

March 20, 1956

H. HECHT

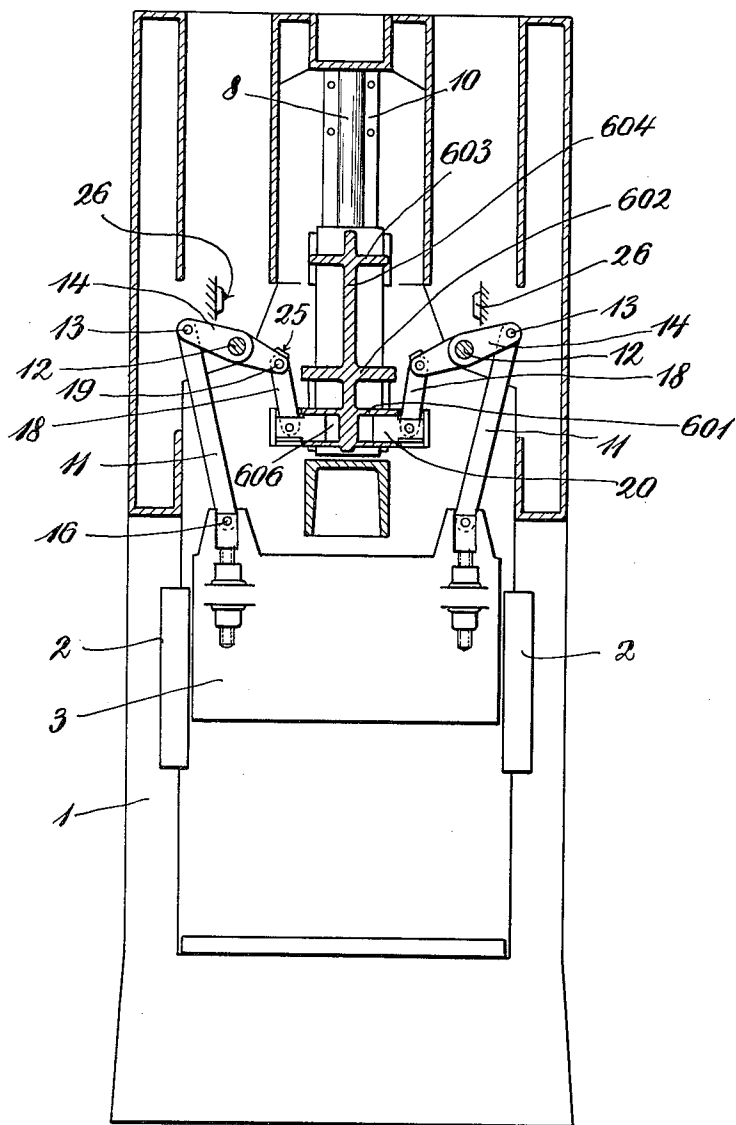
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TOGGLE LEVER OPERATING ARRANGEMENT FOR A PRESS

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6 Sheets-Sheet 1

Fig. 1



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TOGGLE LEVER OPERATING ARRANGEMENT FOR A PRESS

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Fig. 3

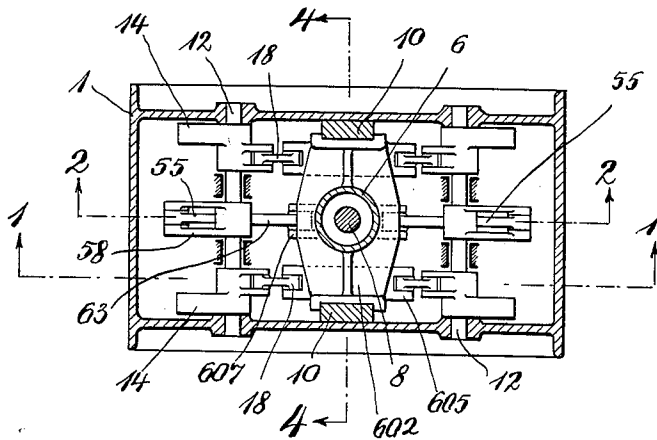


Fig. 4

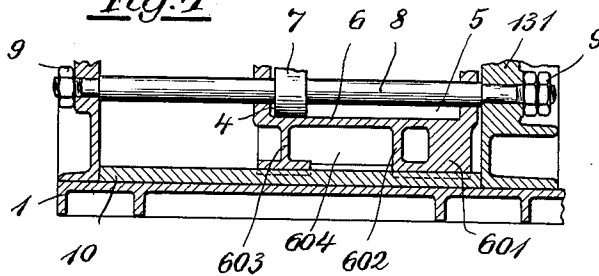
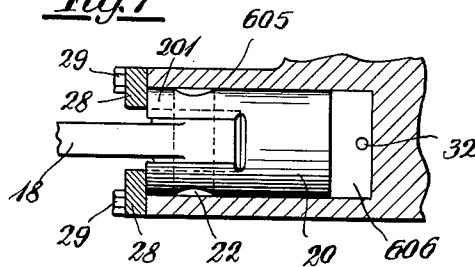


Fig. 7



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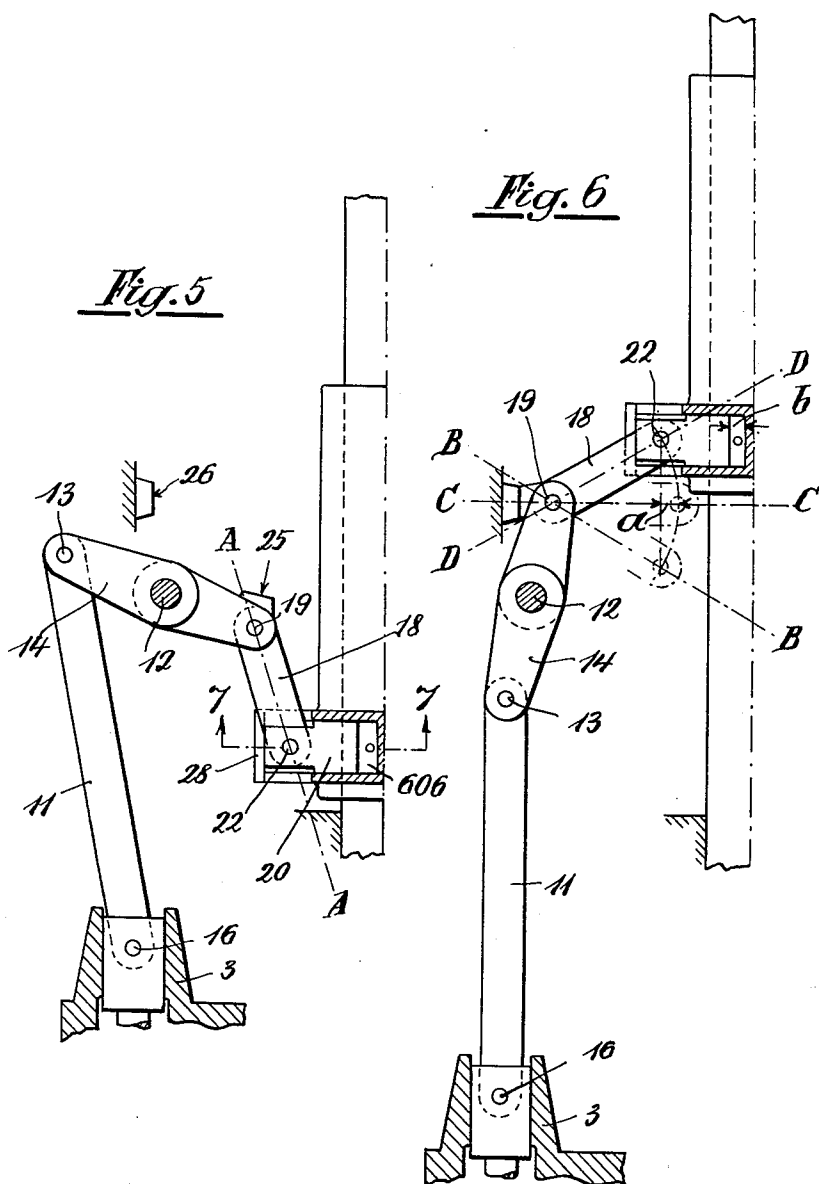
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TOGGLE LEVER OPERATING ARRANGEMENT FOR A PRESS

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6 Sheets-Sheet 4



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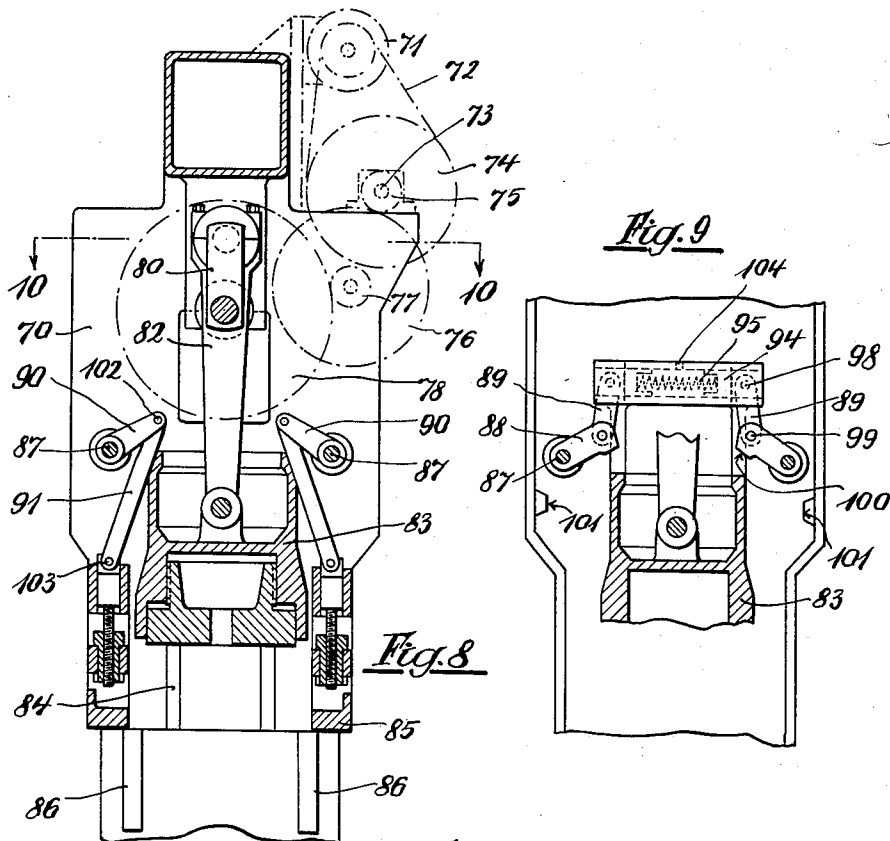
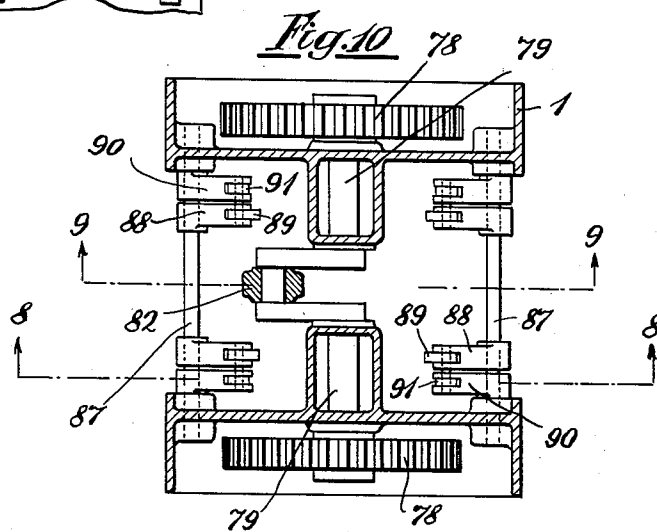
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TOGGLE LEVER OPERATING ARRANGEMENT FOR A PRESS

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6 Sheets-Sheet 5



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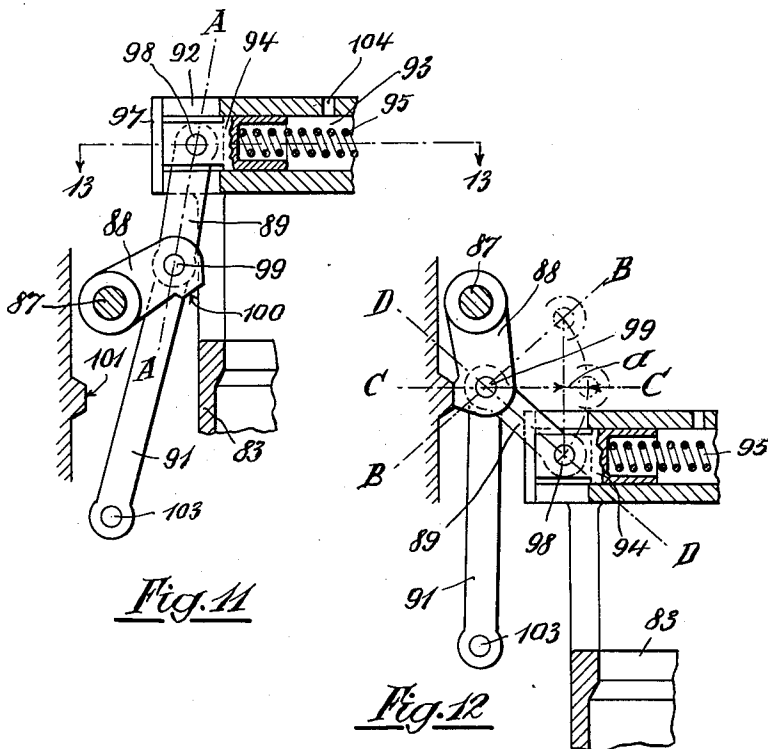
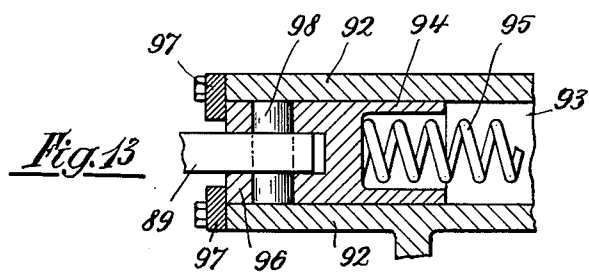
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TOGGLE LEVER OPERATING ARRANGEMENT FOR A PRESS

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6 Sheets-Sheet 6



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2,738,748

TOGGLE LEVER OPERATING ARRANGEMENT FOR A PRESS

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Application January 29, 1952, Serial No. 268,754

12 Claims. (Cl. 113—38)

The present invention relates to presses, and more particularly to a toggle lever arrangement permitting arresting of a movable member actuated by a drive member through a toggle lever arrangement while the drive member continues its movement.

In the known operating arrangements for stamping presses it has not been possible to bring a movable member operated by a toggle lever system to a complete standstill while the driving means connected thereto continue to move. For certain press operations, however, it is highly desirable to hold a movable member in operative position temporarily immovable. In a stamping press, for instance, the holding member which clamps down a blank should be at a complete standstill before the die attached to the plunger carries out the stamping step proper. For molding presses as well, arresting of a movable die in operating position is highly advantageous.

It is the object of the present invention to provide means for arresting a movable member in a press independently of the movement of a drive member.

It is another object of the present invention to provide in a stamping press a resilient connection between a drive member and the toggle lever system operating a holding member, permitting further movement of the drive member after the holding member is arrested in operative position.

It is a further object of the present invention to provide in a press a resilient connection between the drive member and a holding member which prevents damage to the machine in the event that movement of the movable member is blocked by excessively high resistance.

It is a still further object of the present invention to provide in a press a connection between a drive member and a holding member which rigidly connects the drive member to the holding member as long as both of these members move, but resiliently yields when further movement of the holding member is blocked, permitting the driving member to continue movement after overriding the resilient action of the connecting means without any further resistance by the connecting means.

It is also an object of the present invention to provide a stamping press in which a holding member and a plunger member are driven from the same drive means and are connected to each other by resiliently yielding connecting means permitting the plunger to continue its working stroke after the holding member has been arrested in operative position.

With these objects in view the present invention mainly consists in a movable holding member reciprocally mounted in the frame of a stamping press, a lever system including toggle levers connecting the movable holding member with a drive member, and resiliently yielding connecting means arranged between the toggle lever system and the drive member.

The resiliently yielding connecting means may be a piston slidably mounted in a cylinder, urged in a direction transversal to the movement of the drive member by the force of a spring or by an operative pressurized liquid in

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the cylinder. In the event that the drive of the press is hydraulically operated, the operating liquid in the cylinder is the same as used for the drive member.

Preferably the axis of the cylinder of the connecting means is arranged normal to the direction of movement of the drive member whereby a rigid connection is formed in a direction of movement of the drive member, and the resiliently yielding connection is formed for movement of the lever system normal to the direction of movement of the drive member.

A press according to the present invention may be driven by means of a crank shaft or by means of hydraulically operated cylinder and piston means. In either case the drive member preferably performs a straight movement in the same direction as, or in opposite direction to the movement of a movable member connected to the drive member by lever systems.

Several lever systems and resilient connecting means are provided for large presses exerting high pressure, and such lever systems are preferably arranged symmetrically to the drive member.

In a stamping press a movable member may be particularly advantageously employed as a holding member for blanks, while the plunger member may constitute the drive member. The driving means which may be a crank shaft rotated by a motor, and the plunger may be arranged on the same side or on opposite sides of the plane constituted by the surface of the press table.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a sectional view of a stamping press provided with a hydraulically operated drive member on the line 1—1 of Fig. 3;

Fig. 2 is a sectional view on line 2—2 in Fig. 3, the toggle lever system illustrated in Fig. 1 being omitted;

Fig. 3 is a cross-sectional view on line 3—3 of Fig. 2;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is an enlarged partly sectional view of an operating arrangement as shown in Fig. 1;

Fig. 6 is a view of the operating arrangement shown in Fig. 5 in another position;

Fig. 7 is a sectional view of a detail on line 7—7 of Fig. 5;

Fig. 8 is a sectional view of a stamping press driven by a rotating crank shaft on line 8—8 in Fig. 10;

Fig. 9 is a sectional view of an enlarged detail taken on line 9—9 in Fig. 10;

Fig. 10 is a cross-sectional view taken on line 10—10 in Fig. 8;

Fig. 11 is a partly sectional view of an enlarged detail of Fig. 8;

Fig. 12 is a view similar to Fig. 11 showing a different position of the operating arrangement; and

Fig. 13 is a sectional view of an enlarged detail on line 13—13 of Fig. 11.

Referring now to the drawings, Figs. 1 to 4 show a hydraulically driven stamping press according to the present invention. A holding member 3 is guided in the supporting frame 1 of the press on guiding means 2, as shown in Fig. 1. Behind the holding member 3 a plunger member 53 is mounted in the supporting frame 1 slidably along guiding means 54. The plunger member of the press is hydraulically driven, and the operating liquid is supplied to the chambers 4 or 5 of the drive member 6, which in the embodiment shown in Fig. 2 is a cylinder reciprocally movable on a stationary piston 7. A guiding

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rod 8, carrying the piston 7, passes through openings at the ends of the cylinder 6 and is secured on one end thereof to the upper part of the supporting frame of the machine, and on the other end to a transversely extending bar 131 which is a part of the press body. The guiding rod 8 is secured on both ends thereof to the supporting frame by means of nuts 9.

The drive member, or drive cylinder 6 is provided with transversal ribs 601, 602 and 603, clearly shown in Fig. 4, which are connected by longitudinally extending ribs 604. The transversal ribs 601, 602 and 603 engaging guiding members 10 which are secured to the supporting frame of the machine can be best seen from Figs. 3 and 4. The transversal rib 601 is provided with forked projecting portions 605 extending substantially normal to the direction of movement of the drive cylinder in a transversal plane. The transversal rib 601 is provided with bores 606 in the forked portions thereof which constitute cylinders in which pistons 20 are reciprocally movably mounted. The axes of these cylinders 606 are parallel to each other and extend in a transversal plane normal to the main axis of the machine and to the direction of movement of the drive member. The cylinders 606 are arranged in two pairs having aligned axes, the axis of each aligned pair being parallel to the axis of the other aligned pair and extending normal to a plane of symmetry passing through the drive member from the front to the rear of the machine.

Each of the four pistons 20 is connected to the holding member 3 by a lever system, the four lever systems being symmetrically arranged, and exactly alike.

Each of these four lever systems comprises a lever 18, pivoted to one of the pistons 20 and actuating a set of toggle levers 11 and 14. The long toggle lever 11 is pivotally connected to a member 16 which is slidably mounted in the holding member 3, and adjustable by nut and bolt means in a direction parallel to the main axis of the machine.

Two short toggle levers 14 are pivotally mounted on each of the shafts 12 which are mounted on the supporting frame of the machine. Two such shafts 12 are provided as can be clearly seen from Fig. 3. The first long toggle lever 11 is pivotally connected to one end of the second short toggle lever 14 by a pin 13 while the other end of the lever 14 is pivoted to lever 18 by a pin 19. Consequently all pivoting axes of the lever system are parallel and extend normal to the direction of movement of the drive member 6 and of the holding member 3.

The construction of the forked portions 605 and the pistons 20 can be best seen from Figs. 5 and 7 when examined in connection with Fig. 3. The forked portions 605 are provided with a plate 28 secured thereto by bolt and nuts and serving as a stop means for the piston 20. A port 32 is provided near the other end of the cylinder 606 through which an operating liquid may be supplied or discharged. The piston 20 is slotted as shown in Fig. 7 whereby forked portions 201 are formed for mounting the pivoting pin 22 of the lever 18.

The end of the short lever 14 which is pivotally connected to the lever 18 is provided with a projection 25 clearly shown in Figs. 1, 5 and 6 which abuts against an abutment 26 on the supporting frame of the press when the toggle lever 11 and 14 are in almost aligned position.

Referring again to Fig. 2, the drive cylinder 6 is pivotally connected at 61 to levers 63 which engage two-armed toggle levers 58 which are pivoted on the shafts 12. Toggle lever 58 is pivoted by pin 59 to a toggle lever 55. Lever 63 is pivotally mounted between forked portions 607 of the ribs 601 and 602 on pin 61.

As can be seen from Fig. 2, the end of the toggle lever 55 is pivoted to a member 56 which is mounted in the plunger member 53 slidably in the direction of movement thereof and may be adjusted by worm wheel 57 and a worm (not shown).

The toggle lever systems connecting the drive member

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with the holding member 3 are arranged symmetrically in front of and behind the toggle lever systems connecting the drive member with the plunger member 53, all toggle lever systems being arranged in parallel planes as can be seen from Fig. 3. The shafts 12 provide pivoting points for all three toggle lever systems.

The arrangement operates as follows:

When the drive cylinder 6 moves upwardly the lever 18 urges the toggle levers 11 and 14 from the angular position shown in Fig. 5 to an almost aligned position shown in Fig. 6 so that the holding member 3 is moved downwardly. Simultaneously the lever system 63, 58 and 55 move the plunger member 53 in the same direction.

In the position shown in Fig. 5, lever 18 is in the position A—A, and the holding member 3 is in inoperative lifted position. In this position piston 20 is urged to the left by the operating liquid contained in the cylinder 606 to engage the stop means 28. Since the drive member 6 moves normal to the axis of the cylinder 606, the connection between piston 20, and ribs 601 and the forked portion 605 thereof, respectively, is rigid.

In the beginning of the movement of the drive member the movement of the holding member is comparatively fast in respect to the movement of the plunger member which is caused by the particular arrangement of the respective operating lever systems. After the drive member 6 has moved for a predetermined distance turning the short toggle lever 14 about the shaft 12, the toggle levers 14 and 11 are in an almost aligned position as shown in Fig. 6, corresponding to an operating clamping position of the holding member. When the toggle levers reach this position, the projection 25 of the toggle lever 12 abuts against the stationary abutment means 26. The lever 18 is now in the position B—B, and the toggle levers 14 and 11 and the holding member 3 are blocked. In this position the blank is clamped down by the holding member.

The drive member continues its movement and the plunger member is actuated by toggle levers 58 and 55 to carry out the stamping operation. While the drive member 6 continues its movement the lever 18 is pivoted about the pin 19 and arrives at the position C—C as shown in Fig. 6 in broken lines. The end of lever 18 which is pivoted to the piston 20, moves along a circle so that the piston 20 moves a distance *a* in the cylinder 606. Consequently, a free space must be provided between the end of the piston and the bottom of the cylinder, and the distance *b* must be greater than the distance *a*. The cylinder 606 either contains a compressible fluid or communicates through the port 32 with a container containing a compressible fluid such as compressed air. In this event an operating liquid is contained in the cylinder 606.

During further movement of the drive cylinder 6, the lever 18 turns further about the pivot pin 19 and the piston 20 returns to its initial position due to the action of the compressed fluid on the operating liquid contained in the cylinder 606. Shortly before the piston 20 arrives in the end position defined by the stop means 28 the lever 18 is in the position D—D and the movement of the drive member is terminated. When the drive member 6 moves downwardly the procedure is reversed, and first the plunger member 53 is moved upwardly while the piston 20 performs its reciprocating movement, whereupon the toggle lever system 11—14 is actuated to lift the holding member 3.

Figs. 8 to 13 illustrate a press according to the present invention in which the plunger member is driven by crank means. On the upper part of the supporting frame of the press 17 a motor 71 is mounted driving a shaft 73 by a belt 72 and a pulley 74. Pinions 75 are arranged at the ends of shaft 73. Two gears 76 each meshing with one of the pinions 75 are fixedly connected to pinions 77 which mesh with the main gears 78 arranged at the

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ends of the crank shaft 89. The driving means 71 to 77 are schematically indicated in broken lines in Fig. 8.

Crank shaft 79, rotatably mounted on the supporting frame of the press, drives a connecting rod 82 which is pivoted to the plunger 83. Fig. 8 shows the crank in the upper dead center position, while for the sake of clarity the crank is shown in Fig. 10 in a horizontal position. The holding member 85 is provided with a wide passage permitting the plunger member and the die to pass therethrough. The plunger member 83 is guided on guiding means 84 inside the holding member, while the holding member 85 is slidably guided on guiding means 86 on the supporting frame of the machine. The holding member 85 is actuated by the plunger member 83 through four symmetrically arranged lever systems. Since the four lever systems are identical, only one will be described hereafter.

A shaft 87, rotatably mounted in the supporting frame of the press, is connected on one hand with the plunger member by means of two pivoted levers 88 and 89, and on the other hand with the holding member 85 by means of a pair of toggle levers 90 and 91. On each shaft 87 two such lever systems are arranged. The plunger member 83 is provided on its upper part with two forked portions 92. A transversal bore 93 passes through the entire width of the plunger member ending on both sides thereof in forked end portions 92, as clearly shown in Figs. 9 and 11. Two pistons 94 are coaxially arranged in the bore 93, and outwardly urged by a spring 95. Fig. 13 shows the construction of the pistons 94 in greater detail. Each piston 94 is provided at the outer end thereof with a forked portion 96 abutting in the extreme outer position of the piston 94 against stops 97 which are secured to forked portion 92 of the plunger member 83. In the interior of the bore 93 the spring 95 is arranged and urges the pistons 94 towards the stops 97. Since the bore 93 constitutes a cylinder for the pistons 94, a passage 104 clearly shown in Fig. 11, is provided to permit air to enter and leave the interior of the cylinder 93. On each piston 94 the lever 89 is pivoted on a pin 98 which is mounted in the forked portion 96. A pin 99 connects the lever 89 with the lever 88. Lever 88 is fixedly mounted on the shaft 87. One end of lever 88 is provided with an abutting portion 100 which abuts against abutment means 101 on the supporting frame of the press after shaft 87 has been turned through a predetermined angle. Besides the lever 88, the short toggle lever 90 is fixedly mounted on shaft 87 and pivoted by a pin 102 to the longer toggle lever 91. Consequently, the lever 88 and the lever 90 constitute a second toggle lever cooperating with the first toggle lever 91, and with the third lever 89. The other end of toggle lever 91 is pivoted by pin 103 to an adjustable sliding member which is mounted in the holding member 85.

The operating arrangement according to the embodiment shown in Figs. 8 to 10 operates as follows:

In Fig. 11 the plunger member 83 and the holding member 85 are assumed to be in their uppermost position. In such position the lever 89 is in the position A—A and the piston 94 is urged by spring 95 to its outermost position abutting on the stop means 97. When the plunger member 83 is moved downwardly within the holding member 85 along the guide means 84, the lever 89 turns the lever 88 which is pivoted thereto about the axis of the stationary shaft 87, turning shaft 87 for a predetermined angle. Thereby the short lever 90 which is fixedly connected to the shaft 87 is turned through the same angle so that the first toggle lever 91 and the second toggle lever 90, 88 are pivoted from an angular position towards an aligned position causing downward movement of the holding member 85 since point 103 is farther spaced from shaft 87 when the toggle levers are substantially aligned. When the toggle levers are in almost aligned position the abutting portion 100 of the lever 88 engages the abutment means 101 on the machine frame in the position B—B of

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Fig. 12. Since shaft 87 is thereby arrested, the toggle levers 90 and 91 remain immovable during further movement of the plunger member, keeping the holding member 85 in its lowermost operative position adapted for holding a blank while the plunger member continues its movement. When the plunger member 83 moves to position C—C the pistons 94 are pressed inwardly against the action of spring 95 for a distance a , while during further movement of the plunger member the pistons 94 move again outwardly until they engage the respective stop means 97. In contrast to the embodiment shown in Figs. 1 to 7, the drive member of the embodiment shown in Figs. 8 to 13, which is constituted by the plunger member, moves in the same direction as the holding member.

In the embodiment illustrated in Figs. 8 to 13 one spring 95 is provided for two oppositely arranged pistons 94. Even if the cylinders 96 are supplied with an operative liquid under pressure and pistons 94 are operated hydraulically, a spring may be provided in each cylinder to urge the piston outwardly in the event that a disturbance in the supply of operating liquid occurs. In the embodiment shown in Figs. 1 to 6 such spring may be provided in each cylinder.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of operating lever arrangements differing from the types described above.

While the invention has been illustrated and described as embodied in an operating toggle lever arrangement for a stamping press permitting movement of the plunger member while the holding member is arrested, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In an apparatus of the type described, in combination, a supporting frame; a movable member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable member; a second toggle lever pivotally mounted on said supporting frame turnable about a stationary axis, said second toggle lever being pivotally connected at a point spaced from said stationary axis to the other end of said first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member reciprocally mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to said second toggle lever at a point spaced from said stationary axis and being operative to rotate said second toggle lever about said stationary axis; resiliently yielding connecting means mounted on said drive member and pivotally connecting the same with the other end of said third lever so that movement of said drive member moves said first and said second toggle levers from said first position to said second position; and abutment means fixedly secured to said supporting frame and engaging and holding one of said toggle levers when said toggle

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levers are in said second position so that further movement of said drive member requires and effects yielding of said connecting means.

2. In an apparatus of the type described, in combination, a supporting frame; a movable member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable member; a second toggle lever pivotally mounted on said supporting frame turnable about a stationary axis, said second toggle lever being pivotally connected at a point spaced from said stationary axis to the other end of said first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member reciprocally mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to said second toggle lever at a point spaced from said stationary axis and being operative to rotate said second toggle lever about said stationary axis; connecting means slidably mounted on said drive member and pivotally connecting the same with the other end of said third lever so that movement of said drive member moves said first and said second toggle levers from said first position to said second position; resilient means urging said connecting means in one direction; and abutment means fixedly secured to said supporting frame and engaging and holding one of said toggle levers when said toggle levers are in said second position so that further movement of said drive member requires and effects yielding of said connecting means.

3. In an apparatus of the type described, in combination, a supporting frame; a movable member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable member; a second toggle lever pivotally mounted on said supporting frame turnable about a stationary axis, said second toggle lever being pivotally connected at a point spaced from said stationary axis to the other end of said first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member reciprocally mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to said second toggle lever at a point spaced from said stationary axis and being operative to rotate said second toggle lever about said stationary axis; connecting means slidably mounted on said drive member and pivotally connecting the same with the other end of said third lever so that movement of said drive member moves said first and said second toggle levers from said first position to said second position; spring means urging said connecting means in one direction; and abutment means fixedly secured to said supporting frame and engaging and holding one of said toggle levers when said toggle levers are in said second position so that further movement of said drive member requires and effects yielding of said connecting means.

4. In an apparatus of the type described, in combination, a supporting frame; a movable member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable member; a second toggle lever pivotally mounted on said supporting frame turnable about a stationary axis, said second toggle lever being pivotally connected at a point spaced from said stationary axis to the other end of said

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first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member reciprocally mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to said second toggle lever at a point spaced from said stationary axis and being operative to rotate said second toggle lever about said stationary axis; a cylinder fixedly mounted on said drive member; a piston reciprocally mounted in said cylinder and pivotally connected with the other end of said third lever so that movement of said drive member moves said first and second toggle levers from said first position to said second position; a container communicating with said cylinder so that a compressed fluid contained in said container urges said piston in one direction; and abutment means fixedly secured to said supporting frame and engaging and holding one of said toggle levers when said toggle levers are in said second position so that further movement of said drive member requires and effects yielding of said piston.

5. In a press, in combination, a supporting frame; a movable blank holding member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable blank holding member; a second toggle lever pivotally mounted intermediate its ends on said supporting frame turnable about a stationary axis, one end of said second toggle lever being pivotally connected to the other end of said first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a hydraulically operated drive member reciprocally mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to the other end of said second toggle lever and operative to rotate said second toggle lever about said stationary axis; a cylinder fixedly mounted on said drive member; a piston reciprocally mounted in said cylinder and pivotally connected with the other end of said third lever so that movement of said drive member moves said first and said second toggle levers from said first position to said second position; a container communicating with said cylinder so that a compressed fluid contained in said container urges a portion of said operating liquid contained in said cylinder and thereby said piston in one direction; and abutment means fixedly secured to said supporting frame and blocking said movable member and said toggle levers when said toggle levers are in said second position so that further movement of said drive member requires and effects yielding of said piston.

6. In an apparatus of the type described, in combination, a supporting frame; a movable member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable member; a second toggle lever pivotally mounted on said supporting frame turnable about a stationary axis, said second toggle lever being pivotally connected at a point spaced from said stationary axis to the other end of said first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member reciprocally

mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to said second toggle lever at a point spaced from said stationary axis and being operative to rotate said second toggle lever about said stationary axis; a cylinder mounted on said drive member and having an axis normal to said direction of movement of said holding member and to said pivoting axes of said toggle lever means; a piston reciprocally mounted in said cylinder and pivotally connected with the other end of said third lever so that said drive member, when moving, pivots said first and said second toggle levers from said first position to said second position while said piston remains immovably in said cylinder; abutment means fixedly secured to said supporting frame and blocking movement of said toggle lever means and of said holding member when said toggle lever means are in said second position so that further movement of said drive member effects movement of said piston in said cylinder; resilient means urging said piston and said third lever toward said abutment means; and stop means on one end of said cylinder holding said piston in an end position against the action of said resilient means.

7. In an apparatus of the type described, in combination; a supporting frame; a movable member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable member; a second toggle lever pivotally mounted on said supporting frame turnable about a stationary axis, said second toggle lever being pivotally connected at a point spaced from said stationary axis to the other end of said first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member reciprocally mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to said second toggle lever at a point spaced from said stationary axis and being operative to rotate said second toggle lever about said stationary axis; a cylinder mounted on said drive member and having an axis normal to said direction of movement of said holding member and to said pivoting axes of said toggle levers; a piston reciprocally mounted in said cylinder and pivotally connected with the other end of said third lever so that said drive member, when moving pivots said first and said second toggle levers from said first position to said second position while said piston remains immovably in said cylinder; abutment means fixedly secured to said supporting frame and engaging said toggle levers blocking further movement of the same and of said holding member when said toggle lever means are in said second position, said one end of said third lever being located forwardly in the direction of movement in respect to the other end thereof when said abutment means engages said toggle levers so that further movement of said drive member effects reciprocation of said piston in said cylinder; resilient means urging said piston and said third lever toward said abutment means; and stop means on one end of said cylinder holding said piston in an end position against the action of said resilient means.

8. In a press, in combination, a supporting frame; a reciprocable blank holding member slidably guided in said supporting frame movable in one direction; a first toggle lever connected at one end thereof to said blank holding member pivotable about an axis normal to the direction of movement of said blank holding member; a second toggle lever mounted at one end thereof on said supporting frame pivotable about a stationary axis parallel to said axis, the other end of said second toggle lever

being pivoted to the other end of said first toggle lever for pivotal movement about an axis parallel to said axes, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a third lever pivotally connected at one end thereof to said other end of said second toggle lever and being operative to rotate said second toggle lever about said stationary axis; a drive member slidably mounted in said supporting frame reciprocally movable in said direction of movement of said holding member; a cylinder mounted on said drive member and having an axis normal to said direction of movement of said holding member and to said pivoting axes of said toggle levers; a piston reciprocally mounted in said cylinder and pivotally connected with the other end of said third lever so that said drive member, when moving pivots said first and said second toggle levers from said first position to said second position while said piston remains immovably in said cylinder; abutment means fixedly secured to said supporting frame and engaging said toggle levers blocking further movement of the same and of said holding member when said toggle lever means are in said second position, said one end of said third lever being located forwardly in the direction of movement in respect to the other end thereof when said abutment means engages said toggle levers so that further movement of said drive member effects reciprocation of said piston in said cylinder; resilient means urging said piston and said third lever toward said abutment means; and stop means on one end of said cylinder holding said piston in an end position against the action of said resilient means.

9. In an apparatus of the type described, in combination; a supporting frame; a movable member reciprocally mounted in said supporting frame; a first toggle lever pivotally connected at one end thereof to said movable member; a second toggle lever pivotally mounted on said supporting frame turnable about a stationary axis, said second toggle lever being pivotally connected at a point spaced from said stationary axis to the other end of said first toggle lever, said first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member reciprocally mounted in said supporting frame movable in a plane extending normal to the pivoting axes of said toggle levers; a third lever pivotally connected at one end thereof to said second toggle lever at a point spaced from said stationary axis and being operative to rotate said second toggle lever about said stationary axis; resiliently yielding connecting means mounted on said drive member and connecting the same with the other end of said third lever so that movement of said drive member moves said first and second toggle levers from said first position to said second position; and abutment means blocking turning of said toggle levers relative to each other beyond said second position so that further movement of said drive member requires and effects yielding of said connecting means.

10. An operating arrangement as claimed in claim 1 and including another first toggle lever; another second toggle lever; another third lever; another connecting means; and another abutment means, all cooperating in the same manner as the corresponding elements claimed in claim 1 and arranged symmetrically to the same with respect to the plane of symmetry of said movable member extending in the direction of movement thereof.

11. An operating arrangement as claimed in claim 7 and including another first toggle lever; another second

toggle lever; another third lever; another piston reciprocally mounted in said cylinder; and another stop means on the other end of said cylinder, all cooperating in the same manner as the corresponding elements claimed in claim 7 and arranged symmetrically to the same with respect to a plane of symmetry of said holding member extending in the direction of movement thereof, said resilient means being arranged in said cylinder between said piston and said other piston urging said two pistons apart.

12. In a press, in combination, a supporting frame; a reciprocable holding member slidably guided in said supporting frame movable in one direction and in operative position adapted to clamp down a workpiece; two parallel shafts mounted in said supporting frame and extending normal to the direction of movement of said holding member on either side of the same; four first toggle levers, each connected at one end thereof to said holding member pivotally about an axis extending parallel to said shafts; two pairs of second toggle levers, each pair of second toggle levers pivotally mounted intermediate the ends thereof on one of said parallel shafts, one end of each of said second toggle levers and the other end of each of said first toggle levers being connected pivotally about an axis extending parallel to said axis, each set of associated first and second toggle levers being turnable relative to each other between a first position in which said one end of said first toggle lever is spaced from said stationary axis of said second toggle lever a shorter distance, and a second position in which said one end of said first toggle lever is spaced from said stationary axis a greater distance; a drive member slidably mounted in said supporting frame reciprocable in said direction of movement of said blank holding member, two of said first and second toggle levers being located on one side of said drive member, and the other two of said first and second toggle levers being located on the other side of the same; four third levers, each

third lever pivotally connected at one end thereof to the other end of one of said second levers and being operative to rotate the same about the associated shaft; four cylinders mounted on said drive member, two of said cylinders being located on each side of said drive member, each of said cylinders having an axis normal to said direction of movement of said holding member and to said pivoting axes of said levers; four pistons, each piston reciprocally mounted in one of said cylinders and pivotally connected with the other end of one of said third levers so that said drive member, when moving, pivots said first and second toggle levers from said first position to said second position while said pistons remain immovably in said cylinders; four abutment means, each abutment means fixedly secured to said supporting frame and engaging one of said sets of associated first and second toggle levers blocking further movement of the same and of said holding member when said toggle levers are in said second position, said one end of each of said third levers being located forwardly in the direction of movement in respect to the other end thereof when said abutment means engage said toggle levers so that further movement of said drive member effects movement of said pistons in said cylinders; resilient means located in each of said cylinders and urging the respective piston and the third lever associated therewith towards the associated abutment means; and stop means on one end of each of said cylinders holding the piston associated with the same in an end position against the action of the resilient means associated therewith.

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