Feb. 14, 1933. D. G. CLIFFORD 1,897,605

CONCRETE LAYING MACHINE

Filed March 17, 1930 5 Sheets-Sheet 1

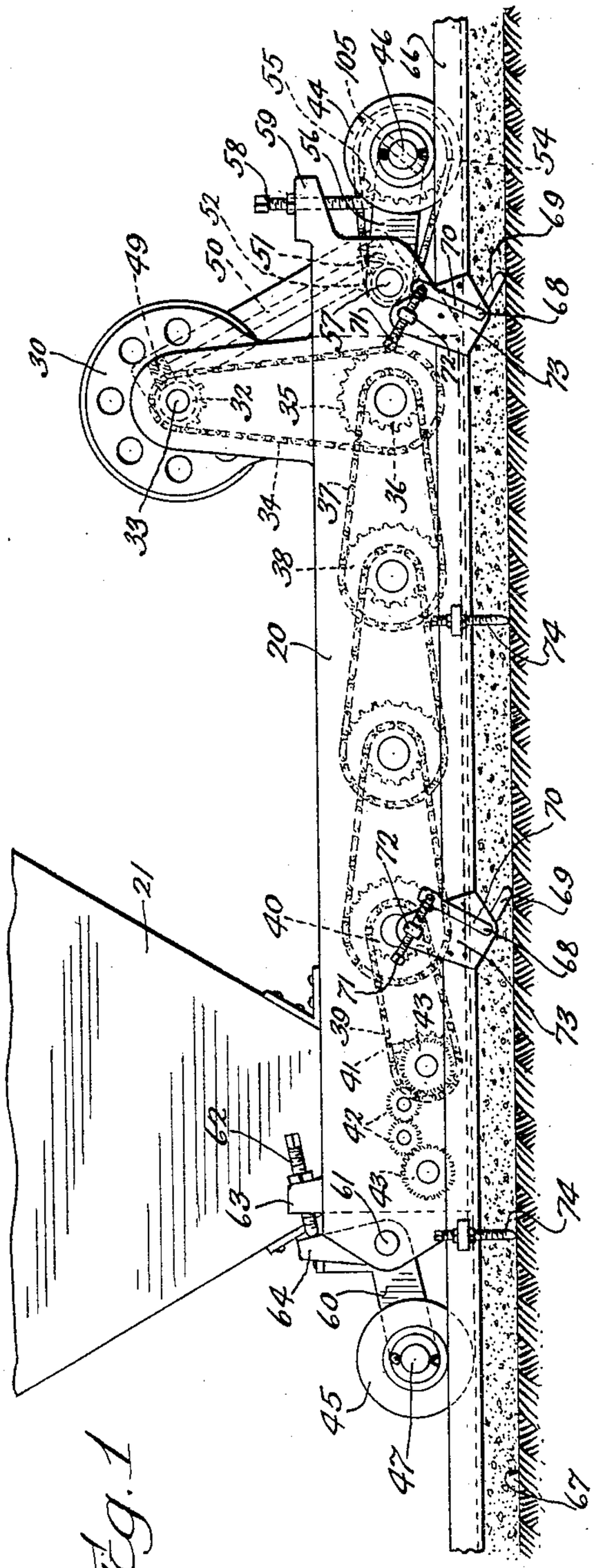

Fig. 1

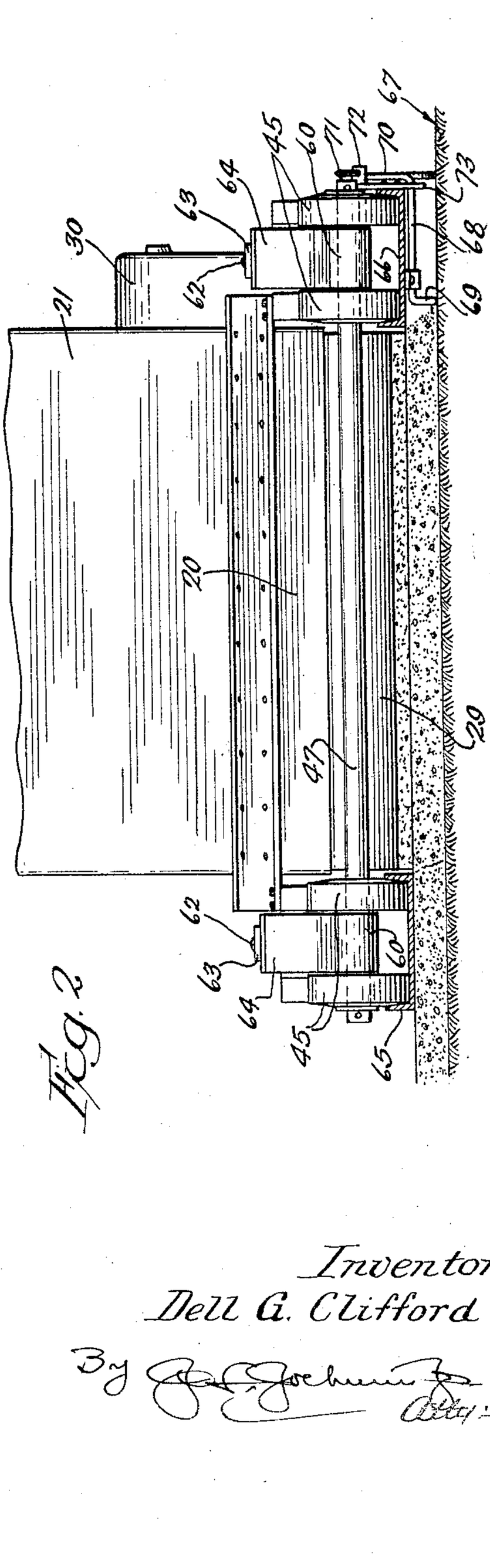

Fig. 2

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CONCRETE LAYING MACHINE

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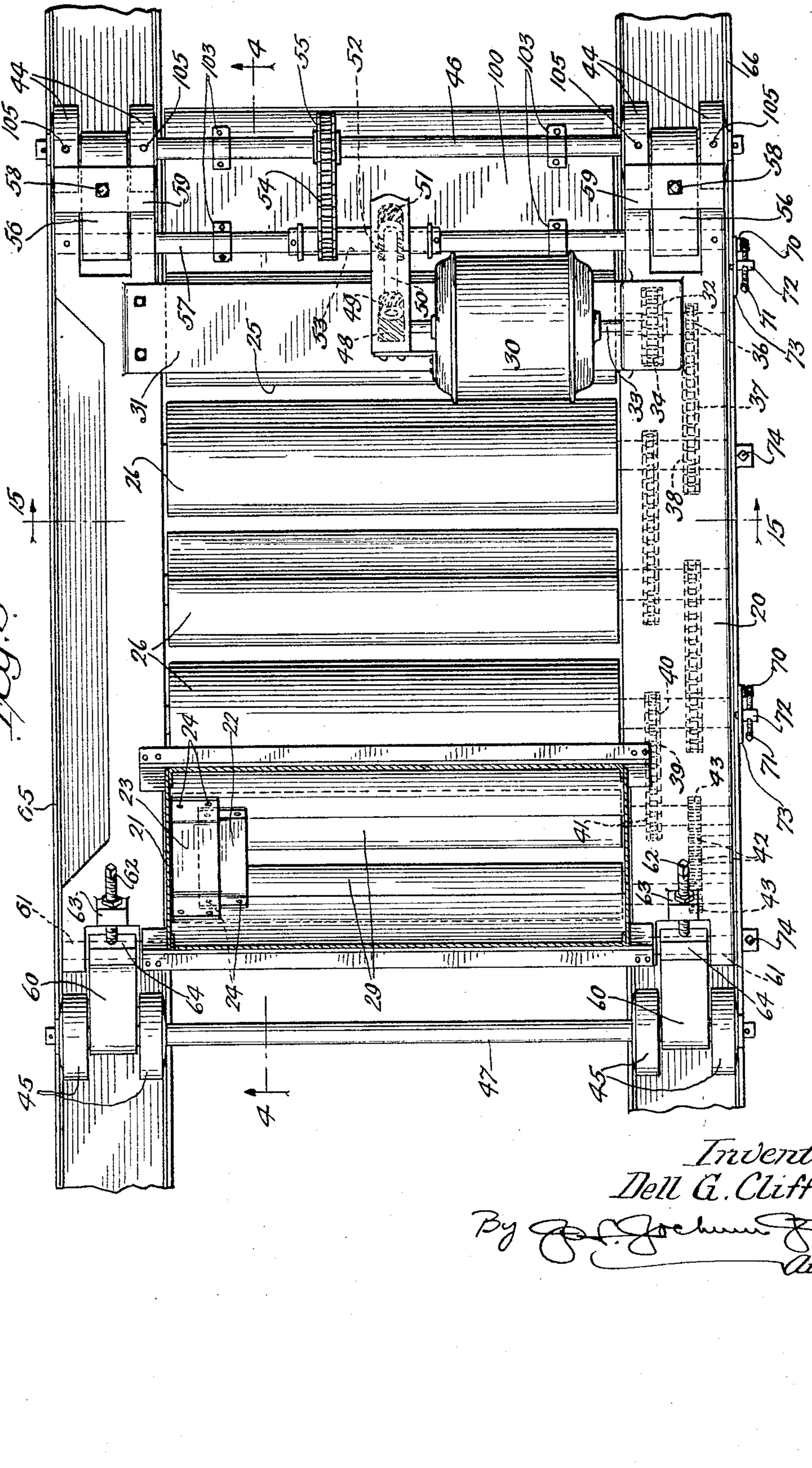

Fig. 3.

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CONCRETE LAYING MACHINE

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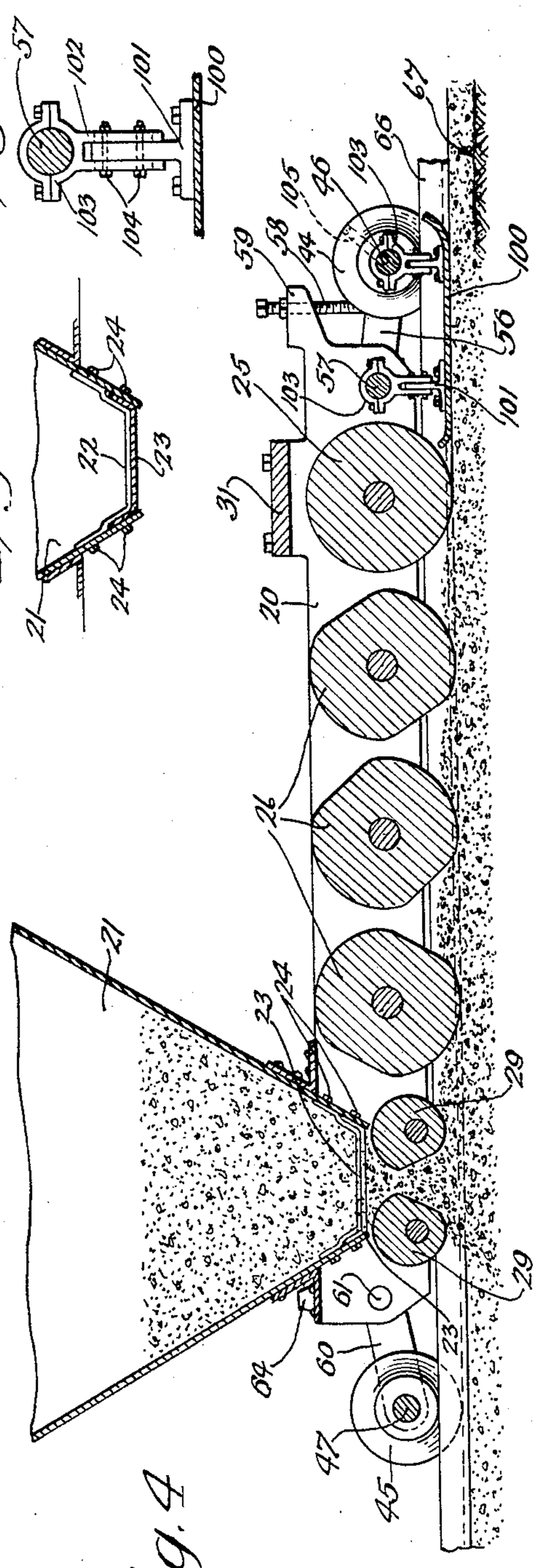

Fig. 6

Fig. 5

Fig. 4

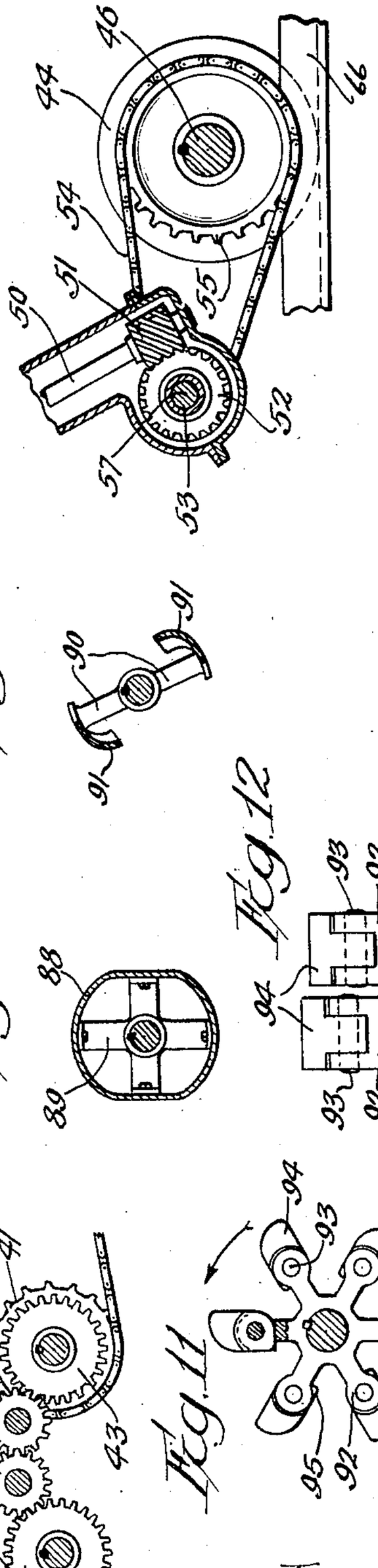

Fig. 8

Fig. 10

Fig. 9

Fig. 12

Fig. 11

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CONCRETE LAYING MACHINE

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Fig. 13

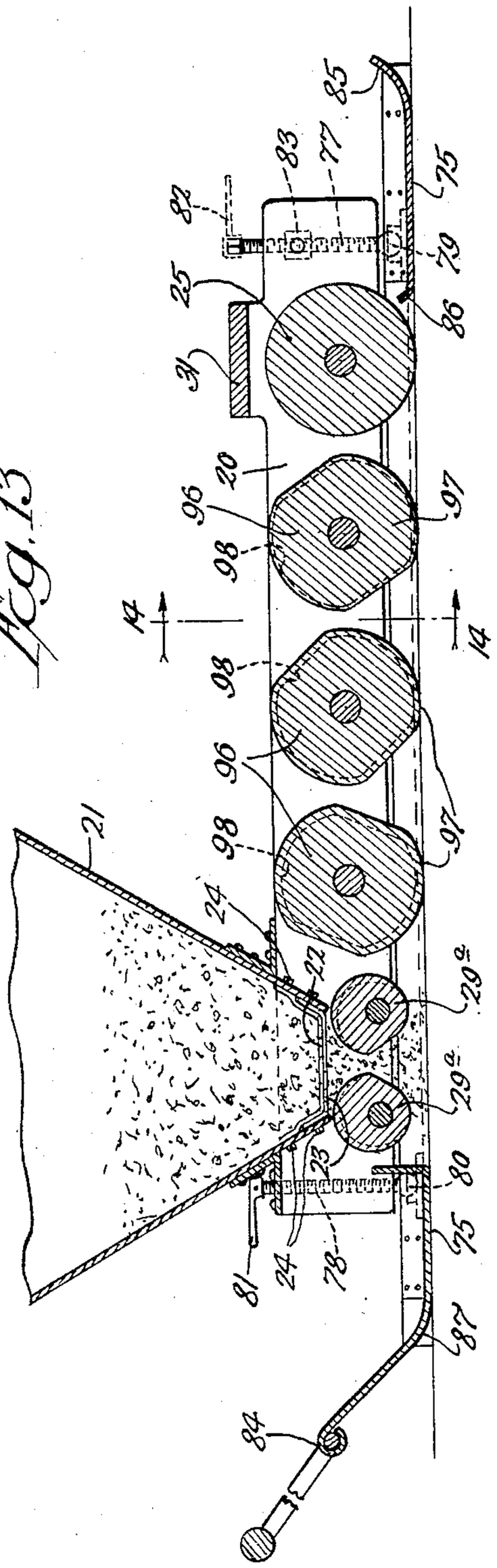
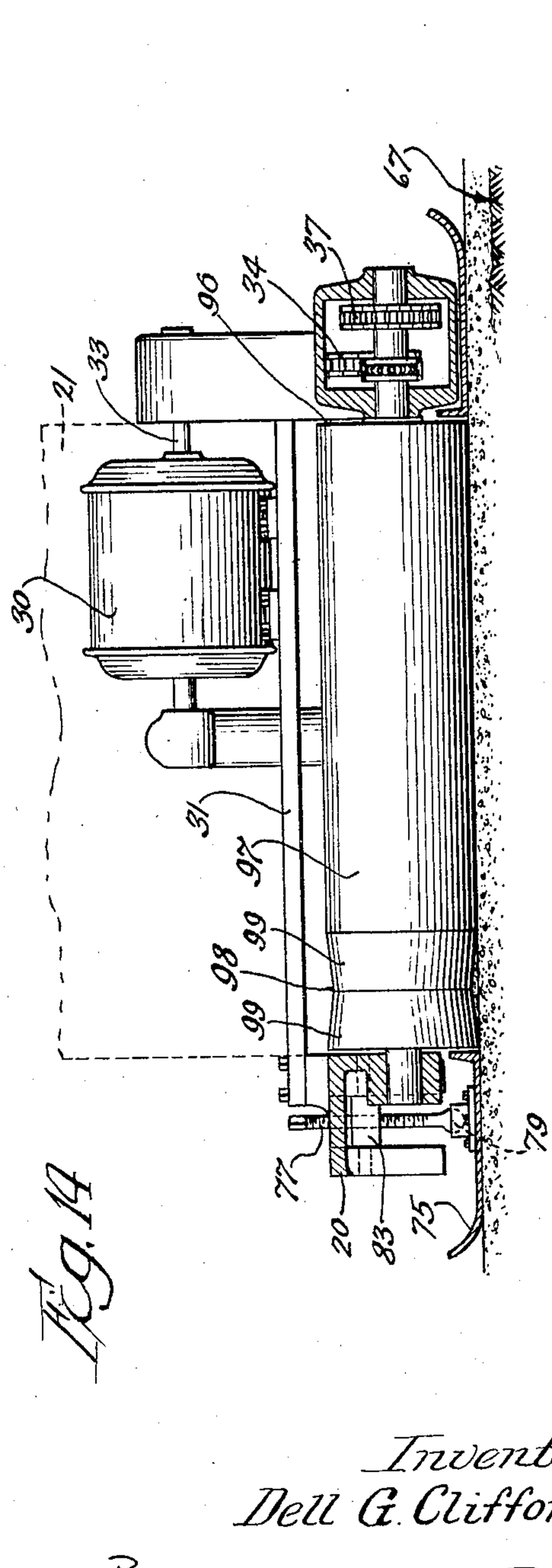


Fig. 14



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CONCRETE LAYING MACHINE

Filed March 17, 1930 5 Sheets-Sheet 5

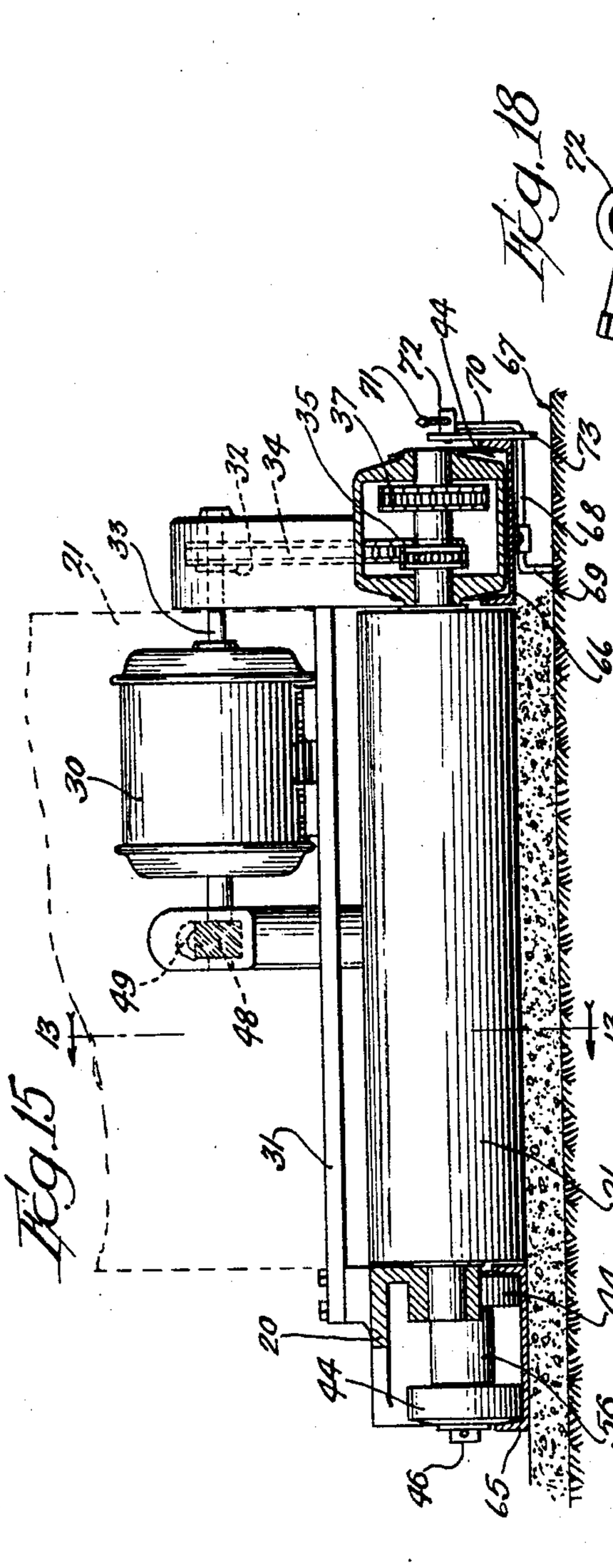

Fig. 15

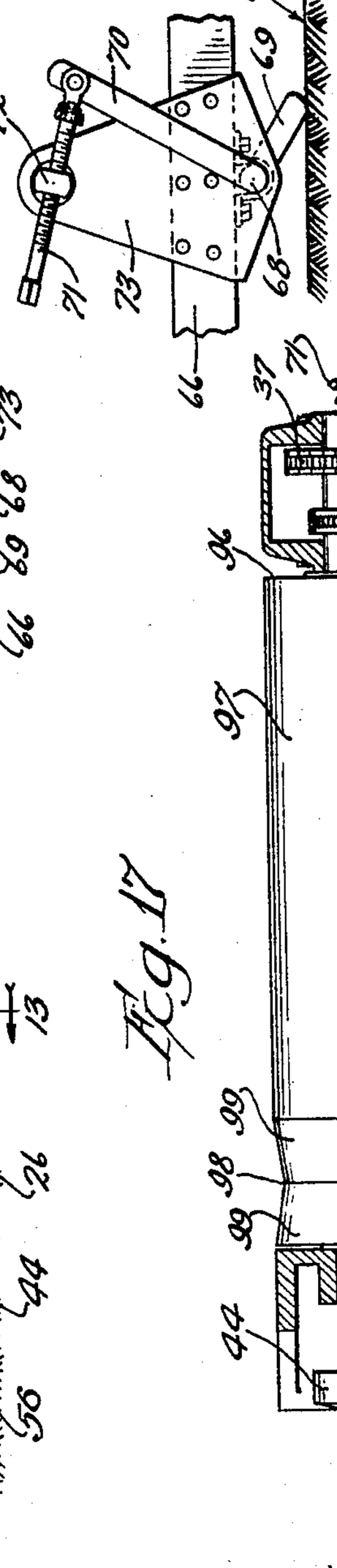

Fig. 18

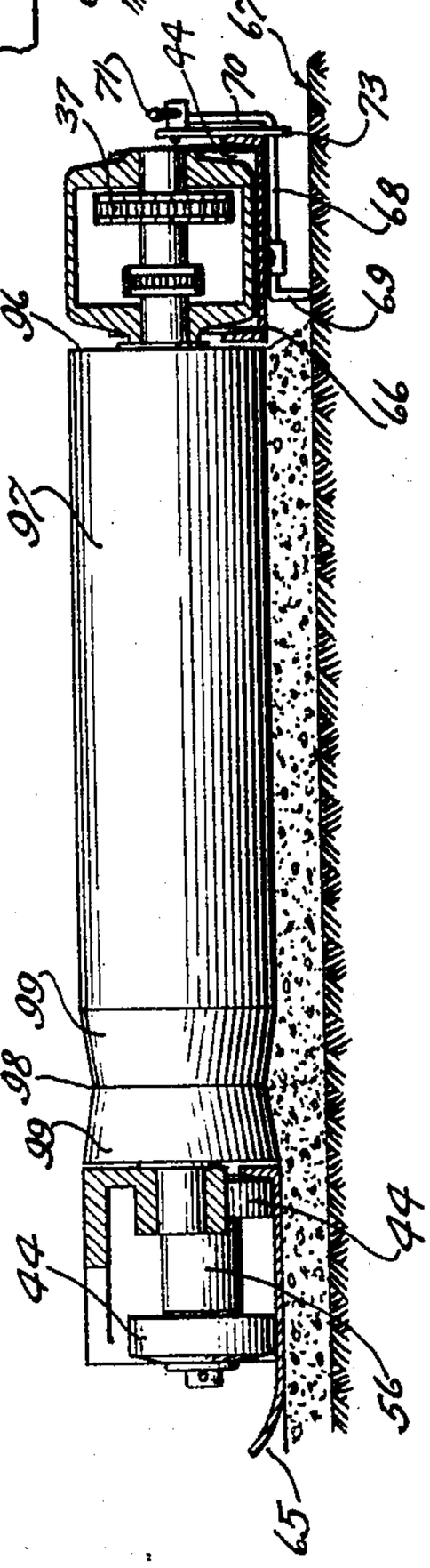

Fig. 17

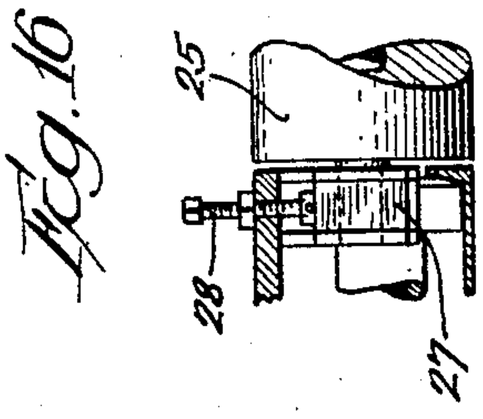

Fig. 16

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1,897,605

UNITED STATES PATENT OFFICE

DELL G. CLIFFORD, OF CHICAGO, ILLINOIS

CONCRETE LAYING MACHINE

Application filed March 17, 1930. Serial No. 436,389.

This invention relates to machines for laying concrete and the like, and one of the objects of the invention is to provide an improved machine of this character by means of the use of which a very hard stiff mixture may be worked into a dense plastic mass, and at the same time will operate to produce a smooth surface and will work the mass into an intimate contact with the supporting surface upon which it is placed.

Furthermore, the machine will operate to work air bubbles out of the mass and will bring sufficient fine particles to the surface of the mass, with the result that the surface may be readily troweled to a high degree of smoothness.

A further object is to provide an improved machine of this character which will be simple, durable, cheap and compact in construction, effective and efficient in operation, and which may be readily positioned or propelled to suit the existing conditions and to produce the best results.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention, and in which

Figure 1 is a side elevation of a machine of this character constructed in accordance with the principles of this invention.

Figure 2 is a left hand end elevation of Figure 1.

Figure 3 is a top plan view of Figure 1.

Figure 4 is a sectional view taken on line 4—4, Figure 3.

Figure 5 is an enlarged detail view partly in elevation and partly in section of the bottom of the hopper showing the sectional closure therefor.

Figure 6 is a detail view, partly in elevation and partly in section showing one of the supporting members, for the body of the machine.

Figure 7 is a view partly in section and partly in elevation of the operating mechanism of the rollers at the discharge opening of the hopper.

Figure 8 is a view partly in elevation and partly in section of a portion of the propelling mechanism.

Figures 9, 10, 11 and 12 are views of different forms of compacting rollers.

Figure 13 is a sectional view taken on line 13—13, Figure 15.

Figure 14 is a sectional view taken on line 14—14, Figure 13.

Figure 15 is a view similar to Figure 14, of a modified form of the invention.

Figure 16 is a detail view of one of the bearings for one of the rollers.

Figure 17 is a view partly in elevation and partly in section of another form of roller.

Figure 18 is a detail view in elevation of one of the adjusting elements for one of the track or guide members.

Referring more particularly to the drawings the numeral 20 designates a suitable supporting structure or frame which may be of any desired size or configuration and mounted thereupon is a hopper 21 for supplying the material. This hopper is preferably provided with closures 22—23 which overlap each other and are adapted to be adjusted with respect to each other so as to vary the discharge opening through which the material is delivered and thereby regulate or gage the width of the strip of material to be laid. After the closures 22—23 have been relatively adjusted they may be secured in their adjusted position by means of fastening devices 24.

Extending across the frame or structure 20 are a series of rollers 25—26 parallel with each other and are rotatably supported in suitable bearings 27 which may be adjusted by means of suitable adjusting devices 28 to vary the position of the rollers with respect to the supporting frame 20.

The rollers may be of any desired configuration in cross section and as shown in Figure 4, the roller 25 is regular in cross section while the rollers 26 are irregular, the irregular rollers being provided for the purpose of causing the rollers to not only force the material against the surface to which it is

to be applied, during their rotation, but to act in the nature of tampers as the irregular surfaces of these rollers will cause a tamping action upon the material.

Arranged beneath the outlet of the hopper 21 are eccentric or cam shaped members or rollers 29 which co-operate with each other and not only tend to force the material against and distribute the same over the surface to which the material is applied, but also operate in a measure to assist in drawing or pulling the material out of the hopper 21.

All of these rollers are operated from a single source of power such as a motor 30 mounted upon a support 31 carried by the frame or structure 20, and passing over a sprocket wheel 32 on the shaft 33 of the motor is a sprocket chain 34 which also passes over a sprocket wheel 35, the latter having connected with it for rotation therewith another sprocket wheel 36. Over this sprocket 36 passes a chain 37 which in turn passes over a sprocket wheel 38 connected to the shaft of one of the rollers 25—26. Similar sprocket gear and chain connections are provided between the remaining rollers 26. A sprocket chain 39 passes over a sprocket wheel 40 on the shaft of one of the rollers 26 and this sprocket chain 39 passes over a sprocket wheel 41 which is secured to the shaft of one of the elements 29 for rotation therewith, and gear connections 42—43 are provided between the elements 29 so that the operation of one of the elements will cause the other to simultaneously operate.

It will therefore be manifest that through these drive connections the rollers 25—26 and the elements 29 will be rotated from the motor 30.

The structure is adapted to be supported in any suitable manner but preferably by means of rollers 44—45 located at opposite ends of the machine and on opposite sides thereof, the rollers 44 at one end of the machine being connected by means of a shaft 46, and the rollers 45 at the other end of the machine being connected by a shaft 47.

The shaft 46 is driven from the motor 30, preferably through the medium of a worm gear 48 on the motor shaft which meshes with a gear 49 on a shaft 50 and connected to the shaft 50 is a gear 51 that meshes with a gear 52 on a shaft 53. Secured to the shaft 53 is a sprocket wheel over which a sprocket chain 54 passes (see particularly Figures 3 and 8) and this sprocket chain passes over a sprocket gear 55 secured to the shaft 46 for rotation therewith.

Thus it will be seen that when the motor 30 is operated the machine will not only be advanced, but the rollers 25—26 and the elements 29 will also be rotated.

The rollers 44 are journaled in arms 56 pivotally supported upon a shaft 57, which latter forms a bearing for the shaft 53, the latter being preferably tubular and sleeved thereover. Adjusting devices such as screws 58 engage the arms 56 (see particularly Figures 3 and 4) and are supported by a suitable bearing portion 59 forming a part of the supporting frame so that when the screws 58 are adjusted against the arms 56, one end of the frame 20 may be raised and by the manipulation of these screws 58 the supporting frame or structure may be raised or lowered.

At the other end of the machine there is preferably arranged bell crank levers 60 (see particularly Figure 1) pivotally supported as at 61 and in one arm of which bell crank lever the shaft 47 has bearing. A screw or adjusting device 62 having a bearing in a portion 63 of the supporting structure 20 engages the arm 64 of the bell crank lever and by adjusting the element 62, it will be manifest that the bell crank lever may be caused to move about the pivot 61 in one direction or the other according to the direction of adjustment of the element 62.

Thus, by adjusting the element 62 and the screws 58, on the respective sides and at the respective ends of the machine, it will be manifest that the distance between the peripheries of the rollers 25—26 with respect to the surface to which the material is to be applied may be varied.

The rollers 44—45 on one side of the machine are adapted to travel upon a track or guide 55, which latter is adapted to be placed upon the surface of the material which has been laid. The rollers 44—45 on the other side of the machine, in the form of the invention shown in Figures 1 to 3, are adapted to travel in a track or guide 66 which is adjustably supported from the surface 67 upon which the material is to be laid.

Any suitable means may be provided for adjustably holding the track or guide 66 in position. A suitable and efficient means embodies a rock shaft 68, one end of which (see particularly Figures 2 and 18) is deflected or bent downwardly as at 69 to form a supporting foot. The other end of the shaft is bent upwardly as at 70 and connected with the portion 70 is an adjusting screw 71 mounted in a pivoted bearing 72 in a fixed support 73 which is secured to the track or guide 66. By adjusting the screw 71 the shaft 68 may be rocked in its bearing to raise or lower the foot portion 69 and thereby elevate or lower the track 66.

Any number of these elements may be provided throughout the length of the track 66, two of such elements being shown in Figure 1 of the drawings. Intermediate and adjustable supporting elements 74 may also be provided for the track 66 if desired. Thus by manipulation of these adjusting elements it will be manifest that the track 66 may be

raised or lowered with respect to the surface 67, as desired.

In the form of the invention shown in Figure 13, the supporting frame may be mounted on a sled embodying plates 75, which is connected with the supporting structure 20 respectively by means of screws 77—78 having a ball bearing 79—80 with the respective plates. The screw 77 may be actuated by means of an operating handle 81 and an operating handle 82 may be applied to the screw 77, the screw 77 being preferably journaled in a pivotally mounted bearing 83.

In this form of the invention the propelling mechanism for advancing the machine may be omitted and the machine adapted to be dragged over the surface of the work by means of a suitable handle 84 connected to one end of the structure.

The edges of the plates 75—76 may be turned up as at 85—86 and 87 so as to permit advancement of the machine without injuring the work.

The rollers which operate upon the work and tamp the same, to-wit: the rollers 25—26 (see Figure 4) may be of any desired configuration such as shown in Figure 4 or they may be hollow as at 88 (see Figure 9), the tubular element forming the roller being supported or braced by means of arms 89.

In Figure 10 arms 90 may be provided and connected thereto may be blades 91 so shaped as to present a smooth surface to the work when they are rotated.

In Figures 11 and 12 the rollers are shown as being formed of a plurality of spaced arms 92 suitably arranged with respect to each other and connected to the outer extremity of each of the arms by means of a pivot 93 is an element 94 adapted for free pivotal movement when the roller is moved in one direction, a shoulder 95 being formed on the elements 94 so as to limit their pivotal movement in one direction.

In Figures 13, 14 and 17 the rollers 96 corresponding to the rollers 26 may be provided with a portion 97 that is of uniform diameter throughout its length and another portion of the roller may be provided with a constricted portion such as a groove 98 therein having tapering sides 99 so as to act upon the material in a manner to force it against the surface 67 and insure a good bond between the strip of material being laid and a previously laid strip.

In Figure 4 there is shown a support for connecting smoothing plates 100 with the body structure 20, such support consisting of an upright 101 (see particularly Figure 6) secured to the plate 100, and telescoping with a portion 102 of a member 103 that is secured to the shaft 57, fastening devices 104 passing through the telescoping portions to secure them together. These telescoping portions are adapted to be adjusted relatively with respect to each other to vary the distance between the plate 100 and the axis of the shaft 57. Another support of the same construction may be connected with the plate 100 and secured to the shaft 46.

The rollers 44 are preferably secured to the shaft 46 by means of fastening pins 105 which may be removed when desired so as to disconnect the rollers from the shaft 46.

With this improved construction it will be manifest that any combination or arrangement of the supporting tracks with the machine may be provided in accordance with the work to be performed, some of the types of machines illustrating the tracks or guides, one of which is placed on a previously laid strip of concrete and the other being an adjustable guide supported by the surface to which the material is to be applied.

If desired another structure may be mounted or provided with a sled construction as shown in Figures 4 and 13, or the entire structure may be mounted upon rollers to facilitate the propelling thereof, or a sled may be arranged on one side and a guide on the other side with rollers running on the guide as shown in Figure 17.

While the preferred forms of the invention have been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. A machine for laying concrete embodying a supporting structure, a hopper carried thereby and having a discharge outlet for the material, and co-operating eccentrics rotatably supported adjacent said discharge outlet of the hopper and operating to assist in discharging the material therefrom and for forcing it against the surface to which it is to be applied.

2. A machine for laying concrete embodying a supporting structure, a hopper supported thereby having a discharge outlet for the material, rollers carried with the structure and operating upon the material as it is laid, means supporting one side of the machine directly upon the laid material, and means supporting the other side of the machine upon the surface upon which the material is to be laid.

3. A machine for laying concrete embodying a supporting structure, a hopper supported thereby having a discharge outlet for the material, rollers carried with the structure and operating upon the material as it is laid, a guide supporting one side of the machine directly upon the laid material, and a guideway supporting the other side of the machine upon the surface upon which the material is to be laid.

4. A machine for laying concrete embodying a supporting structure, a hopper carried thereby and having a discharge outlet for the material, rollers carried by the structure and operating upon the material to compress and tamp the same as it is laid, a guide for one side of the machine, said guide supported directly by the material that has been laid, a guide for the other side of the machine and supported upon the surface upon which the material is to be laid, and means for adjusting the last said guide in directions towards and away from the last said surface.

5. A machine for laying concrete embodying a supporting structure, a hopper carried thereby and having a discharge outlet for the material, rollers carried by said structure and operating upon the laid material to compress the same against the supporting surface thereof, rollers other than the first said rollers for propelling the machine, a motor common to all of said rollers for actuating them, a supporting guide for one side of the machine resting directly upon the laid material, a supporting guide for the other side of the machine resting upon the surface to which the material is to be applied, and means for adjusting the last said guide in directions towards and away from said surface.

6. A machine for laying concrete embodying a supporting structure, a hopper carried thereby and having a discharge outlet for the material, rollers carried by said structure and operating upon the laid material to compress the same against the supporting surface thereof, some of said rollers being irregular in cross section to effect a tamping action as they are rotated, rollers other than the first said rollers for propelling the machine, and a motor common to all of said rollers for actuating them.

7. A machine for laying concrete embodying a body frame, a hopper carried thereby and having a discharge outlet for the material, rollers extending thereacross and operating upon the material as it is laid to compact the same, the diameter of certain portions of the rollers at a given cross section being less than another diameter of the rollers at the same cross section, means for rotating the rollers, supporting means for the body frame, and means for relatively adjusting said body frame and said supporting means to vary the thickness of the laid material.

8. A machine for laying concrete embodying a body frame, a hopper carried thereby and having a discharge outlet for the material, rollers extending thereacross and operating upon the material as it is laid to compact the same, the diameter of certain portions of the rollers at a given cross section being less than another diameter the rollers at the same cross section, means for rotating the rollers, supporting means for the body frame, and a smoothing plate connected with the body frame and movable over and against the top surface of the laid material.

9. A machine for laying concrete embodying a frame, rollers carried by the frame, means for actuating the rollers, a sled on one side of the machine engaging and movable directly upon the material which has been laid, and a guide on the other side of the machine for supporting the machine by the surface upon which the material is to be laid.

10. A machine for laying concrete embodying a frame, rollers carried by the frame and operating directly upon the concrete, a supporting plate for the frame and movable directly upon the work, and means for actuating the rollers.

11. A machine for laying concrete embodying a frame, means carried by the frame and operating upon the material as it is laid for compacting the same, rollers for supporting and advancing the machine, and a pair of guides for the last said rollers, one of said guides resting upon the surface upon which the material is to be laid and the other guide resting directly upon the surface of previously laid material.

12. A machine for laying concrete embodying a frame, means carried by the frame and operating upon the material as it is laid for compacting the same, rollers for supporting and advancing the machine, and a pair of guides for the last said rollers, one of said guides resting upon the surface upon which the material is to be laid and the other guide being disposed in close proximity to the upper surface of previously laid material and back of the joint formed between said previously laid material and the next supply of material deposited upon the surface upon which the material is to be laid.

In testimony whereof I have signed my name to this specification on this 14th day of March, A. D. 1930.

DELL G. CLIFFORD.