J. W. DAVIS.

MOLDING MACHINE.

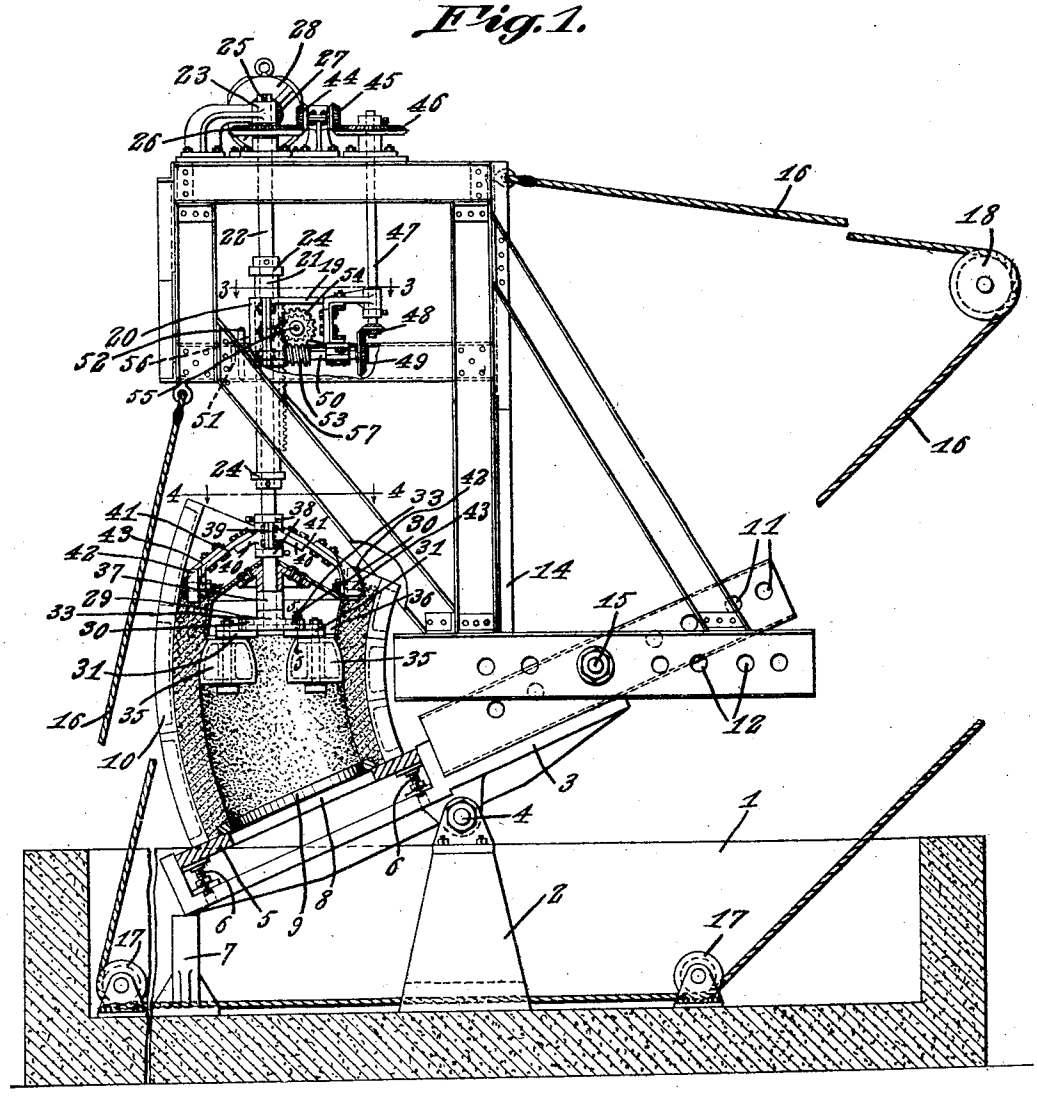
APPLICATION FILED JUNE 17, 1920.

1,410,172.

Patented Mar. 21, 1922.

3 SHEETS—SHEET 1.

Fig. 1.

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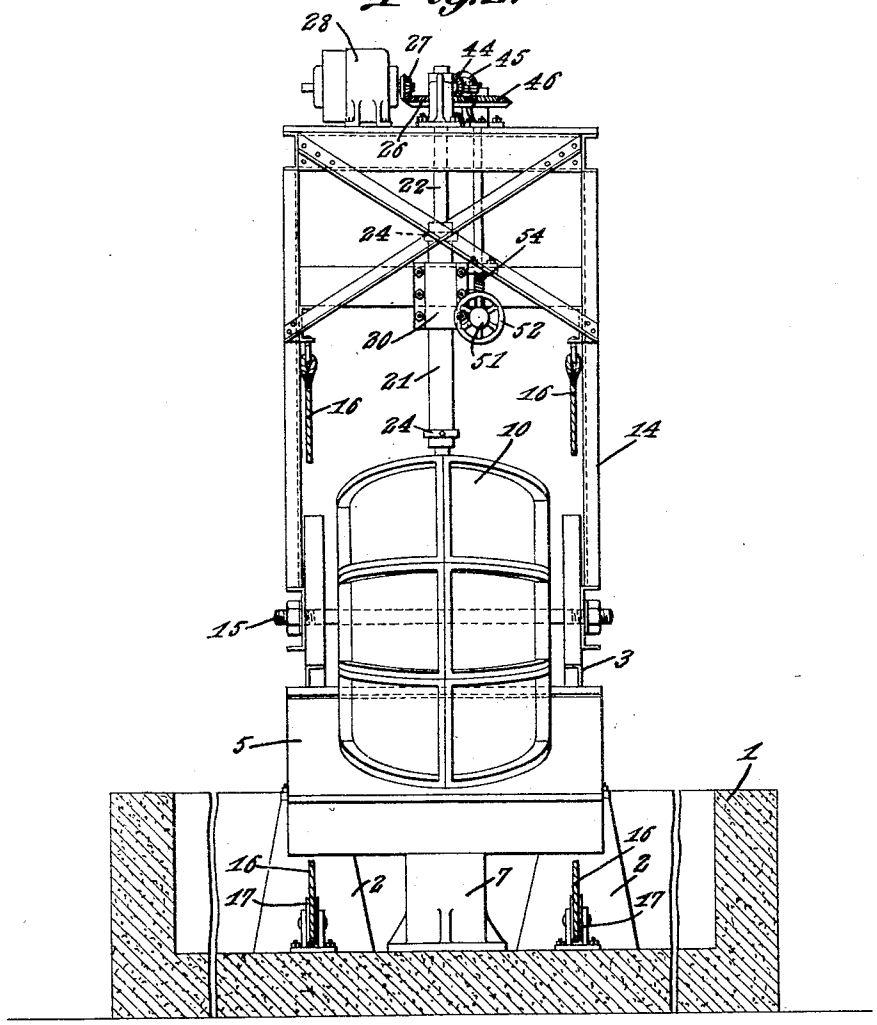
3 SHEETS—SHEET 2.

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

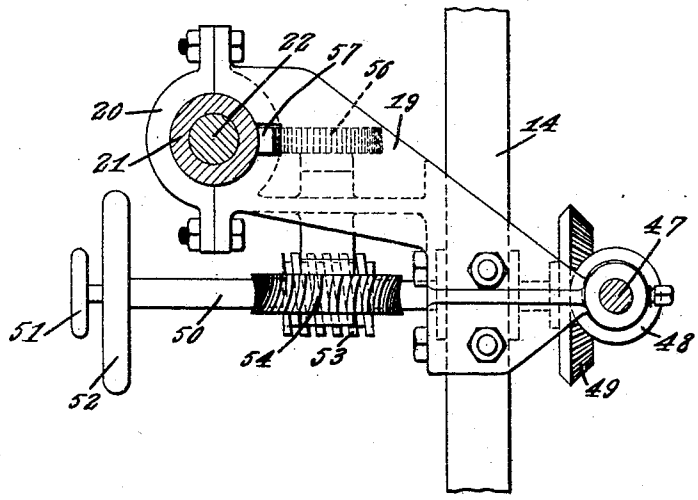



Fig. 4.

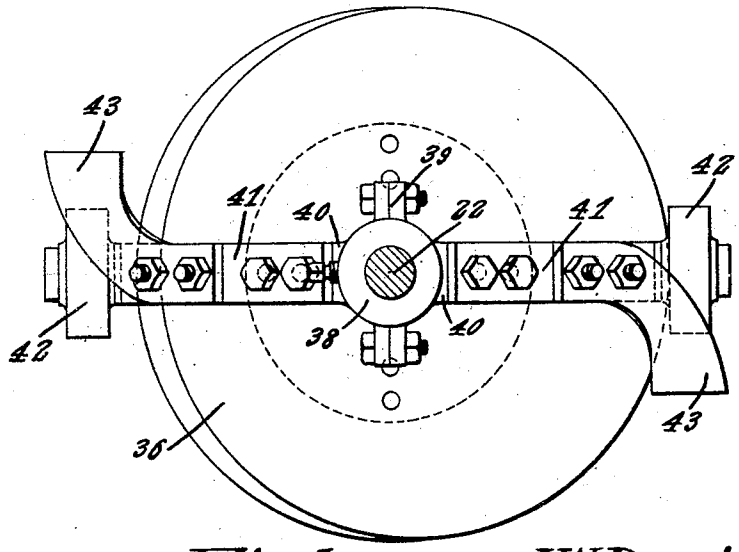
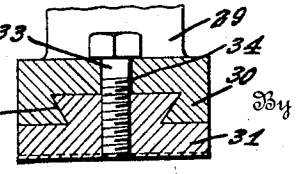



Fig. 5.

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# UNITED STATES PATENT OFFICE.

JOHN WILLIAM DAVIS, OF CINCINNATI, OHIO.

## MOLDING MACHINE.

1,410,172. Specification of Letters Patent. **Patented Mar. 21, 1922.**

Application filed June 17, 1920. Serial No. 389,650.

*To all whom it may concern:*

Be it known that I, JOHN WILLIAM DAVIS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Molding Machine, of which the following is a specification.

The device forming the subject matter of this application is adapted to be used for making molds of the kind in which a metal pipe is cast and the invention aims to provide novel means whereby the mold may be fashioned readily, whether the mold be of curved form or straight.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that, within the scope of what it claimed, changes in the precise embodiment of the invention shown can be made without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in side elevation, a device constructed in accordance with the invention, parts appearing in section; Figure 2 is a front elevation; Figure 3 is a horizontal section taken approximately on the line 3—3 of Figure 1; Figure 4 is a horizontal section taken approximately on the line 4—4 of Figure 1; and Figure 5 is a section taken on the line 5—5 of Figure 1.

The numeral 1 marks a pit or foundation wherein are located pedestals 2. The numeral 3 designates a main frame, mounted as indicated at 4 on the pedestals 2 to swing about a horizontal axis.

A table 5 is provided, the same being supported for adjustment on jacks 6 carried by the forward portion of the main frame 3, the table having an opening 8 and being provided with a ring 9 which serves to retain the sand against falling through the opening 8, the ring serving, at the same time, to shape the end of the mold. The forward end of the main frame 3 is supported on a prop 7 located in the pit 1 and one prop may be substituted for another, thereby to vary the angle of the frame 3 with respect to the horizontal, when the frame is tilted on its pivotal mounting 4. A casing 10 of curved form is supported on the table 5.

In the rear portion of the main frame 1 there are openings 11, adapted to cooperate with openings 12 and auxiliary frame 14, to receive a pivot bar 15, whereby the auxiliary frame 14 is mounted on the main frame 3 for tilting movement in a vertical plane about an axis represented by the pivot bar. Any suitable means may be provided for tilting the auxiliary frame 14 on the vertical axis represented by the pivot bar 15. In the present embodiment of the invention, the ends of a flxible element 16 are made fast to the auxiliary frame 14, adjacent to the top thereof, the flexible element being extended across idlers 17 in the pit 1 and around a drum 18 which is power-driven.

A bracket 19 is mounted on the auxiliary frame 14 and constitutes a part thereof, the bracket including a bearing 20 wherein a sleeve 21 is mounted for longitudinal movement. So far as the present discussion is concerned, the longitudinal movement of the sleeve 21 may be disregarded, the sleeve constituting a means for supporting rotatably, a shaft 22, the upper end of which is journaled in a bearing 23 on the upper end of the auxiliary frame 14. There are set collars 24 on the shaft 22, the set collars cooperating with the ends of the sleeve 21 to hold the shaft against longitudinal movement in the sleeve. The shaft 22 is splined as indicated at 25 into a beveled gear wheel 26 meshing with a beveled pinion 27 on the shaft of a motor 28 which may be driven electrically, the motor being mounted on the upper end of the auxiliary frame 14.

A hub 29 is fixed to the lower end of the shaft 22 and has arms 30, into which extensions 31 are dove-tailed as shown at 32 in Figure 5. The extensions 31 may be slid inwardly and outwardly on the arms 30, and in order to hold the extensions in any positions to which they may have been adjusted, clamp screws 33 are threaded into the extensions 31, the clamp screws operating in slots 34 in the arms 30, the heads of the clamp screws being adapted to bear on the arms. Packing rollers 35 are journaled on the outer ends of the extensions 31 for rotation on axes parallel to the axis of the shaft 22.

The numeral 36 denotes an annular core

having a cone-shaped top connected to a sleeve 37 through which the shaft 22 passes. The core 36 does not participate in the rotation of the shaft 22 but remains fixed against rotation, being held thus by the friction of the molding sand. Set collars 38 are mounted on the shaft 22, one set collar cooperating with the core 36 to limit the upward movement thereof. The core 36 is disposed above the packing rollers 35, and above the core is disposed a clamp 39, the same being engaged with shaft 22, between the collars 38, the clamp being secured to the shaft. The clamp 39 has outstanding arms 40 to which extensions 41 are secured, the extensions carrying packing elements, such as rollers, packing rollers being mounted to rotate on axes substantially at right angles to the axis of rotation of the shaft 22. Scrapers 43, in the form of blades, are secured to the extension 41 are operated in front of the packing rollers 42.

At this point, the description of the mechanism may be suspended profitably, in order to point out the operation of the device.

The table 5 may be adjusted with respect to the forward end of the frame 3, by manipulating the jacks 6. The casing 10 is mounted on the table 5 and the auxiliary frame 14 is swung on its pivotal mounting 15 until the packing rollers 35 are located in the opening 8 of the table 5. The molding sand is shoveled into the top of the casing 10 on top of the annular core 36. Rotation is imparted to the drum 18, the flexible element 16 tilting the auxiliary frame 14 rearwardly on an arc the center of which is the pivot bar 15. Obviously, when the auxiliary frame 14 is tilted as aforesaid, the packing rollers 35 and the core 36, together with the packing rollers 42, will move upwardly and rearwardly on an arc, so as to form the sand mold with the proper curvature, as will be understood clearly when Figure 1 of the drawings is noted.

The motor 28 operates the beveled pinion 27, the beveled pinion 27 driving the gear wheel 26, rotation being imparted to the shaft 22. When the shaft 22 is rotated, the rollers 35 move in an orbit and rotate on their axes, the sand being packed outwardly against the casing 10, notably in view of the fact that the rollers 35 taper toward their upper ends. The sand is packed above and in advance of the rollers 35 by the core 36, the core further preventing the sand from dropping downwardly between the rollers 35. When the shaft 22 is rotated, the rollers 42 move in an orbit, and, at the same time, rotate on horizontal axes. The rollers 42 serve to pack the sand downwardly about the periphery of the annular core 36. The scrapers 43, which are located in advance of the rollers 42, serve to smooth down and level off the sand in advance of the said rollers.

The mechanism hereinbefore described, and the operation last above set forth, presupposes that a mold of tubular form and of curved configuration is to be fashioned. The machine, however, may be so adjusted that, at any time, a curved mold may run off into a straight cylindrical part. The mechanism for accomplishing the result mentioned will now be described.

The gear wheel 26 meshes into a beveled pinion 44 journaled on the upper end of the auxiliary frame 14 and connected to a beveled pinion 45, the pinion 45 meshing auxiliary frame 14 and connected to a shaft 47 journaled in the upper portion of the auxiliary frame 14 and in the bracket 19 on the said frame. On the lower end of the shaft 47 there is a beveled pinion 48 meshing into a beveled gear wheel 49 on a shaft 50 journaled in the bracket 19 and disposed at right angles to the shaft 47. The beveled gear wheel 49 is loose on the shaft 50 but is adapted to be coupled thereto by an internal clutch which need not be described in detail since, per se, it constitutes no part of the present invention. Let it suffice to say that the clutch is operated by a member 51 located outwardly of a hand wheel 52 on the shaft 50. The shaft 50 is provided with a worm 53 meshing into a worm wheel 54 on a shaft 55 journaled in the bracket 19 and provided with a pinion 56 meshing into a rack 57 on the sleeve 21 wherein the shaft 22 is journaled.

When the machine is operated, as above described, to form a curved mold, the beveled gear wheel 49 is uncoupled by the clutch mechanism 51 from the shaft 50; but when a straight mold section is to be turned out, then the beveled gear wheel 49 is coupled to the shaft 50 by the clutch mechanism 51. When the beveled gear wheel 49 is coupled to the shaft 50, the rotation of the drum 18 is stopped, and consequently, the auxiliary frame 14 does not tilt in a vertical plane on its axis 15. Then, when the motor 28 is put into operation, the shaft 22 and parts carried thereby will be rotated as hereinbefore set forth. At the same time, there will be put into operation, a driving train comprising the gear wheel 26, the beveled pinion 44, the beveled pinion 45, the beveled pinion 46, the shaft 47, the beveled pinion 48, the beveled gear wheel 49, the shaft 50, the worm 53, the worm wheel 54, the shaft 55, the pinion 56 and the rack 57. Since the rack 57 is located on the sleeve 21, and since the set collars 24 prevent the shaft 22 from moving endwise independently of the collar 21, the shaft 22 will be raised when the sleeve 21 is raised by the action of the pinion 56 on the rack 57, the shaft 22 sliding upwardly through the gear wheel 26, and the

driving relation between the shaft 22 and the gear wheel 26 being maintained, because the shaft is splined at 25 to the gear wheel. Clearly, when the shaft 22 is raised as above explained, and rotated, a straight mold section is fashioned.

Since the main frame 3 can be tilted on the axis 4 to assume different positions with respect to the horizontal, the proper adjustment may be made, upon the radius of which the mold is to be curved. Noting Figure 5 of the drawings, it will be recalled that the packing rollers 35 may be moved inwardly and outwardly, so as to adapt the machine to molds of different diameters and to molds having different wall thicknesses. The packing rollers 42 may be shaped as required, to put the desired finish on the upper end of the mold, one sort of a roller being necessary in connection with a bell and spigot pipe and other forms of rollers being necessary for pipes which are coupled otherwise than by a bell and spigot joint.

Having thus described the invention, what is claimed is:—

1. In a device of the class described, a main frame; an auxiliary frame mounted to tilt on the main frame; means for tilting the auxiliary frame; a casing on the main frame; outwardly acting packing means supported rotatably on the auxiliary frame and operating in the casing; and mechanism for imparting rotary movement to the packing means.

2. In a device of the class described, a main frame; an auxiliary frame mounted to tilt on the main frame; means for tilting the auxiliary frame; a casing on the main frame; outwardly-acting packing means supported rotatably on the auxiliary frame and operating in the casing; and mechanism for imparting movement to the packing means in the direction of the axis of rotation of packing means.

3. In a device of the class described, a main frame and an auxiliary frame mounted to tilt on approximately parallel axes; means for holding the auxiliary frame in adjusted positions; means for tilting the auxiliary frame; a casing on the main frame; outwardly-acting packing means supported for rotation on the auxiliary frame and operating in the casing; and mechanism for moving the packing means in the direction of the axis of rotation of the packing means.

4. In a device of the class described, a casing; a frame; a shaft journaled in the frame; and packing means carried by the shaft and operating in the casing, said packing means comprising rollers journaled on axes substantially parallel to the shaft and substantially at right angles to the shaft.

5. A device of the class described, constructed as set forth in claim 4, and further characterized by the provision of a core on the shaft and located between the rollers on the normal axes and in advance of the rollers on the parallel axes.

6. A device of the class described, constructed as set forth in claim 4 and further characterized by the provision of a smoother operating in the path of the roller which is mounted to turn on an axis substantially at right angles to the shaft.

7. In a device of the class described, a main frame and an auxiliary frame mounted to tilt on approximately parallel axes; means for holding the auxiliary frame in adjusted positions; means for tilting the auxiliary frame; a casing on the main frame; outwardly acting packing means supported for rotation on the auxiliary frame and operating in the casing; and mechanism for imparting rotary movement to the packing means.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN WILLIAM DAVIS.

Witnesses:

MILTON SAYLER,

ROBT. L. HEITZMAN.