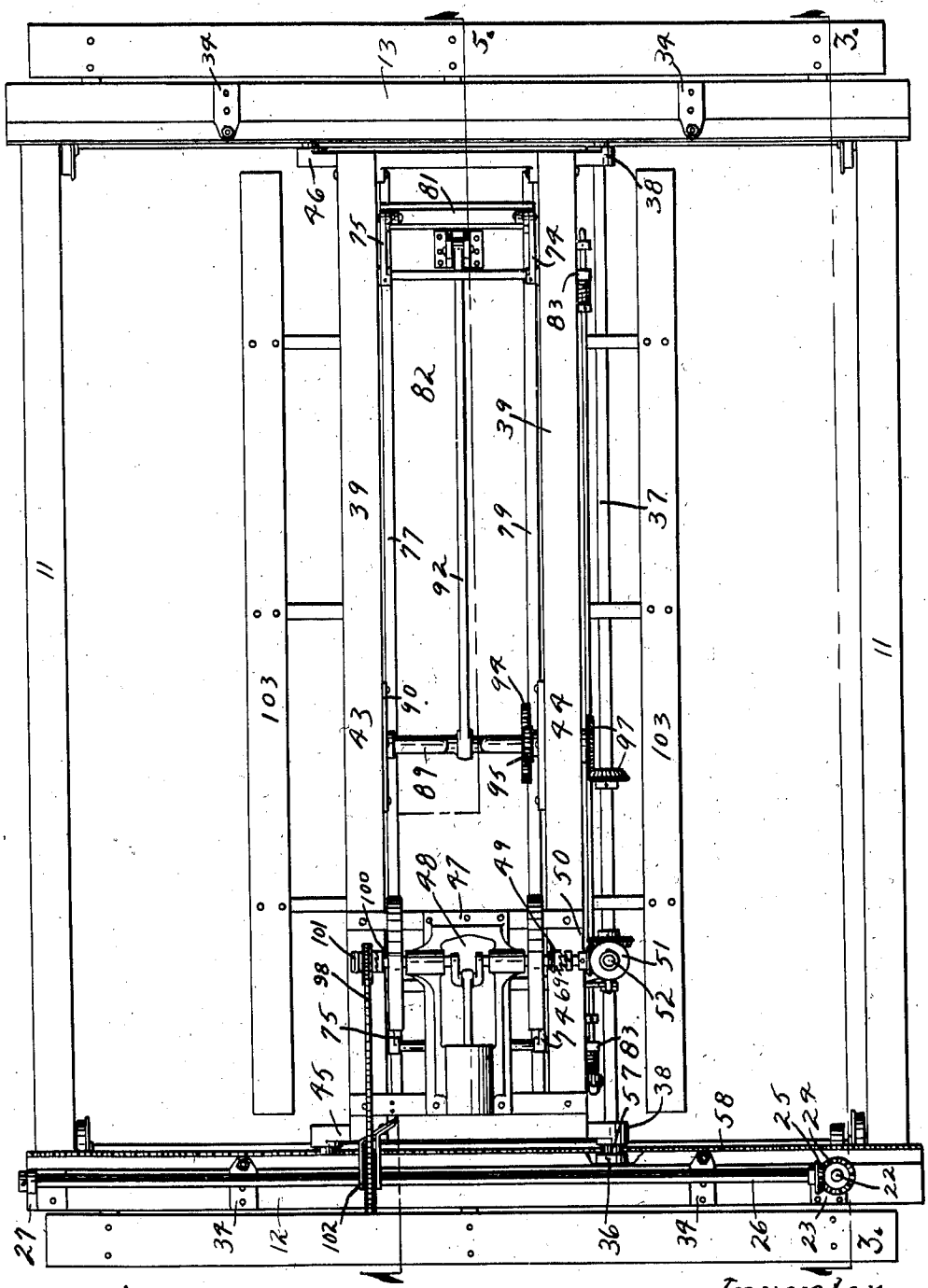


Fig. 1.

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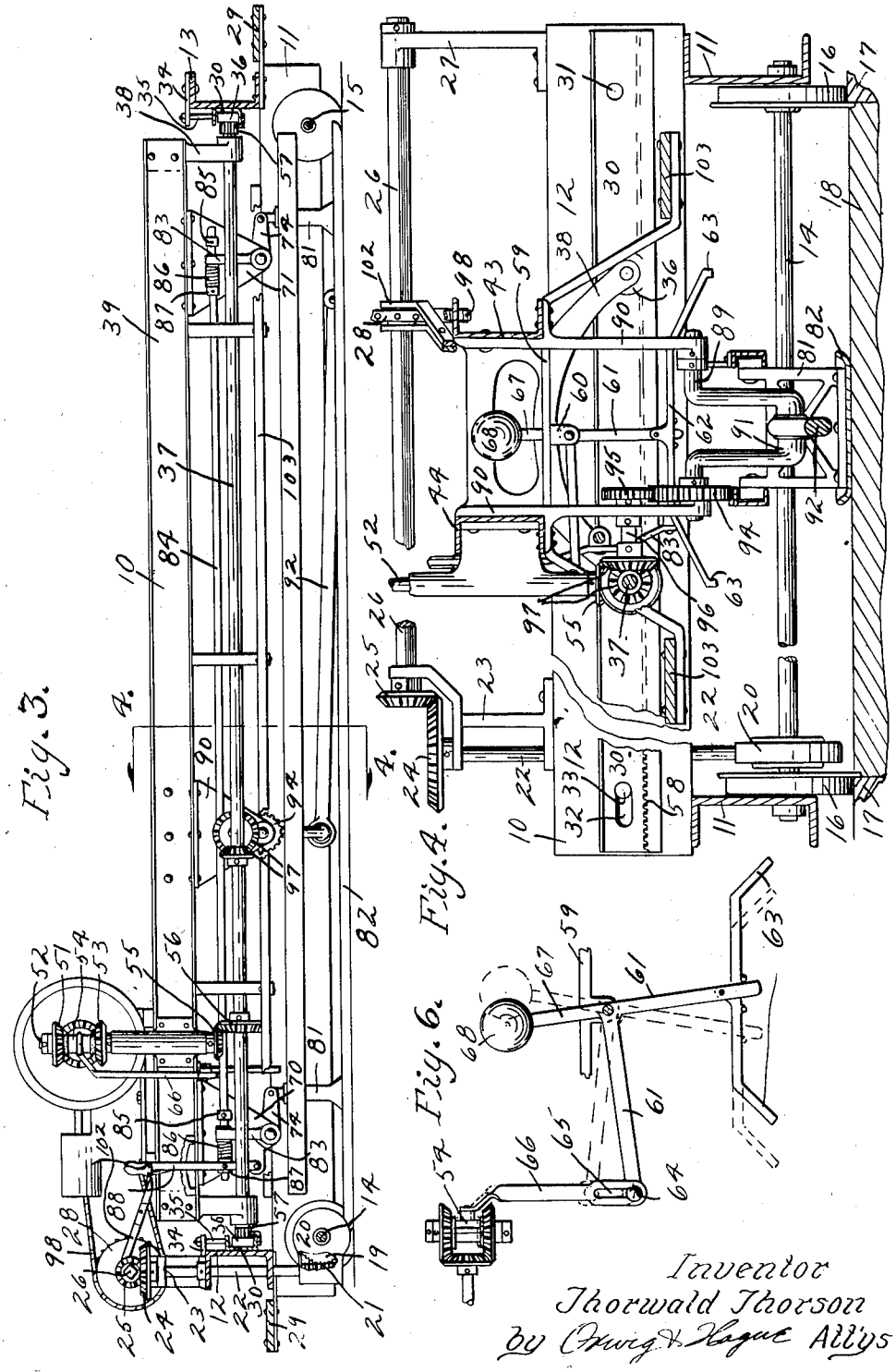


Fig. 3.

Fig. 4.

Fig. 6.

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TROWELING MACHINE FOR PAVING

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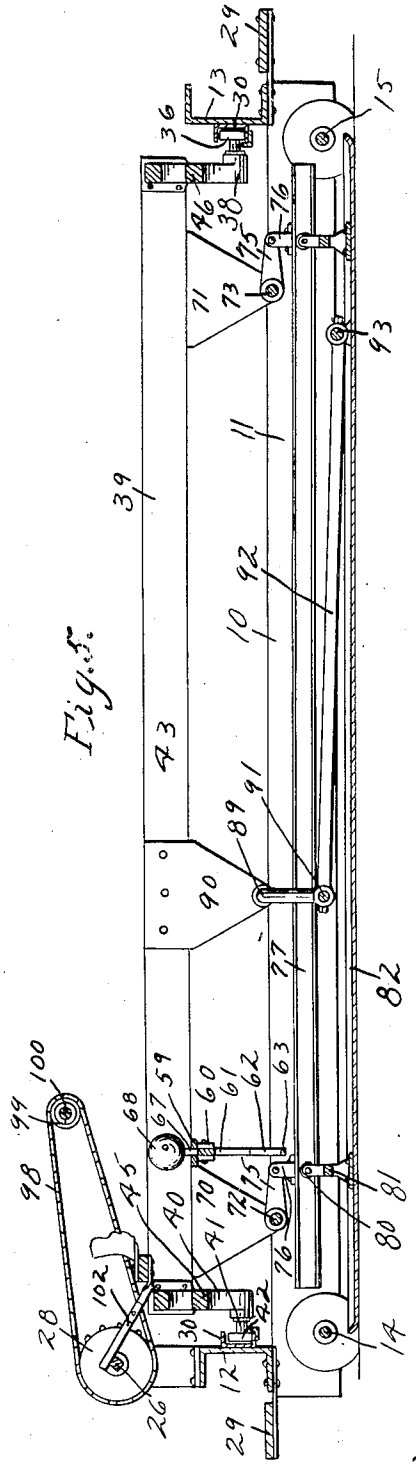


Fig. 1.

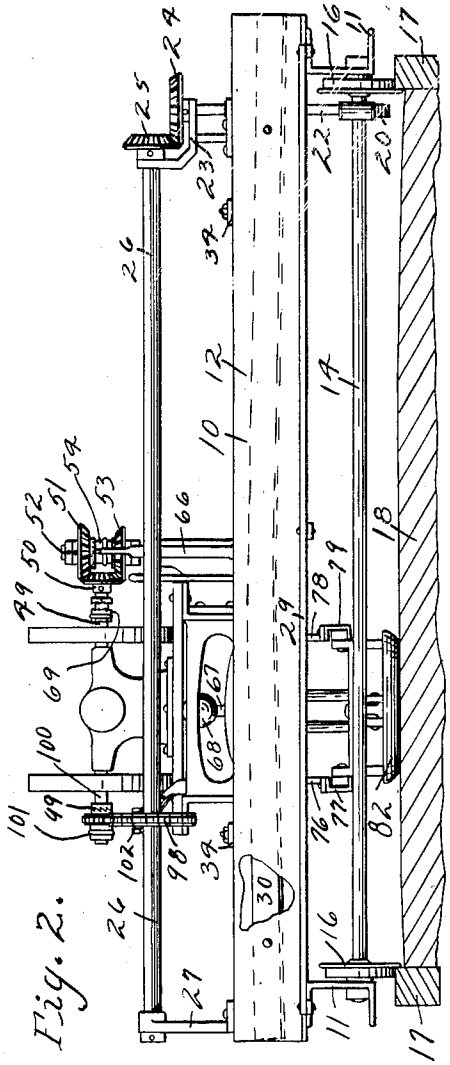


Fig. 2.

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Patented Nov. 24, 1931

1,832,951

UNITED STATES PATENT OFFICE

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TROWELING MACHINE FOR PAVING

Application filed October 14, 1929. Serial No. 399,515.

This invention relates to improvements in machines for building cement paving.

Cement or concrete paving is usually constructed between a pair of forms which extend longitudinally of the roadway and spaced apart a distance equal to the width of the paving. The space between the forms is filled with plastic concrete, after which the top surface is troweled either manually or mechanically, usually with the trowel moving transversely of the paving. The troweling machine is usually advanced forwardly intermittently so that the finished surface of the paving has a series of laterally extending depressions which are more or less uniformly spaced so that the top surface of the concrete is of a wave formation, which results in a very unpleasant sensation as an automobile is advanced over the roadway.

It is, therefore, the object of my invention to provide a troweling machine adapted to follow the ordinary paving machines and to trowel out the waves in the upper surface of the concrete while it is in a plastic condition, and which is accomplished by a comparatively long trowel supported longitudinally of the roadway, and provided with suitable mechanism for reciprocating the trowel longitudinally and at the same time transversely, the entire troweling mechanism being advanced forwardly at a uniform speed.

More specifically it is the object of my invention to provide a troweling machine adapted to move longitudinally of the roadway, having a comparatively long trowel arranged longitudinally of the roadway, and to provide suitable mechanism whereby the trowel will be automatically reciprocated longitudinally, and whereby the trowel will be moved laterally, and in connection therewith means for automatically reversing the lateral movement of the trowel as it reaches each side of the pavement.

A further object is to provide in a troweling machine adapted to move longitudinally of a roadway, and having a comparatively long trowel mounted longitudinally of the roadway, means for reciprocating the trowel longitudinally and laterally, and means for raising and lowering the trowel, said raising and lowering means including means for applying yieldable pressure to the trowel in such manner that either end of the trowel will be slightly elevated independently of the other.

A further object is to provide in a troweling machine adapted to move longitudinally of the roadway, and having a longitudinally extending and reciprocating trowel, means for moving the trowel laterally while it is being reciporcated and for causing the trowel to move laterally through a curved path, and to provide in connection therewith means whereby the curvature of the path may be varied.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of my improved troweling machine.

Figure 2 is an end elevation of the same.

Figure 3 is a longitudinal sectional view taken on the line 3—3 of Figure 1.

Figure 4 is an enlarged, detail, sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a longitudinal sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a detail view of the mechanism for reversing the movement of the carriage.

My improved troweling machine comprises a truck 10 formed of a pair of side members 11 spaced apart a distance slightly greater than the width of the pavement, and having their ends connected by cross members 12 and 13. The side members 11 are supported by shafts 14 and 15 mounted in suitable bearings near the ends of the side members. The said shafts are carried by flanged wheels 16 designed to operate on tracks 17 which provide forms for the concrete bed 18.

The truck 10 is adapted to be moved longitudinally of the roadway and is provided with means for advancing the same, which comprises a worm gear 19 mounted on one end of the shaft 14 and in a suitable housing 20. The worm gear 19 is driven by a worm 21

mounted on a vertical shaft 22 rotatively mounted in the frame member 12, and has its upper end suported in a bracket 23.

The upper end of the shaft 22 is provided with a bevel gear 24 designed to mesh with a bevel pinion 25 mounted on a square shaft 26. The shaft 26 is rotatively mounted in suitable bearings carried by the bracket 23, and a bracket 27, the shaft extending longitudinally above the frame member 12. A sprocket wheel 28 is slidably mounted on the shaft 26 and provides means for rotating said shaft by mechanism hereinafter described. By rotating the shaft 26, the truck may be moved longitudinally of the tracks 17.

Each of the cross members 12 and 13 is provided with a foot board 29 supported above the concrete bed a slight distance, so that an operator may stand on the same and do any hand work that may be desired, and also provides a platform for the operator of the machine.

Mounted adjacent to the inner face of each of the cross members 13 and 12 is a track 30 in the form of a channel iron. Each of the tracks 30 is placed with its web portion adjacent to the inner face of the cross members, and each has one end pivotally connected thereto by a pivot 31. The opposite end of each of the tracks is provided with a slot 32 for receiving a pin 33 mounted in the cross members.

The top edge of each of the cross members 12 and 13 is provided with a pair of brackets 34, each of which is provided with a bolt 35 mounted in the upper flange of each of the tracks 30. Said bolts provide means whereby the central portion of the tracks 30 may be bent upwardly so that the tracks may be made to have the same curvature as the paving. The slot 32 permits any end movement of the tracks due to the bending of the same.

Supported in one end of each of the tracks 30 is a roller 36 provided with a shaft 37 having bearings 38 for suporting one side of the carriage frame 39. The opposite side of the carriage frame 39 is provided with downwardly extending bearings 40, each of which is provided with a stub shaft 41 having a roller 42 mounted in the tracks 30.

The carriage comprises side members 43 and 44 and end members 45 and 46. One end of the carriage 39 is provided with an engine bed 47 on which is mounted an engine 48 having a drive shaft 49 provided with a bevel gear 50 designed to mesh with a bevel gear 51 mounted on a vertical shaft 52. The bevel gear 50 is also in mesh with a bevel gear 53 rotatively mounted on the shaft 52. A clutch member 54 is slidably mounted on the shaft 52 between the gears 51 and 53 and designed to coact with the gear 51 when at its upper limit of movement, and with the gear 53 when at its lower limit of movement. Said clutch 54 is of the friction type and adapted to operatively connect the shaft 52 with the shaft 49 through either of the gears 51 or 53, and to provide means for imparting reverse movement to said shaft 52.

The lower end of the shaft 52 is provided with a bevel gear 55 designed to mesh with a bevel gear 56 mounted on the shaft 37. Each end of the shaft 37 is provided with a pinion 57 designed to mesh with racks 58 mounted on the lower flanges of the tracks 30, thus providing means whereby the carriage will be moved transversely of the truck as the shaft 37 is rotated by the engine 48.

The under surfaces of the frame members 43 and 44 are provided with a bar 59. The central portion of the bar 59 has a downwardly extending bracket 60 in which is mounted a bell crank lever 61. The downwardly extending arm of said bell crank is provided with a trip bar 62 having each end provided with a downwardly extending portion 63 designed to engage the side members of the truck when the carriage is at either of its limited lateral positions of movement.

The horizontal member of the bell crank 61 is provided with a pin 64 slidably mounted in a slot 65 of a vertically arranged bar 66, the upper end of which is operatively connected with the clutch member 54. The bell crank lever 61 is provided with an upwardly extending arm 67 on which is mounted a weight 68.

The parts are so arranged that if the carriage is advanced toward the right, as illustrated in Figure 4, then the right hand member 63 will engage the frame member 11, causing the downwardly extending arm of the bell crank to be moved to the left and the pin 64 to be elevated in the slot 65, and the weight 68 to be thrown to the right of a vertical center line extending through the pivot of the bell crank. The weight 68 will then throw the pin 64 upwardly and cause the bar 66 to be elevated and the clutch member 54 to engage the gear 51, which in turn will cause the carriage 39 to be reversed and moved toward the left. A reverse operation will take place when the carriage reaches the left position of movement. Means is thereby provided whereby the carriage will be automatically reciprocated laterally.

The shaft 49 is provided with a clutch member 69 by means of which the gear 50 may be operatively connected or disconnected. Suitable lever arrangement may be provided for operating the clutch.

The under surfaces of the frame members 43 and 44 are provided with brackets 70 and 71. The brackets 70 are designed to support a rock shaft 72 and the brackets 71 are designed to support a rock shaft 73. Each of the rock shafts is provided with rock arms 74 and 75. The rock arms 75 have downwardly extending links 76 designed to sup-

port a track 77. The rock arms 74 have downwardly extending links 78 designed to support a track 79. Said tracks 77 and 79 are designed to receive rollers 80 and to support brackets 81 to which the trowel 82 is connected.

The tracks 77 and 79 provide guides whereby the trowel will be permitted to move longitudinally and to provide means whereby the trowel may be moved laterally as the said tracks are moved laterally. Each of the rock shafts 72 and 73 is provided with an upwardly extending arm 83. The upper ends of said arms 83 are slidably mounted on a shaft 84. Said shaft 84 is provided with collars 85 to engage the adjacent sides of the arms 83. The shaft 84 is also provided with springs 86 to engage the opposite side of the arms 83, said springs resting against collars 87, and imparting yieldable pressure in a clockwise direction to the upper ends of the arms 83, as illustrated in Figure 3, and applying yieldable downward pressure to the trowel 82.

A lever 88 has one end pivoted to one of the brackets 70 and is pivoted with one end of the shaft 84, and provides means whereby the tension of the springs 86 may be increased or decreased by moving the upper end of the lever forwardly or rearwardly, and also provides means whereby the trowel may be elevated by moving the upper end of the lever 88 to the left, as illustrated in Figure 3, which will cause the collars 85 to engage the upper ends of the arms 83.

It will be seen that the springs 86 provide means whereby yieldable pressure is applied independently to each end of the trowel, thus permitting one end to be elevated or lowered in advance of the other, and to cause the trowel to adapt itself to slight irregularities in the surface of the paving.

A crank shaft 89 is mounted in suitable brackets 90 secured to the frame members 43 and 44, having a crank 91 to which a connecting rod 92 is connected, one end of which is pivotally connected to the trowel 82 by means of a pivot 93. Rotation of the crank shaft 89 will cause the trowel 82 to be reciprocated longitudinally.

One end of the crank shaft 89 is provided with a gear 94 in mesh with a gear 95 supported on the shaft 96 carried by one of the brackets 90. The shaft 96 is operatively connected with the shaft 37 by suitable bevel gears 97. The shaft 37 provides means whereby the crank shaft 89 is rotated.

The sprocket wheel 28 is driven by means of a chain 98 mounted on a sprocket 99 carried by the engine shaft 100. A clutch member 101 is provided for operatively connecting and disconnecting the sprocket 99 and the engine shaft 100. An arm 102 is carried by the engine frame and is operatively connected with the sprocket 28 whereby said sprocket will be moved longitudinally of the shaft 26 as the carriage 39 is reciprocated laterally. Each side of the carriage 39 is provided with a foot board 103.

The operation of my device is as follows:

Assuming that the truck 10 has been placed on the tracks 17, and that the preliminary laying of the concrete bed 18 has taken place, the trowel 82 is then lowered into position by means of the lever 88 and any desired pressure applied thereto. The clutch members 69 and 101 are then operated, causing the shafts 52 and 26 to be rotated, the shaft 26 causing the truck 10 to be advanced forwardly at a very slow speed and the trowel to be reciprocated longitudinally at a considerably higher speed, and the carriage to be moved laterally at a low speed, so that a comparatively large amount of longitudinally force may be applied to the upper surface of the concrete bed to smooth out any lateral depressions and ridges.

Inasmuch as the advance of the truck is comparatively slow, one transverse path formed by the trowel will be overlapped by the second path, so that the entire surface of the concrete bed is trowled a number of times, resulting in a very smooth and uniform surface.

I claim as my invention:

1. A troweling machine comprising a truck, a carriage, a horizontally supported trowel, means for advancing the truck, means for reciprocating the carriage transversely of the advance of the truck, means for reciprocating the trowel longitudinally of the movement of the truck, means for elevating and lowering the trowel, said means including yieldable means whereby one end of the trowel may be elevated slightly relative to the other end, and means whereby yieldable pressure may be applied to both ends of the trowel.

2. A troweling machine comprising a movable truck, a horizontally supported trowel, means for reciprocating the trowel longitudinally of the movement of the truck, means for applying yieldable pressure independently to each end of said trowel, means for increasing or decreasing the pressure of said pressure applying means, and means for elevating the trowel.

3. A troweling machine comprising a truck, a carriage adapted to move transversely of said truck, said carriage having supporting rollers, tracks carried by said truck in which said supporting rollers are mounted, means for changing the curvature of said tracks, a trowel carried by said carriage, and means for operating the trowel.

4. A troweling machine comprising a truck adapted to move longitudinally of a paving, a trowel adapted to move longitudinally of the paving and to be reciprocated relative to said truck, and means for moving said trowel laterally in a curved path, said means

including means whereby the curvature of the path may be varied.

5. A troweling machine comprising a truck adapted to move longitudinally of a paving, a carriage carried by said truck and mounted to move transversely of said truck, a horizontally arranged trowel carried by said carriage, a power device supported by said carriage, means actuated by said power device for reciprocating the trowel longitudinally of said paving and relative to said carriage, means operated by said power device for reciprocating said carriage transversely, and means actuated by said power device for advancing said truck, and hand actuated means for causing said trowel, said carriage and said truck to be simultaneously operated.

6. In a troweling machine having a carriage adapted to move longitudinally and transversely of a paving, a comparatively long and narrow trowel arranged longitudinally of the paving and means for reciprocating the trowel longitudinally as the carriage is simultaneously moved longitudinally and transversely.

7. In a troweling machine having a carriage adapted to move longitudinally and transversely of a paving, a comparatively long and narrow trowel arranged longitudinally of the paving, means for reciprocating the trowel longitudinally as the carriage is moved both longitudinally and transversely, and means for applying yieldable downward pressure to said trowel.

8. A troweling machine comprising a truck, a carriage mounted to move transversely of said truck, means for guiding said carriage in a curved transverse path, means for varying the curvature of said path, a trowel carried by said carriage, truck advancing means, means for simultaneously operating said trowel and said carriage, and means for advancing said truck.

Des Moines, Iowa, September 26, 1929.

THORWALD THORSON.