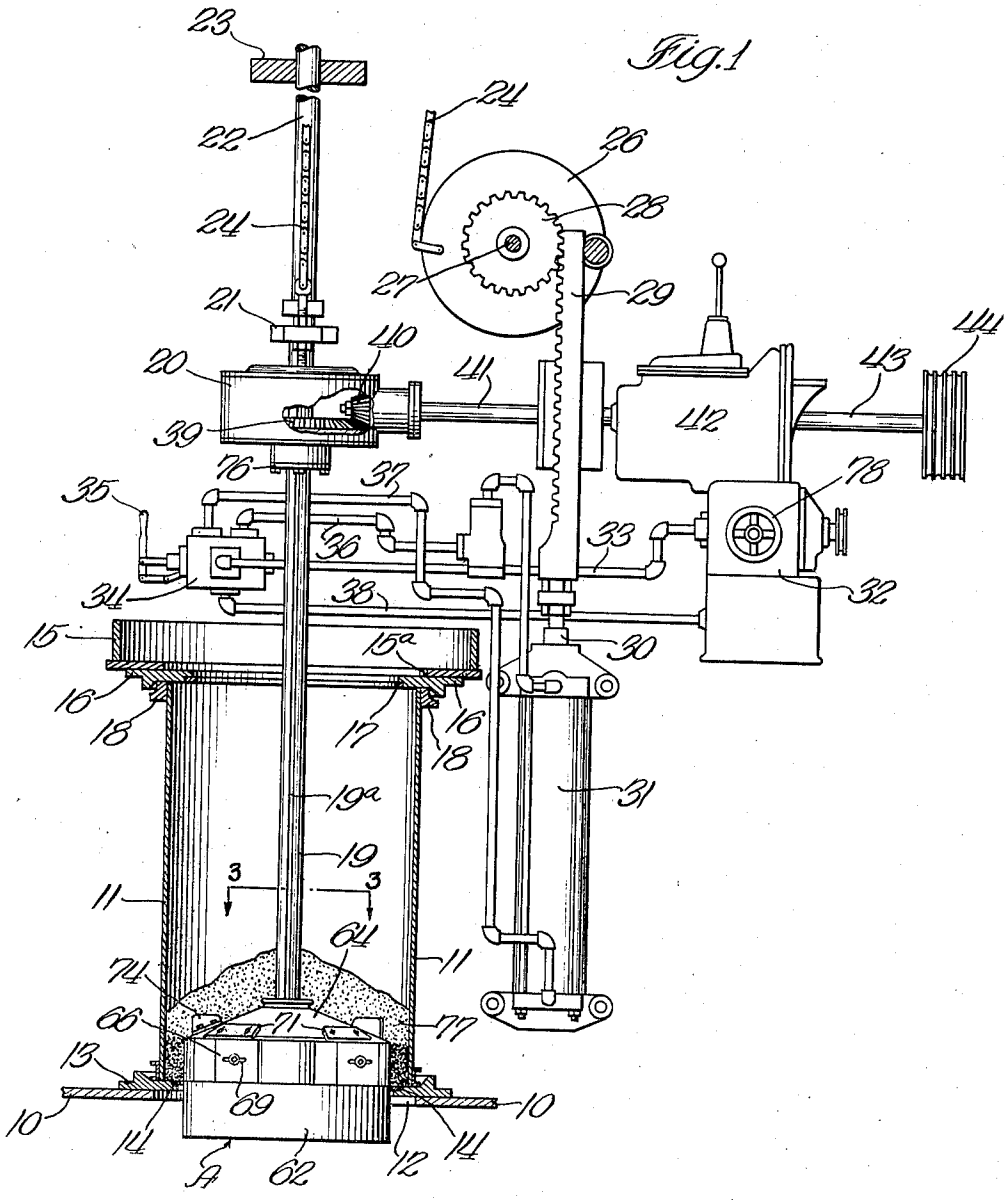
March 12, 1940. J. H. LA DUE 2,193,286

ROLLER PACKER FOR CONCRETE TILE

Filed Nov. 21, 1938 2 Sheets-Sheet 1

Fig. 1



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Filed Nov. 21, 1938 2 Sheets-Sheet 2

Fig. 3

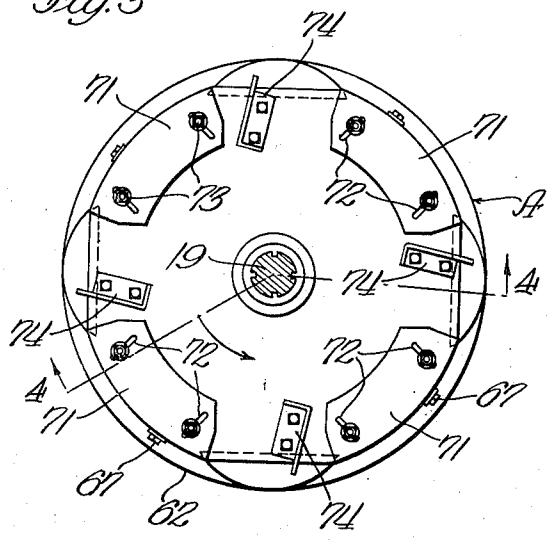


Fig. 2

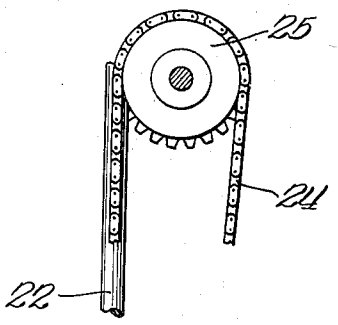


Fig. 4

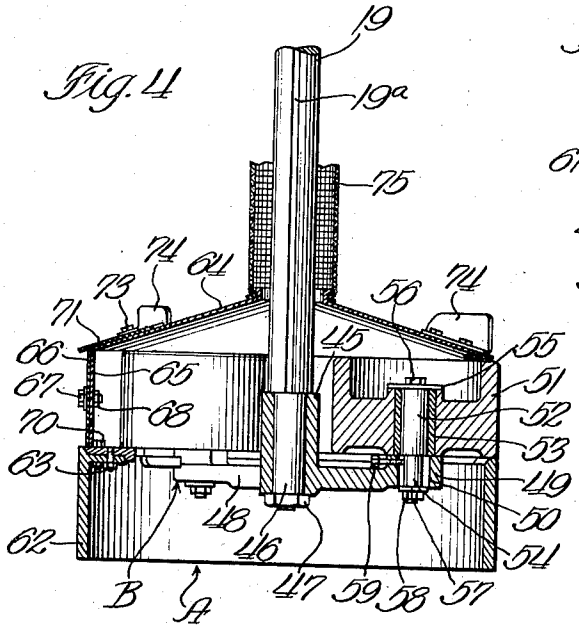
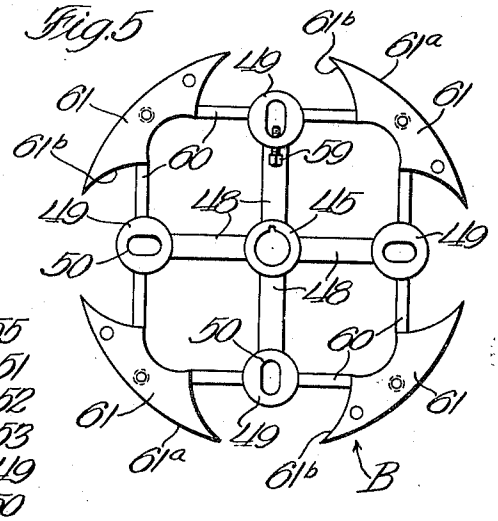


Fig. 5



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UNITED STATES PATENT OFFICE

2,193,286

ROLLER PACKER FOR CONCRETE TILE

Jay H. La Due, Sioux City, Iowa

Application November 21, 1938, Serial No. 241,624

8 Claims. (Cl. 25—36)

The object of my invention is to provide a roller packer head as a substitute for or improvement on the troweling type packer head heretofore used. This application is a continuation in part of my application Serial No. 640,497, filed August 23, 1937, on a Roller packer for concrete tile.

It is my object to provide a roller packer head which will

1. Pack a thicker wall than can be packed by the troweling type packer head;

2. Consequently extend the range of sizes of pipe or tile which can be made by the packer head process;

3. Permit using more coarse aggregate and consequently less cement;

4. Maintain the same quality on a thick walled pipe that the packer head of the troweling type can produce in a thin walled pipe.

5. Pack the concrete through two lines or cages of steel reinforcing more adequately than can now be done with known packer heads or than can be done at present with a troweling type packer head where no steel is used;

6. Permit the use of one elliptically shaped steel reinforcing cage of the kind permitted under present A. S. T. M. specifications in sizes of 36 inches and up and will adequately pack through such a cage.

It is my particular purpose to provide a roller type packer head which will effect the relative speed and economy in making sizes of eighteen inches diameter tile or pipe and larger, that have been heretofore possible with the troweling type of packer head on the smaller sizes, it adequately makes.

Still a further object is to provide a simple mechanism which will have less wear than that to which previous troweling packer heads have been subjected, and will impose less twisting or torque load on the reinforcing cages which must be used in larger sewer pipe and tile, for instance on sewer pipe larger than twenty-four inches and culvert pipe larger than twelve inches, as required by A. S. T. M. specifications.

It is my object also to provide a roller type packer head, which can be used in conjunction with other mechanisms, to pack the barrel of bell and spigot and tongue and groove sewer pipe, as well as drainage tile or pipe, as here shown.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my roller packer for concrete tile, 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 front elevation of a roller packer head embodying my invention, illustrating associated machinery, parts being shown in section and many parts being omitted.

Figure 2 is a side elevation of one of the idler sprockets at the upper end of the machine, the shaft therefor being shown in section.

Figure 3 is a horizontal, sectional view taken on the line 3—3 of Figure 1, illustrating particularly the top of the roller packer head.

Figure 4 is a vertical, sectional view taken on the line 4—4 of Figure 3; and

Figure 5 is a detail, plan view of the spider mounting forming a part of the roller packer head.

I have shown my apparatus without illustrating the main frame of the machine.

It will, of course, be understood that a proper frame is provided for supporting the parts here shown.

The numeral 10 indicates a turn-table supported by mechanism not illustrated and adapted to support the mold or form 11. The turn-table has one or more openings 12 through it to permit the passage of the roller type packer head.

The turn-table may be of a standard construction having two or more openings 12 and being so mounted that it may be rotated so that while one tile or pipe is being packed, another may be removed and a new form or mold put in place on the table.

I shall first describe the mechanism for raising and lowering and rotating the packer head and will then describe the details of the roller type packer head, which is primarily the subject of my invention.

The roller packer head is indicated generally at A. A centering pallet 13 is secured to the turn-table 10 in any suitable way. The centering pallet 13 has a central opening of smaller diameter than that of the hole 12. Each centering pallet 13 is provided at its inner edge and on its upper side with a replaceable wear ring 14.

Suitably mounted by means not here shown is a hopper 15. The hopper 15 has a central opening 15a through which material is supplied to the interior of the mold. Secured to the under side of the bottom of the hopper 15 in any suitable way is a ring pallet 16 having a central opening, the diameter of which is less than that of the mold 11. The ring pallet 16 has on its under surface adjacent its inner edge of a replaceable wear ring 17.

At the top of the mold 11 on the outside thereof is a reinforcing ring 18.

The hopper 15 may be raised and lowered by mechanism not shown. When in use, it is lowered until the pallet ring 16 rests against the top of the mold 11 and against the reinforcing ring 18.

The hopper may be locked in place by means not here shown and not pertinent to the present invention.

The roller packer head is mounted on the lower end of a vertical shaft 19. The shaft is provided with a splines 19*a*. It is slidably and rotatably extended through a fixed gear casing 20 in which it is journaled.

Fixed to the shaft 19 above the gear casing 20 is a raising yoke 21. The shaft 19 is screwed to or otherwise secured to an extension shaft 22 at its upper end. The upper portion of the shaft 22 is slidably guided in the member 23.

Secured to the yoke 21 on opposite sides of the shaft 19 are chains 24 which extend over sprockets 25 (Figures 1 and 2) and thence downwardly and are secured to discs 26 fixed on the shaft 27. On the shaft 27 is a spur gear pinion 28 which meshes with a rack 29. The rack 29 is connected with a stem 30 of the plunger, not shown, of an ordinary hydraulic ram 31. The ram is operated from an oil pump 32. From the outlet of the pump 32, a pipe 33 extends to a valve or control box 34 having ordinary valves of known construction operated by a lever 35. From the control box 34, pipes 36 and 37 lead to the upper and lower ends of the hydraulic ram 31. A by-pass pipe 38 is provided to permit oil to flow from the control box 34 back to the pump 32. When the pump 32 is operating, then by proper manipulation of the handle 35, the hydraulic ram 31 may be operated for actuating the rack 29 for raising and lowering the shaft 19.

It will be understood that the roller packer head is raised to position where it will be out of the way when the mold 11 is being turned to pipe-making position on the turn-table 10 and then is lowered to the position shown in Figure 1 for starting the packing of a tile or pipe.

Concrete is supplied to the hopper 15 and thus to the interior of the mold and drops down to the bottom of the mold for providing material for the tile.

I shall next describe the mechanism for imparting rotation to the roller packer head.

In the gear casing 20, a beveled gear 39 is nonrotatably mounted on the shaft 19 to permit vertical sliding movement of the shaft. The beveled gear 39 meshes with a beveled gear 40 on a shaft 41. The shaft 41 extends to and is operatively associated with an ordinary change-speed gearing device 42. The change-speed gearing device is actuated by a shaft 43 on which is a V-belt sheave 44, driven by any suitable source of power.

It will, of course, be understood that the shaft 43 may be operated in any way and from any source of power available.

Roller packer head

I shall now describe in greater detail the roller packer head A. This head includes a peculiarly shaped casting or spider mounting B indicated generally in Figure 5. The spider B has a hub 45 through which the reduced lower end 46 of the shaft 19 extends. On the lower part of this reduced end 46 is a nut 47.

Extending radially from the lower part of the hub 45 are arms 48 preferably arranged at about a 90° angle with relation to each other having at their outer ends the short bearing centers 49 formed with the holes 50 which are horizontally elongated radially with relation to the hub 45. The bearings 49 support the packing rollers 51. Each packing roller is journaled on a spindle 52 which has a bushing 53. Each spindle 52 has a reduced lower end indicated at 54 projecting through a hole 50 of a bearing 49. A washer 55 rests on the upper end of each spindle 52 and is held in place by a screw bolt 56 extending through it and extending through the spindle 52.

On the lower end of the reduced end 54 of each spindle 52 is a washer 57 locked in place by means of a nut 58 on the lower threaded end of the spindle 52.

The spindles 52 may be adjusted radially by loosening the nuts 58 and adjusting set screws 59. This adjustment serves for accurately positioning the rollers 51 at the time of their original installation and for wear.

The spider B may be made to support a variety of numbers of packing rollers. As here illustrated, the spider is provided with four such rollers.

Extending in opposite directions from each bearing 49 are web arms 60 at right anges to the arm 48 of the particular bearing 49. These web arms 60 support plates 61, the outer faces 61*a* of which are curved as shown in Figure 5 on the arc of a circle, having its center at the vertical center of the spider. These plates 61 stand between and below the rollers 51 and their vertical edges 61*b* nearest adjacent the rollers are curved to conform to the curved faces of the rollers 51.

A troweling skirt 62 is bolted to the plates 61 as by bolts 63 (Figure 4) and has the external diameter of the bore of the pipe to be formed.

The rollers 51 are set so that they are flush with the perimeter of the troweling skirt. This is done by the set screws 59.

Above the spider B is a hollow sheet metal cone 64. The cone 64 is of considerably less external diameter than the troweling skirt 62. Extending downwardly from the cone 64 are apron legs 65 to which are secured circumferentially adjustable plate members 66 by means of bolts 67 and nuts 68. The bolts 67 are extended through horizontally elongated slots 69 in the plates 66. The apron legs 65 and adjustable plate members 66 are intended to close the successive spaces between the rollers 51 around the packer head to prevent concrete or the like which drops down over the cone 64 from getting into the interior of the packing head.

The members 66 are made adjustable to take care of any variations in the distances between the successive rollers 51. Such variations might arise because of the use of the rollers of different sizes or because of wear or because of the radial adjustment of these rollers on the spider B.

The apron legs 65 and the plate members 66 are inset from the perimeter of the troweling apron 62 as shown for example at the left-hand side of Figure 4 in order to allow for material recesses into which the material may drop to be operated on by the rollers and packed into the tile being made. The lower edges of the apron legs 65 are preferably bolted to the plates 61 as indicated at 70.

In order to afford additional control of the amount of material passing down over the cone 64 into the material recesses outside the apron legs 65, I have provided on top of the cone 64 the adjustably mounted material control blades 71 which have the elongated slots 72 shown in Fig-

ure 3 and are fastened in place by means of bolts 73 screwed into the cone. By loosening the bolts 73, the blades 71 may be adjusted to project more or less beyond the cone as may be desired.

Distribution of the loose material falling on the roller packer head is necessary so that a surplus can always be kept above the orifice to the recesses. To accomplish this, I provide distributing shoes 74 fastened on top of the cone 64. As indicated in Figures 3 and 4, these show shoes in the form of members with upright blades which serve to distribute the material which is always maintained on top of the cone 64.

A canvas tube 75 is kept around the packer shaft 19 to keep concrete from getting on the shaft and into the interior of the roller packer head. It is fastened at the top to a revolving driving sleeve 76 projecting from the gear casing 20.

Operation

I shall now describe in greater detail the operation of my improved roller packer head. The mold 11 is placed on the turn-table 10 and the turn-table is rotated to proper position. Then the hopper 15 lowers to proper position above the form, with the packer head which continues to the position shown in Figure 1.

The shaft 43 is turning continually and the change-speed gearing device 42 is set to impart to the packer head the desired speed of rotation. Concrete is supplied through the hopper 15. The supply of concrete is indicated at 77. The lever 35 is moved to position for causing the ram 31 to raise the rack 29 and thus slowly raise the packer head. The speed of this raising movement can be varied by manipulation of the control wheel 78 on the oil pump 32.

It will be understood that the rollers 51 have been adjusted to the desired positions and that the material control blades 71 have been adjusted.

As the packer head rotates and slowly moves upward, the rollers 51 thoroughly pack the material for the formation of the pipe under construction. All the material must pass downwardly over the upper part of the packer head and into the material recesses outside the apron legs 65 and between the successive rollers 51. This material is rolled and packed.

All of the material passing into these recesses must be packed into the pipe or tile. This is true because the rollers roll over this loose material and push it out because there is a portion of each roller which extends radially outwardly farther than any other part of the packer head excepting the troweling skirt.

The effectiveness of the packing action depends upon the amount of material the rollers pass over and pack. If the loose material in the material recesses traveled around with the complete unit, it would not pack but would simply remain in the recesses. The fact is, however, the recesses are continually being emptied and refilled. Because the loose material tends to drag against the pipe wall and because the direction of the packing unit is anticlockwise and the rotation of the rollers is clockwise, the loose material remains substantially stationary so that the rollers pass over and pack it into the pipe wall section.

The degree of packing force can be controlled by the amount of surplus loose material allowed to enter the recesses and by the speed of revolutions of the packer head and by the speed at which the head rises. The amount of material supplied to the recesses is regulated by the position of the blades 71. The speed of rotation of the roller packer head may be controlled by shifting gears in the change-speed mechanism 42. The speed of the rise or lift of the roller packer head can be regulated by means of the wheel 78 on the pump 32.

When the tile or pipe has been packed and the roller packer head has been raised to its proper position, the hopper may be raised and the turn-table then rotated to remove the finished tile from the zone of operation of the packer head and to bring a new form to position for another cycle of operations. No other reference is here made to the possible use of additional mechanism for making pipe or tile with a bell end or other special ends or joints.

As heretofore indicated, a roller packer head of the type under consideration has numerous advantages.

It is common knowledge that heretofore the rotary packer head of the troweling type provided the most efficient and economical means for making concrete pipe in sizes under twenty-four inches diameter. The use of the roller type packer head instead of the troweling type packer head makes it possible to pack a thicker wall and consequently to extend the use of the rotary packer head method to the manufacture of larger sizes of pipe or tile.

Experience has demonstrated that the roller type packer head will actually successfully roll and pack the larger sizes of tile.

It is a fact demonstrated by experience that the roller packer head can be made to put more pressure on the material being packed than can be successfully applied with the troweling type packer head. This being true, it follows that the greater pressure causes more coarse aggregate to be effectively coated by the cement and it therefore follows that with the roller packer head it is possible to use relatively more coarse aggregate and relatively less cement than would be possible with the troweling type packer head.

I have found by experience also that in making the larger sizes of the pipe with the roller packer head, it is possible to actually maintain the same high quality of product, which heretofore was secured by the use of the troweling type packer head on the smaller size pipe, but was heretofore impossible to maintain with the troweling type packer head in making the larger sizes of pipe.

I have found that with the rolling type packer head it is possible to pack the concrete more effectively through two lines or cages of steel reinforcing than can at present be done with any other type of packer head.

Because the rollers rotate and do not drag, it is possible with the roller packer head to properly pack and finish the tile with substantially less power expenditure than that required for the troweling type of packer head.

My experience indicates for example that where a troweling type packer head is used for making the larger sizes of pipe, for example twenty-four inches in diameter and larger, it is necessary to use a packer shaft so large that the same mechanism can not be used for making small diameter (four to six inch) pipe.

I claim as my invention:

1. In a roller packer head, a spider mounting rotatably supported, a plurality of packing rollers thereon, a cover above the rollers, of less diameter than the pipe to be packed, apron legs below the edge of the cover, substantially closing the spaces between the successive rollers.

2. In a roller packer head, a spider mounting rotatably supported, a plurality of rollers thereon, a cone cover above the rollers, of less diameter than the pipe to be packed, apron legs below the edge of the cover between the successive rollers, the apron legs having adjustable parts for fitting them to the rollers.

3. In a roller packer head, a spider mounting rotatably supported, a plurality of rollers radially adjustable thereon, a cover above the rollers, of less diameter than the pipe to be packed, apron legs below the edge of the cover, substantially filling the spaces between the successive rollers.

4. In a roller packer head, a supporting member, a troweling skirt therebelow, a plurality of rollers rotatably mounted on the supporting member, a cover arranged above the rollers and apron-like elements arranged to substantially fill the spaces between the successive rollers and spaced inwardly from the path taken by the outer parts of the rollers when the packer head is rotated.

5. In a roller type packer head, a spider having an annular troweling skirt at its lower part, a series of rollers mounted on the spider above the troweling skirt, a shaft connected with the spider and extending upwardly, a cover plate for the spider, apron legs between the successive rollers spaced inwardly from the outer face of the troweling skirt, scraper plates for the rollers on said apron legs.

6. In a roller type packer head, a spider having an annular troweling skirt at its lower part, a series of rollers mounted on the spider above the troweling skirt, a shaft connected with the spider, and extending upwardly, a cover plate for the spider, apron legs between the successive rollers spaced inwardly from the outer face of the troweling skirt, scraper plates for the rollers on said apron legs, plates for regulating flow of material mounted on said device at the upper part thereof for radial adjustment, substantially upright distributor plates arranged at the top of said packer near the outer part thereof.

7. In a roller type packer head, a spider having an annular troweling skirt at its lower part, a series of rollers mounted on the spider above the troweling skirt, a shaft connected with the spider and extending upwardly, a cover plate for the spider, apron legs between the successive rollers spaced inwardly from the outer face of the troweling skirt, material flow control plates mounted on the top of said packer for radial adjustment.

8. In a roller type packer head, a spider, a series of rollers carried by the frame and projecting beyond the spider laterally, with their axes in a circle, and scraper plates arranged between the outer parts of the successive rollers.

JAY H. LA DUE.