July 22, 1924. 1,502,509

S. G. MacTARNAGHAN

CONCRETE PIPE FORMING MACHINE

Filed Oct. 3, 1923 2 Sheets-Sheet 1

Fig. 1.

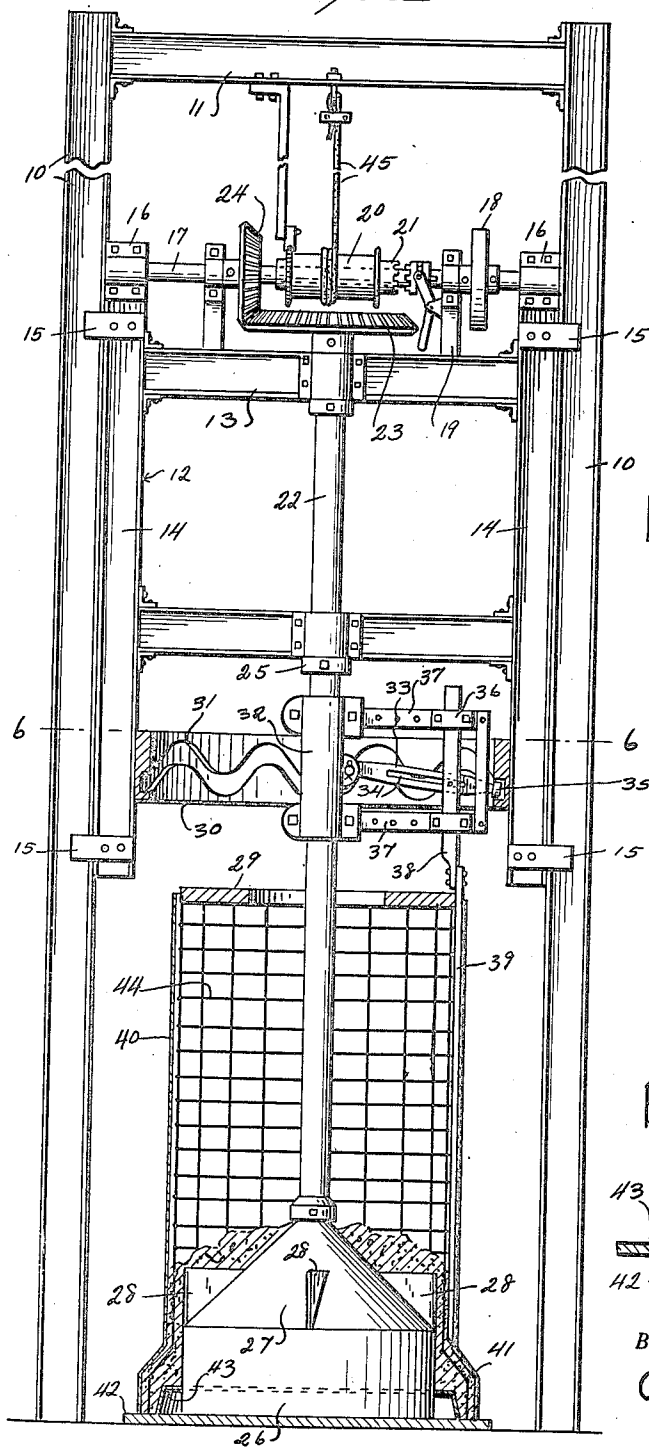


Fig. 2.

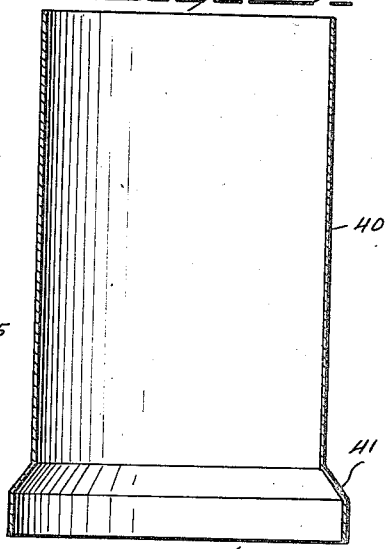


Fig. 3.

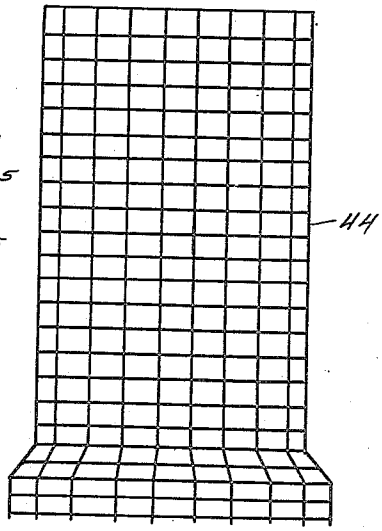
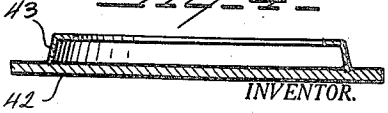


Fig. 4.



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Fig. 5.

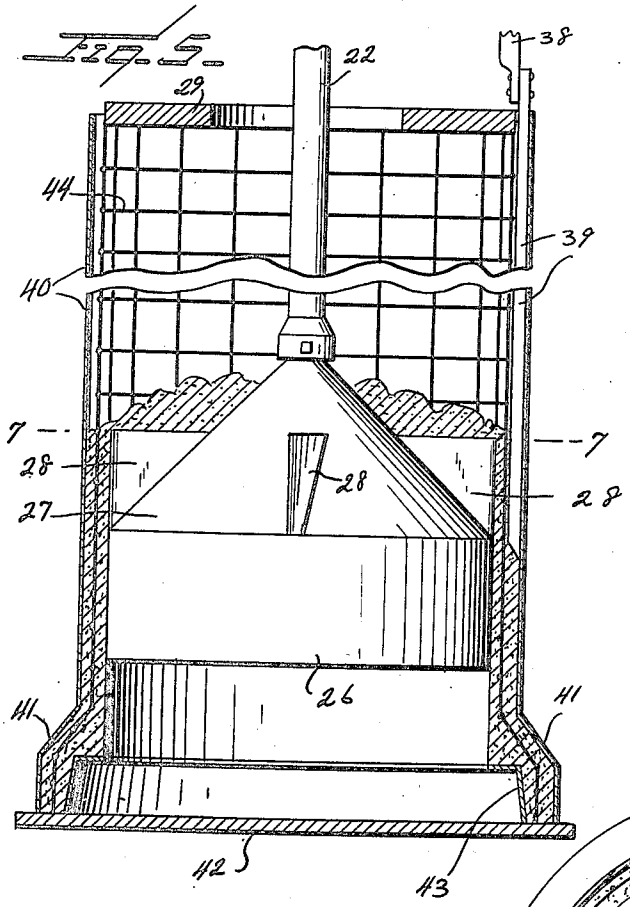


Fig. 6.

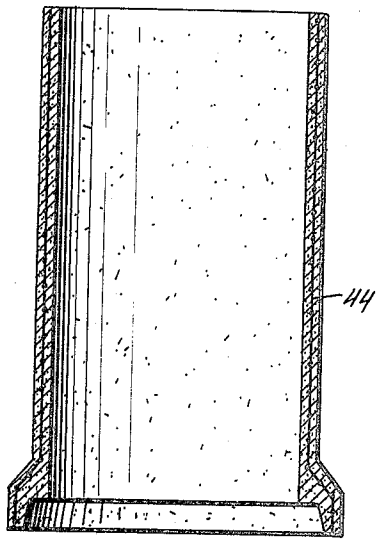


Fig. 7.

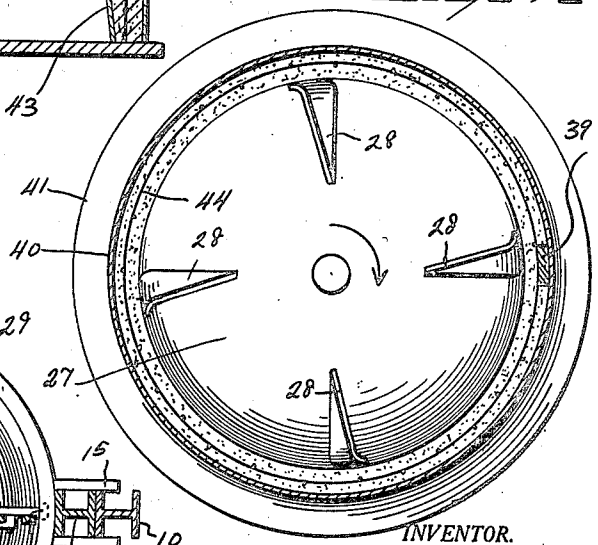
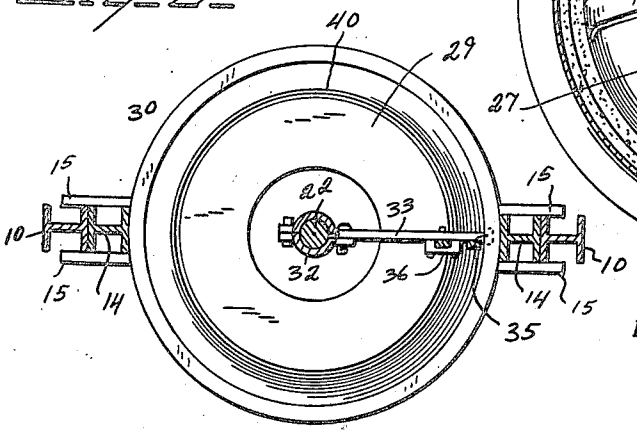


Fig. 8.



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UNITED STATES PATENT OFFICE.

SAMUEL G. MacTARNAGHAN, OF NUNDA, NEW YORK.

CONCRETE-PIPE-FORMING MACHINE.

Application filed October 3, 1923. Serial No. 666,381.

To all whom it may concern:

Be it known that I, SAMUEL G. MacTARNAGHAN, citizen of the United States, residing at Nunda, in the county of Livingston and State of New York, have invented certain new and useful Improvements in Concrete-Pipe-Forming Machines, of which the following is a specification.

This invention relates to pipe forming mechanism, and particularly to a machine for making concrete pipe.

One of the objects of the invention is to provide a machine of this character which will make bell-ended reinforced concrete pipe.

A further object is to provide a machine of this character which is very simple in construction and which embodies an outer mold having the general form of the pipe section to be made, a pallet which is designed to form the bell end or mouth of the pipe and an inner form which constitutes a packer, this inner form having a conical upper end which causes the concrete poured into the form to be discharged laterally against the form to thus cause the concrete through its own weight to pack the material against the form, the packer being rotatable and carrying upon it a plurality of trowel-like wings which act to force the concrete through a reinforcing mesh and to smooth off the interior facing of the soft concrete.

A still further object is to provide means whereby the packer may be lifted as the pipe is formed, and provide means whereby the concrete may be tamped on the outside of the reinforcement.

Another object is to provide a machine of this character whereby the combined action of the inside packer and the outside tamper spreads the concrete around the inside of the reinforcement and tamps from the outside, thus making a continuous wall of very dense and smooth concrete.

Still another object is to provide a device of this character wherein the form with the packed concrete inside, together with the pallet, may be readily removed from the apparatus and carried to the curing room, leaving the apparatus to be used with a new form and pallet.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is an elevation of my pipe forming machine partly in section, the form or mold, the reinforcing element and the concrete filling being in section;

Figure 2 is a vertical sectional view through the form;

Figure 3 is an elevation of the reinforcing member;

Figure 4 is a diametrical sectional view of the pallet member 43;

Figure 5 is an enlarged vertical section on the same lines as Figure 1, but showing the packer raised from the bottom of the form;

Figure 6 is a section on the line 6—6 of Figure 1;

Figure 7 is a section on the line 7—7 of Figure 5;

Figure 8 is a longitudinal vertical section through one of the pipe sections;

Referring to these drawings, it will be seen that my machine comprises a supporting frame which includes the uprights 10 which may be of any suitable material and of any suitable form in cross section, these uprights 10 being connected by a transverse beam 11. There may be any number of these uprights 10.

Mounted to slide between these uprights 10 is a sliding frame, designated generally 12, and embodying transversely extending, horizontally disposed braces 13 and the vertical members 14. The edge faces of these vertical members slide against the inner edge faces of the beams 10 and slidingly engage with these beams by the outwardly projecting plates 15 which are riveted or otherwise attached to the upper and lower ends of the beams 14. The upper ends of the beams 14 carry upon them bearings 16 within which is mounted a transverse shaft 17. This shaft, by means of the gear wheel 18, may be connected to any suitable source of power. I do not wish to be limited to the use of the gear wheel 18, as any other means may be used for rotating the shaft 17 by power. Mounted upon this shaft 17, which in turn is mounted in bearing brackets 19 carried upon the uppermost transverse beam 13, is a loosed drum 20, and mounted on the shaft 17 is a clutch 21 adapted to be shifted to engage this drum with the shaft or shifted to release the drum from the shaft.

Suitable means, as for instance, a pawl and ratchet are used for holding the drum from reverse rotation.

Mounted in bearings in the beams 13 is the vertical shaft 22, the upper end of which carries the beveled gear wheel 23 which meshes with a beveled pinion 24 carried upon shaft 17. Obviously when this shaft 17 is rotated the shaft 22 will be rotated. The shaft 22 is held from upward movement by means of the collars 25 which bear against bearings carried on the beams 13.

The shaft 22 extends below the sliding beam 14 and at its lower end has attached thereto a packer 26. This packer 26 is circular in plan view, the upper portion 27 of the packer being conical to form a spreader, and the shaft 22 is attached in any suitable manner to the apex of this conical portion or spreader 27. The conical portion 27 has outwardly projecting, substantially radial wings 28 which are triangular in side elevation, as illustrated in Figure 1, these wings being somewhat curved at their upper ends, as also shown in Figure 7, and the wings extending outward to and having their outer edges in alignment with the periphery of the circular packer 26. The shaft 22 passes through an annular head 29 whose function will be later stated.

Mounted upon the slide beams 14 is an annulus 30 formed with a sinuous cam track 31, and mounted upon the shaft 22 to revolve therewith is a bracket 32 which is approximately radial. Pivoted to the bracket 32 is an arm 33 which is longitudinally slotted, as at 34, the extremity of this arm carrying a roller 35 which operates within the cam track. Operating in vertical guides 36 in the horizontal beams 37 which constitute the frame extending from the bracket 32 is a rod 38 having a pin which engages in the slot 34. This rod at its lower end is connected to a tamper or tamping bar 39 which is adapted to extend down nearly to the lower end of the packer 26.

Coacting with the packer 26 is a form or mold 40 which may be made of sheet metal or any other suitable material and which, as the machine is particularly intended for making bell-mouthed pipe, is flared at its lower end, as at 41, and then downwardly extended. The lower end of this mold 40 rests upon a pallet 42 which carries upon it the mold 43 which forms part of the pallet and which is angular in cross section to form the bell-shaped mouth of the pipe, this annular mold 43 being of such internal diameter as will permit the packer 26 to pass down within it.

In the use of this device, the pallet 42 with the form 43 thereon is first put in place. The cylindrical reinforcement 44 is next placed on the pallet and the form 40 placed around it. The frame 12 is then lowered until the packer 26 comes down to the floor and centers in the pallet. The ring 29 is then lowered so that it rests on top of the reinforcing and centers it at the top and the batch of concrete is then poured into the mold from the top. The shaft 22 is now rotated. As the upper part of the packer is conical, the weight of the material tends to force it outward from the reinforcing wires and against the outside form 40. This is also aided by the wings 28 which act as trowels to force the concrete through the reinforcing wires in the same manner in which a trowel is used by a mason to plaster a wall, the whirling motion of the packer also setting up a centrifugal action which aids the placing of material in the wall of concrete between the packer and the outer form. The wings 28 not only act to force the concrete outward and through the meshes of the reinforcing fabric but also act to smooth off the inside of the concrete so as to form a perfectly smooth interior surface for the pipe.

As the shaft rotates the tamper frame 37, the arm 33 oscillates vertically and causes a vertical reciprocation of the tamper 39 which moves between the form 40 and the reinforcing fabric. This tamps down the concrete on the opposite side of the reinforcing fabric from the packer. The combined action of the inside of the packer and the outside tamper acts to spread the concrete from the inside of the reinforcement and tamp it from the outside and thus make a continuous wall of very dense and smooth concrete. When the machine has revolved a few seconds, sufficient to properly form the bell 41 of the pipe, the clutch 21 is engaged with the winding drum. This winding drum has wound thereon a cable 45, which at its upper end is attached to the cross bar 11 and this acts to raise the frame 12 with all its attached machinery. As the frame 12 is raised, the packer rotates and the tamper operates and thus the concrete pipe is gradually built up until the whole length of pipe has been completed. When the packer 27 reaches the ring 29, it raises the ring 29 or head with it so it is out of the way of the top of the pipe when the packer reaches the position so it clears the top of the form 40. The form 40 with the pallet 43 with the contained pipe is then removed to the curing room, the form 40 is removed from the pipe, and the operation repeated.

Obviously this machine may be designed so as to manufacture any sizes of pipes by using various dimensioned pallets, forms, rings or heads. Obviously I do not wish to be limited to the details of construction and arrangement of parts as these may be changed in many ways without departing from the spirit of the invention as defined in the appended claims. Attention is par-

ticularly called to the fact that the conical upper end of the packer 26 acts to cause the weight of the concrete to force the concrete laterally through the meshes of the wire fabric, while the tamper acts to pack the concrete exterior to the wire fabric, the wings 28 acting not only to force the concrete outward through the meshes but to smooth off the interior of the pipe.

I claim:

1. A pipe forming machine of the character described comprising an outer form having a height equal to the pipe section to be formed and having a diameter equal to the external diameter of a section, means for centering the cylindrical reinforcing web within the form, and means operating on the inside of said form and inward of the web acting to force plastic material uniformly outward from the center toward the form and acting to smooth the inside of the pipe.

2. A pipe forming machine of the character described comprising an exterior form having a height equal to the height of the pipe section to be formed, a packer disposed within said form and having a diameter slightly less than the internal diameter of the pipe section to be formed, said packer being movable vertically through the form, said packer having an upper conical end and this conical end having radially extending blades having their outer edges in alignment with the periphery of the packer, means for rotating the packer and for shifting it longitudinally through the form, a reciprocatable tamper disposed within the form and close to the inside face thereof, and means for reciprocating the tamper.

3. A pipe forming machine of the character described comprising an exterior form having a height equal to the height of the pipe section to be formed, a packer disposed within said form and having a diameter slightly less than the internal diameter of the pipe section to be formed, said packer being movable vertically through the form, said packer having an upper conical end and this conical end having radially extending blades having their outer edges in alignment with the periphery of the packer, means for rotating the packer and for shifting it longitudinally through the form, a reciprocatable tamper disposed within the form and close to the inside face thereof, and means operated by the rotation of the packer acting to reciprocate the tamper.

4. In a machine of the character described, a supporting frame, a sliding frame mounted upon the supporting frame and a centrally disposed shaft carried by the sliding frame, a pallet, a form adapted to be disposed upon said pallet concentric to the shaft and having a height equal to the pipe section to be made, a packer carried by the shaft to the lower end thereof. the packer being cylindrical in form and having an exterior diameter less than that of the form, the upper portion of the packer being conical, the shaft engaging the apex of the conical portion of the packer and said packer being provided with radially extending blades, means for rotating the shaft, a winding drum, a cable extending upward therefrom to the supporting frame, means for causing the gradual rotation of the drum to thereby lift the shaft and the packer upward, a tamper operating in the space between the form and the packer, means mounted on the shaft for supporting the tamper, and means for causing the reciprocation of the tamper as the shaft rotates.

5. In a machine of the character described, a supporting frame, a sliding frame mounted upon the supporting frame and a centrally disposed shaft carried by the sliding frame, a pallet, a form adapted to be disposed upon said pallet concentric to the shaft and having a height equal to the pipe section to be made, a packer carried by the shaft at the lower end thereof, the packer being cylindrical in form and having an exterior diameter less than that of the form, the upper portion of the packer being conical, the shaft engaging the apex of the conical portion of the packer and said packer being provided with radially extending blades, means for rotating the shaft, means for causing the gradual elevation of the shaft and the packer, a tamper operating in the space between the form and the packer, means mounted on the shaft for supporting the tamper, means for causing the reciprocation of the tamper as the shaft rotates, said means including an annular cam mounted upon the sliding frame and having a sinuous cam groove, and means operatively connecting the tamper with said cam groove to cause the reciprocation of the tamper.

6. In a machine of the character described, a supporting frame, a sliding frame mounted upon the supporting frame and a centrally disposed shaft carried by the sliding frame, a pallet, a form adapted to be disposed upon said pallet concentric to the shaft and having a height equal to the pipe section to be made, a packer carried by the shaft at the lower end thereof, the packer being cylindrical in form and having an exterior diameter less than that of the form, the upper portion of the packer being conical, the shaft engaging the apex of the conical portion of the packer and said packer being provided with radially extending blades, means for rotating the shaft, means for causing the gradual elevation of the shaft and the packer, a tamper operating in the space between the form and the packer, means mounted on the shaft for supporting

the tamper, means for causing the reciprocation of the tamper as the shaft rotates, said means including an annular cam mounted upon the sliding frame and having a sinuous cam groove, and an arm operatively and pivotally supported upon the shaft and having its free extremity disposed in said cam groove, the tamper being operatively connected to said arm whereby to cause the reciprocation of the tamper by the oscillation of said arm.

7. A pipe forming mechanism comprising a supporting frame, a sliding frame mounted upon the supporting frame for vertical movement, a vertical shaft operatively supported in the sliding frame, means carried upon the sliding frame for rotating said shaft, a pallet, a form coacting with the pallet and disposed concentric to the shaft, the form having a height equal to the height of the pipe to be made, means for centering a cylindrical reinforcement of wire fabric within the form and spaced therefrom, a packer connected to the lower end of the shaft, the packer having a cylindrical portion slightly less in diameter than the interior diameter of the wire reinforcement and having an upper conical portion, the apex of which is connected to said shaft, said conical portion having outwardly extending blades, the edges of the blades being flush with the peripheral face of the packer, a vertically reciprocatable tamping bar disposed just inside the form, a bracket mounted upon the shaft and rotatable therewith and having an outwardly projecting frame having vertical guides, a vertical slide disposed in said guides and operatively connected to the tamping bar, an arm pivoted upon the bracket and having a pin and slot engagement with the slide, an annular cam mounted upon said sliding frame, the inner face of the annular cam having a sinuous cam groove with which the outer end of the arm engages whereby as the bracket and frame rotate with the shaft the arm will be oscillated and the tamping bar reciprocated, and power operated means for rotating the shaft and for gradually raising the sliding frame on the first named frame.

8. In a pipe making machine, an outer form, an inner packer, means for centering a reinforcement within the form outward of the packer, a reciprocatable tamper disposed within the form and operating between the form and the packer, means for reciprocating the tamper comprising a fixed annular cam, means at the upper end of the tamper engaging said cam, and means for rotating the tamper around the axis of the form.

9. A pipe forming machine of the character described comprising an exterior form, packing means disposed within said form, means for tamping the material in the space between the packing means and the form comprising a vertically reciprocatable tamper, a fixed cam supported above the upper end of the form and having a sinuous cam track therein, a member supporting the tamper and having operative engagement with the cam track, and means for rotating said member around the axis of the form.

10. A pipe forming machine of the character described comprising an exterior form, rotatable means disposed within the form for packing the material therein and including a vertical shaft, a reciprocatable tamper operating between the form and the packing means, means supporting said tamper and mounted upon said shaft, said means permitting vertical reciprocation of the tamper but causing the tamper to rotate with the shaft around the axis of the form, and means for giving a reciprocatory movement to the tamper as it rotates around the axis of the form.

11. A pipe forming machine of the character described comprising an exterior form, packing means disposed within said form and including a rotatable shaft, tamping means comprising arms projecting radially from the shaft and adjustable inward or outward and having vertical guides, a tamping bar having a member extending vertically through said guides, a fixed cam formed with a sinuous cam track, and a lever pivotally connected to the shaft and to the tamping bar and at its end operatively engaging said cam track.

12. In a pipe making machine, an outer form having a height equal to the height of the pipe to be made, an inner packer having a diameter slightly smaller than the internal diameter of the pipe to be made and movable vertically through the form, power operated means for rotating the packer, a tamping member rotatable with the packer and disposed outward thereof, and power operated means for reciprocating the tamper.

In testimony whereof I affix my signature.

SAMUEL G. MacTARNAGHAN.