Feb. 22, 1955 D. G. LOOMIS 2,702,409

HYDRAULIC EXTRUSION PRESS

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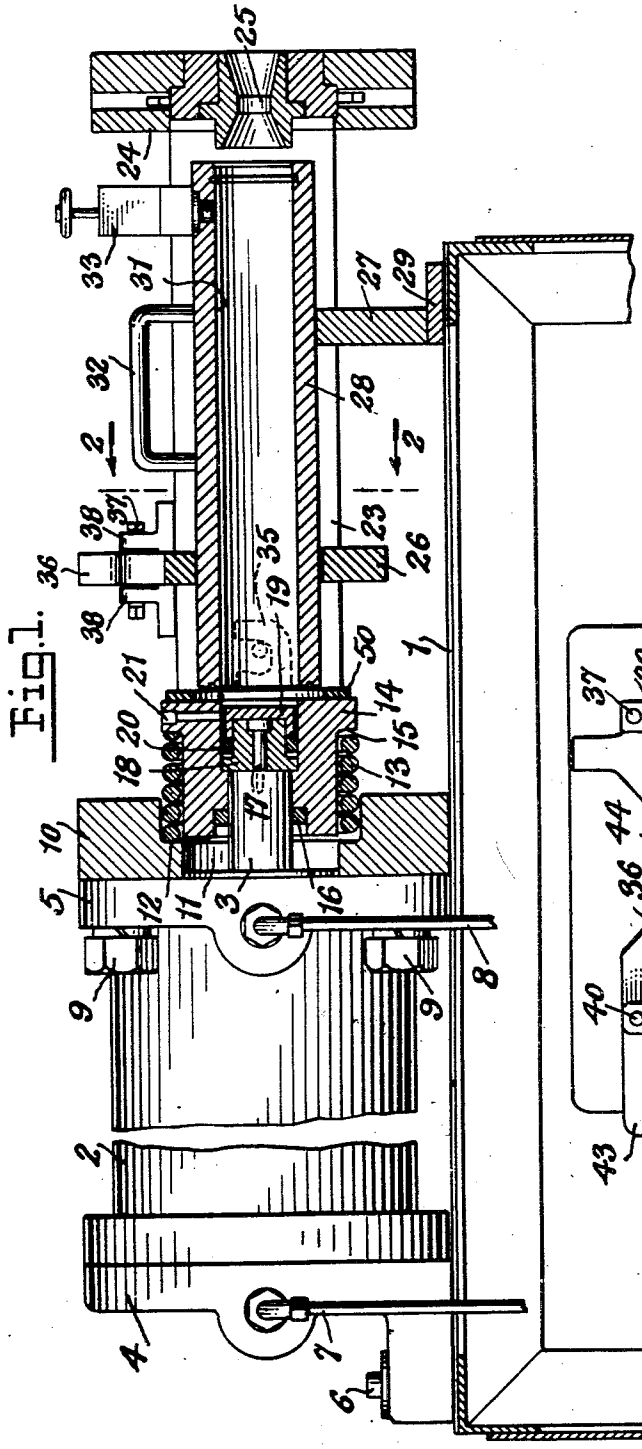


Fig. 1.

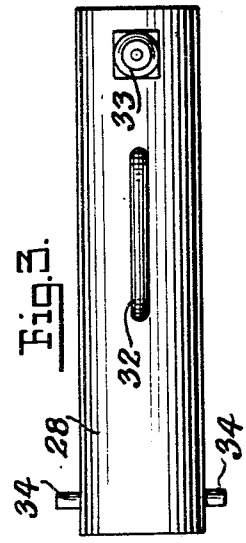


Fig. 3.

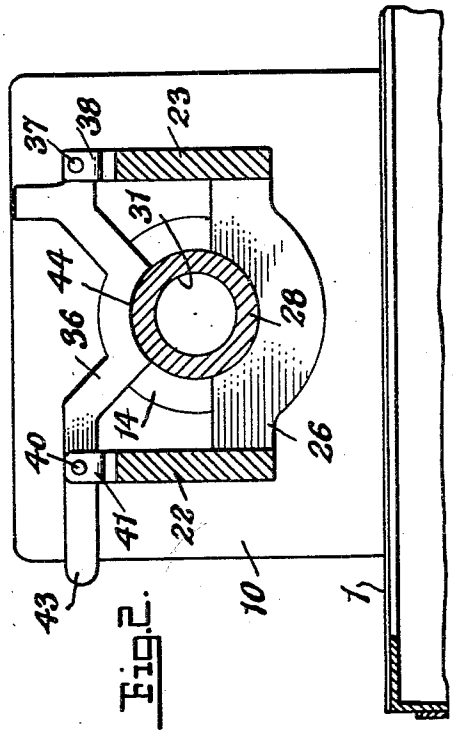


Fig. 2.

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Fig. 4.

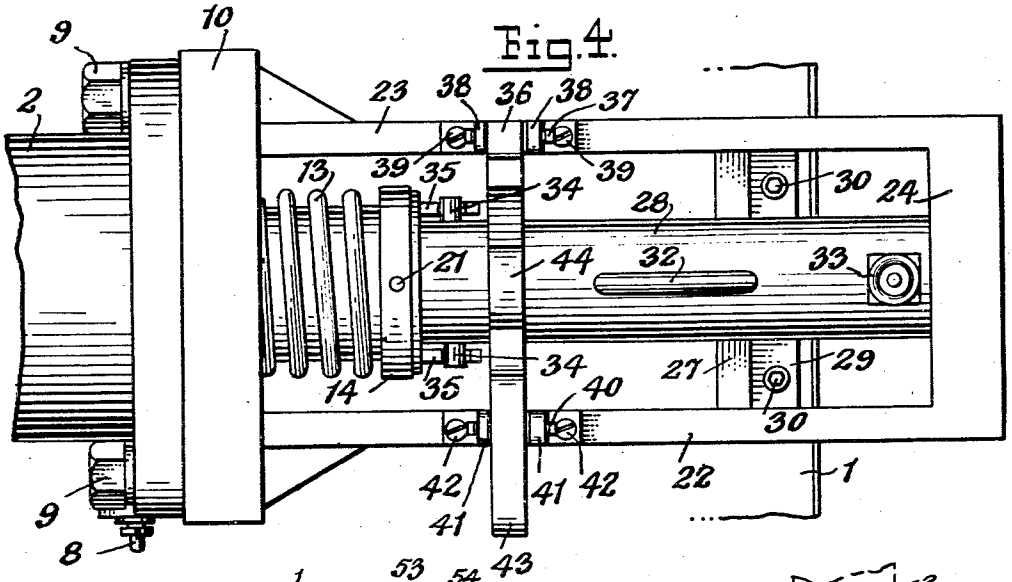


Fig. 6.

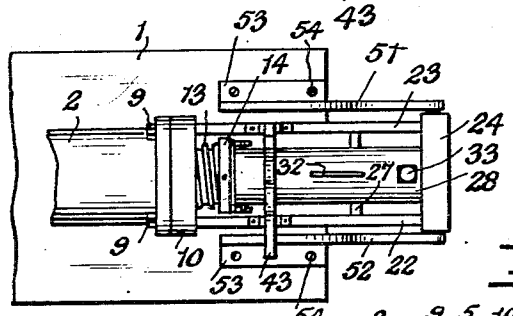
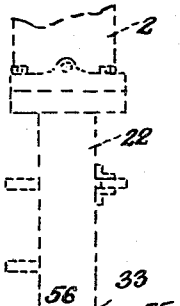
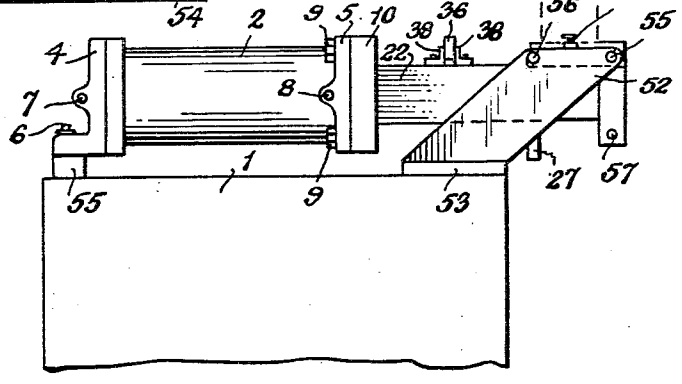


Fig. 5.





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HYDRAULIC EXTRUSION PRESS

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12 Claims. (Cl. 18—12)

This invention relates to hydraulic extruding presses, and more particularly to the type employed for the extrusion of plastic materials, as for example Steatite and many other materials of substantially similar characteristics.

It is an object of the invention to provide a press of this character which can be used either horizontally or vertically; which will be provided with quickly removable and replaceable material-holding cylinders which are separate and independent of the die through which the material is extruded.

It is another object of the invention to provide a press of this kind having means for quickly and effectively de-airing the cylinder from which the plastic material is forced, and to provide a construction in which the material-containing cylinders are easily fitted into extruding position preparatory to the extruding operation, and the empty cylinders quickly and easily removed.

It is still another object of the invention to provide in a press, means by which the material-containing cylinder will be separate and independent of the extrusion die, permitting the die to remain in place in the press while the emptied cylinder is removed and replaced, and without disturbing the extrusion die or altering its position in the press.

With these and other objects to be hereinafter set forth in view, I have devised the arrangement of parts to be described and more particularly pointed out in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed,

Fig. 1 is a vertical longitudinal sectional view of a hydraulic press, constructed in accordance with the invention;

Fig. 2 is a sectional view, taken substantially on the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a top plan view of one of the material-containing cylinders;

Fig. 4 is a top plan view of the press;

Fig. 5 is a side elevational view of a modified construction by means of which the press is capable of use in either a horizontal or vertical position, and

Fig. 6 is a top plan view of a portion of the structure shown in Fig. 5.

Referring to the drawings, 1 indicates the top portion of the supporting frame upon which the press is mounted, said frame being preferably, but not necessarily, composed of angle-beam construction, and being sheathed or covered for the purpose of forming an enclosure or housing for piping, valves, the motor and other parts employed in connection with a press of this general character. Horizontally mounted on top of the frame is a hydraulic cylinder 2, which is of known construction and contains the usual hydraulic piston or ram from which a piston rod 3 (Fig. 3) extends. The cylinder is supported at its ends by the brackets indicated respectively at 4 and 5, the bracket 4 being secured to the base or frame 1 by the screws 6 and having the lead-in piping 7 connected to it in a manner to supply the hydraulic fluid into the cylinder 2 at the required times. Piping 8 communicates with the opposite end of the cylinder 2 through the bracket 5 for the return stroke of the piston, when required.

Secured by the bolts 9 to the bracket 5 is a block 10 having a central passage 11 through which the piston rod 3 is operative, and the block 10 is formed with an annular

seat 12 which receives a coil spring 13. The coil spring 13 surrounds a head or bell 14 which is formed with a seat 15 against which the spring 13 is operative, so that the head or bell 14 is thus spring-loaded and is urged by the spring 13 to a limited extent toward the right, as viewed in Fig. 1.

The head or bell 14 is formed with a central bore which fits around the piston rod 3 and permits relative axial movement of the piston rod and bell 14. A packing 16 may be used between the interior of the bell and the surface of the piston rod 3.

Secured to the end of the piston rod 3 by the screw 17 is the piston 18 to which the head 19 is attached. A packing 20 is interposed between the piston and the bore of the bell 14. A washer or gasket 50 is provided on the end or face of the bell 14. A de-airing valve 21 is provided in the head or bell 14.

Extending forwardly from the block 10 is a yoke-shaped frame consisting primarily of a pair of spaced, elongated parallel bars indicated respectively at 22 and 23, connected at one end by the cross-member 24 in which the extruding die 25 is mounted. The bars 22 and 23 are connected by the spaced-apart cross-pieces 26 and 27 which co-operate in forming a cradle for the support of the material-containing cylinder shown at 28. The bar 29 located at the lower end of the cross-piece 27 is secured to the base or frame 1 by the screws indicated at 30 in Fig. 4.

The material-containing cylinder, indicated at 28, is shown in detail in Fig. 3, and it consists of a cylindrical tube of suitable metal provided with a continuous, smooth, internal bore 31 through which the piston 18 is moved to force the soft plastic material contained in the cylinder out of the same and out through the die 25. It will be understood that while this extruding action is taking place, the cylinder 28 will be clamped between the head or bell 14 and the extrusion die 25, and will not be spaced away from these parts as it is shown for clarity in illustration in Fig. 1.

Provided at the top of the cylinder 28 is a handle or bail 32 by means of which the cylinder can be conveniently carried and placed in or removed from the press. Near one end the cylinder 28 is provided with a de-airing valve 33, and adjacent to its opposite end the cylinder carries a pair of diametrically-opposite, laterally-extending pins 34 which are adapted to fit into hook-shaped supports shown at 35 and provided on and constituting extensions of the forward end of the head or bell 14. The cylinder 28 is held against rising movement from the supports 26 and 27 by means of a clamping arm 36 which is pivoted at 37 in the brackets 38, secured by the screws 39 to the top or upper edge of the bar 23. A removable pin 40, passed through brackets 41, secured by the screws 42 to the top of the bar 22, extends through the handle portion 43 of the clamp 36 and holds the arcuate portion 44 of the clamp against the cylindrical surface of the cylinder 28 and thus serves to prevent any tendency of the cylinder to rise from off the supports 26 and 27.

From the foregoing, the operation of the improved press will be readily understood. The press is usually provided with two or more of the cylinders 28 so that while the material is being extruded from one cylinder in the press, another one of the cylinders can be refilled with the plastic material in readiness for its insertion into the press upon the completion of the extrusion from the first cylinder. The filled cylinder containing the plastic material is filled to a point just to the rear of the de-airing valve 33 to thereby permit de-airing of the cylinder without the possibility of the valve 33 becoming clogged by the material. When the cylinder is lowered into place in the press to come to rest upon the cradle formed by the supports 26 and 27, the pins 34 will engage with the hooks 35, as clearly shown in Figs. 1 and 4. The cylinder is then locked in place by the clamp 36. The hydraulic fluid is now caused to flow through piping 7 and this will cause the piston 18 to be moved toward the right, bringing the head or bell 14 into sealing contact with the left end of the cylinder 28 and moving the cylinder toward the right to bring its right or forward end into sealing contact with the extrusion die 25. The press is now ready for

de-airing and this is effected by opening the de-airing valve 33 and starting the operation of a vacuum pump connected to the valve 21, which de-airing is continued until the air is eliminated. The piston is now moved forwardly through the bore 31 of the cylinder 28 until the plastic material therein is forced out through the extrusion die 25. When the extrusion is completed, and the piston has reached the end of its stroke, a retracting movement of the piston then takes place to thereby return the piston to its former retracted position. At the very end of this return movement of the piston, the hooks 35 attached to the end of the head or bell 14, will pull the cylinder 28 away from the die 25 so that the clamp 36 can now be raised and the empty cylinder then lifted out and replaced with a filled cylinder ready for the next extrusion, performed in the manner above described.

While I have herein shown the head or bell 14 as being urged against the filled cylinder 28 by means of the spring 13, it may in some cases and particularly in conjunction with larger presses, be found desirable to urge this head against the cylinder by other means, such as for example, hydraulic means, and such arrangement, when found necessary, is contemplated as being within the scope of the present invention.

In Figs. 1 and 4 of the drawing, the press is shown as being arranged for horizontal operation. The structure shown in Figs. 5 and 6 permits the use of the press either horizontally or vertically. Therein the press is substantially similar in construction to that shown in Figs. 1 and 4 except that its forward end is supported between brackets 51 and 52 extending upwardly and forwardly from the frame 1. Each of the brackets 51 and 52 is provided at its lower end with a laterally-projecting flange 53 fastened at the top of the frame by bolts or screws indicated at 54. The cross member 24 at the forward end of the press is attached by pivot pins 55 to the brackets 51 and 52, which are also provided at the top with the apertures 56. When it is desired to use the press horizontally, as shown in full lines in Figs. 5 and 6, the press will be supported by the pins 55 and secured at the rear ends by the screws 6, which in this embodiment, pass through a spacing block 55.

When the press is to be used vertically, the screws 6 are removed and the press can then be swung pivotally on the pins 55 to bring it to the vertical position shown in dotted lines in Fig. 5. This will bring the apertures 57 in the cross piece 24 into registration with the apertures 56 in the brackets 51 and 52, and pins may then be inserted into the aligned apertures 56 and 57 to maintain the press in its vertical position. The press can also, when in said position, be otherwise braced to thereby hold it rigidly.

Having described a single embodiment of the invention, it is obvious that the same is not to be limited thereto but is broad enough to cover all structures coming with the scope of the annexed claims.

What I claim is:

1. In a hydraulic extruding press, a frame including a pair of spaced, elongated bars having a cross member extending between them at one end of the frame, an extrusion die held in said cross member, a spring-pressed head at the opposite end of the frame, a material-filled cylinder removably mounted in the frame between the spring-pressed head and the extrusion die with one end of the cylinder held against the extrusion die by the pressure of the spring-pressed head, a hydraulic ram having a piston axially aligned with the cylinder and operable through the head to thereby force the material out of the cylinder and through the extrusion die.

2. In a hydraulic press, a hydraulic ram having a piston rod carrying a piston at its end, a cylindrical head through which the piston is operative, a spring for urging the head in one direction, a support remote from the head for holding an extrusion die, and a cylinder charged with material to be extruded removably held between the spring-pressed head and the extrusion die and in axial alignment with the piston.

3. In a hydraulic press, a hydraulic ram having a piston rod carrying a piston, a cylindrical head through which said piston is operative, means for urging the head in a direction away from the ram, a support remote from the head for holding an extrusion die, and a cylinder charged with a plastic material to be extruded removably held between the head and the extrusion die and in axial alignment with the piston.

4. In a hydraulic press, a frame having a fixed element at one end, an extruding die held by said element, a head at the opposite end of the frame, a cylinder removably held between the head and the die means for urging said head against one end of the cylinder located between said head and the die, the cylinder containing a plastic material to be extruded through the die, and a piston movable through the head and axially aligned with the bore of the cylinder to thereby force the material out of the cylinder and through the extrusion die.

5. In a hydraulic press as provided for in claim 4, wherein a cradle is provided in the frame for the support of the cylinder, a clamp on the frame for holding the cylinder against the support, hook members provided on the head, and pins extending radially from the cylinder to thereby couple the cylinder to the head.

6. In a hydraulic press, a hydraulic cylinder having a ram provided with a piston, a head surrounding the piston, a spring for urging the head in one direction, a fixed extruding die spaced from the head and located in axial alignment with the piston, a cylinder removably held between the head and the die and held in contact with the die by the pressure of the head, said cylinder containing plastic material for extrusion through the die, a support for the cylinder and a clamp for holding the cylinder on said support.

7. In a hydraulic press, a reciprocating piston, a frame having spaced side bars between which the piston is movable, cross members on the bars, a cylinder removably held in the frame and mounted on the cross bars, clamping means extending across the frame and on top of the cylinder and holding the cylinder against raising movement but permitting sliding movement of the cylinder, a spring-loaded head mounted concentrically around the piston and operative against one end of the cylinder to thereby force the cylinder axially in one direction, an extrusion die fixedly mounted in the frame and aligned axially with the cylinder and against which the cylinder is held by the spring-loaded head and in position to enable the piston to urge material out of the cylinder and through the extrusion die upon forward movement of the piston, coupling means between the head and the cylinder causing one end of the cylinder to be pulled away from the extrusion die when the piston is retracted at the end of the extruding movement.

8. In a hydraulic extruding press, a fixed die, a spring-actuated head urged in a direction toward the die, a material-containing cylinder open at both of its ends and positioned between the head and the die and having one of its open ends held against the die by said head, plunger means movable axially through the head and through the cylinder for forcing the material out of the cylinder and through the die, means for coupling the head and cylinder together in a manner to cause the cylinder to be drawn away from the die upon a retraction of the plunger means.

9. In a hydraulic extruding press, a hydraulic cylinder, a piston rod emerging therefrom, a cradle for supporting a material-holding tubular member, a plastic-filled tubular member resting on the cradle, an extrusion die mounted at one end of the cradle and at one end of the tubular member, a spring-loaded head contacting the second end of the tubular member and holding the first end of the same in contact with the extrusion die, means for movably coupling one end of the tubular member to the head, a piston head on one end of the piston rod, said piston head being axially movable through the spring-loaded head and also movable through the tubular member to thereby force the contents thereof through the extrusion die, means for clamping the tubular member on the cradle, said tubular member being bodily removable from between the head and die when the clamping means is moved from contact with said tubular member.

10. In a hydraulic press as provided for in claim 9 and including de-airing valves in the cylinder and head by means of which said parts can be de-aired before the piston head is moved through the material-containing tubular member.

11. In a hydraulic press, a piston, a die spaced therefrom, a material-holding cylinder removably held between the piston and die, means for supporting the cylinder consisting of a frame having cross members against

which the cylinder is rested, a clamp for holding the cylinder against the support, a spring-loaded head surrounding the piston and holding the cylinder against the die, and interengaging elements on the cylinder and head for coupling one end of the cylinder to the head.

12. In a hydraulic extruding press, a fixed die, a cylinder independent of said die and containing plastic material to be extruded, spring-actuated means for engaging against and urging the cylinder into contact with the die and in axial alignment therewith, plunger means operative through the cylinder while the cylinder is held against the die to force the plastic material out of the cylinder and through the die, and coupling means between one end of the cylinder and the spring-actuated means and operative to draw the cylinder away from the die when the piston reaches the end of its retracting movement through the cylinder.

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