

Dec. 23, 1958

A. J. WACHT

2,865,208

PRESS

Filed June 29, 1956

6 Sheets-Sheet 1

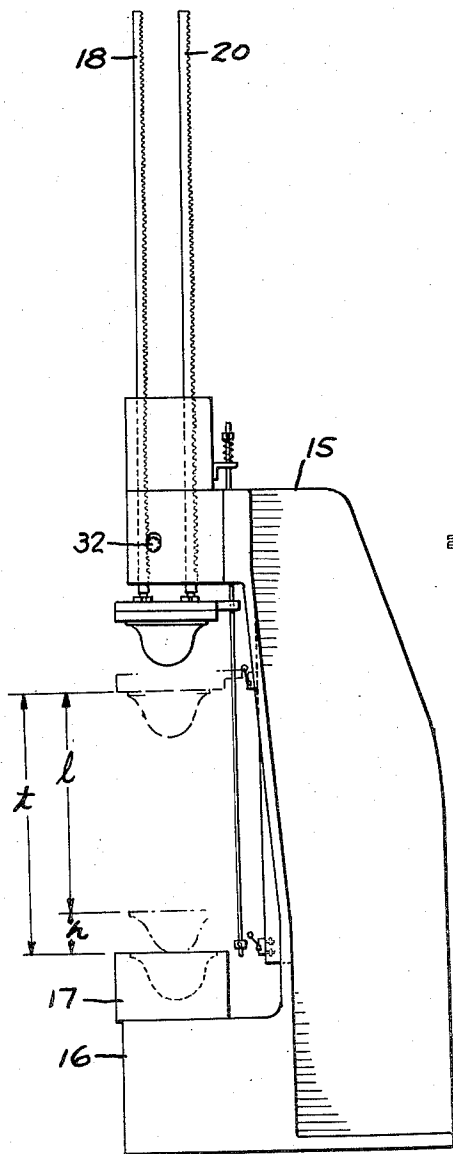


Fig. 1

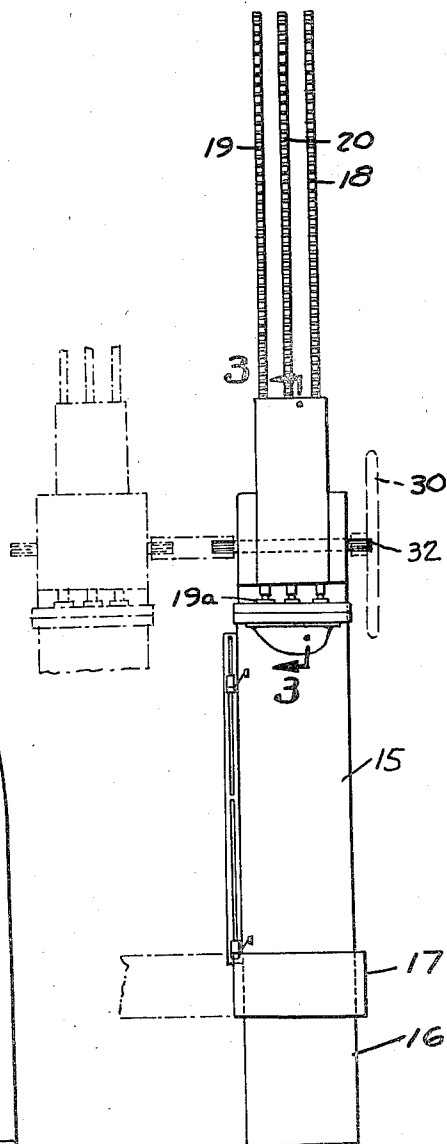


Fig. 2

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6 Sheets-Sheet 2

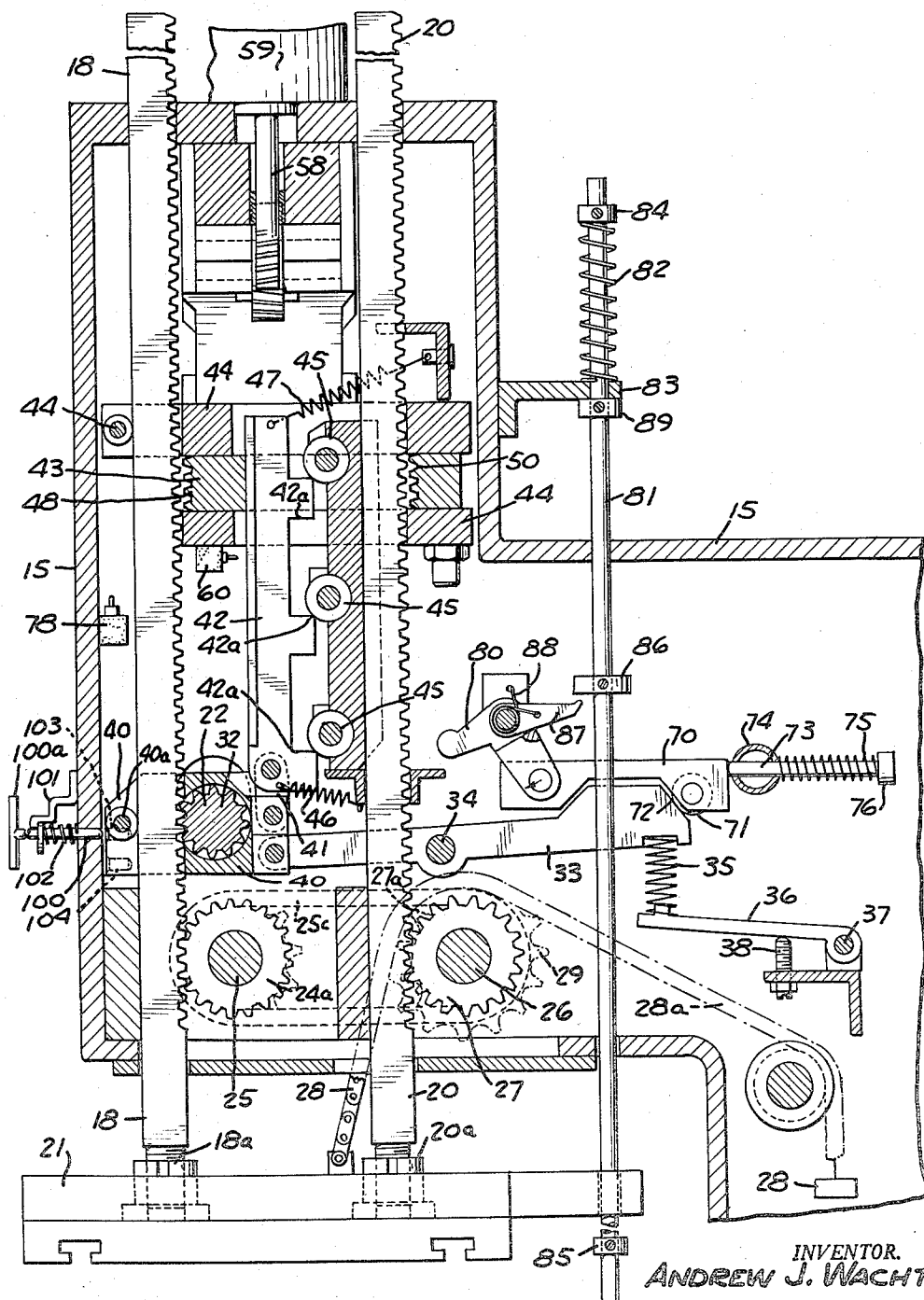


Fig. 3

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6 Sheets-Sheet 3

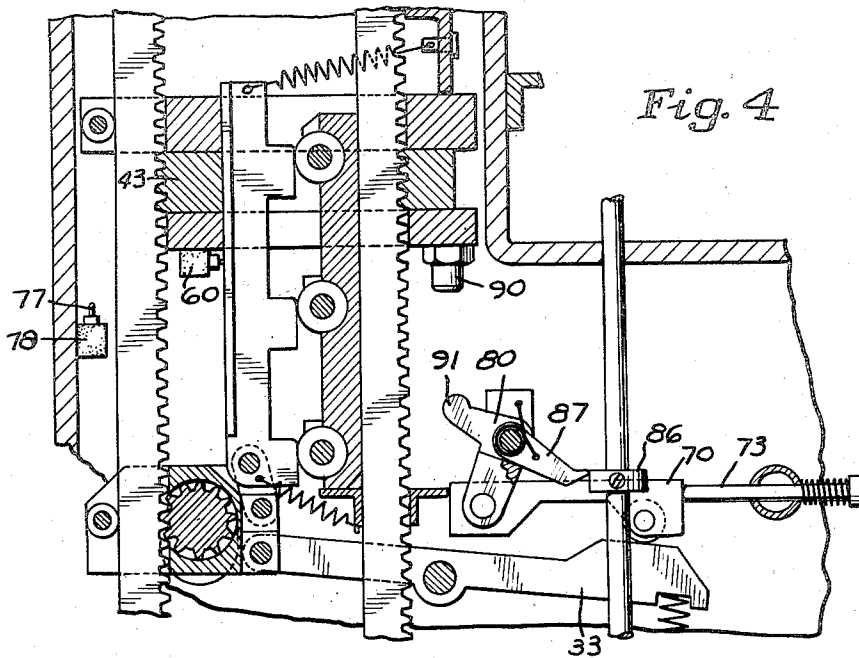


Fig. 4

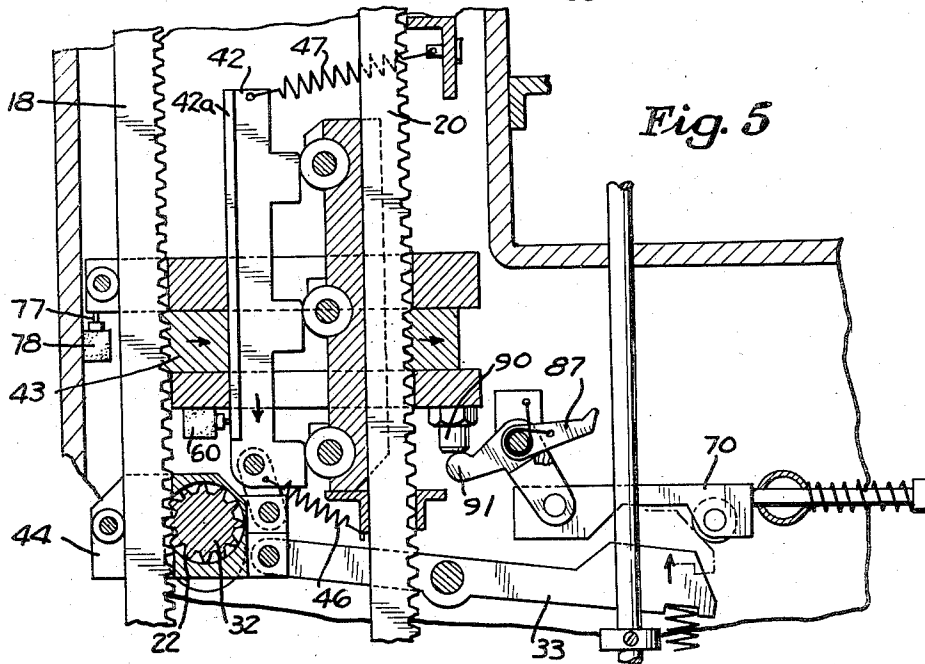


Fig. 5

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6 Sheets-Sheet 4

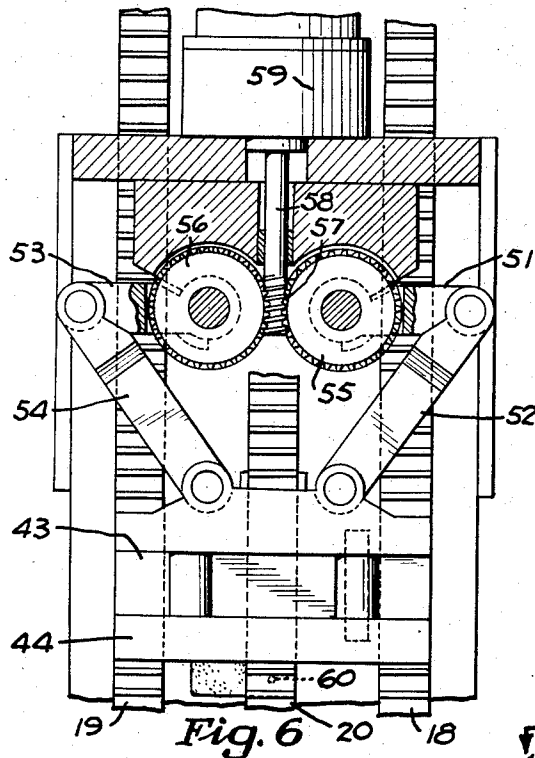


Fig. 6

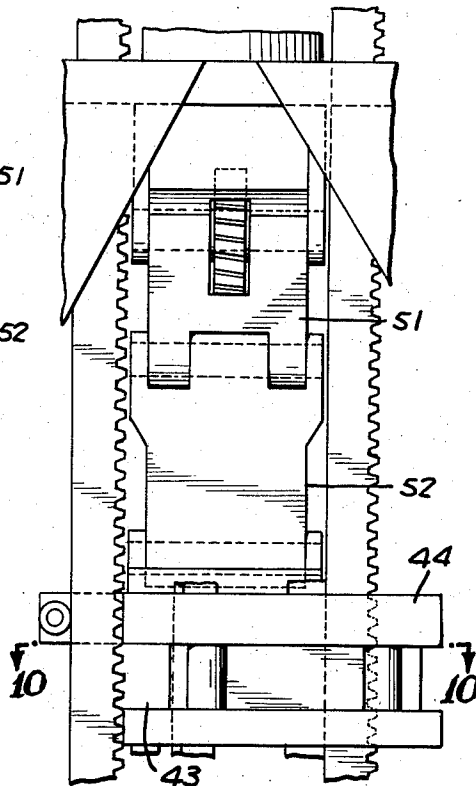


Fig. 8

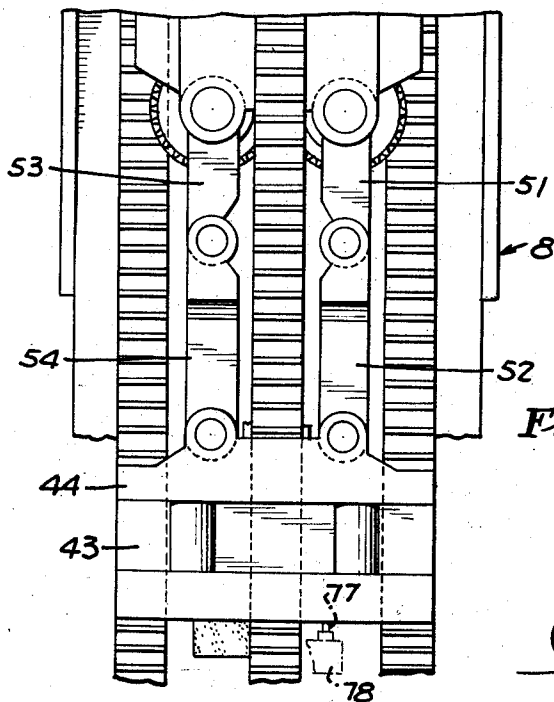


Fig. 7

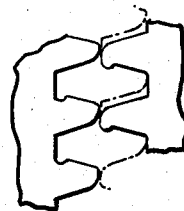


Fig. 9

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6 Sheets-Sheet 5

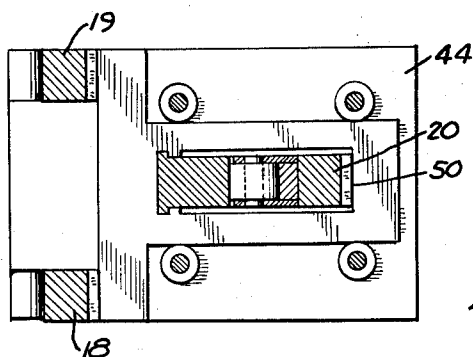


Fig. 10

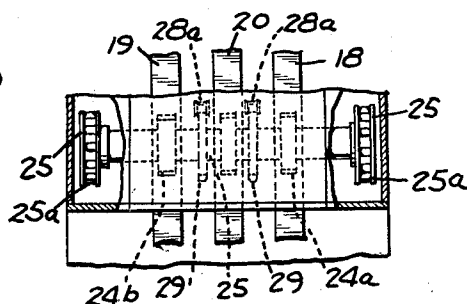


Fig. 11

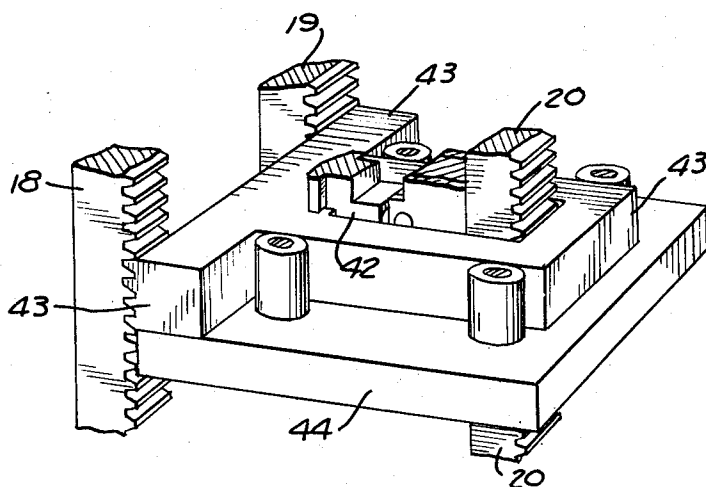


Fig. 12

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PRESS

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6 Sheets-Sheet 6

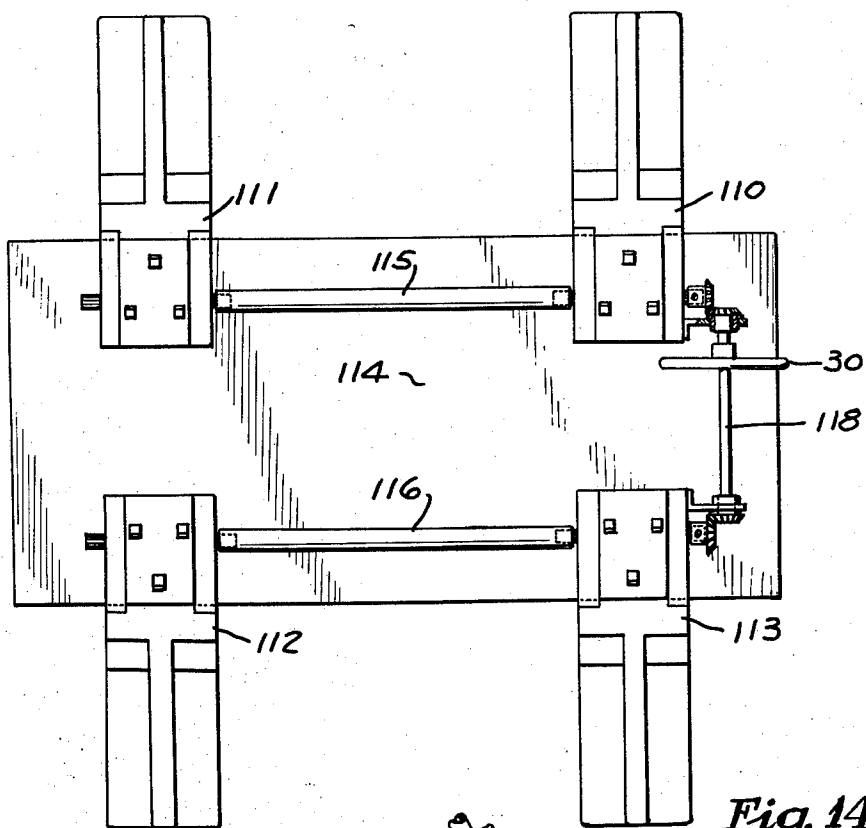


Fig. 14

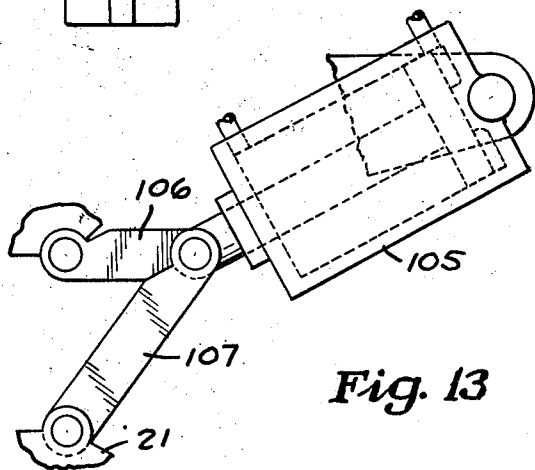


Fig. 13

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2,865,208

PRESS

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Application June 29, 1956, Serial No. 594,731

12 Claims. (Cl. 74—25)

This invention relates to presses such as used in stamping, pressure molding, plastic laminate molding, and similar operations. The present application is a continuation-in-part of my co-pending application Serial No. 576,845, filed on April 9, 1956, for Toggle Press.

In spite of the fact that the art of stamping and constructing presses is an old and well advanced art, difficulties have been encountered in utilizing such presses in many operations which have to be performed in the present day manufacturing processes. In some of such operations, such, for instance, as in laminate plastic molding, particularly when the workpiece has deep draws, considerable difficulties have been encountered in the use of conventional presses. In performing an operation of such a nature, it is necessary to have considerable working space above the mold or die in order to load a "preform" or workpiece into the mold without interference from the movable portion of the mold and to withdraw the molded workpiece from the stationary portion of the mold. This condition requires a press having a very long stroke in order to take care of moving the movable portion of the mold through a considerable distance away from the stationary portion of the mold and to move such movable portion to the work as well as through the working portion of its downward stroke. In addition, exceedingly high pressures may be required at the end of such working portion of the downward stroke, while very light forces are sufficient to bring the movable portion to the work and to withdraw it therefrom.

Presses which develop very high forces, such as toggle presses, have a relatively short stroke and, therefore, are not always fully suitable for such operations. On the other hand, presses of other types that have long strokes are not capable of developing sufficiently high forces in certain portions of the working stroke. Use of hydraulic presses with plurality of cylinders to satisfy these requirements has been resorted to in many instances under the theory that production of desired long strokes with light forces and short strokes with high forces cannot be developed in a mechanical press. However, in addition to various known disadvantages of hydraulic devices of this nature, maintaining pressure thereon during the curing operation requires the use of hydraulic devices, running of hydraulic pumps for considerable length of time, which is not only expensive but results in undesirable heating of the hydraulic fluid.

The above difficulties are increased still further when the object to be molded is of considerable size such, for instance, as a laminate plastic or reinforced plastic boat, and the pressures to be exerted on the preform or workpiece has to be distributed over a very large area, resulting in very high total force which has to be applied centrally of the movable portion of the mold and distributed through a large area from the center of movable portion of the mold. This condition may result in objectionably large deflection of such larger movable portion at its periphery, requiring heavy ribbing and other reinforcement

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ments in its construction, and resulting in exceedingly cumbersome and heavy structure.

A similar difficulty is also experienced in fabricating various sheet material panels with the aid of so-called rule dies, i. e. dies made of a steel blade bent to a certain outline for cutting out various forms from materials such as fiber, paper and the like. It should be understood that for cutting a panel out of such strong material as fiber for use, for instance, in an automobile door, pressure as high as 200 tons may be required. This results from the fact that such dies do not cut on a bias like shears or scissors, or solid dies, but must cut the entire thickness of the material through the entire periphery of the workpiece at the same time.

While conventional presses, such as toggle presses, may be constructed that would fully satisfy the requirements for stamping or molding a certain workpiece or preform, it is obvious that this cannot be done for a variety of stamping and molding operations that may have to be performed on a press during its lifetime. Therefore, as soon as the press especially designed for a certain definite workpiece has to be used for another workpiece, it may become wholly unsuitable. Obviously, building a press for each piece of work is possible only in very rare instances.

One of the objects of the present invention is to provide an improved press for stamping, laminate molding, rubber molding and similar operations, in which the above difficulties and disadvantages are overcome and largely eliminated without introducing any additional problems or increasing costs.

Another object of the present invention is to provide an improved press in which its stroke can be regulated and adjusted at will to produce quick approach movements through considerable length with the exertion of relatively light forces, and movements with developing, exceedingly high forces through the remaining portions of the working stroke.

A further object of the present invention is to provide a press of the nature specified in the preceding paragraph, in which the lengths of the approach movement and of the high pressure or working movement can be selectively adjusted to suit the particular requirements.

A still further object of the present invention is to provide an improved press of the foregoing nature which is automatically locked at the end of its high pressure movement and can remain in such locked position for any desired length of time without the necessity of running any pumps or motors for maintaining such pressure, which is an important advantage in plastic and rubber molding.

A still further object of the present invention is to provide a press of the foregoing nature, in which the approach movement of the movable portion of the die or mold to the work may be performed manually while the high pressure movements are power produced, or to have both types of movements produced manually or to have both types of movements power produced.

A still further object of the present invention is to provide an improved press of the foregoing nature which can utilize hydraulic, pneumatic, electric, and other types of power producing means.

A still further object of the present invention is to provide an improved press which can be made to operate either as light force long stroke press only, or as a short stroke high force press, with the change in the press being accomplished merely by actuating a control lever provided thereon.

It is an added object of the present invention to provide an improved press of the foregoing nature which is simple and rugged in construction, safe and dependable in operation, and is inexpensive to manufacture.

Further objects and advantages of this invention will

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be apparent from the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification, wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a side view of a press embodying the present invention.

Fig. 2 is a front view of the press of Fig. 1 and showing its connection to another press for operating on the same workpiece.

Fig. 3 is an elevational view partly in section taken in the direction of the arrows on the section plane 3—3 of Fig. 2 and showing operative parts of the press in their positions corresponding to the uppermost position of the movable portion of the die.

Fig. 4 is a fragmentary view similar in part to Fig. 3 but showing the toggle linkage engaging the rack, and before the toggle linkage begins moving the rack downwardly.

Fig. 5 is a view similar in part to Fig. 4 but showing said linkage in its fully extended position, i. e. at the end of its operative movement.

Fig. 6 is a front view of the toggle linkage before the same moves down to exert high pressure on the racks through the comb block, i. e. corresponding to Fig. 4.

Fig. 7 is a view similar in part to Fig. 6 but illustrating said toggle linkage in its fully extended position, i. e. corresponding to Fig. 5.

Fig. 8 is a fragmentary side view taken on the toggle linkage from the same direction as in Fig. 3.

Fig. 9 shows teeth on one of the racks and on the comb block, chamfered to prevent such teeth from meeting with their flat tops that could prevent their proper engagement.

Fig. 10 is a sectional view taken in the direction of the arrows on the section plane passing through the line 10—10 of Fig. 8.

Fig. 11 is a fragmentary view with portions broken away of the middle portion of the press shown in Fig. 2.

Fig. 12 is a perspective view showing the comb block and its engagement to the racks, with portions of the construction being broken away.

Fig. 13 is a diagrammatic view showing hydraulic means for operating the toggle linkage.

Fig. 14 is a plan view showing a combination of four press units for operating on a single workpiece.

It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and not of limitation.

In accordance with the invention, I provide a press which combines within itself the advantages of both an arbor press and a toggle press, with the arbor press mechanism operating to move the movable portion of the die or mold through relatively long distances where application of only relatively light forces is required, such, for instance, as in approaches to work and withdrawal therefrom. However, for exerting high operation forces the arbor press mechanisms automatically engage the toggle mechanism to aid themselves, such engagement being effected not only automatically but also at a selectively predetermined portion of the working stroke of the press.

For average requirements, my improved press is constructed to have its arbor press mechanisms actuated manually for bringing the movable portion of the mold or die to the work, whereupon, upon automatic engagement of the toggle mechanism, the same is power operated for exerting high pressure forces on the workpiece. Operation and the stroke of the toggle linkage are so adjusted that in the position of the press when the

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highest force is to be exerted, which is usually at the end of the working movement of the movable portion of the die or mold, the toggle linkage comes to its dead center and, therefore, locks the movable portion of the die or mold in such a position and retains it therein for a predetermined period of time. The duration of such a period is controlled by a timing mechanism, which mechanism, upon the expiration of the prescribed period closes a switch, setting in motion the power means operating the toggle linkage for withdrawal of the movable portion of the die or mold. Thereupon, by the operation of the arbor press means, said movable portion may be withdrawn for a considerable distance to permit withdrawal of the workpiece. It will be understood, however, that, if desired, the arbor press mechanisms may also be power operated. Also, the arbor press mechanisms and the toggle mechanisms may both be operated manually. The power means may be of any suitable character, electric, hydraulic, pneumatic, and the like.

While the present invention has been illustrated and described with reference to a press utilizing toggle means for exerting high pressure forces, it will be understood that eccentric means and crank means can be substituted for toggle linkage and serve for the purposes of the present invention with success. It will also be understood that use of pneumatic or hydraulic means for long distance light force travel of the movable portion of the die or mold may also be substituted for arbor means, with the former means operating the controls setting toggle, eccentric or crank press means in operation for short distance high pressure travel of the movable portion of the die or mold.

Referring to the drawings, there is shown therein, by way of example, a group of presses adapted to operate together on a certain workpiece without the necessity of constructing a ram of a large size. The connection between the separate presses to ensure their operation will be described in detail below. Construction of all of the presses of the group may be identical or similar and, therefore, only one such unit needs to be described in detail.

Referring more specifically to the drawings, a unit press comprises a frame generally indicated by the numeral 15 and having a base 16 adapted to receive and support the lower or stationary portion 17 of the die or mold. In the hollow head of the press there are operatively mounted for vertical movements three racks 18, 19 and 20. The total stroke of the movable portion of the die or mold carried by said racks is designated in Fig. 1 by the letter *t*. The long distance light force portion of the total stroke is designated by the letter *l*, and the short distance heavy force portion of the total stroke is designated by the letter *h*.

The racks 18, 19 and 20 are connected with the movable portion 21 of the die or mold through adjustable connections 18a, 19a and 20a. The racks 18 and 19 are engaged and are operated by gears 22 and 23, respectively, mounted on the same shaft and operating to move said racks 18 and 19 for effecting long distance light force movements of the portion 21. The rack 20 is actuated by the racks 18 and 19 through gears 24a and 24b mounted on a shaft 25 on which there are also mounted sprocket wheels 25a drivingly engaging through chain 25c similar sprockets 26a mounted on a shaft 26 and carrying a gear 27 engaging the rack 20. By virtue of such a construction, operative forces on the portion 21 are exerted not in the center or in one locality thereof but in three different places around its entire area, ensuring more even distribution of forces and stresses. Although in the present embodiment of the invention two racks are shown in front and one at the rear, different number and arrangement of the racks can be used to suit the particular conditions.

A counterweight 28 operating on the chain 28a con-

nected to the portion 21 and passing over a sprocket wheel 29 is used to counterbalance the portion 21 which may be of considerable weight. Obviously, counterweight may be varied by addition or removal of weight disks, as conditions require.

With the construction so far described, the operation of the press would be that of a conventional arbor press except for the use of a plurality of the racks in a single press. For instance, as the gear 22 is rotated, which may be done with the aid of a hand wheel 30 (see Fig. 2) or a handle or with the aid of some suitable power means, the racks can be moved up or down, as required.

In accordance with the present invention, the shaft 32 of the gear 22 is made movable bodily for a predetermined distance up and down by being mounted on a lever 33 hinged at 34, with a compression spring 35 operating on the opposite end of said lever 33. The lower end of the spring 35 is supported at a lever 36 hinged at 37 and provided with adjustment screw 38. The spring 35 tends to maintain the righthand end of the lever 33 (see Fig. 3) in its uppermost position.

It will now be understood that if the gear 22 moves bodily upward, it will roll on the rack 18, carrying with it its shaft 32 and moving the righthand end of the lever 33 downward in opposition to the action of the spring 35. Upward movement of the shaft 32 will carry with it also the gear block 40 having retainer roller 40a, in which block said shaft 32 is journaled. To the block 40 there is hingedly connected through a link 41 a slide 42 sliding in a recess provided with a comb block 43. On the slide 42 there are formed cam fingers 42a cooperating with cam rollers 45 operatively mounted on the stationary structure of the press. Springs 46 and 47 maintain the slide 42 in contact with said cam rollers 45. The comb block 43 slides transversely of the racks in an articulated guide block 44 having a retainer roller 44a running along the smooth face of the racks 18 and 19, and has provided thereon rack portions or combs 48, 49 and 50 adapted to engage racks 18, 19 and 20, respectively.

As can be seen from examination of Fig. 3, movement of the comb block 43 to the left would cause the comb portions 48, 49, and 50 to engage the racks 18, 19 and 20. The comb slide 44 is connected through toggle linkage, including two pairs of links, one of said pairs comprising links 51 and 52, and the other, links 53 and 54, with gears 55 and 56 which are operated by a worm 57 formed on a shaft 58 connected through a reduction mechanism including a clutch, with the armature shaft of an electric motor 59.

In operation, as the hand wheel 30 is rotated to move the portion 21 of the die downward, operation of the gears through the racks 18, 19 and 20 will carry said portion downwardly as long as resistance to the motion of said portion 21 is less than the force exerted by the spring 35. However, as soon as the portion 21 meets a strong resistance such as occurs when the portion 21 is brought in contact with the work, further rotation of the gear 32 will not cause movement of the portion 21 downward but rolling of the gear 32 up on the rack 18 carrying the block 40 and the slide 42 upward. In the process of such a movement the rollers 45 will cause the slide 42 to move not only upwardly but also to the left pushing the comb block 43 into engagement with the racks 18, 19 and 20. At the same time the slide 42 will operate the switch 60, closing the circuit of the electric motor 59 and causing rotation of the shaft 58 and of the worm gears 55 and 56, and, therefore, operation of the toggle linkage or mechanism to push the comb slide 44 carrying the comb block 43 and, therefore, the racks 18, 19 and 20 downwardly.

Because of the driving connection of the comb block 43 with the racks 18, 19 and 20 through a number of rack teeth rather than gear teeth, such connection is very reliable, and it greatly exceeds in its strength the driving connection of the racks 18, 19 and 20 through gears.

This is due to the fact that gears of the same pitch are stronger on a rack than on a gear. The smaller is the number of teeth on a gear, the greater is the undercut at the roots of the gear teeth, and the weaker are such teeth. Thus, while transmission of forces through such gears is entirely satisfactory for approach and withdrawal movements of the die portion 21, exerting high pressure forces through gears would cause stripping of their teeth. In accordance with the invention, the high forces exerted by the toggle mechanism are transmitted to the racks through such strong construction, ensuring that no breakage occurs.

As the toggle mechanism operates from its position shown in Fig. 6 to its position shown in Fig. 7, the links 51 and 52 as well as the links 53 and 54 arrange themselves along two straight lines or come to dead centers, thus making the linkage irreversible. In other words, when the toggle links assume positions shown in Fig. 7, no amount of pressure on the portion 21 in the upward direction would cause operation of the links, and such links, in effect, lock the portion 21 in its lowermost position. If desired, the toggle mechanism may be carried slightly beyond its dead center to ensure more reliable locking. In the fully extended position of the toggle linkage, said linkage or any other part movable therewith is made to operate a control lever 77 of a timing device 78 which interrupts the electric circuit of the motor 59 for a predetermined period of time and upon expiration thereof operates a reversing switch to close the motor circuit and to operate the motor in a reverse direction, thus bringing the toggle linkage into its retracted position to withdraw the portion 21 of the die away from the work for a corresponding distance and then to stop the electric motor. Thereupon, by operating the wheel 30, the portion 21 may be brought to its original position shown in Fig. 1 for repeating the cycle.

With the construction described above, automatic engagement of the toggle linkage would occur only when high resistance to the motion of the movable portion 21 of the die or mold is met. However, in many instances of application of stamping and molding presses it is desired to have the toggle linkage begin the operation slightly before or after meeting such resistance. Often it is also of great advantage to have the length of the arbor stroke arranged to suit some particular requirements.

In accordance with the invention, means are provided enabling the user to make such adjustments in a simple and easy manner. In the embodiment illustrated, said means are exemplified by a movable cam block 70 carrying a roller 71 cooperating with a cam 72 provided on the end of the lever 33. While the cam block 70 may move sidewise from the position shown in Fig. 3 to the position shown in Fig. 4, it is restrained from upward movement by a rod 73 passed through a tube 74 mounted on the stationary structure of the machine and having a compression spring 75 provided between a head 76 of the rod and the tube 74 to maintain the block 70 in its position shown in Fig. 3.

Movement of the cam block to the left, i. e. to its position shown in Fig. 4, operates to push the righthand end of the lever 33 down, in opposition to the action of spring 35, and to carry the gear block 40 upward, thus causing engagement of the comb block 43 with the racks 18, 19 and 20. On the other hand, return of the cam block 70 into its position shown in Figs. 3 and 5 will cause upward movement of the righthand end of the lever 33 and disengagement of the comb block 43 from the racks 18, 19 and 20. It will be understood that because of the provision of shoulders 42a on the slide 42 which engages the comb block 43, disengagement of said block 43 from the racks will be effected by operation of the springs 46 and 47.

Operation of the cam block 70 is effected with the aid of a crank 80 which, in turn, is operated from a control

rod 81. The rod 81 is passed through the frame of the machine and is maintained in its uppermost position with the aid of a spring 82 supported by a bracket 83 and acting on an adjustable collar 84. The control rod 81 is, in turn, operated by the movable portion 21 of the die. It can be seen from examination of Fig. 3 that there is provided on the rod 81 a control collar 85 which may be adjustably secured on the rod 81 at a desired location along the length of said rod under the portion 21. As the portion 21 reaches the control collar 85, further downward movement of the portion 21 causes downward movement of the rod 81 in opposition to the action of the spring 82. In the process of such movement of the control rod 81, the collar 86 reaches the finger 87 and by rotating the crank 80 around its stationary axis 88 in the direction indicated by the arrow in Fig. 3 moves the cam block 70 and brings it into the position shown in Fig. 4. In the process of such movement the roller 71 presses downwardly the righthand end of the lever 33 and thus causes engagement of the arbor racks by the toggle linkage through the operation of the mechanisms described above.

As the toggle linkage moves the comb block 43 down, the stud 90 carried on the block 44 contacts the end 91 of the crank 80, rotating said crank and bringing it into the position shown in Fig. 5, and, therefore, returning the cam block 70 into its original position and permitting the righthand end of the lever 33 to move upwardly and to disconnect in the manner described above the comb block 43 from the racks. Thereupon, by manually operating the hand wheel 30 the movable portion 21 may be returned to its original position shown in Fig. 1.

A stop collar 89 may be provided on the rod 81 to restrict its upward movement. However, with a definite length of the spring 82, the collar 89 may not be necessary since the weight of the rod will keep it in its predetermined uppermost position.

In accordance with the invention, there are provided locking means adapted to lock the gear block 40 selectively either in its upper or in its lower position. It will now be understood in view of the foregoing, that if the gear block 40 is locked in its lower position, operation of the press will be that of a mere arbor press since no upward movement of the gear block 40 for engaging the toggle linkage to the racks can occur in the press. On the other hand, locking the gear block 40 in its uppermost position will cause constant engagement of the toggle linkage to the racks 18, 19 and 20 and their actuation by the toggle linkage. Then operation of the press becomes that of a toggle press only, with the manual wheel 30 and the gears connected thereto rotating idly in response to the movements of the racks.

In the present invention, such locking means are exemplified by the pin 100 provided in the bracket 101 secured to the frame 15 of the press. A compression spring 102 tends to maintain the pin 100 in its retracted position shown in Fig. 3, thus ensuring operation of the press as a combined arbor-and-toggle press. On the other hand, when the pin 100 is pushed to have its end enter the upper hole 103 provided in the gear block 40, and the pin is locked in that position by having its handle 100a turned 180° to have the eccentric 100b provided on the pin to bear on the shoulder 101a of the bracket 101, the gear block 40 will not move up and will not cause engagement of the toggle linkage to the racks. Therefore, under such a condition operation of the press through its entire stroke will be that of an arbor press. However, when the block 40 is moved into its uppermost position, and the pin 100 is made to engage it at the lower hole 104, operation of the press becomes that of a toggle press with the length of its stroke being only that determined by the toggle linkage.

Fig. 13 illustrates a fluid cylinder 105 which may utilize either liquid, such as oil, or gas, such as air, for op-

erating the linkage comprising the links 106 and 107 for operating the movable portion 21 of the die.

Fig. 14 illustrates a combination of four presses 110, 111, 112 and 113 operating on a single workpiece 114, particularly at the corners thereof. It will be noted that the shafts 115 of the presses 110 and 111 are arranged along a straight line and are connected together, with the shafts 116 of the presses 112 and 113 being similarly connected. Connection of shafts 115 and 116 is effected with the aid of miter gears and shafts 117 and 118. Operation of the control wheel 30 will thus operate all of the gear shafts of the presses and make all of them operate together as arbor presses, bringing the toggle linkage in operation as described above. While there may be some torsional deflection in the shafts and play in the miter gears, the same does not affect appreciably operation of the presses since such deflection would occur primarily in the arbor operation of the press. On the other hand, when the toggle linkages of the presses come into play, they act directly on each individual press.

By virtue of the above disclosed construction, the objects of the present invention listed above and numerous additional advantages are attained.

I claim:

1. In a press, a longitudinal movable rack provided therein, a gear engaging said rack and adapted, when rotated, to actuate said rack and to roll on said rack longitudinally thereof when said rack meets resistance of a predetermined magnitude; a toggle mechanism adapted to produce press operating forces, means adapted to interconnect drivingly said toggle mechanism and said rack, power means operating said toggle mechanism, cam means actuated by the bodily movements of said gear along the rack and adapted to operate the means interconnecting drivingly said toggle mechanism and said rack to cause driving engagement of the toggle mechanism to said rack, and to start said power means for operating said toggle mechanism.

2. In a press, a longitudinally movable rack provided therein, a gear engaging said rack and adapted when rotated to actuate said rack longitudinally and to roll on said rack and thus to move bodily longitudinally thereof when said rack meets a resistance of a predetermined magnitude, a toothed member movable in and out of engagement with said rack and to move bodily to actuate the same, a toggle mechanism operatively connected to said member to exert operation forces thereon, means adapted to exert operation forces on said toggle mechanism and thus to cause said toggle mechanism to move said toothed member for actuating said racks, and mechanical means operatively interposed between said gear and said toothed member and responsive to the bodily movements of said gear along said rack to move said toothed member in and out of engagement with said rack.

3. In a press, a longitudinally movable rack provided therein, a gear engaging said rack and adapted when rotated to actuate said rack longitudinally and to roll on said rack and thus to move bodily longitudinally thereof when said rack meets a resistance of a predetermined magnitude, a toothed member movable in and out of engagement with said rack and to move bodily for actuating the same, a toggle mechanism operatively connected to said member to exert operation forces thereon, manual means for rotating said gear in operating of the press, power means operating said toggle mechanism to move said toothed member bodily for actuating said racks, and mechanical means operatively interposed between said gear and said toothed member and responsive to the bodily movements of said gear along said rack to move said toothed member in and out of engagement with said rack, and control means responsive to the movement of said mechanical means and adapted to start said power means when said toothed member is moved into engagement with said rack.

4. In a press, a longitudinally movable rack provided

therein, a gear engaging said rack and adapted when rotated to actuate said rack and to roll on said rack and thus to move bodily longitudinally thereof when said rack meets a resistance of a predetermined magnitude, a toothed member movable in and out of engagement with said rack and to move bodily to actuate the same, a toggle mechanism operatively connected to said member to exert operation forces thereon, manual means for rotating said gear in operating the press, an electric motor adapted to operate said toggle mechanism to cause said toggle mechanism to move said toothed member for actuating said racks, and mechanical means operatively interposed between said gear and said toothed member and responsive to the bodily movements of said gear along said rack to move said toothed member in and out of engagement with said rack, and a switch operated by said mechanical means, when said toothed member is moved into engagement with said rack, to switch said motor on.

5 The press defined by claim 1 and including yielding means associated with the gear and determining the amount of minimum resistance at which the gear begins to roll along the rack.

6. The press defined by claim 1 and including a spring of a predetermined rate and resisting bodily movement of the gear along the rack and thus determining the minimum resistance at which the gear begins to roll on the rack.

7. In a press having an operating device including a stationary portion and a movable portion, a rack carrying the movable portion of the operating device, a gear engaging said rack and moving the same longitudinally when rotated, said gear being adapted to roll on said rack for a predetermined distance when said rack meets a resistance of predetermined magnitude, a toothed block adapted to move in and out of engagement with said rack, a toggle mechanism operatively connected to said block to exert operation forces thereon, power means for actuating said toggle mechanism, cam means, a slide engaging said cam means and acting on said block to move it in and out of engagement with said rack and adapted to be actuated by the movement of the gear along the rack.

8. The invention defined in claim 7, and including selectively operable means to lock said gear at least in one of its extreme positions of bodily movements along the rack.

9. The invention defined in claim 7, and including selectively operable means to lock said gear at either of the

two extreme positions of its bodily movements along the rack.

10. The invention defined by claim 7 and including adjustable rod-and-collar means actuated by the movable portion of the press for controlling occurrence of the engagement of the rack by said toothed block.

11. In a press, a rack, a gear engaging said rack and moving the same longitudinally when rotated, said gear being adapted to roll along said rack for a predetermined distance when said rack meets in its longitudinal movement a resistance of predetermined magnitude, a support for said gear movable bodily along said rack when the gear rolls along the rack, toothed means adapted to engage said rack for moving the same and to be disengaged therefrom, toggle mechanism acting on said toothed means to actuate the same for moving said rack, power means operating said toggle mechanism, control means adapted to switch on said power means, and movable means intermediate said gear support and said toothed means and adapted to actuate said control means to switch the power means on after said tooth means are moved into engagement with said rack.

12. In a press having a movable portion, a plurality of racks secured to said portion at spaced localities to exert pressure thereon at said localities, a gear for each of said racks, each of said gears being adapted, when rotated, to actuate its respective rack but to roll along said rack when the movable portion meets resistance greater than a predetermined minimum, means drivingly interconnecting said gears, a toothed block adapted to be moved in and out of engagement with each of said racks simultaneously, a toggle mechanism adapted to exert pressure on said racks through said toothed block, cam means operatively interposed between at least one of said gears and said block and adapted to move said block into engagement with the racks when said gear rolls along the rack, power means operating said toggle mechanism, and switch means operated by said block when said block moves into its fully engaged position to switch on said power means, and second switch means operated by said toothed block when the movable portion of the press reaches the end of its predetermined stroke to switch said power means off.

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