May 28, 1963 W. V. HOLL ETAL 3,091,147

GUIDE MEANS FOR ADJUSTABLE HYDRAULIC PRESS

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Fig. 1

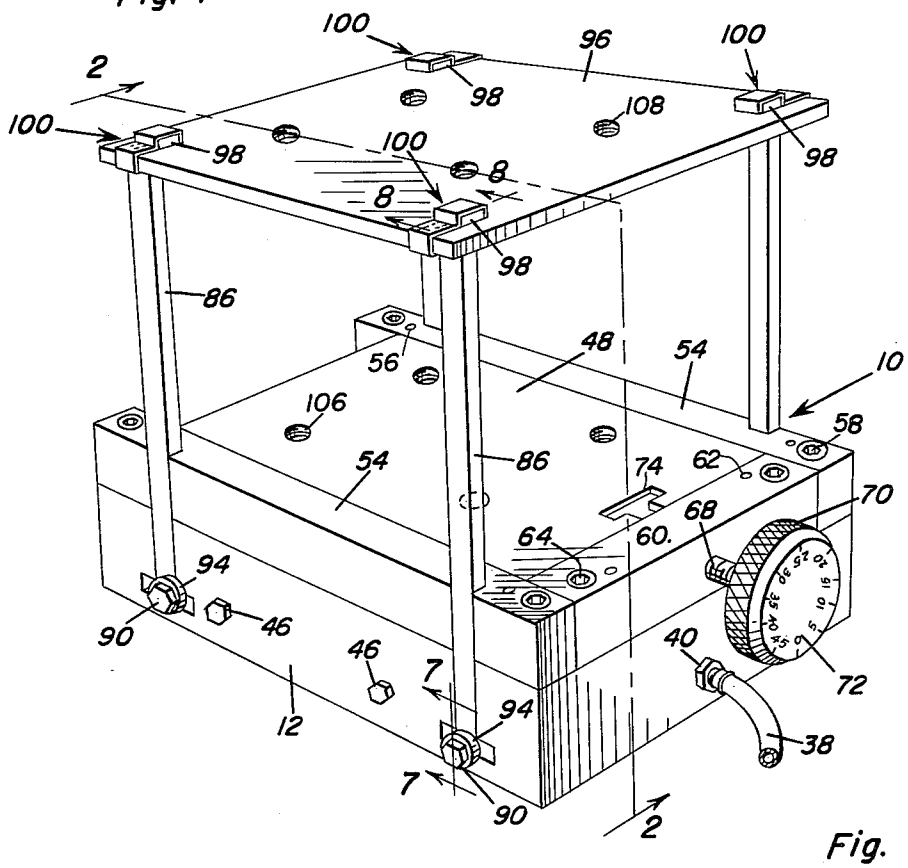

Fig. 6

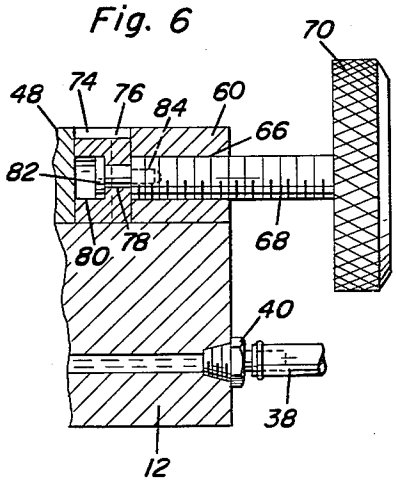

Fig. 7

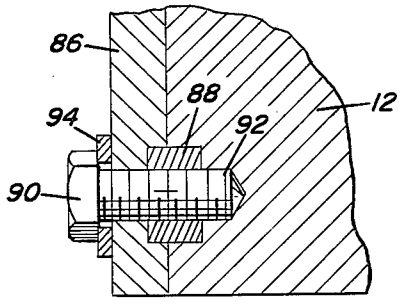

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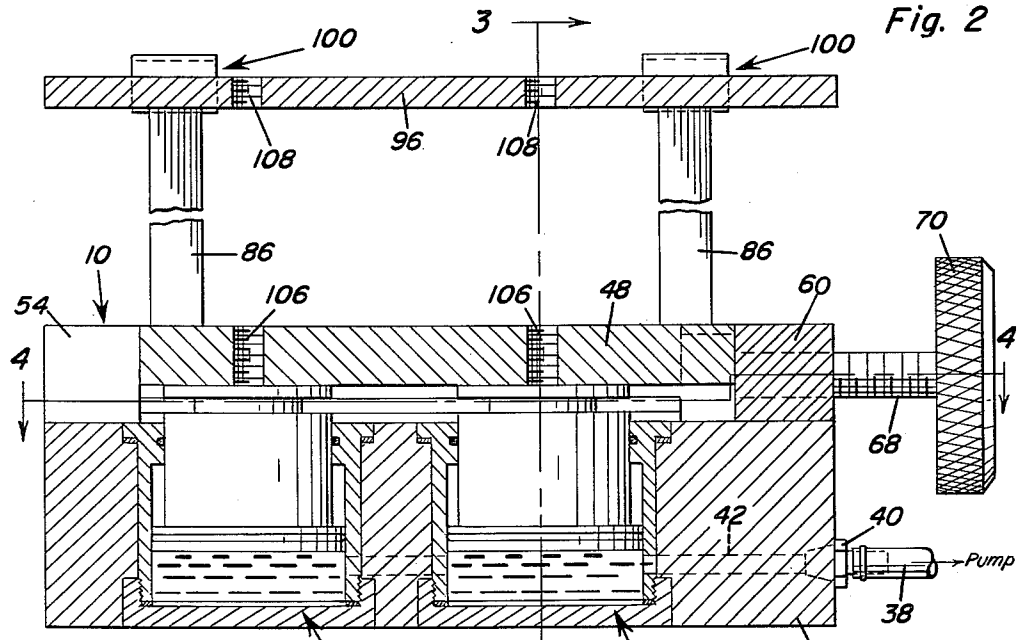
Fig. 2



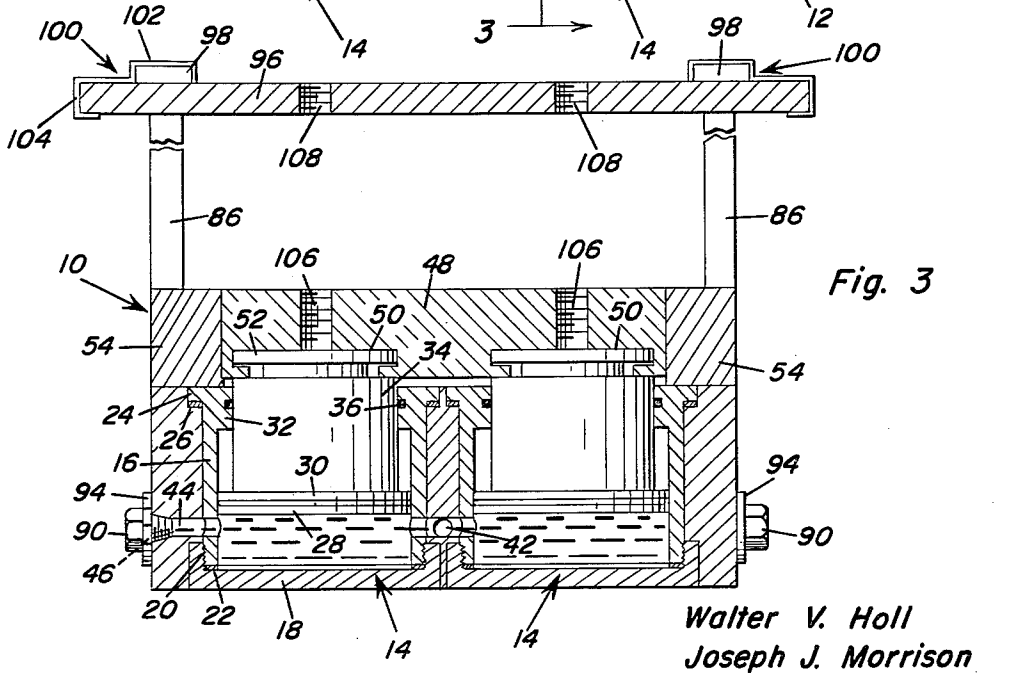


Fig. 3

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Fig. 4

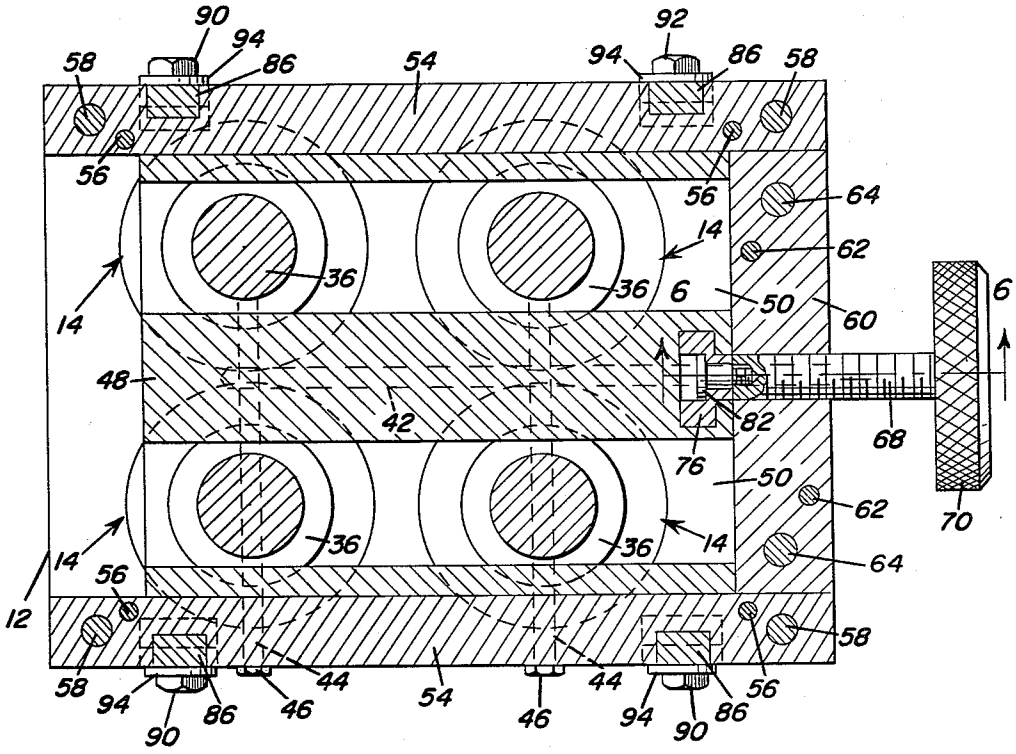
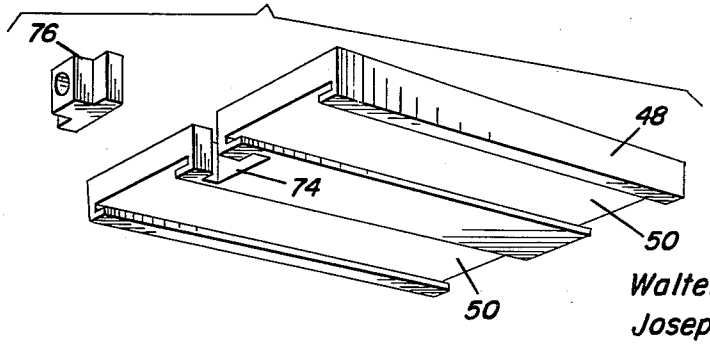


Fig. 5



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3,091,147
GUIDE MEANS FOR ADJUSTABLE HYDRAULIC PRESS

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This invention relates in general to new and useful improvements in hydraulic presses, and more specifically to a novel die fitting press.

In large plants where thousands of a particular article are formed by punching and trimming, there is normally provided a master die and the individual punches are formed in accordance with the master die. Normally the punches are shaped as closely as possible to the cross-section of the master die, after which the punches are aligned with the master die and then forced into the master die with a broaching action so as to finally shape the punches. The punches are then heat-treated and hardened.

It is the primary object of this invention to provide a relatively small die printing press which is provided with a platen that is movable with respect to the base thereof so as to facilitate the alignment of the two parts being fitted together.

Another object of the invention is to provide a hydraulic die fitting press which is of a relatively flat construction so as to facilitate the insertion thereof in existing machinery where necessary thus rendering the die fitting press available for such uses wherein the clearance in the machinery is relatively small.

Still another object of the invention is to provide a die fitting press which includes a base having four extensible fluid motors or a sufficient number as to define a plane so as to impart rectilinear movement to a platen seated in overlying relation to the base and guided by guides for vertical longitudinal movement, the platen being supported by but not rigidly connected to the piston rods of the fluid motors for vertical movement and equal pressure distribution thereon, also permitting longitudinal adjustment of the platen with respect to the base and the fluid motors.

A further object of the invention is to provide a die fitting press wherein the platen is not only vertically movable under the influence of fluid motors, but also is longitudinally shiftable, the platen having a non-rigid sliding interlocked connection with each of the fluid motors and being provided with a micrometer adjustment so that it may be accurately positioned longitudinally of the supporting base.

Another object of the invention is to provide a novel die fitting press which includes a base carrying a plurality of extensible fluid motors, a platen supported by the fluid motors for vertical movement, standards extending upwardly from the base and having an auxiliary platen overlying the main platen in spaced relation, the standards passing through the auxiliary platen and having enlarged heads limiting upward movement of the auxiliary platen, the heads of the standards further carrying clips which pass around the edges of the auxiliary platens to prevent downward movement thereof.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of the die fitting press, which is the subject of this invention, and shows the general details thereof;

FIGURE 2 is an enlarged longitudinal sectional view taken substantially upon the plane indicated by the section line 2—2 of FIGURE 1 and shows a specific internal construction of the die fitting press, intermediate portions of the standards thereof being broken away;

FIGURE 3 is an enlarged transverse sectional view taken substantially upon the plane indicated by the section line 3—3 of FIGURE 2 and shows further the details of construction of the die fitting press, including the details of the clips which extend between the enlarged heads of the standards and the auxiliary platen for retaining the auxiliary platen in its elevated position;

FIGURE 4 is an enlarged horizontal sectional view taken substantially upon the plane indicated by the section line 4—4 of FIGURE 2 and shows the specific mounting of the platen, including the connection between the platen and the micrometer adjustment screw;

FIGURE 5 is an exploded perspective view rotated from its position of FIGURE 1 and shows the details of the connection between the micrometer adjustment screw and the platen;

FIGURE 6 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 6—6 of FIGURE 4 and shows further the details of the micrometer adjustment screw; and

FIGURE 7 is an enlarged fragmentary vertical sectional view taken substantially upon the plane indicated by the section line 7—7 of FIGURE 1 and shows the details of the mounting of one of the standards.

Referring now to the drawings in detail, it will be seen that there is illustrated in FIGURE 1 a die fitting press which is the subject of this invention, the die fitting press being generally referred to by the numeral 10. The die fitting press 10 includes a relatively thick base 12 which is in the form of a plate. The base 12 has mounted therein four extensible fluid motors which are arranged in a rectilinear pattern, as is best illustrated in FIGURE 4, each of the fluid motors being referred to in general by the reference numeral 14. It will of course be apparent to those skilled in the art, that the actual number of fluid motors is not critical in general, as long as the number exceeds three, the number necessary to impart rectilinear movement to the platen supported thereon.

Each of the fluid motors includes a two-piece cylinder assembly including an upper cylinder part 16 and a lower cylinder part 18. The cylinder parts 16 and 18 are releasably connected together by a threaded connection 20 and are sealed together by a compressed O-ring 22. The upper cylinder part 16 is provided at the upper end thereof with a peripheral flange 24 which overlies a portion of the base 12 and is sealed relative thereto by a compressed O-ring 26. It is to be noted that when the cylinder parts 16 and 18 are connected together, they clamp a relative portion of the base therebetween to thus firmly anchor the cylinder in the base 12.

The individual fluid motor 14 also includes a piston 28 which is sealed relative to the cylinder part 16 by an O-ring 30. The cylinder part 16 has a reduced upper bore 32 through which an enlarged piston pin 34 passes. The piston pin 34, because of its size, if desired, may be integrally formed with the piston 28. The piston pin 34 is sealed with respect to the cylinder part 16 by means of an O-ring 36.

It is intended that all of the fluid motors 14 act simultaneously. In view of this, there is provided a single hydraulic source for the four fluid motors 14. This hydraulic source includes a hydraulic line 38 connected to a suitable pump (not shown). The hydraulic line 38 is connected to the base 12 by a fitting 40 (FIGURE 2) which is threadedly engaged into a longitudinal bore 42. The bore 42 extends through a central part of the base 12 intermediate the fluid motors 14, as is best shown in

FIGURE 4. A pair of transverse bores 44 are formed through the cylinder part 16 and the base 12, as is best shown in FIGURES 3 and 4, so as to communicate the individual fluid motors 14 with the fluid passage 42. The bores 44 do not extend entirely through the base 12, there being no necessity for this. The outer part of each bore 44 is plugged by plug 46.

A platen 48 overlies the base 12, and is of a smaller dimension than base 12. As best shown in FIGURE 5, the platen 48 is provided on the underside thereof with a pair of longitudinally extending T-slots 50. The upper ends of the piston rods 34, as best shown in FIGURE 3, are provided with T-heads 52 of a size and proportion snugly fitting between the longitudinal sides of the T-slots 50 for slidable adjustment. In this manner the platen 48 is connected to all of the piston rods 34 for movement therewith and at the same time longitudinal sliding movement of the platen 48 with respect to the fluid motors 14 and the base 12 is permitted.

A pair of longitudinally extending guide bars 54 are secured to the upper surface of the base 12 along the longitudinal edges thereof. The guide bars 54 are aligned with respect to the base 12 by aligning pins 56 and are secured in place thereon by cap screws 58.

Another bar 60 extends transversely of the base between the guide bars 54 at one end of the base 12. The bar 60 is aligned with the base 12 by means of aligning pins 62 and is removably secured to the base 12 by means of cap screw 64.

The transverse bar 60 is provided with an internally threaded bore 66 as seen in FIG. 6 which has fine threads formed therein. A micrometer adjustment screw 68 is threadedly engaged in the bore 66. The micrometer adjusting screw 68 is provided with an enlarged hand wheel 70 and facilitates the positioning of the micrometer adjustment screws 68. The hand wheel 70, as is best shown in FIGURE 1, is provided with numerical indicia 72 to facilitate the positioning thereof.

Referring now to FIGURE 5 in particular, it will be seen that one end of the platen 48 is provided with a vertical T-slot 74. A T-shaped fitting 76 is positioned within the T-slot 74 for relative sliding movement. As is best shown in FIGURE 6, the T-shaped fitting 76 is provided with a bore 78 therethrough which opens in the rear part thereof into an enlarged bore 80. A fastener 82 having an enlarged head extends through the fitting 76 and is threaded into one end of the micrometer adjustment screws 68, as at 84. It is to be understood that the fastener 82 is rotatable within the fitting 76 and at the same time connects the fitting 76 to the micrometer adjustment screw 68 without the existence of play. Certainly, there is no play between the fitting 76 and the platen 48 even though the platen 48 may move vertical with respect to the fitting 76. In this manner the micrometer adjustment screw 68 is connected to the platen 48 to shift the platen 48 longitudinally of the base 12 while permitting the platen 48 to be vertically adjusted by the fluid motors 14. A pair of standards 86 extends upwardly along the sides of each side of the base 12. Each of the standards 86 is generally rectangular in cross-section and is of a size to assume the necessary load. As best illustrated in FIGURE 7, a bushing 88 is seated in the lower part of the base 12 and is interlocked with its respective standard 86 to prevent rotation thereof. The lower part of the standard 86 is clamped in place by a bolt 90 which extends through the standard 86, the bushing 88 is threadedly engaged in a bore 92 in the base 12. A washer 94 is carried by the fastener 90 and bears against the standard 86.

An auxiliary platen 96 overlies the base 12. The auxiliary platen is provided at the upper end thereof with a plurality of openings through which the standards 86 pass. Each of the standards 86 is provided with an enlarged head 98 which overlies the auxiliary platen 96 and prevents upward movement thereof.

Reference is now made to FIGURE 3 wherein the details of a platen supporting clip 100 are illustrated. The upward movement of the auxiliary platen 96 is limited by the heads 98. However, the platen 96 has a tendency to move downwardly. This is prevented by clips 100 which are carried by the heads 98 of the standards 86. Each of the clips 100 includes a socket portion 102 which is engaged over a respective one of the standard heads 98, and a generally channel-shaped clip portion 104 which extends about an edge of the auxiliary platen 96. The clips 100 may be merely slid sideways to remove them from engagement with the standard heads 98.

The platen 48 is provided with a plurality of internally threaded bores 106. The bores 106 may be of any pattern desired for clamping workpieces thereto. Similarly, the auxiliary platen 96 is provided with a plurality of internally threaded bores 108. The bores 108 are also for the purpose of clamping workpieces to the auxiliary platen 96 and may be of any desired pattern.

In accordance with the present invention, a first workpiece, for example a master die, will be clamped to the platen 48. A second workpiece, for example, a punch blank, will be secured to the underside of the auxiliary platen 96 by means of suitable clamps. The platen 48 is then longitudinally adjusted through the use of micrometer adjusting screw 68 until the two parts are aligned. Then, the hydraulic pump (not shown) is actuated so as to pump hydraulic fluid into the individual fluid motors 14. This will result in an evenly distributed upward pressure movement of the platen 48 so as to force the master die over the punch and, thus, with a broaching action, shape the punch to fit the master die. This is a typical example of the use of the die fitting press and is not to be considered the sole use thereof. The die fitting press may equally as well as used in the formation of small parts and the like. It will also be appreciated that the equally distributed pressure more reliably obtainable by the present press will be a generally desirable feature thereof for all uses to which it is applied.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A fitting press comprising a base, guides on the upper portion of said base, a platen seated between said guides and in overlying relation to said base for guided vertical and longitudinal movement with respect to the base and the guides, a micrometer adjustment screw carried by said guides, means operatively connecting said adjustment screw to said platen for longitudinally positioning said platen and accommodating relative vertical movement between the guides and the platen, extensible fluid motor means in said base and underlying said platen, and means operatively connecting the fluid motor means to the platen for elevating the platen under evenly and equally applied pressure from the motor means, said fluid motor means including a piston rod, an interlocked connection between said platen and said piston rod locking said platen to said piston rod for vertical movement therewith while permitting relative longitudinal sliding movement of said platen with respect to the piston rod.

2. A fitting press comprising a base, guides on the upper portion of said base, a platen seated between said guides and in overlying relation to said base for guided vertical and longitudinal movement with respect to the base and the guides, a micrometer adjustment screw carried by said guides, means operatively connecting said adjustment screw to said platen for longitudinally posi-

tioning said platen and accommodating relative vertical movement between the guides and the platen, a plurality of extensible fluid motors in said base for imparting rectilinear movement to and underlying said platen, and slide means operatively connecting said fluid motors to said platen for elevating the platen with even and equally applied pressures, an interlocked connection between said platen and each of said fluid motors for vertical movement therewith while permitting relative longitudinal sliding movement of said platen with respect to said fluid motors.

3. A fitting press comprising a base, guides on the upper portion of said base, a platen seated between said guides and in overlying relation to said base for guided vertical and longitudinal movement with respect to the base and the guides, a micrometer adjustment screw carried by said guides, means operatively connecting said adjustment screw to said platen for longitudinally positioning said platen and accommodating relative vertical movement between the guides and the platen, extensible fluid motor means in said base and underlying said platen, and means operatively connecting the fluid motor means to the platen for elevating the platen under evenly and equally applied pressure from the motor means, a plurality of standards extending upwardly from said base and passing through said platen, and an auxiliary platen overlying said first-mentioned platen in spaced relation thereto, said auxiliary platen being carried by upper portions of said standards.

4. A fitting press comprising base means, guide means mounted on the base means, platen means guidingly mounted by the guide means above the base means, fluid motor means mounted in the base means engageable with the platen means for imparting movement thereto with respect to the base means and the guide means and constrained by the guide means, pressure supply means for applying equally distributed fluid pressure to the fluid motor means, connecting means operatively connecting the fluid motor means to the platen means for movement of the platen means under evenly and equally distributed pressure, said fluid motor means including a plurality of pistons vertically displaceable by equal pressure simultaneously applied thereto by the pressure supply means, each of said pistons being separately connected by the connecting means to the platen means, horizontal adjustment means mounted on the guide means, slotted joint means operatively connecting the adjustment means to the platen means for adjustment movement of the platen means relative to the guide means and the connecting means in which it is mounted and engaged respectively.

5. The combination of claim 3, wherein said standards passing through said platen have enlarged heads preventing upward movement of said auxiliary platen, and clips engaged over said enlarged heads holding said auxiliary platen in place.

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