Oct. 27, 1970 U. WALCHHÜTTER 3,535,754

CROSS-HEAD OR MOBILE MOLD PLATEN

Filed Dec. 7, 1967 3 Sheets-Sheet 1

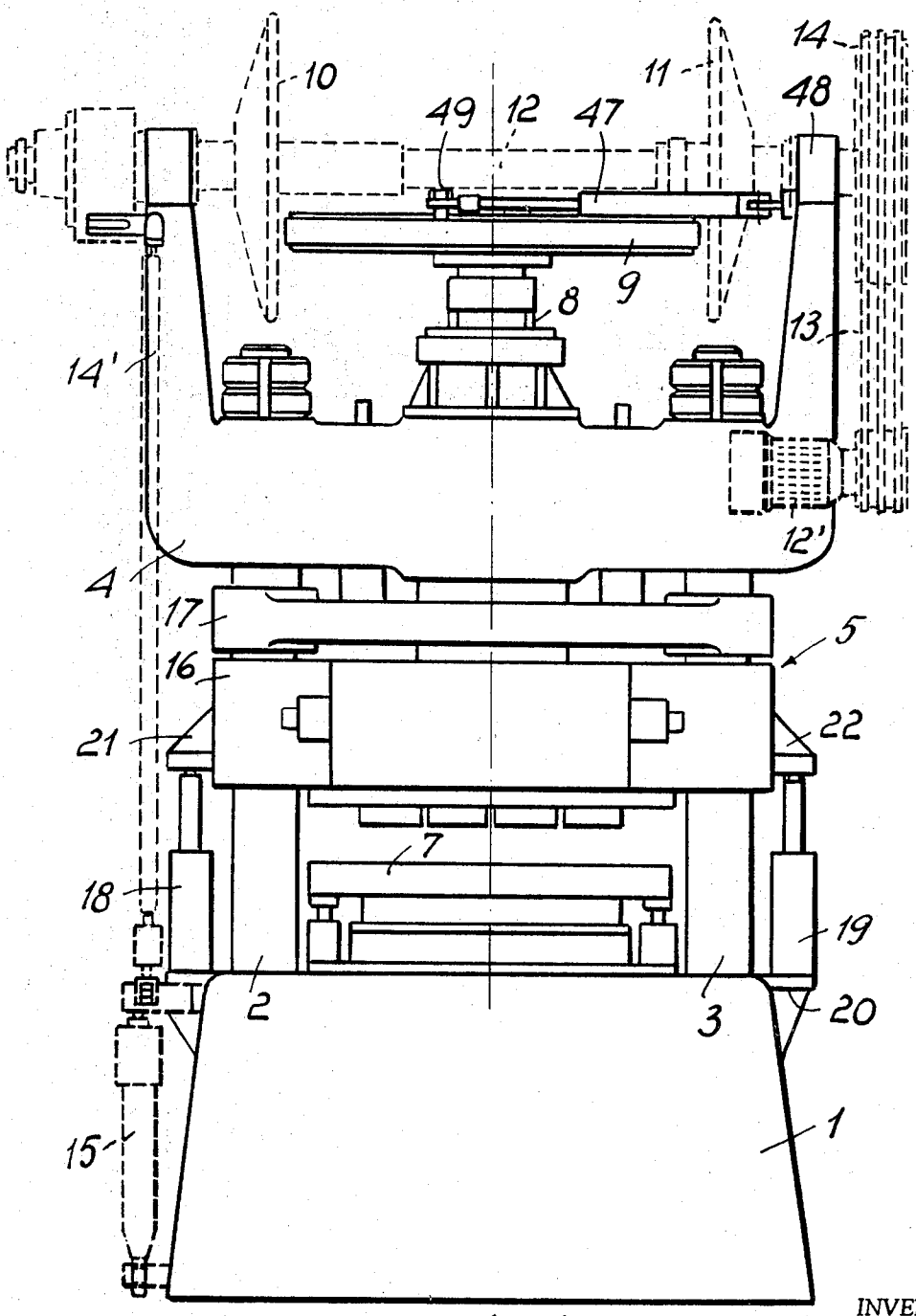

Fig. 1

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Filed Dec. 7, 1967 3 Sheets-Sheet 2

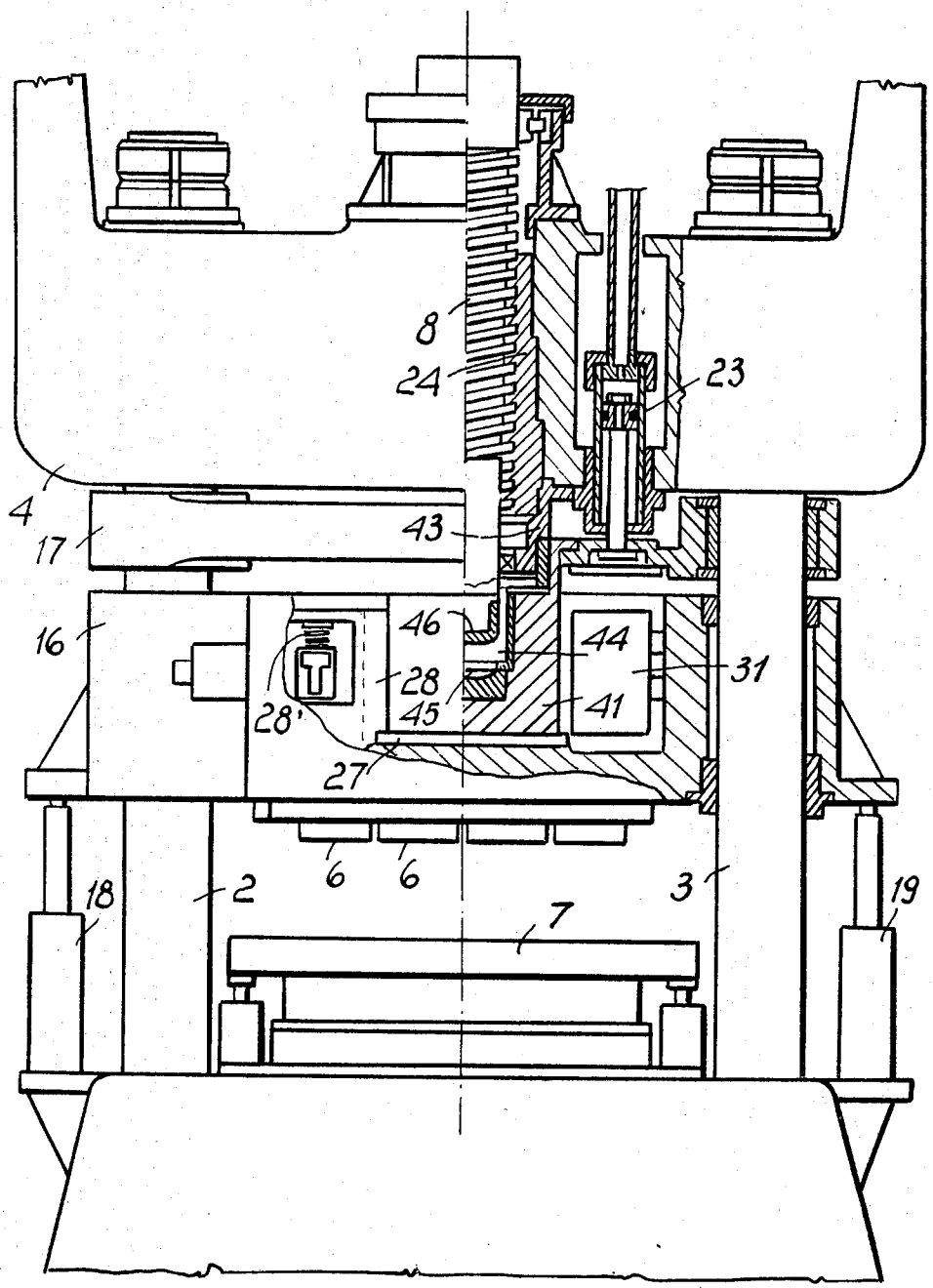

Fig. 2

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Oct. 27, 1970 U. WALCHHÜTTER 3,535,754

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Filed Dec. 7, 1967 3 Sheets-Sheet 3

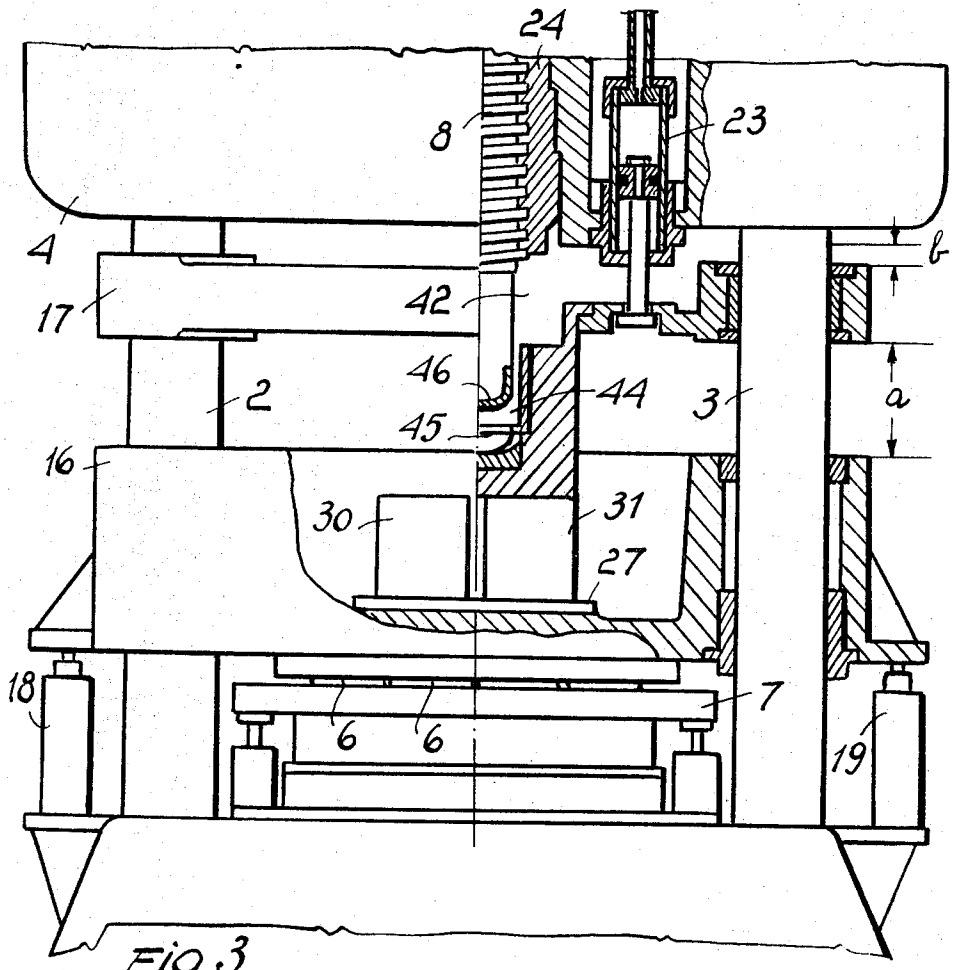

Fig. 3

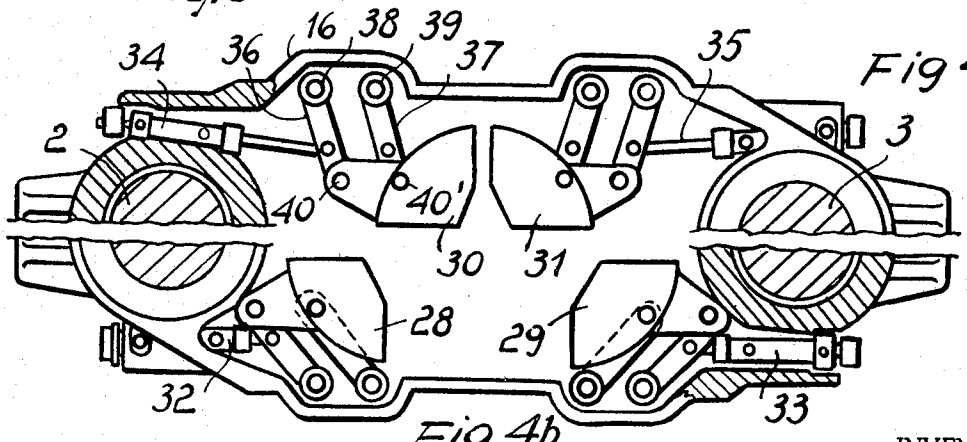

Fig 4a

Fig. 4b

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CROSS-HEAD OR MOBILE MOLD PLATEN

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Int. Cl. B28b 3/00
U.S. Cl. 25—45 10 Claims

ABSTRACT OF THE DISCLOSURE

A press in which material located in open dies is compressed by punches entering thereto and in which dies and punches are respectively carried by a stationary support and a movable cross-head of the press. In order to permit, on the one hand, wide opening of the press to charge the dies with material to be compressed and, on the other hand, to keep the actual compression stroke as short as possible, the movable cross-head is formed of two parts, at least one of which adjacent the stationary support is movable relative to the latter and to the other part, while spacer means are insertable between the two parts when the one part is moved away from the other and toward the support to thereby reduce the actual compression stroke of a member acting on the other part, which compression stroke is then transmitted by the spacer means to the one part.

This invention relates to a cross-head or mobile platen for presses of every kind, to limit the stroke of the pressing member to the strict necessity.

In particular, the mobile platen or cross-head object of this invention may be used in all cases wherein for loading of the molds into press a proper loading carriage is used, as for instance in certain presses for plastic material, and for similar cases, and wherein said cross-head or mobile platen has to effect a long stroke to cause said pressing member to effect a correspondently long stroke.

This occurrence results always in a fundamental inconveniency both in hydraulic presses and mechanical presses, and in particular in screw presses, wherein the pressure is obtained by using the kinetic energy of a flywheel.

In the case of hydraulic presses of high capacity, the pressing member is a hydraulic cylinder which exerts its force onto the cross-head or mobile platen, by means of a piston or plunger which has to effect a considerably long stroke. This requires a large quantity of motoring fluid, very much larger than the one which is necessary in order to reach the required point of compression. In order to obtain sufficiently high closure speeds of said cross-head of the press, large quantities of fluid (usually oil) have to enter said cylinder with high velocity and in large amounts through pipings and valves, which both have to be sized to withstand the strong pressure. For all these provisions it is necessary to use tubes and valves of wide cross section and with thick walls causing high cost of installation of the hydraulic apparatus without solving the inconveniences derivating from the passage of liquids flowing with high speeds and in large volume.

In the case of friction screw presses, the flywheel has to effect more turns so that the screw may run the entire required stroke. In such kind of presses, further to the heavy wear to which the same are subjected, due to the high friction during the operation, it is necessary to drive the flywheel by means of friction discs alternatively engaging a friction crown surrounding said flywheel. Thus all the drawbacks have to be accepted deriving from the friction control which, even with complicate constructions, will not assure a uniform contact between flywheel and driving discs.

In both these kinds of presses, the longer stroke of the pressing member, the longer will be time, required to carry out the stroke which fact negatively influences the output of said presses.

Now, according to this invention, there is proposed a mobile cross-head or platen composed of two separate portions, both mounted and guided along uprights or guiding shafts of the press, the first portion, nearer to the mold, being provided with known moulding means, as plungers or mold halves, and being movable along uprights or guiding shafts independently from the second portion, which is provided in its interior with means movable in turn transversely to said upwards movement, so as to obtain an intermediate piece which is interposed between said first portion, when displaced in the closing position of said mold halves, and the said second or upper portion, said intermediate piece being of such thickness as to limit the displacement of said second portion which has to abut thereonto, said second portion being provided with means for receiving the throw of the pressing member, the stroke of which is therefore limited to the strict necessity.

Said first portion of the mobile cross-head or platen is equipped with its own displacing means, which are of reduced power inasmuch as they only act to carry out said displacement.

Also said second portion is preferably provided with its own displacing means, of limited power, but it may be moved by the pressing member (piston of a hydraulic cylinder or a screw moved by a flywheel).

In the case of hydraulic presses, the said second portion may be omitted as a piston or plunger can act upon said intermediate piece.

The means supported by the said first portion of the mobile cross-piece or platen, and provided in order to form said intermediate piece between said first and second portions of the press, is preferably shaped as circular sectors moved by respective hydraulic means guided in such a manner as to be moved from a position at a certain distance one from another, which it may assume, when the first portion is at a sufficient distance from the molds, to a closed position, so as to form a full block resisting the working throw of the press, said closed position being assumed when the first portion has been moved to the closing position of the molds, before effecting the pressing operation.

A so conceived mobile cross-head, further to eliminate the above mentioned inconveniences, in the specific case of aplication to screw and flywheel presses, allows the elimination of the friction discs and the control of the flywheel by more simple driving means, as f.i. a hydraulic device with a double acting piston or two such hydraulic devices at opposed positions inasmuch as it is possible to considerably limit the rotating movement of the flywheel to about only one quarter of revolution.

The above possibility constitutes an important advantage in one of the main applications of the screw friction presses as in the case of using them for stamping ceramic tiles or the like articles, as it is possible to considerably simplify the construction of the machine and to increase the operating speed of the press due to the reduced stroke of the screw.

Furthermore the elimination of the friction drive allows to define with more precision, and independently from the room conditions, the exact force required for the pressing operations, which thus can remain unchanged for a long period of time, so as to avoid any loss of power due to frictional engagement of the element of the friction drive and consequent heating of these elements.

The attached sheets of drawings show a more limitative example of an embodiment of this invention, wherein

there is considered the case of a friction screw press. In these drawings:

FIG. 1 is a front view of a press provided with the mobile cross-head of platent object of this invention;

FIG. 2 shows partially in crosssection the mobile cross-head or platen of the press of FIG. 1, but represented in larger scale and in lifted position;

FIG. 3 is a partly crosssectional view of the said mobile cross-head in position of closed mold or molds;

FIG. 4*a* and 4*b* are plan views with portions represented in crosssection of the lower portion of the mobile cross-head in FIGS. 2 and 3 and respectively showing elements thereof in different positions.

Referring to said drawings, FIG. 1 relates to a friction screw press for the manufacture of ceramic articles, such as tiles and the like. Said press generally comprises a ground platen **1**, from which two uprights **2** and **3** project, which support an upper fixed cross-head **4** and along which moves a mobile cross-head **5**, which in presses according to the prior art is formed by an integral body supporting the upper plungers **6** pertaining to a mold **7** adapted to abut upon the bearing surface of said ground platen **1**. Said mobile cross-head **5** is moved up and down by a screw **8** which threads up and down within a female thread **24** located in turn within the fixed cross-head **4**, said screw providing the movement up and down of said mobile cross-head **5** and likewise its pressing action by using the kinetic energy supplied by the flywheel **9** keyed to the upper end of said screw.

The rotation and resulting up and down movement of the flywheel, in known screw presses, is enacted by two driving discs **10** and **11**, mounted on a shaft **12** and driven with a constant rotational speed from an electric motor **12'** through belts **13** connected to a larger counterpulley **14** keyed at the end portion of said shaft **12**. Said counterpulley **14** serves to axially displace the discs bearing shaft **12** to alternatively engage said discs **10**, **11** with the crown **9**. Said counterpulley is moved by a hydraulic jack **15**, generally contrasted by a spring not shown for recalling said jack to its starting position, and thus applied on the discs shaft **12**.

Discs **10** and **11**, shaft **12** and pulleys and belts have been represented in dotted lines for the purposes hereinafter explained.

According to this invention, the mobile-cross head of platen **5** is composed of two portions **16** and **17**, both provided with sleeves and guided along the uprights **2** and **3**.

The lower portion **16** of said mobile cross-head or platen **5** has it own displacement means, f.i. two hydraulic jacks **18** and **19** bearing on brackets **20** projecting sideways from base platen **1** and acting on respective lateral brackets **21** and **22** of the portion **16**. These jacks may be of simple effect in order to act onto said portion **16** for lifting purposes only, while the lowering of the same takes place by gravity. On the other side, these hydraulic jacks may be of the double acting kind, so as to control both the lifting and lowering movements of said mobile cross-head or platen **5**, thus cooperating in the compression of the material, f.i. providing for a precompression thereof able to promove an initial expulsion of the air contained in the material to be stamped, and a pre-setting of the same before the normal pressing cycle.

The upper portion **17** of the mobile cross-head or platen **5** (FIGS. 1 and 2) is further provided with it own displacements means, f.i. hydraulic jacks **23** traversing the fixed cross-head **4**, within the spaces between the uprights **2** and **3** and the female thread **24** located in the stationary cross-head **4**. These hydraulic jacks **23** are preferably of the double acting kind inasmuch as they serve for lifting and lowering the portion **17**, and further also for effecting the precompression of the material, instead of using the hydraulic jacks **18** and **19** for this purpose.

The displacement means **18**, **19** and **23** for both portions of the mobile cross-head or platen **5** makes both said portions independent from the pressing member, in the actual case from the screw **8**, which thus serves exclusively to promote the compression stroke by making use of the kinetic force supplied by the flywheel **9**. It is evident, however, that portion **17** maye be mechanically connected with screw **8** and displaced together with said screw, following the usual arrangement in friction presses, eliminating in the case the jacks **23**.

As shown in FIGS. 2, 3 and 4, the lower portion **16** of the mobile cross-head or platen **5**, and which has a greater thickness than the upper portion **17**, shows internally a wide recess **25** provided with a plane bottom **26** whereon an intermediate platen **27** is disposed the surface of which is polished for slding purposes.

In the interior of said recess **25** there are disposed wedges **28**, **29**, **30**, and **31** (in the actual case said wedges are four, but they may be less or more), having substantially the shape of a circular sector. These wedges are slidingly arranged on said plate **27** and they are provided with means able to promote a displacement from a distanced position, as shown by wedges **28** and **29** in FIG. 4*a*, to an approached position, as shown by wedges **30** and **31** in FIG. 4*b*.

The displacement means for said wedges may be for instance respective hydraulic jacks **32**, **33**, **34** and **35** of the double acting kind influencing quadrilateral articulated kinematisms consisting each one of two connecting rods **36** and **37** hinged at one end on pivots **38** and **39** set on the mobile cross-head or platen, and at the other end on pivots **40** and **40'**, set on respective wedges. Said quadrilateral kinematisms serve to displace said wedges without changing their orientation. Around one of said pivots **40** and **41** a helicoidal spring **28'** is wound, which serves to counterbalance the weight of the respective wedge in order to have it a little distanced from plate **27** during the displacement thereof.

Said four wedges **28**, **29**, **30**, **31**, when moved to each other, constitute a rigid block resisting compression exerted by the pressing member.

The thickness of said wedges is made at a suitable value determined by the reasons stated hereinafter.

The upper portion **17** of the mobile cross-head which is connected to the rods of jacks **23**, centrally supports also a cylindrical maseter piece **41** wherein the bottom and lower portion of the cylindrical wall has a considerable thickness, while the upper portion is considerably reduced in order to obtained a large space **42** for introducing thereinto cylindrical means **43** serving to guide and rigidly hold the screw **8**.

The lower portion **44** of the inner recess of the master piece **41** is equipped to contain members suitable to receive the shock of the pressing member, f.i. an insert **45** which an insert **46** at the end of said screw may abut.

As shown in FIG. 2, when said wedges **28** through **31** are moved apart, both portions **17** and **18** may be lifted while approaching each other, so that the master piece **41** becomes lodged within the space left free by said spaced wedges.

When, on the contrary, part **16** is lowered, and wedges **28** through **31** are moved closely to each other, said wedges will form a spacer block which will interfere with said master piece **41**, so that the lowering stroke of portion **17** will be considerably shortened. In consequence thereof, the screw **8** will have to run a much shorter stroke to exert a compression force which is transmitted to the molds through the master piece **41** and the wedges **28** to **31**. From FIG. 3 it is evident that while portion **16** is lowered for a distance *a*, portion **17** is lowered a much reduced distance *b*.

In the illustrated case of a screw friction press, the limited stroke of screw **8** will of course require a limited rotation of a flywheel **9**, practically for only a small angle which is necessary for the effective compression of the material.

This solution, in the case of limited stroke of compression, permits to eliminate from the press both friction discs **10** and **11**, shaft **12**, electric motor **12'**, belt **13**,

counterpulley **14** and hydraulic jack **15** together with its accessories, thus rendering the press lighter and consequently reducing maintenance and price. In place of the discs **10** and **11**, f.i. a hydraulic double acting jack **47** may be used, which is connected to one (**48**) of the upwards directed arms of the upper fixed plate **4** of the press, and articulated at its other end, as at **49** to the flywheel **9**, in order to impart to the flywheel **9** approximately one-fourth of revolution to throw it at the required speed of rotation thus giving the possibility of suitable control of the speed of feeding, the pressure of the fluid used and the section of the jack cylinder.

Of course, this invention can be varied in its details and also completed with other means as will be obvious to those skilled in the art without departing in any way from the spirit of the present invention.

What we claim is:

1. A press comprising a first and a second stationary support means; elongated guide means connecting said support means spaced a fixed distance from each other; mobile cross-head means comprising a first and a second member guided on said guide means for movement relative to each other and to said stationary suport means, said first member having a transverse face facing a corresponding face of said first suport means and opposite said transverse face a face portion facing an end portion of said second member; means cooperating with said first member for moving the latter from an inactive position in which said faces are considerably spaced from each other and in which said face portion of said first member is closely adjacent to said end portion of said second member, to an active position in which said faces are closely adjacent to each other and said face portion is spaced a given distance from said end portion; spacer means having a length substantially equal to said given distance and being carried by said first member movable in direction transverse to the elongation of said guide means between a laterally displaced position and an active position located between said end portion of said second member and said face portion of said first member; moving means cooperating with said spacer means for moving the latter from said displaced to said active position thereof when said first member has moved to said active position thereof; and means to impart a compression stroke to said second member when said spacer means and said first member are in said active position, whereby said compression stroke is transmitted from said second to said first member by said spacer means interposed between said end portion of said second member and said face portion of said first member.

2. A press as defined in claim **1**, wherein said means for imparting a compression stroke to said second member comprises a screw threadingly connected to said second support means and projecting with opposite ends beyond the latter, a flywheel connected to the end of said screw distant from said cross-head means, and means for turning said flywheel about its axis.

3. A press as defined in claim **2**, wherein said means for turning said flywheel comprises a fluid operated jack means connected to said flywheel and said second support means.

4. A press as defined in claim **1**, wherein said first member is formed with a cavity defined by a peripheral face and an end face, said face portion defining a central portion of said end face of said cavity, and wherein said end portion of said second member projects into said cavity.

5. A press as defined in claim **4**, wherein said spacer means comprises a plurality of parts located in said cavity and arranged in said displaced position between said peripheral face of the cavity and said end portion of said second member.

6. A press as defined in claim **5**, wherein said moving means for moving said spacer means between said displaced and active positions thereof, comprises a plurality of fluid operated jacks located in said cavity and transmission means connecting said jacks respectively to said spacer parts.

7. A press as defined in claim **4**, wherein said end portion of said second member is formed with a blind bore into which the inner end of said screw extends.

8. A press as defined in claim **7**, and including means cooperating with said second member to move the latter toward and away from said second support means to change the spacing between the inner end of said screw and the closed end of said blind bore.

9. A press as defined in claim **8**, wherein said means cooperating with said second member comprise double acting fluid operated jack means between said second member and said second support means.

10. A press as defined in claim **1**, wherein said means for moving said first member comprises a pair of double acting fluid operated jack means between said first member and said first support means.

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U.S. Cl. X.R.

18—16, 30