# United States Patent [19]

**Britten**

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[54] **PRESS CONSTRUCTION**


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[52] **U.S. Cl.** ..... **425/406,** 425/405, 425/451, 425/389

[51] **Int. Cl.** ..... **B29c 3/00**

[58] **Field of Search** ..... 425/406, 451, 77, 78, 405, 425/DIG. 44, 389



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[57] **ABSTRACT**

A molding press construction wherein a pair of die-holding platens are movable toward and away from each other by a primary mover of relatively large displacement and lesser force to a locked position, wherein a secondary mover of relatively small displacement and large force maintains the platens together in molding position.


**7 Claims, 4 Drawing Figures**

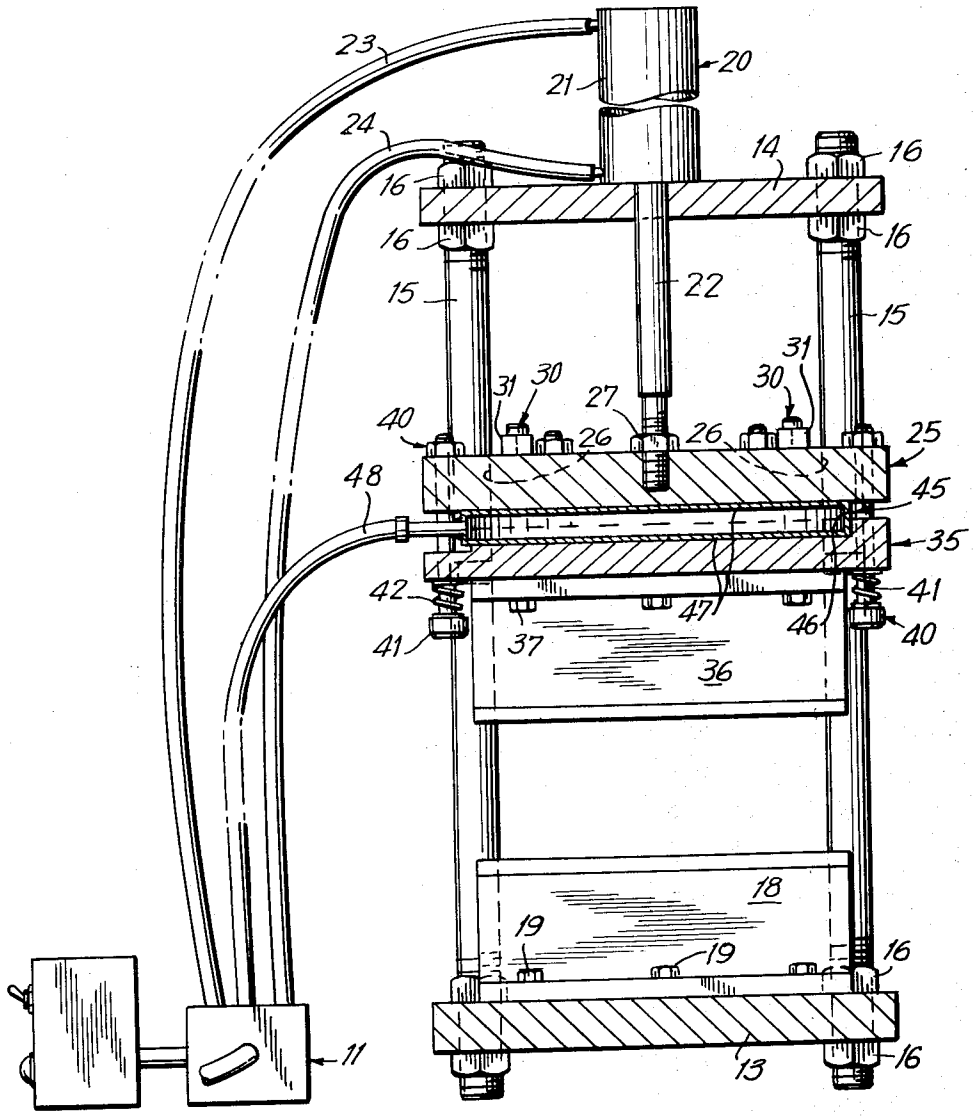


FIG. 1

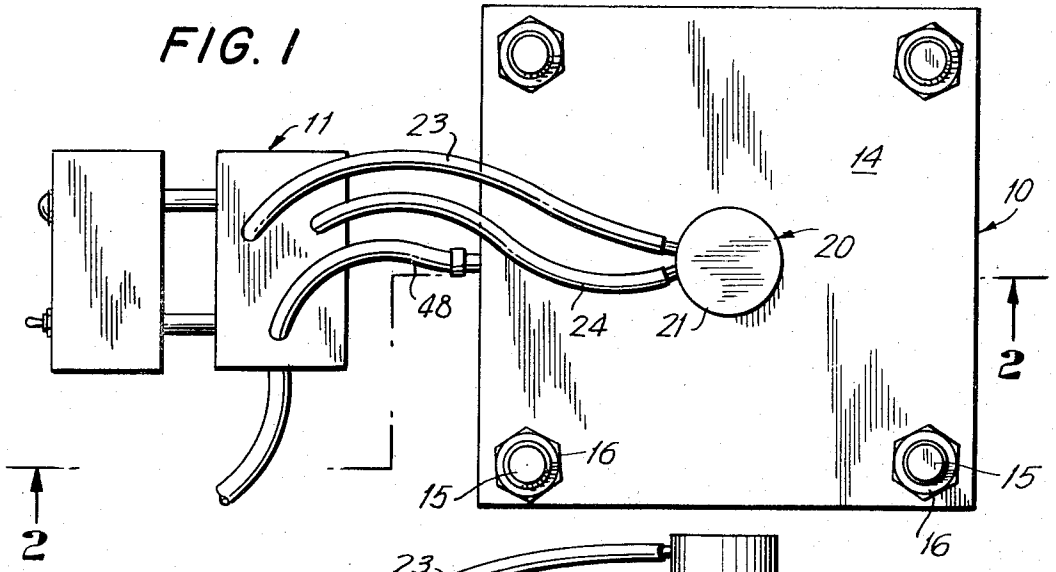

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FIG. 2

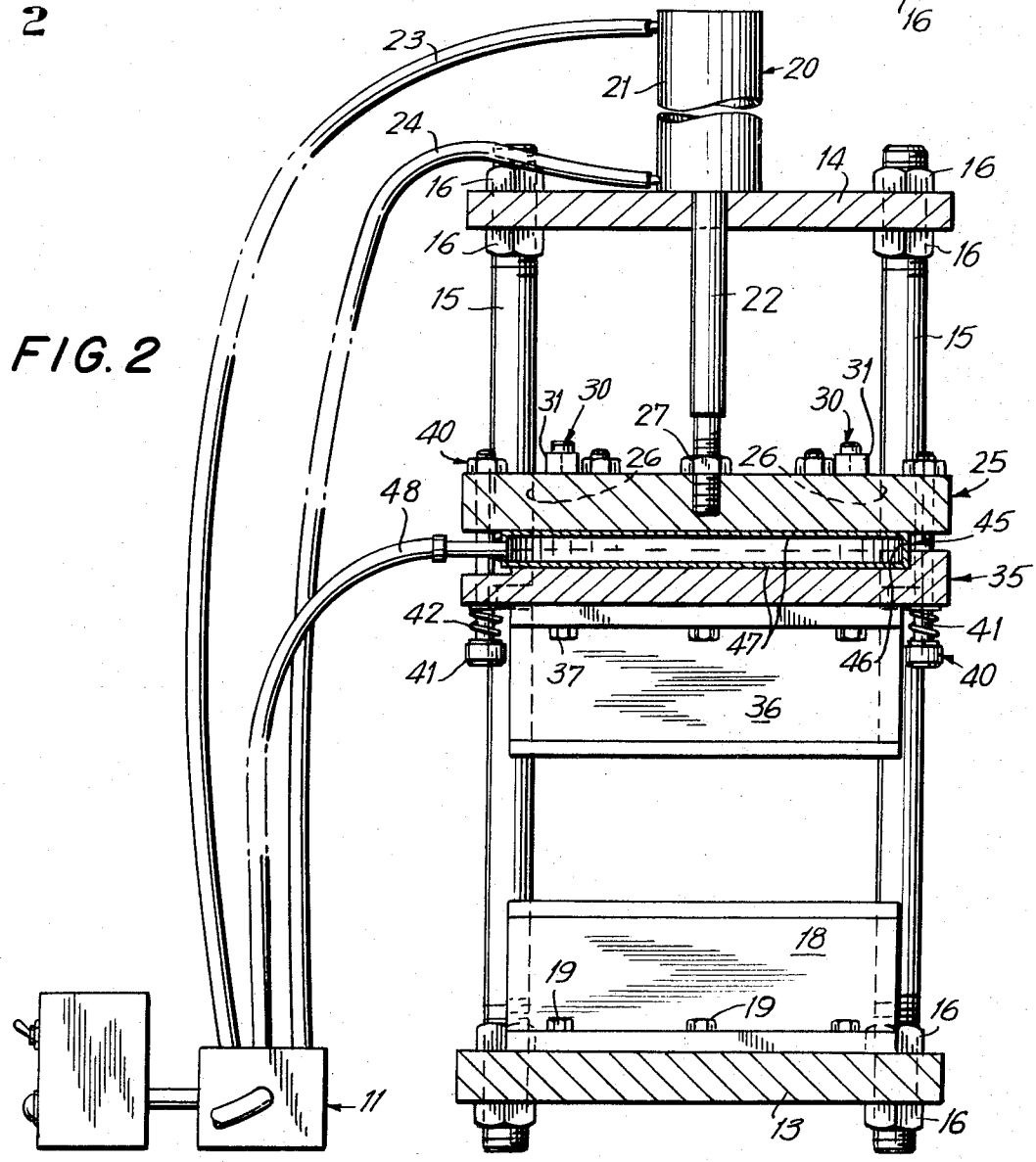

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FIG. 3

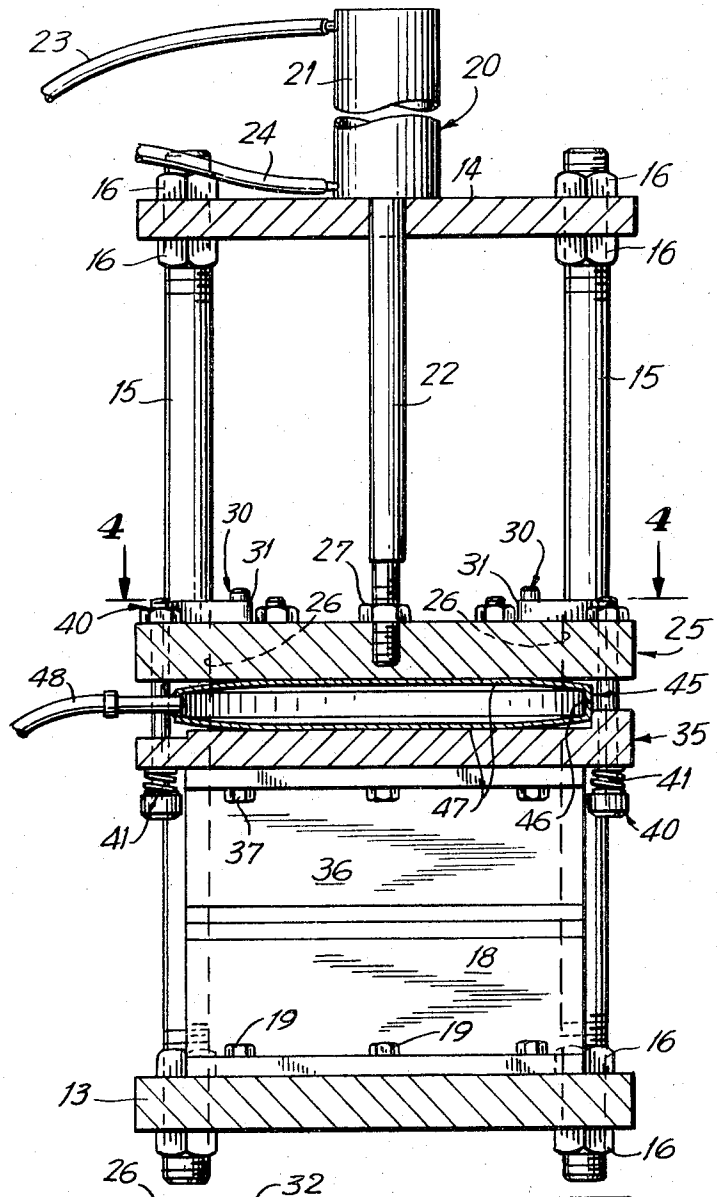
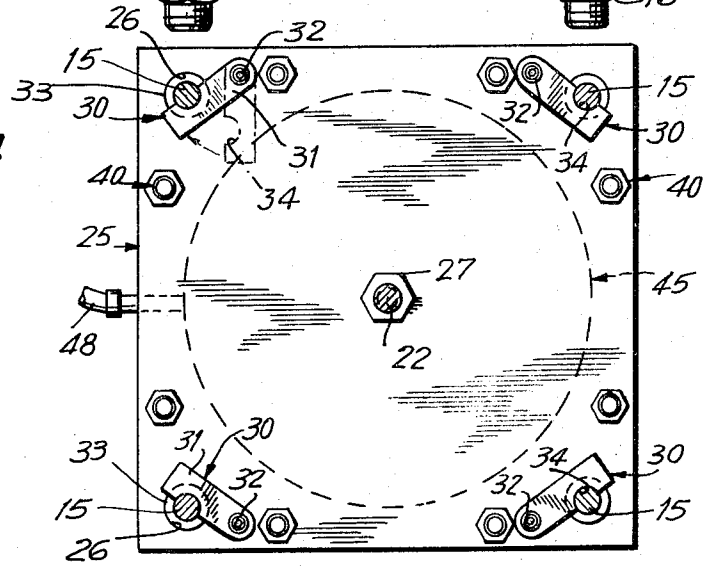

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FIG. 4


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# PRESS CONSTRUCTION

## BACKGROUND OF THE INVENTION

As is well known to those versed in the art, press constructions, including molding presses and others, have heretofore utilized motive means for effecting press closure having the full required displacement or throw of the die parts, as well as the full required closure force necessitated by the molding operation. To obtain these inconsistent requirements it was necessary to employ relatively large, expensive and slow moving motive means. For example, using hydraulics would require a relatively large cylinder and piston movable over a relatively great distance at a relatively slow rate, which involves excessive quantities of oil or other hydraulic fluid, under relatively high pressures and moved by relatively large and expensive pumps.

## SUMMARY OF THE INVENTION

It is, therefore, an important object of the present invention to provide a molding press construction which overcomes the above-mentioned difficulties, permitting of relatively high speed low pressure press movement throughout the major part of its displacement, while requiring relatively small and inexpensive fluid movers or pumps, and which affords the requisite high pressure die closure with relatively low pressure fluid motive means to insure proper die closure, and, moreover, without the leakage most usually experienced with hydraulic systems.

It is a further object of the present invention to provide a molding press construction of the type described which is relatively simple in structure, durable and reliable throughout a long useful life, and which effects substantial savings in manufacture, operating costs and maintenance.

It is still a further object of the present invention to provide a molding press construction having the advantageous characteristics mentioned in the preceding paragraphs which is of enhanced safety to an operator, both in the event of being caught between the dies, and in the use of low pressure fluid, and which further reduces the high rate of maintenance heretofore required by high pressure fluids and wear resulting therefrom.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top plan view showing a molding press construction in accordance with the teachings of the present invention.

FIG. **2** is an elevational view, partly in section, taken generally along the line **2—2** of FIG. **1**, illustrating an open or retracted condition of the die platens, being broken away to conserve drawing space.

FIG. **3** is an elevational sectional view similar to FIG. **2**, but illustrating the die platens in a closed, operative or molding condition.

FIG. **4** is a horizontal sectional view taken generally along the line **4—4** of FIG. **3.**



## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, and specifically to FIGS. **1** and **2** thereof, a molding press of the present invention is there generally designated **10,** and is illustrated as operatively connected to a fluid control system **11.**

The molding press **10** may consist of a framework including lower and upper opposite end members or plates **13** and **14,** respectively, interconnected by a plurality of generally parallel, elongate frame members or tie bars **15.** It will be appreciated that the shape and size of the frame end members **13** and **14,** as well as the number and arrangement of frame side members or tie bars **15** may vary, without departing from the instant invention. However, the congruent polygonal configuration of end members **13** and **14,** and the parallel relationship of tie bars **15** each extending through and having its opposite ends secured in a corner of a respective end member, as by nuts **16,** has been found satisfactory.

The lower frame end member **13** may define a platen as for removably holding a die member **18,** as by bolts or fasteners **19.** Thus, the lower frame member or platen **13** is fixed to the tie bars or rods **15** at the lower end thereof, and may removably mount a die part **18** in upwardly facing relation, as seen in the drawings.

The upper frame end member or plate **14** may carry a primary motive means or mover **20,** which may advantageously be fluid operated, say pneumatic or hydraulic, and may assume the form of a cylinder **21** mounted on the upper or outer side of upper end plate **14,** centrally thereof and fixedly secured thereto. Interiorly of the cylinder **21,** the motive means **20** may include a piston reciprocable in the cylinder and having a rod **22** projecting downwardly through the end plate **14** for longitudinal shifting movement within the press, together with its associated piston. The piston of motive means **20** may be suitably controlled, as by fluid conduits **23** and **24** connected between the fluid control means **11** and opposite ends of the cylinder **20** to shift the piston rod **22** vertically upwardly and downwardly throughout the relatively great throw or displacement afforded by the vertically elongate cylinder-piston assembly **20.** That is, the motive means **20** is of relatively large displacement, as required in a molding press, but is of relatively small effective cross-section or piston area, as only relatively low total piston rod force is required, for reasons appearing more fully presently.

A carrier or crosshead is generally designated **25,** and may assume the configuration of a plate interposed in parallelism between the platen **13** and upper end member **14,** being mounted on the tie rods or ways **15** for shifting movement therealong. As shown for purposes of illustration and without limiting intent, the carrier member or plate **25** may be generally congruent to the lower platen **13** and upper end plate **14,** having corner holes therethrough, as at **26** slidably receiving respective tie rods **15** of shifting movement therealong. Further, the carrier **25** is suitably affixed to the free, depending end of piston rod **22,** as by a threaded adjustment connection therebetween including a lock nut **27.**

The carrier **25** is adapted to be positively located at a selected position of its shifting movement along the

tie rods or ways **15** by suitable locating means generally designated **30.** The locating means **30** may include one or more swingable latch members **31** each adjacent to a respective tie rod or bar **15** and pivotally mounted for swinging movement in a plane parallel to that of carrier **25** by a pivot member or pin **32** projecting normally from the carrier member. Each of the latch members or arms **31** is swingable about its pivotal axis **32** toward and away from the adjacent tie member **15.** Further, the tie members **15** are provided with one or more external recesses or grooves, as at **33** for reception of the adjacent latch member **31** when swung toward the associated tie member. The latch members may be cut out as at **34** for conforming engagement about the reduced portion of the adjacent rod **15** defined by the annular groove or recess **33.** The condition of latch members **31** being engaged in recesses **33** so as to positively locate and thereby lock the carrier **25** at the illustrated position is shown in FIGS. **3** and **4.**

Thus, the carrier **25** is shiftable to the position shown in FIGS. **3** and **4,** whereupon the locating means **30** may be swung to their locking condition; and, the locating means may be swung out of their locking condition, say to the phantom position shown in FIG. **4,** to release the carrier for movement out of the illustrated position.

An additional platen or plate is generally designated **35,** being interposed in spaced parallelism between the platen **13** and carrier **25,** and may, without limitation thereto, be generally congruent to the lower platen and apertured at its corner regions for slidably receiving and passing therethrough the tie members or bars **15.** The upper platen **35** is thus located with its under surface in facing relation with respect to the lower platen **13,** and the upper platen is adapted to carry a complementary die part **36,** say by suitable fastener means **37.**

The upper platen **35** is carried by the carrier **25,** being in parallel spaced relation therebelow. Mounting means, as generally designated **40,** mount the upper platen **35** to the carrier **25** for movement with the latter and for a resiliently yieldable urgence toward the carrier.

More specifically, the mounting means **40** may include a plurality of headed members or bolts **41** depending from the carrier **25** about the margin thereof and passing slidably through corresponding marginal regions of the platen **35.** Suitable resilient means, such as coil compression springs **42,** may be interposed between the lower enlarged ends or heads of mounting pins **41** and the underside of platen **35** to resiliently, yieldably urge the platen upwardly toward the carrier.

Thus, it will be appreciated that the upper platen **35** is mounted on the carrier **25** for movement with the latter throughout the relatively large displacement of the motive means **20,** to thereby move the die part **36** toward and away from its complementary die part **18.** Also, by the relatively small effective cross-section of cylinder **20,** being considerably smaller than the permissible area of the upper frame plate **14,** relatively low flow rates of fluid will be required to effect relatively rapid shifting movement of the carrier **25** and platen **35.**

Interposed in the space between the carrier **25** and platen **35,** being sandwiched therebetween in bearing engagement both with the carrier and upper platen, is an additional motive means, generally designated **45.** The motive means **45,** as is the first described motive means **20,** is advantageously of the expansile and contractile chamber type, so as to utilize a fluid working medium. In practice, the motive means **45** is advantageously of a relatively large effective cross-section, say occupying a maximum of area within the limits of tie rods **15** and mounting pins **42,** best seen in FIGS. **2, 3** and **4.** The motive means **45** may include a generally cylindrical side wall **46,** and a pair of somewhat flexible, generally circular end walls **47,** which combine with the peripheral side wall to define a closed cylinder. A fluid conduit **48** may be connected from the fluid control means **11** to the interior of the chamber defined by peripheral wall **46** and end walls **47.** By this construction, the chamber **46, 47** is expansile endwise upon flexure of the endwalls under internal pressure and contractile endwise upon return of the end walls to their unflexed condition upon reduction of internal pressure. The expanded condition is best seen in FIG. **3.** It will there be observed that the platen **35** is displaced a short distance by the expansion of motive means **45** away from the carrier **25** against the resilient yieldable urgence of springs **42.** This relatively small displacement of platen **35** by motive means **45** is under a relatively great force achieved by the relatively large effective cross-section of the expansile chamber **46, 47.** Further, this relatively great force insures that the die parts **18** and **36** remain closed, as shown in FIG. **3,** against very substantial molding pressures tending to open the die parts.

Of course, after the molding is completed, pressure may be removed from the motive means **45** to permit contraction thereof, and the locating means **30** may be disengaged from the rods **15,** whereupon the carrier **25,** together with platen **35** and die part **36** may be withdrawn upwardly by the motive means **20,** to complete the operating cycle.

It will now be appreciated that the period of the operating cycle may be substantially reduced by reason of the increased speed of movement of carrier **25** and platen **35** throughout the relatively large displacement effected by motive means **20.** Further, as the motive means **20** may exert relatively small force, the danger of injury or accident by catching of one's hand or other appendage between the dies is effectively eliminated. That is, the force of motive means **20** may be insufficient to cause injury, and when the relatively great force is exerted by the motive means **45,** it is no longer possible for a person's appendage to enter between the dies.

It will be appreciated that the grooves **33** on the tie rods **15** may be plural in number on each tie rod so as to provide for different locating positions thus to accommodate dies of varying dimensions. It is also to be appreciated that the locating means **30** is not to be limited to include only the swingable latch member **31.** Alternatively, circular clamps opening and closing for engagement and disengagement in the grooves **33** may be provided. The opening and closing of such circular clamps may be accomplished by a variety of means which may include a toggle clamp activated by the closing of the platens, or, pneumatic or hydraulic cylinders which may be recessed in the top surface of the platen and activated upon the closing of the platen by limit switches or the like.

While it is contemplated that the primary motive means **20** will advantageously be a conventional type of pneumatic or hydraulic cylinder, this limitation is not to be imposed with regard to the motive means **45.** In the preferred embodiment of this invention, the motive means **45** comprises a closed chamber having flexible end walls, as heretofore described, so as to permit for the expansion and contraction desired at the same time providing for a sealed unit without any moving parts. It will be further appreciated that the shape of the motive means **45** is not in any way limited to the cylindrical shape heretofore described, but, rather, it can take any shape as desired so as to occupy the entire area of the facing surfaces of the carrier **25** and platen **35** and extending, if necessary, about the tie rods **15.**

From the foregoing it will now be understood that a molding press construction is provided by the instant invention which is capable of effecting substantial cost reductions in press manufacture and maintenance, as well as savings in operation, and to otherwise fully accomplish its intended objects.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention.

What is claimed is:

**1.** A molding press construction comprising a first platen for holding a die or the like, a carrier shiftably mobable toward and away from said first platen, locating means for releasably positively locating said carrier at a selected position relative to said first platen, a second platen for holding a complementary die or the like and spacedly interposed between said first platen and carrier, mounting means mounting said second platen for movement together with said carrier and resiliently yieldable urgence toward said carrier, primary motive means of lesser force for moving said carrier and first platen toward and away from each other into and out of said selected position, and secondary motive means of greater force for urging said second platen away from said carrier toward said first platen, for holding said platens toward each other during molding, said secondary motive means comprising a sealed chamber of metallic material defined by a substantially rigid peripheral side wall, a pair of end walls, at least one of said end walls being relatively flexible, and having fluid passage means to the interior of said sealed chamber, whereby under internal pressure said chamber is expansible endwise upon flexure of at least one of said end walls and contractile endwise upon return of the end walls to their unflexed condition upon reduction of internal pressure.

**2.** A molding press construction according to claim **1,** said primary motive force being of relatively great displacement for displacing said carrier from a retracted position toward said first platen, and said secondary motive force being of less displacement for maintaining said platens toward each other during molding.

**3.** A molding press construction according to claim **1,** said mounting means comprising a frame, said first platen being fixed to said frame, and said carrier being mounted for said shifting movement on said frame.

**4.** A molding press construction according to claim **3,** said locating means comprising latch means operatively associated with said frame and carrier for positively locating the latter relative to the former.

**5.** A molding press construction according to claim **1,** said secondary motive means being interposed between said carrier and said second platen for opposing said resiliently yieldable urgence.

**6.** A molding press according to claim **5,** said secondary motive means comprising an expansile and contractile chamber of relatively large effective cross section, for relatively great resultant force.

**7.** A molding press construction according to claim **6,** said primary motive means comprising an expansile and contractile chamber of relatively small effective cross section, for relatively great resultant displacement.

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