Sept. 3, 1946. H. V. ALLISON 2,407,123

PRESS

Filed Oct. 1, 1943 2 Sheets-Sheet 1

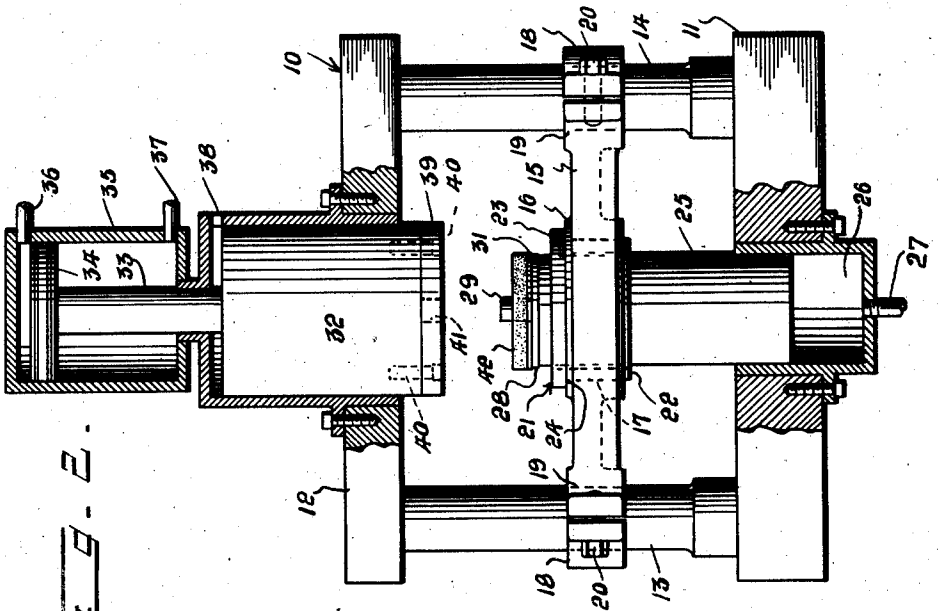


FIG. 2.

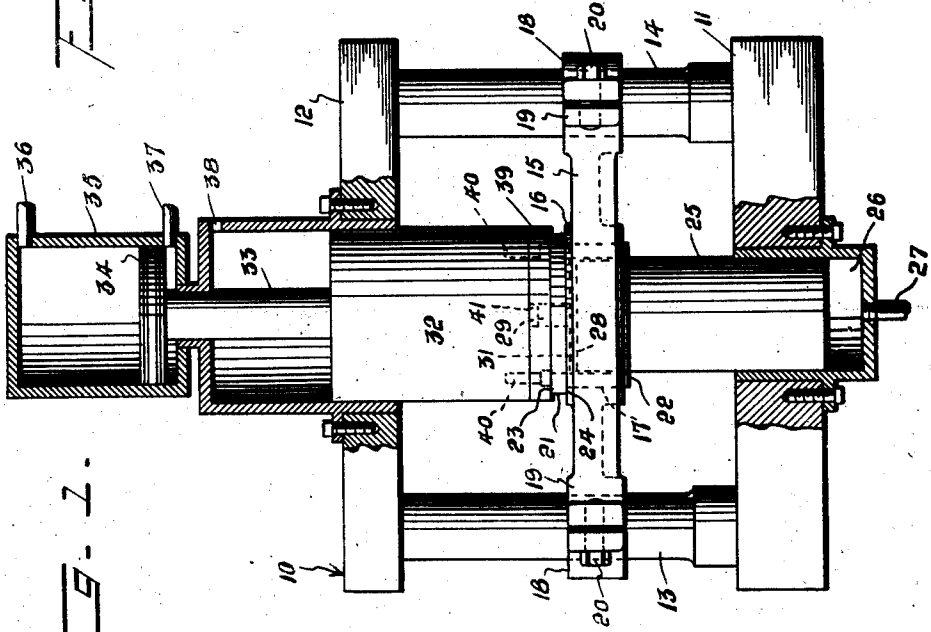


FIG. 1.

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Sept. 3, 1946. H. V. ALLISON 2,407,123

PRESS

Filed Oct. 1, 1943 2 Sheets-Sheet 2

Fig. 3.

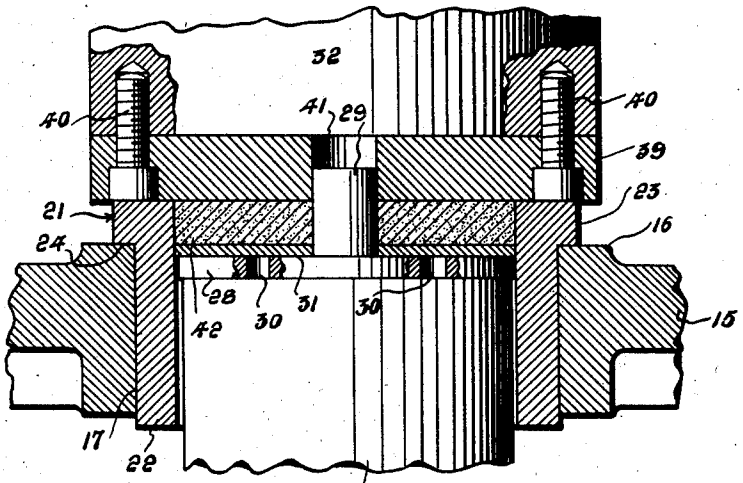
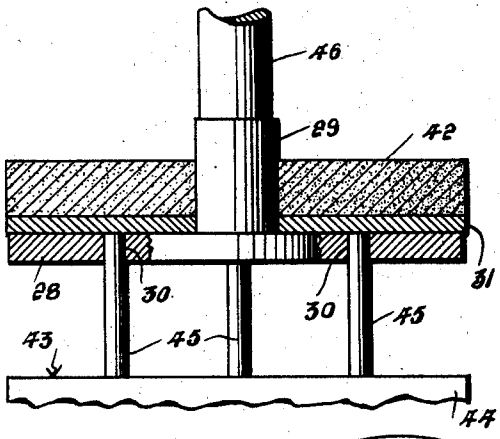


Fig. 4.

Fig. 5.



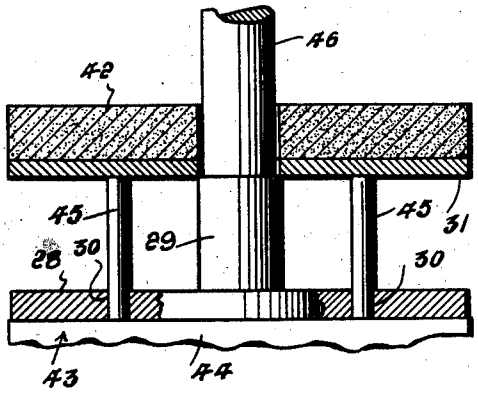
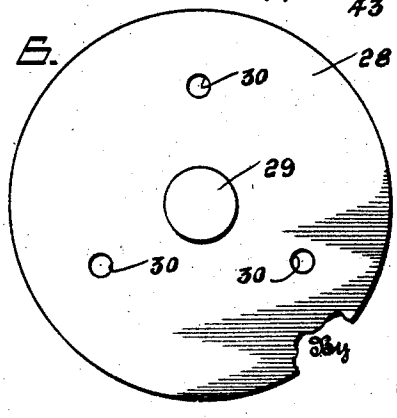


Fig. 6.



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UNITED STATES PATENT OFFICE

2,407,123

PRESS

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Application October 1, 1943, Serial No. 504,636

1 Claim. (Cl. 18—16)

1

This invention relates to new and useful improvements in presses and has particular relation to molding presses.

The objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a view partly in front elevation and partly in section and showing a press made in accordance with the teaching of the invention;

Fig. 2 is a view similar to Fig. 1 but showing the press in open position and with a piece of work ejected and supported by the lower or pressure ram;

Fig. 3 is a vertical sectional view on a somewhat larger scale through the central portion of the press when closed;

Fig. 4 is a sectional view showing a step in the separation of the molded piece from a bottom die plate;

Fig. 5 is a similar view showing the parts separated; and

Fig. 6 is a plan view of the bottom die plate.

While the invention is herein illustrated as applied to the manufacture of abrasive articles, as grinding wheels, it is to be understood that the invention has many other applications. For example, the press of the invention may be used in powdered metallurgy, in plastic molding, etc., and the claims of this application are intended to include these as well as other uses to which the invention may be applied.

Referring in detail to the drawings the press of the invention as herein shown comprises a frame generally designated 10 and including a bed 11 and a head 12 together with connecting uprights 13 and 14 supporting the head from the bed and having other functions as will appear. Supported between the bed 11 and the head 12 by the uprights 13 and 14 (which are shown as transversely round posts) is a die holder comprising a web or plate 15 having a thickened central portion 16 provided with an opening 17 extending vertically therethrough. Plate 15 is shown as having split end portions 18 and 19 about the respective posts or uprights and these split portions are adapted to be drawn together about the uprights on tightening of screws 20 whereby to secure the die holder in the desired position of vertical adjustment relative to the bed and the head.

Supported by the die holder 15 is a mold ring generally designated 21 and comprising a skirt

2

portion 22 of an outer diameter to enter the hole or opening 17 and a radially enlarged portion 23 at one end providing a strengthened portion and a shoulder 24 disposed against the upper side of the thickened central portion 16 of the holder 15. Ring 21 in its skirt portion 22 is of an outside diameter to have a tight or pressed fit in the opening 17. The ring is removable from the holder for replacement by a ring having a larger or smaller internal diameter than that shown whereby articles of the desired diameter may be molded.

A pressure ram 25 is shown as movable through the bed 11 and this ram, at least in its inner or upper portion, is of a diameter a few thousandths less than the internal diameter of ring 21 to enter the mold ring and be freely movable therein without contacting the sides thereof. The precise manner in which the ram 25, or other pressure applying means if some other means is employed, is moved is not a limiting feature of the invention. As shown the lower end of the ram is movable in a cylinder 26 to the lower end of which fluid under pressure may be supplied as through a passage 27. The fluid may be exhausted through the same passage or otherwise to permit of retraction or downward movement of the ram in the cylinder 26 and relative to the mold ring 21 although it is noted that the ram is never entirely withdrawn from the mold ring.

Within the mold ring 21 and on the upper end of the ram 26 is a bottom die plate 28 also having a free or loose fit in the ring. This plate is provided with a central upwardly extending portion 29 comprising a molding core and which may be integral with the plate as shown or otherwise fixed thereto. A predetermined number of holes 30 are provided in the plate 28 in predetermined relation to the stud or core 29 and the purpose of these holes will appear. Further it will appear that these holes or openings 30 may be in the form of notches opening through the edges of the plate if that is desired.

Disposed on the upper side of bottom plate 28 is an inner die plate 31 of a diameter to have a snug fit in the ring 21 but yet to be movable into and out of such ring. Plate 31 has a central opening receiving the core 29 of plate 28 so that plate 31 is disposed flat against the upper side of plate 28 when the parts are in the mold ring 21. Aside from its central opening for the reception or passage of the core 29 plate 31 is imperforate.

Operable through the head 12 is a holding ram 32 to the upper end of which is connected the lower end or the inner end of a piston rod 33. A piston 34 secured to the outer or upper end of rod 33 operates in a cylinder 35 to which fluid under pressure may be supplied and from which the fluid under pressure may be exhausted at the upper and lower sides of the piston as

through pipes 36 and 37. An opening 38 may be provided to prevent the trapping of air in the head above the upper end of the ram 32.

A closure plate 39 is removably secured to the lower end of the ram 32 as by machine screws 40 or otherwise as may be desired. The closure plate has an opening or recess 41 to receive, freely, the upper end of the core or projection 29 when the press is closed as in Figs. 1 and 3. Since the closure plate 39 is removable from the lower end of the holding ram 32 it will be understood that this plate may be replaced by another of greater or lesser diameter or having a larger or smaller hole or recess 41, etc.

When an article is to be molded the pressure ram 25 is located with its upper end within the mold ring 21 as in Figs. 1 and 3. The inner die plate 31 is disposed on the bottom die plate 28 and this assembly placed within the ring 21 and on the upper or inner end of the ram 25. Alternatively the bottom plate 28 may be dropped into the ring 21 onto the upper end of the ram 25 and thereafter the inner die plate 30 may be placed on plate 28. In either case the parts are arranged with the core 29 passing through the inner die plate.

Now (at this time the holding ram 32 and the closure plate 39 are in an upper or retracted position) the proper amount of material to be molded is placed within the ring 21 on the plate 31 which has a snug fit in the ring as above set forth. The holding ram is then lowered to move the closure plate 39 into the position shown in Figs. 1 and 3 and wherein said plate is closing the upper end of the mold ring 21. Then pressure ram 25 is moved further into the mold ring 21 forcing the plates 28 and 31 upwardly therein and pressing the moldable material against the closure plate 39, the inner die plate 31 and the inner wall of the mold ring and about the core 29. Clearly the mold ring has an inner configuration corresponding with the desired outer configuration of the articles being molded.

The moldable material which is here disclosed as an abrasive compound comprising abrasive grain, fillers, a binder, curing agents, etc., is placed on the plate 31 in a measured quantity. After it is pressed or molded into the shape of a wheel 42 shown in the drawing (or other desired shape) the holding ram 32 is raised or retracted. Then the pressure ram 25 is moved further into and in fact through the mold ring 21 to eject the bottom plate 28, the inner plate 31 and the molded wheel 42 from the mold ring 21.

Thus the parts are moved to the relative positions in which they are shown in Fig. 2. There it is noted that both the die plates and the newly molded wheel 42 are held above the mold ring by the lower or pressure ram 25. It will be understood that in the molding operation there is a tendency to mold the material to the inner surface of the mold ring 21 and that the lower ram acts as an ejector forcing the plates and the newly molded article from the mold ring.

With the parts positioned as in Fig. 2 the operator lifts the plates and the newly molded article from the upper end of the ram 25. This may be done by grasping the upper end of the core 29 or by lifting from the edges and the under side of the plate 28. At this time the article or wheel 42 may be soft and readily deformable. If the finished product is to be a grinding wheel the article 42 will likely contain water and be soft and deformable prior to final

curing. Thus it should not be touched as it comes from the press and is lifted on the plates 28 and 31.

When the plates and the newly molded article are lifted from the upper end of the ram 25 they are taken to a separating means preferably located conveniently adjacent the press. This means, generally designated 43, comprises a supporting base or plate 44 having upstanding pins 45 in the number and spaced relation of the holes or openings 30 in the bottom die plate 28. The operator places the plates 28 and 31 and the article 42 on the pins 45 with the latter aligned with and entering the openings 30 in the bottom die plate 28 as in Fig. 4. Then pressure is applied to the upper end of the core 29 as by a plunger 46 or the like and the bottom die plate 28 is pushed downwardly over the pins 45 and toward the base 44 leaving the inner die plate 31 and the article 42 supported on the upper ends of the pins 45.

Now the plate 31 and the article 42 thereon are removed from the pins and the article while supported on the plate 31 may be transported to an oven or to a sheet on which it is to be placed in an oven or the like for final cure. In any event direct handling of the newly molded article is avoided. Thereafter the plate 28 is again placed in the mold ring on the upper end of the pressure ram 25 and if the work has been removed from the plate 31 it is again used and if it has been placed in an oven or the like a new plate 31 is used and the above described cycle of operation is repeated.

It will be understood that the main purpose of the core 29 is to form a central opening through the article being molded. This is important in the molding of abrasive wheels and the like but where a central opening is not required (or in fact where no opening is required in the product) the core 29 may be omitted. Where openings other than central openings are required in the product the core 29 or a plurality of such cores may be suitably located on the bottom die plate and the inner die plate will be provided with openings for their passage. The rams may be operated other than hydraulically and the top and bottom rams may move upwardly together when the finished work is being removed from the mold ring and in such instance the top ram may move faster than the pressure ram or while at the same speed may move a greater distance to expose the ejected work for removal from the lower or pressure ram.

Having thus set forth the nature of my invention, what I claim is:

In a machine for molding articles, a die holder having a vertical opening therethrough, means for closing the upper side of said opening, a ram movable into and through said die holder from the lower side thereof, a pair of die plates insertable into and removable from said die holder, said pair of die plates comprising a bottom die plate resting on said ram when in said die holder, a centrally located core projecting from the upper side of said die plate, an inner die plate on said bottom die plate and having a centrally located opening through which said core projects, said bottom die plate having holes therethrough in spaced relation to said core, and said ram when moved through said die holder adapted to move said die plates out through the upper side of the latter.

HUGH V. ALLISON.