July 2, 1935. E. C. CLEMENS 2,007,074

PRESS FOR PLASTIC MATERIALS

Filed Sept. 27, 1932

FIG. 2

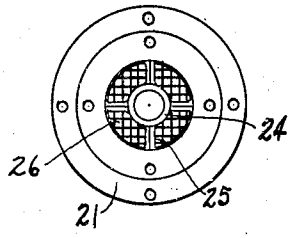


FIG. 1

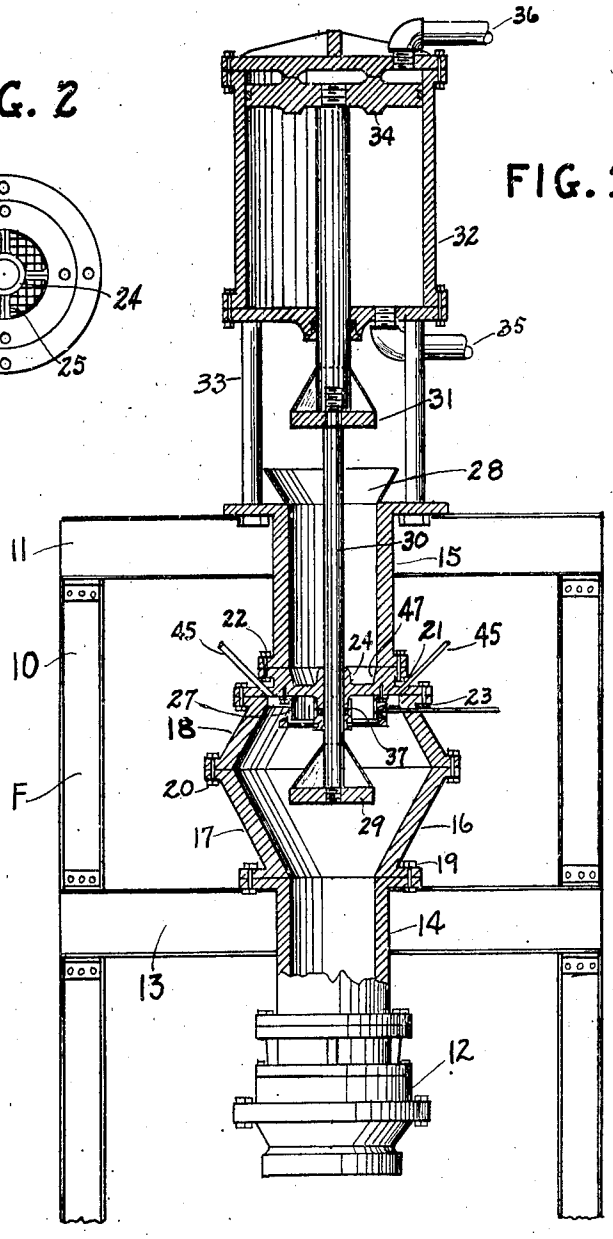


FIG. 3

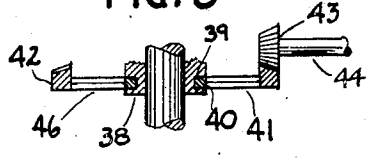
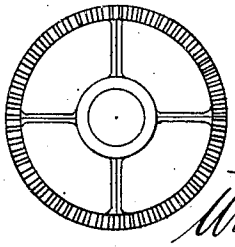


FIG. 4



Inventor
E. C. Clemens
Watson E. Coleman.
Attorney

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PRESS FOR PLASTIC MATERIALS

Eugene C. Clemens, Cannelton, Ind., assignor to The Bonnot Company, Canton, Ohio, a corporation of Ohio

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5 Claims. (Cl. 25—15)

This invention relates to presses and more particularly to a press adapted for use in the making of clay pipe or other ceramic articles.

An object of this invention is to provide a press for compressing the clay in plastic form so that when the clay is molded, the article will not have bubbles of air or gas trapped therein.

A further object is to provide a press in which a charging cylinder and a die-carrying compressing cylinder are disposed in axial alinement with an exhaust chamber intermediate the two cylinders or chambers and provide a piston rod carrying two pistons, one operating within the charging cylinder and the other within the compressing cylinder, and provide a motor for reciprocating said piston rod so that as the piston rod moves in one direction the clay within the charging cylinder will be forced into the exhaust chamber while the clay within the compressing chamber is being simultaneously forced out thru the die.

A further object of this invention is to provide a machine or press of this kind which is so constructed that it can readily and easily be taken apart for cleaning purposes or the like, and which is constructed to periodically force a predetermined quantity of material through the machine and into the forming dies or molds which may be of any desired configuration.

The above and various other objects and advantages of this invention will in part be described and in part be understood from the following detailed description of the present preferred embodiment, the same being illustrated in the accompanying drawing, wherein:—

Figure 1 is a vertical section partly broken away and partly in detail of a device constructed according to the preferred embodiment of this invention.

Figure 2 is a top plan view of the grid used for breaking the plastic material.

Figure 3 is an enlarged sectional view showing the rotatable breaking member disposed within the evacuating chamber to break up the plastic material after it has passed through the grid shown in Figure 2.

Figure 4 is a detail top plan view of the breaking member detached from the press.

Referring to the drawing wherein like characters of reference designate corresponding parts throughout the several views, the letter F designates generally a supporting frame structure which is provided with vertical supporting members 10, upper horizontal members 11 and lower horizontal members 13.

Supported on the horizontal members 13 is an expressing chamber 14, this expressing chamber carrying the usual forming die 12 at its lower end.

A charging cylinder 15 is supported from the upper horizontal bar 11 and extends downwardly therefrom and is disposed in axial alinement with the lower or expressing cylinder 14. An air evacuating chamber, designated 16, is interposed between the lower and upper cylinders 14 and 15, respectively, and this air evacuating chamber 16 comprises a pair of substantially frustro-conical or tapering members 17 and 18.

The frustro-conical member 17 has the reduced or apex portion thereof secured as by bolts 19 to the flanged upper end portion of the cylinder 14, and the base or enlarged portion of the frustro-conical member 17 is secured as by bolts 20 to the flanged base portion of the upper frustro-conical member 18.

Interposed between the apex or reduced portion of the upper frustro-conical member 18 and the lower end of the cylinder 15 is a grid, generally designated 21, which is secured to the flanged lower end portion of the cylinder 15 as by bolts 22 and to the flanged upper end portion of the upper frustro-conical member 18 by means of bolts 23 or the like.

This grid includes a central collar 24 having radial arms 25 and an outer annular portion. Disposed to extend over the spaces between the pairs of arms 25 is a grid or screen 26. As the plastic material or moistened clay is forced downwardly through the upper cylinder 15 by means of the plunger 31, the clay is broken up into ribbons or strings by being forced through the screen. A sleeve 27 is secured to the lower surface of the grid member 21, and is disposed about the collar 24, and this sleeve 27 extends downwardly into the interior of the air evacuating chamber 16, the purpose for which will be hereinafter described. A hopper 28 is carried by the upper portion of the upper cylinder 15, and is adapted to receive the material which is fed into the upper or charging cylinder

In order to force the plastic material into the cylinder 14 and through the die, I have provided a lower plunger or piston 29, which is secured to a piston rod 30 extending axially through the cylinders 14 and 15. This lower plunger 29 fits closely within the cylinder 14 so as to force the material downwardly therethrough and through the die 12. An upper plunger or piston 31 is secured to the piston rod 30 in order to force the material downwardly through the charging cylinder 15.

A power cylinder 32 is supported as by supports 33 above the charging cylinder 15, and this power cylinder 32 has a piston 34 slidable therein which is secured to the piston rod 30. Pipe connections 35 and 36 are adapted to be connected to a source of power supply such as steam, air or the like so that the piston 34 may be reciprocated within the cylinder 32.

A packing gland 37 surrounds the shaft 30 and is supported by the lower portion of the collar 24 to prevent the passage of air through this collar 24 during the operation of the mechanism.

A collar or annulus 38 is carried by the packing gland 37, and this collar has a groove 39 therein within which is disposed a cutting member in the form of a wheel having a hub 40 positioned within the groove 39 and spokes or knives 41 extending radially therefrom and in a position beneath the sleeve 27 and in the path of the material passing downwardly within this sleeve 27. A gear ring 42 is secured to the outer ends of the knives 41, and a pinion 43 carried by a drive shaft 44 engages this gear ring so as to effect rotation of the breaking member. This breaking member including the hub 40 and the knives 41 rotates continuously. The drive shaft 44 is adapted to be connected to a power means of suitable character (not shown).

A pair of pipes 45 communicate at one end with the air evacuating chamber 16 at points outside of the depending sleeve 27, and these pipes 45 are connected to a suitable air exhausting means (not shown) so that the air within the evacuating chamber 16 can be constantly withdrawn. By mounting the pipes 45 in a position outward of the sleeve 27, the material which has been broken up by the grid 21 and by the rotating breaking member 46, will not be sucked out of this evacuating chamber 16, nor will any of the broken material clog the inner open ends of the pipes 45, but as the clay is broken up into small pieces by the action of the breaking member 46 on the strings of clay forced through the grid, the entrapped air will be exhausted from the clay and carried off.

In the use of this mechanism, the moistened clay or other ceramic material which is in plastic condition is discharged into the hopper 28 from which point it passes into the cylinder 15 while the plunger 31 is raised. The piston 34 is then operated to move the rod 30 downwardly, to cause the upper plunger 31 to force plastic material downward through the grid 21 and into the evacuating chamber 16. It will, of course, be understood that the upper end of the collar 24 acts as a stop for the piston 31 and that thus a quantity of material will at all times remain on the top of the grid 21, and act as a seal to prevent the entrance of air into the evacuating chamber 16 through the cylinder 15. The material after being broken into small pieces drops downward through the evacuating chamber 16, and falls into the lower expressing cylinder 14 and the downward movement of plunger 29 forces this material downwardly through the die 12 by which the material will be formed into the desired article such as a pipe or other article.

In actual practice, after the first batch of material has been forced through the grid 21, the piston 34 is moved upwardly, and a second batch of material is placed in the hopper 28, so that there will be no lost motion and so that upon each downward stroke of the piston 34, material will be forced into the die members 12. The material passing through the grid 21 will be broken up into the desired ribbons which may be either squared, round or any other desired configuration. The screen 26 may be either formed as a separate means between the arms 25 or may be integral with the arms, as may be desired.

While the piston 34 operates periodically, the horizontally rotating cutting member 46 rotates continuously. This will break up the strings of clay passing through the grid 21, so that there will be no trapped air or pockets within the clay which entrapped air, in the event the material is baked or otherwise hardened, will have a tendency to not only weaken the material but also to form flaws which reduce the commercial value of the finished article.

After one or two strokes of the piston rod 30 there will at all times be a seal of material in the die 12, and a seal of material over the grid 21, so that these seals of plastic material will prevent the entrance of air from below or from above, and thereby permit the substantial evacuation of air from the evacuating chamber 16 and in the material disposed within this evacuating chamber.

The grid 21 is provided with a tapering inner wall portion 47 so that the material discharging from the cylinder 15 will be initially compressed to a slight degree before being broken up into ribbons or bars by the grid member 21. By constructing the evacuating chamber 16 larger in diameter than the lower cylinder 14 when the lower piston is raised, any material resting on top thereof will slide off of the piston 29 within the chamber 16 and fall downwardly into the compressing cylinder 14.

It is, of course, understood that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:—

1. A machine for forming clay pipe including a clay receiving chamber open at its upper end, an expressing chamber having a die at its lower end, an exhausting chamber larger in diameter than the receiving and expressing chambers and disposed between and connected to these chambers, the exhaust chamber being connected to air exhaust means, the lower end of the expressing chamber having a die, and a piston rod reciprocable through these chambers and carrying two plungers, one for operation in the receiving chamber and the other in the expressing chamber, the plungers being so spaced apart that when one plunger clears the intake end of the receiving cylinder the other plunger will clear the intake end of the expressing chamber.

2. A machine for forming clay pipe including a clay receiving cylinder, a clay expressing cylinder having a die at its lower end and disposed in substantial alinement with the receiving cylinder, an exhaust chamber disposed between the two cylinders and larger in diameter than the two cylinders and connected to the cylinders, the exhaust chamber being connected with air exhausting means, means disposed at the discharge end of the receiving cylinder and at the inlet end of the exhaust chamber for breaking up the clay forced through the receiving cylinder into small particles, a piston rod extending through the receiving cylinder and adapted to be reciprocated into the expressing cylinder, plungers mounted upon said rod, one for the receiving cylinder and

one for the expressing cylinder, and power operated means for reciprocating said rod.

3. A machine for forming clay pipe including a clay receiving cylinder, a clay expressing cylinder having a die at its lower end and disposed in substantial alinement with the receiving cylinder, an exhaust chamber disposed between the two cylinders and larger in diameter than the two cylinders and connected to the cylinders, the exhaust chamber being connected with air exhausting means, means disposed at the junction of the discharge end of the receiving cylinder and the inlet end of the exhaust chamber for breaking up the clay forced through the receiving cylinder into small particles, a piston rod extending through the receiving cylinder and adapted to be reciprocated into the expressing cylinder, plungers mounted upon said rod, one for the receiving cylinder and one for the expressing cylinder, a third cylinder mounted in alinement with and above the reciving cylinder and in which the piston rod extends, and a piston mounted upon the rod and operating within the last named cylinder, and power operated means for reciprocating the piston in the last named cylinder.

4. A machine for forming clay pipe including a vertically disposed clay receiving chamber having a receiving opening at its upper end, an expressing chamber having a die at its lower end, an exhaust chamber larger in diameter than the receiving and expressing chambers and connected to and disposed between these chambers, the exhaust chamber being connected to air exhaust means, and a piston rod vertically reciprocable through these chambers and carrying two plungers, one for operation in the receiving chamber and the other in the expressing chamber, the plungers being so placed apart that when one plunger clears the intake end of the receiving cylinder the other end will clear the intake end of the expressing chamber, and means disposed above the receiving chamber for reciprocating said piston rod.

5. A machine for forming clay pipe and the like including a receiving cylinder and an expressing cylinder supported in substantial vertical alinement with each other, an evacuating chamber between the two cylinders and larger than the expressing cylinder, means for connecting the evacuating chamber with an evacuating means to withdraw air from the chamber, a piston for each cylinder, means connecting both pistons for simultaneous movement, and means for reciprocating both pistons, said means giving a stroke to the piston sufficient to carry the piston of the expressing cylinder up into the evacuating chamber on each upward stroke of the pistons whereby to permit material within the evacuating chamber to flow downward around the piston of the expressing cylinder and into the expressing cylinder, and means interposed between the receiving cylinder and the expressing cylinder to break up the material passing through the evacuating chamber.

EUGENE C. CLEMENS.