June 11, 1940. R. M. LA DUE 2,204,020

INVERTED BELL PACKER FOR CONCRETE PIPE

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Fig. 4

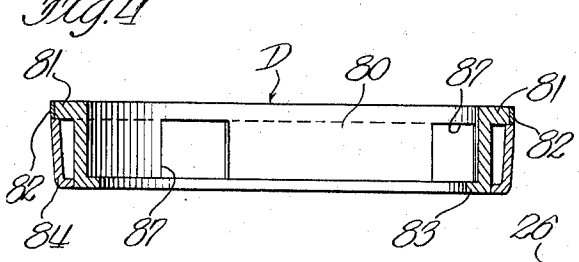


Fig. 1

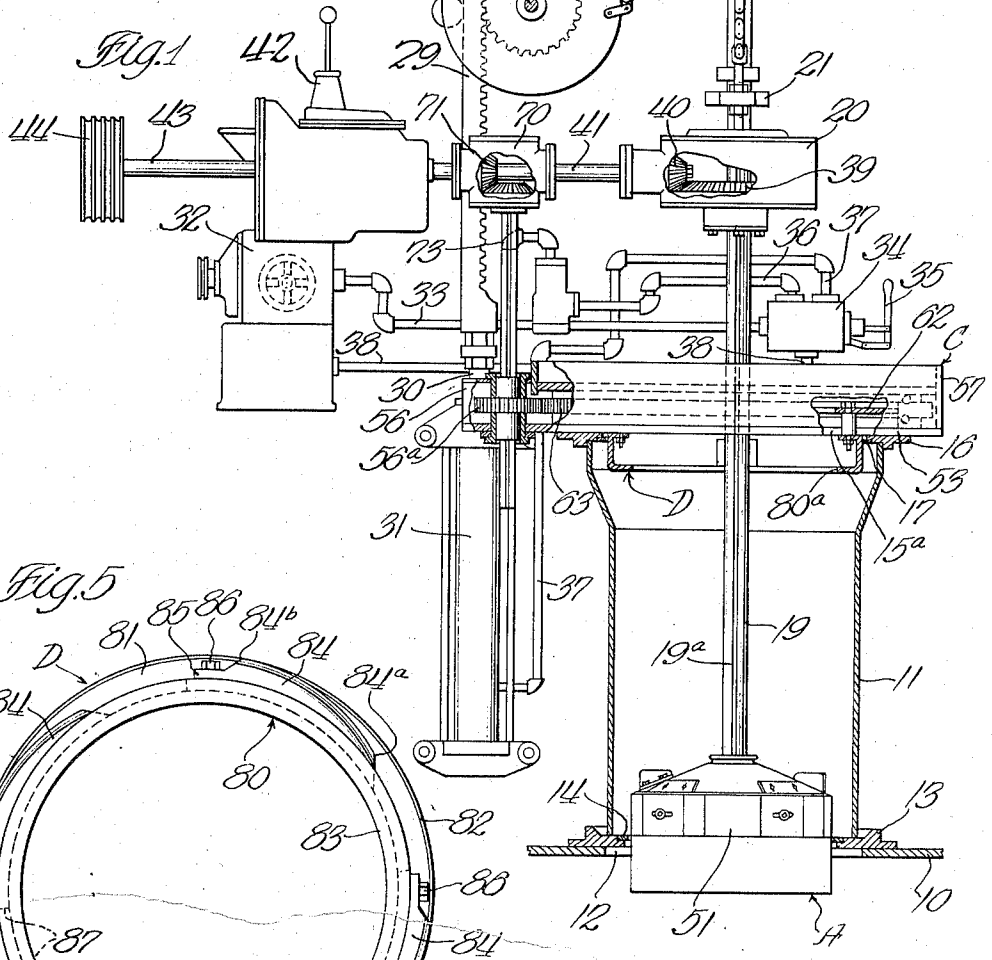


Fig. 5

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Fig. 2

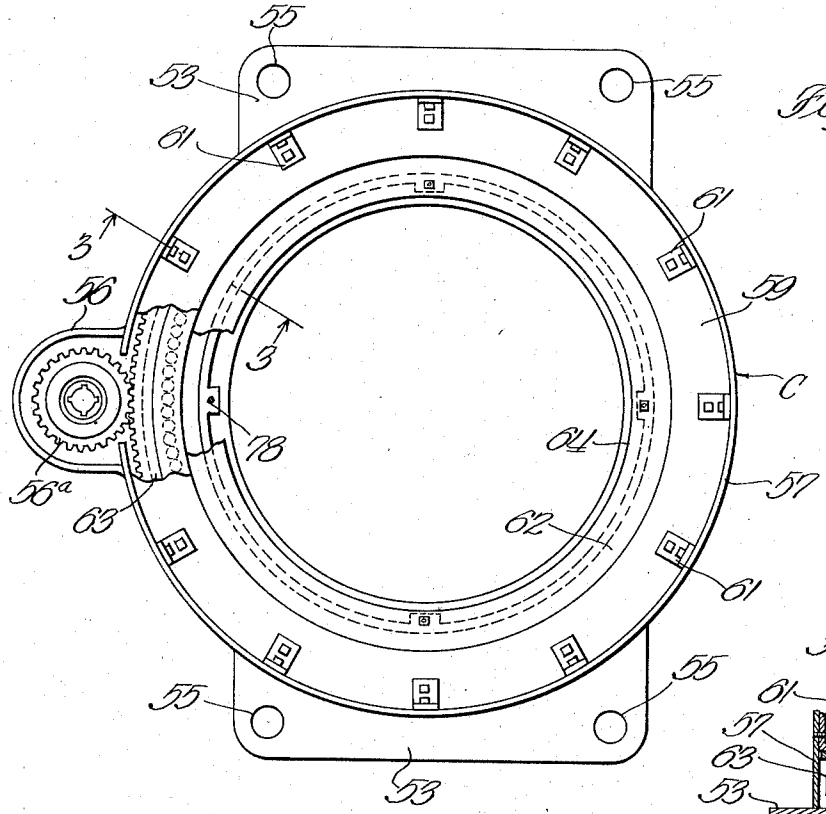


Fig. 3

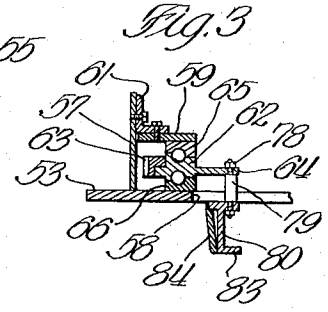


Fig. 6

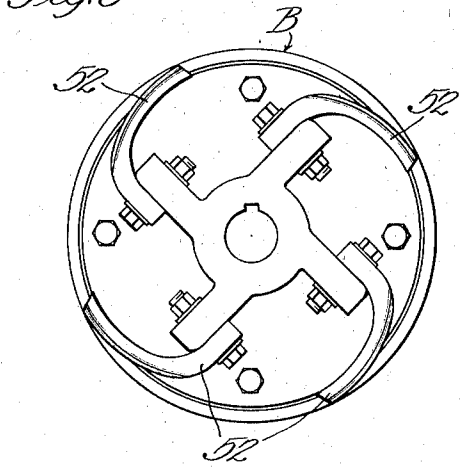
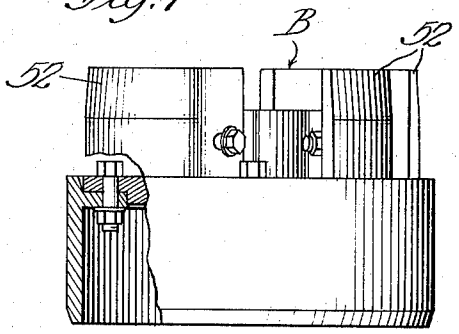


Fig. 7



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UNITED STATES PATENT OFFICE

2,204,020

INVERTED BELL PACKER FOR CONCRETE PIPE

Russell M. La Due, Sioux City, Iowa

Application November 21, 1938, Serial No. 241,625

11 Claims. (Cl. 25—36)

The object of my invention is to provide a bell packer which can make bell and spigot pipe bell end up by the packer-head process with a rotary packer head either of the roller or troweling type. To do this it is necessary to provide such a bell packer to which the loose material can be supplied to its material recesses from the inside instead of the outside as heretofore has been the case, when using the old bell packer mechanism owned by us and invented by W. J. McCracken, No. 1,159,515, which has now expired.

This same new type of packing element, that will pack the bell of a bell and spigot pipe, will also pack the groove of a tongue and groove pipe. This fact should be noted. There is no difference except in the shape of the contour of the elements which must conform to the type of pipe being made.

It is also my purpose to provide a bell packer so constructed, mounted and associated with other mechanism as to have numerous advantages over bell packers of the type heretofore used which make the pipe bell end down and necessitated the use of considerable machinery located below the floor level. Thus it is my purpose by means of the present invention to greatly simplify and to considerable extent eliminate the mechanism heretofore required for operating bell packers of the old type mentioned. It is therefore possible by means of the present structure to eliminate the necessity for locating any mechanism in a pit below the floor. Thereby I make it possible to provide a readily portable apparatus which can be mounted on a trailer, and transported from one point to another and can be put into efficient operation without removing it from said trailer.

Irrespective of whether the apparatus is operated as a portable unit or a fixed plant unit, the other purposes and objects of my inventions are obtainable and equally important to the manufacturer.

By arranging to make the pipe bell end up, there is eliminated the necessity for tipping the mold and pipe over before stripping or removing the mold. This has to be done, when the pipe is made bell end down, because the molds must be removed when the bell is up so that the green pipe can stand on its spigot end and support itself without leaving an end ring or pallet under each pipe. This has saved buying hundreds of pallets in each size and avoids an extra handling of the entire output to retrieve the pallets. This advantage must be maintained and therefore I desire to make the pipe bell end up the same as they must be stripped. Also I eliminate distortion which has heretofore been one of the common disadvantages in the use of known bell packers. This distortion has arisen due to the slump resulting from the horizontal position the pipe must pass through in tipping over the mold and new pipe. When the tipping is eliminated, a saving in cement can be accomplished because a leaner mix can be used and good quality maintained. When tipping is anticipated, it is necessary to use a little richer mixture. Similarly, where tipping is eliminated, it is possible to use more water. This is desirable because machine-made pipe have heretofore been manufactured from a plastic concrete somewhat drier than is ideal from the quality standpoint. A wetter mix can be used on pipe that do not have to be tipped over. The elimination of the tipping operation also reduces the number of cull pipe. There is labor saved when tipping is eliminated. For example, when the pipe is not tipped, the labor of one man only is needed to haul the mold with the pipe encased to the curing room. Heretofore, two men were required for this job. Molds with pipe incased must be raised higher if they are going to be tipped over, and it was impossible to get leverage enough for one man to handle pipe 24 inch and larger.

Making the bell end up, eliminate the mechanism heretofore necessary to raise and lower the bell packer and timing its up and down movements in definite relationship to the position of the packer head forming the barrel of the pipe.

It also eliminates the mechanism necessary to stop and start the rotary motion of the bell packer after the bell is made but before the bell packer is lowered. These are mechanical operations necessary when using the old style bell packer with the roller head, but are no longer required when using the new style inverted bell packer covered by this invention.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my inverted bell packer, 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 pipe making machine equipped with inverted bell packer embodying my invention, parts being shown in section and parts being omitted.

Fig. 2 is a top or plan view of the hopper forming part of the machine, parts being broken away.

Figure 3 is a vertical sectional view taken on

the line 3—3 of Figure 2 illustrating details of construction of the hopper and its operating gear, and illustrating the manner of mounting the inverted bell packer head at the bottom of the hopper.

Figure 4 is a vertical sectional view through the inverted bell packer head.

Figure 5 is an inverted plan view of the bell packer head.

Figure 6 is a plan view of a troweling type packer head that is used in the machine when making small sizes.

Figure 7 is a side elevation of the packer head shown in Figure 6.

However, I prefer to use the roller packer head A, Figure 1, when making pipe 24" in size and larger.

The main frame of the machine is not shown in my drawings but it will of course be understood that such a frame is provided.

In the drawings, the numeral 10, Figure 1, indicates a turn-table supported by mechanism not illustrated and adapted to support the mold 11. The turn-table has two or more openings 12 through it to permit the passage of the roller type packer head, or the troweling type packer head.

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

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

The roller packer 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 the size of the pipe to be made and 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 C. The hopper C has a central opening 15*a* through which material is supplied to the interior of the mold. Secured to the under side of the bottom of the hopper C in any suitable way is a ring pallet 16 having a central opening, the diameter of which is less than that of the form 11. The ring pallet 16 has on its under surface adjacent its inner edge a replaceable wearing ring 17.

The hopper C 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.

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

The packer head A is mounted on the lower end of a vertical shaft 19. The shaft is provided with longitudinal 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 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 and thence downwardly and are secured to discs 26 fixed on the shaft 27. On the shaft 27 is a 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. A pipe 33 extends from the pump outlet 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 bypass 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, and 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 A is raised to position where it will be out of the way when the mold 11 is being put in pipe-making position by turning the turn-table 10 and then is lowered to the position shown in Figure 1 before starting the packing of a pipe.

Concrete is supplied to the hopper C and thus to the interior of the mold and drops down to the roller head A in the mold for providing material for the pipe.

I shall next describe the mechanism for imparting rotations to the roller packer head or troweling packer head, whichever is used.

In the gear casing 20, a beveled gear 39 is non-rotatably 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 or other suitable gearing device adapted to be operated from 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.

The roller packer head shown on the lower end of the shaft 19 whereby the packing operation is performed (except for the formation of the bell) is described as to structure and operation in the co-pending application of Jay H. La Due heretofore referred to and need not be further here described, except to note that it has the rollers 51 whereby the packing operation is effected. This roller packer head is preferably used for pipe of 24 inches and up in diameter. For smaller sizes of pipe one may use a trowel type of packer head B illustrated in Figures 6 and 7. The packer head B need not be further described except to say that it has the packing cheeks 52 which are the same in number as the rollers 51 of roller packer head A sometimes used with the machine in conjunction with my inverted bell packer.

I shall now describe my inverted bell packer which is a primary feature of my present invention.

Inverted bell packer

My inverted bell packer is indicated diagrammatically at D in Figure 1 and in greater detail in Figures 4 and 5. Since the bell packer head D is closely associated in its mounting and operation with the hopper C, I shall first describe in somewhat greater detail the hopper C and the inverted bell packer rotating means which is associated with the hopper.

Referring to Figures 1, 2 and 3, it will be observed that the hopper C has a bottom plate 53 in which are four holes 55 for guide shafts (not shown) used for mounting and keeping the hopper properly positioned when in use and when being raised and lowered by mechanism (not shown). At the rear of the hopper is a projecting case 56 for driving pinion 56a. The annular hopper wall 57 rests on and is preferably welded to the hopper bottom plate 53. The hopper bottom plate 53 has a central opening 58 of proper size to permit clearance of the various parts. Detachably secured in the hopper and spaced above the bottom plate 53 thereof is a top plate 59. This forms the ceiling of the enclosure for driven gear 63, and the bottom plate 53 forms the base for this enclosure and also the driving gear enclosure 56. Plates 53 and 59 have circular openings of proper size to permit the passage of the packer heads A or B. The hopper top plate 59 is detachably fastened in place by means of angular brackets 61 or the like.

Between the bottom hopper plate 53 and the top hopper plate 59 is mounted a gear comprising a gear body and center ball race 62 to which is secured a gear rim 63. The gear body 62 has a central opening 64 which is of smaller size than the openings 58 in the top plate 59 and bottom plate 53 of the hopper. The gear body 62 revolves on balls held between it and the bottom ball race 66 and it also has balls on top between itself and the top ball race 65 to take the up thrust when the packer head pulls through the inverted bell packer. Both sets of balls take care of the radial load. Thus the gear is provided with suitable anti-friction bearings.

The gear 62 is rotated in the following manner: The shaft 41 above referred to extends through a gear casing 70. On the shaft 41 in the casing 70 is a beveled gear 71 which meshes with the beveled gear 72. The beveled gear 72 is fixed on a shaft 73 rotatably journaled in the bottom of the gear casing 70. The shaft 73 is splined and rotates pinion 56a which in turn rotates gear 63.

The various gearing elements are so selected that the shaft 19 and gear 63 and gear body 62 are synchronously rotated at the same number of revolutions per minute.

The inverted bell packer D is detachably supported from the gear body 62 by means of bolts 78 and spacer sleeves 79 (Figure 3).

I shall now describe in greater detail the inverted bell packer D. It comprises an annular core body 80 shown in Figures 3 and 4, having at its upper edge an annular outwardly extending flange 81 provided with a detachably wear band 82. The bell packer core 80 is provided at its lower edge with an inwardly extending flange 83. Detachably mounted on the outside of the bell packer core 80 are the troweling or packing shoes 84, at the outer faces of which are inclined somewhat outwardly from their advancing ends as at 84a outwardly to their rear ends as at 84b. They are also beveled from bottom to top, being thickest at the top, for a portion of their length from the ends 84b, as shown in Figure 5 and at the left-hand side of Figure 4. The packing shoes 84 are provided with a foot 85 to receive the bolts 86 by which they are detachably and rigidly secured to the bell packer core 80.

Between the successive packing shoes 84, the central web of the body 80 between the flanges 81 and 83 is provided with suitable openings 87 to permit the passage of the material for the bell end of the pipe.

Operation

The hopper C with the attached inverted bell packer D and the roller packer head A, or packer head B whichever may be used, are raised. A mold 11 is placed on the turn-table 10 with the bell end up. The turn-table is moved to the proper position. The packer head A or B and hopper C are lowered to the positions shown in Figure 1 and the hopper rests on the mold 11 and holds it down and central. Thereupon the sheave 44 and shaft 43 are operated and rotation is transmitted through the change speed gearing device 42 to the shaft 19. Material is supplied to the hopper C and therefrom to the top of the packer head at the bottom of the mold. The material is then packed by the rollers 51.

The handle 35 is manipulated to cause the hydraulic ram 31 to slowly raise the rack 29 and thus to raise the roller packer head A. The operation is continued until the main body of the pipe is completed and the roller packer head enters the opening 80a in the bell packer.

It will be understood that the inverted bell packer D has been rotating all the while but of course ineffectively. The parts are so arranged that the rollers 51 to the packer head A (or the troweling cheeks 52 of the packer head B) register with the openings 87 of the bell packer during the rotary movement of these parts. Thus when the packer head has entered the center opening 80a of the bell packer D, the material in the recesses of the packer head A or B passes through the registered openings 87 of the inverted bell packer C whereupon it is troweled and packed by the packing shoes 84 of the bell packer for forming the wall section of the bell of the pipe under construction. When this operation is completed, the hopper with bell packer and the packer head A are raised to clear mold 11 and the completed pipe encased in the mold 11 may be turned on the turntable 10 to taking-off position. This puts another mold in pipe-making position and these operations are then repeated.

The advantages of an inverted bell packer of the kind herein described to operate at the top end of the mold will be clear from the foregoing statement of objects and description of the structure. To summarize them, the use of my invention eliminates all necessity for providing mechanism in a pit or the like below the floor which makes it possible to move and operate the machine on a trailer so that it is portable and can be moved and used easily right on the job. My present invention eliminates the necessity for (1) tipping the mold before stripping it; of (2) using excessive cement and too dry a mix for ideal quality; for (3) much superfluous machinery, and for (4) extra labor. It also eliminates all distortion in shape and makes a more perfect pipe. There is an advantage in providing the outer surfaces of the shoes 84 with both the radial outpacking inclined plates and the vertical downpacking inclined plates. Consequently they pack the loose material delivered through the openings in the wall 80 radially outward and vertically downward. The radial packing action results in densely filling the bell section of the pipe and the down packing action improves the horizontal surface of the

socket, and the inside corner of the socket of the pipe.

I claim as my invention.

1. In a pipe making machine, means for supporting a mold, of the kind adapted for forming a bell end pipe, in position with the bell end up, a rotary packer head, means for rotating the rotary packer head and for moving it upwardly through a mold, said packer head having a plurality of packing members, a bell packer head supported on the machine and adapted to be in the bell end of a mold, said bell packer head having an annular vertical wall with circumferentially spaced packing members thereon on the outside thereof, said wall having openings therethrough between the successive packing members for admitting the passage of plastic material and means for rotating the bell packer head in synchronism with said first packer head and with the packing members of the first packer head in registry with the openings in the bell packer head.

2. A bell packer head for pipe making machines, said head having an annular vertical wall with packing members thereon on the outside thereof, said wall having openings therethrough between the successive packing members for the passage of plastic material.

3. The combination of a bell packer head for pipe making machines, said head having an annular vertical wall with packing members thereon on the outside thereof, said wall having openings therethrough between the successive packing members for the passage of plastic material.

4. The combination of a bell packer head for pipe making machines, said head having an annular wall with packing members thereon on the outside thereof, said wall having openings between the successive packing members for the passage of plastic material from the inside with means for cooperating with the bell packer head, said means comprising a second packer head having packing members arranged in registry with the openings and located inwardly therefrom.

5. The combination of a bell packer head for pipe making machines, said head having an annular wall with packing members thereon on the outside thereof, said wall having openings between the successive packing members for the passage of plastic material from the inside with means for cooperating with the bell packer head, said means comprising a second packer head having packing members arranged in registry with the openings and located inwardly therefrom, and means for rotating the packer heads synchronously.

6. The combination of a bell packer head for pipe making machines, said head having an annular vertical wall with packing members thereon on the outside thereof, said wall having openings therethrough between the successive packing members for the passage of plastic material from the inside with means for cooperating with the bell packer head, said means comprising a second packer head having packing members arranged in registry with the openings and located inwardly therefrom, means for rotating the packer heads synchronously, and means for supplying plastic material between the inside packer head and the outside bell packer head.

7. The combination of a bell packer head having an annular wall with packer members on the outside thereof and with openings between the successive packer members with a second packer head having packing members, means for also moving the second packer head axially and into the bell packer head to position where the packer members of the second packer head register with the openings in the first packer head.

8. In a packer head structure adapted to have a continuous supply of plastic material, the combination of a rotatable packer head having an annular wall with spaced openings, packing members on the outside of the wall between the openings, a second packer head having a covered central portion, wall section-like portions, packing members between and projecting radially beyond said last-named portions and registering with said openings, means for synchronously rotating the packer heads, and means for maintaining a supply of plastic material on top of the second packer head so that material passes down between the packing members of the second packer head and is forced out through said openings, any surplus being carried through for future use, said structure having means for actuating the second packer head lengthwise of its axis of rotation.

9. The combination of a packer head having an annular wall, packing members thereon circumferentially spaced outside the wall, the wall having openings for the passage of material to be packed, located between the successive packing members, a second packer head arranged inside the first packer head and provided with packing members in register with said openings, means for synchronously rotating the packer heads and means for supplying material to be packed to the spaces between the packer heads.

10. The combination of a bell packer head for pipe making machines, said head having an annular wall with packing members thereon on the outside thereof, said wall having openings therethrough between the successive packing members for the passage of plastic material from the inside of the packer head.

11. In a pipe making machine, a bell packer head having an annular vertical wall provided with openings therethrough, packing members on the outside of the wall, the outer surface of each member being inclined horizontally and also from the bottom outwardly and upwardly.

RUSSELL M. LA DUE.