

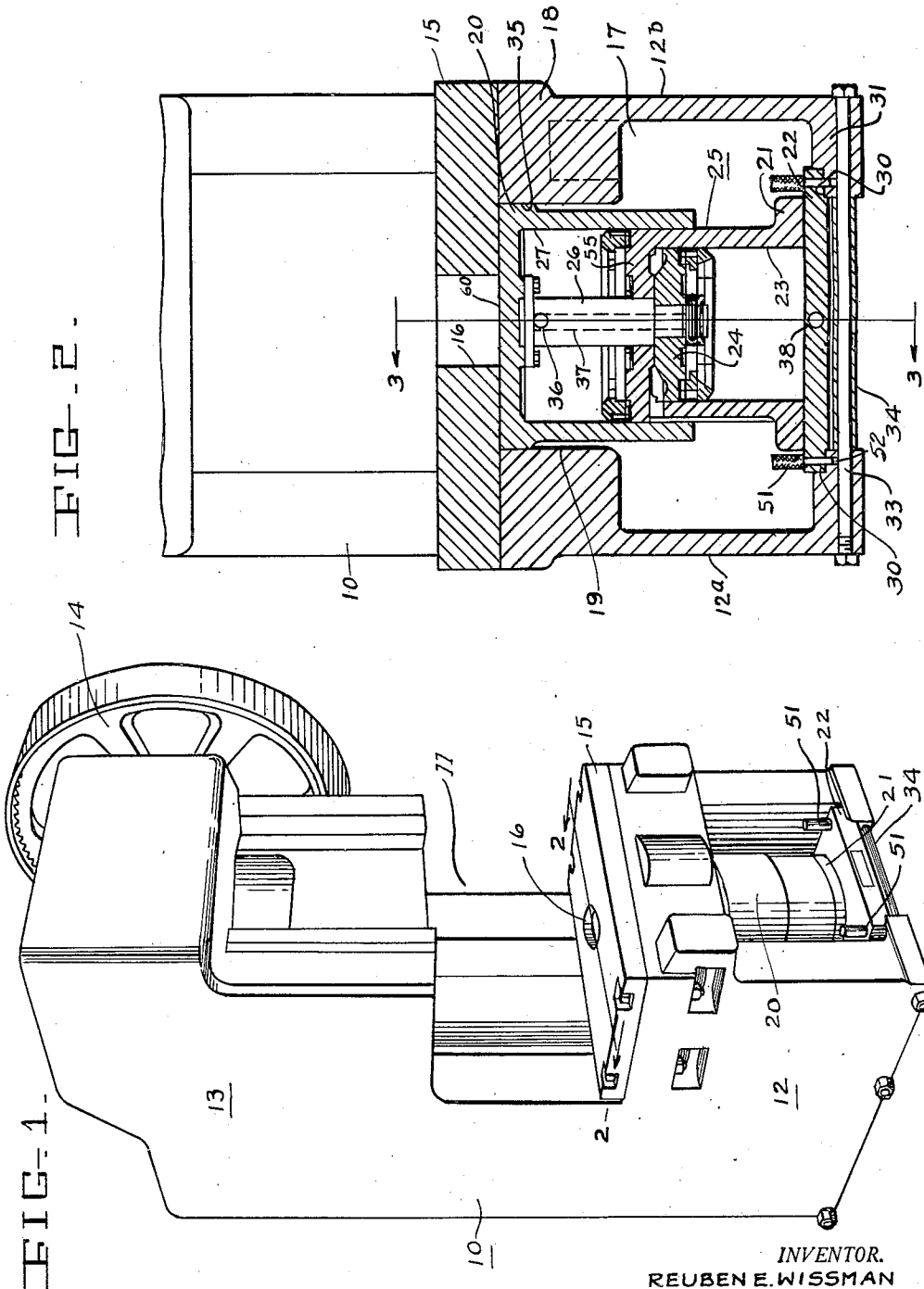
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R. E. WISSMAN
SLIDING DIE CUSHION

2,488,047

Filed May 21, 1945

2 Sheets-Sheet 1



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FIG. 3

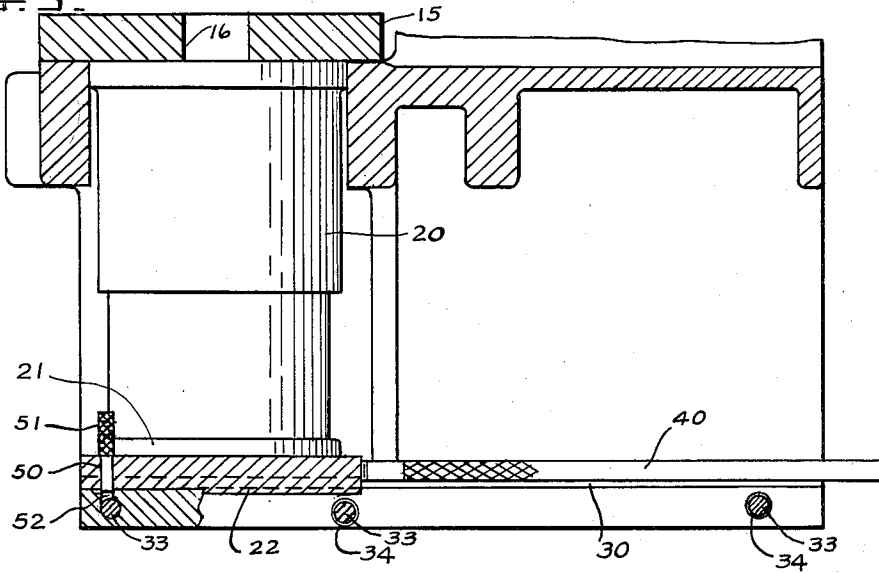
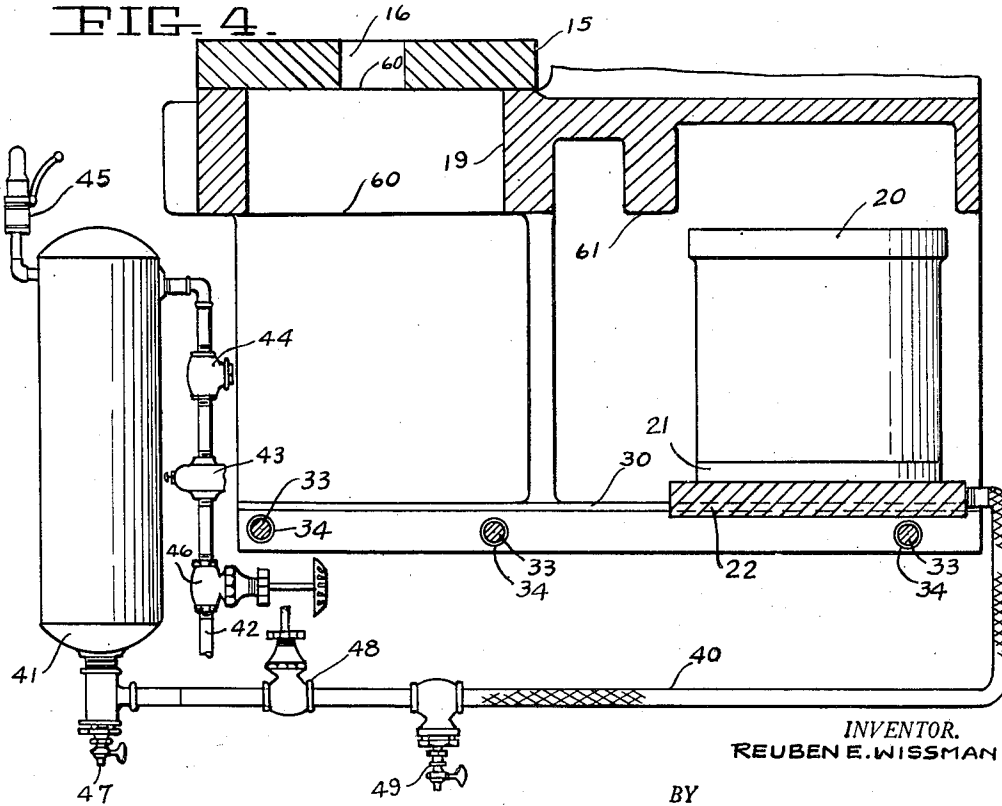


FIG. 4.



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SLIDING DIE CUSHION

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This invention relates to forming and punching presses.

Forming and punching presses are adapted to accomplish many different kinds of work, and it is an object of the invention to provide a punching and forming press that is more versatile in the manner in which it can be used and which is adapted to accommodate various types of punching and forming die set-ups.

Also, many types of work to be performed on punching and forming presses require the use of a die cushion to support the work during the punching or forming operation. It has been heretofore a rather awkward procedure to secure a die cushion upon a punching or forming press for accomplishing a particular type of work, and then remove the die cushion after the work was complete and another type of work was desired to be accomplished upon the forming press.

When using punching and forming presses, it is at times desirable to use a solid bed for supporting conventional dies of a closed bottom-type for straight drawing operations. Other times it is desirable to have an opening in the bottom of the press to receive a work piece as it is being drawn through an open-bottom die, such, for example, as the deep drawings occasioned in shell cases. Also, in various punching operations it is desired that the punched work piece be permitted to drop through the bottom of the die into a receiving basket or receptacle, and on still other occasions, both in punching and drawing work, it is desirable that a die cushion be used for supporting a work piece being worked on by the press. To shift over from one type of work to another and particularly when shifting to a type of work requiring the use of a die cushion, considerable time and effort has heretofore been required to accommodate the conventional presses to the various types of work.

It is, therefore, an object of this invention to provide a punching and forming press that has a die cushion supported in the bed of the press in such a manner that it can be readily removed from association with a die or placed into association with a die without requiring complete removal of the die cushion from the press.

It is still another object of the invention to provide a punching and forming press with a die cushion movably positioned within the base of the press so that it can be easily placed in association with a die and elevated into operating position, and can be quickly removed out of association with the die and moved into a part of the bed of the press that it will no longer in-

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terfere with any operations desired upon a press that do not require the use of a die cushion.

It is still another object of the invention to provide a press in accordance with any of the foregoing objects wherein a die cushion is slidably movably positioned within the bed of the press so that the die cushion can be moved toward the front side of the press when it is to be put into operating association with a die, and can be slidably moved toward the rear of the press out of association with the die when the die cushion is not to be used in the work operation.

Still another object of the invention is to provide a press in accordance with any of the foregoing objects wherein the bed of the press is provided with a vertical bore that receives the movable part of the die cushion for guiding the same when the die cushion is in operative association with a die.

Further objects and advantages will become apparent from the drawings and the following description.

In the drawings:

Fig. 1 is a perspective elevational view of a press incorporating the die cushion of this invention therein.

Fig. 2 is a vertical cross-sectional view of the press illustrated in Fig. 1 taken substantially along line 2—2 of Fig. 1 showing the die cushion in operative position in the press.

Fig. 3 is a vertical cross-sectional view taken substantially along line 3—3 of Fig. 2, but showing the die cushion in elevation.

Fig. 4 is a vertical cross-sectional view of a press similar to that of Fig. 3, but showing the die cushion out of operating position and moved toward the rear of the press to provide a clear space in the forward part of the bed of the press.

The punching or forming press illustrated in Fig. 1 is of the general type known as a gap-type or C-type press that consists of a frame 10 having the daylight opening 11 that receives the dies and forms the working space of the press. The frame 10 of the press consists generally of the bed 12 and the head 13. The head 13 of the press carries the operating mechanism consisting of the usual movable platen that is driven either mechanically or hydraulically, and as illustrated in the present invention, the press is of the mechanical type having the platen thereof driven by the drive wheel 14 that is suitably connected through the conventional crank shaft and connecting rods with the platen of the press. The upper movable platen that is carried by the connecting rods of a mechanical press or the ram of

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a hydraulic press is adapted to carry the dies and functions for performing work during the downward stroke of the platen.

In so far as the operating mechanism for the platen of the press is concerned, any conventional apparatus may be used with the device of this invention, suitable controls being provided for the operating mechanism to produce either automatic or semi-automatic operation of the press.

The bed 12 of the press of this invention consists generally of the two side columns 12A and 12B that may be integral with the general frame 10 of the press. The bed 12 is adapted to receive a supporting plate or platen 15 upon which the lower die or forming punch is adapted to be secured. The supporting plate or platen 15 may be provided with one or more openings 16 therein through which suitable support columns may extend for engaging a die cushion located within the bed of the press, but it is understood that these openings 16 can be made in any suitable arrangement according to the type of work that is being done upon the press. Also, the opening 16 can be dispensed with and a solid supporting plate or platen 15 be placed in position of the platen illustrated in the drawings when it is not desired to use a die cushion in the work being performed, or in case it is not desired to use an open bottom die or that the punched pieces are not to be dropped through the bed of a press into a receptacle.

The two side columns 12A and 12B of the bed of the press provide a chamber 17 within the bed 12 of the press. The top wall 18 of the bed of the press is provided with a bored opening 19 that is adapted to receive the piston 20 of the die cushion device 25.

The die cushion 25 consists of a lower member 21 that is supported upon a base 22 and is suitably secured thereto by any conventional type of fastening means. The lower member 21 is provided with an internal bore 23 that receives a piston 24 for reciprocation therein.

The piston 24 is connected to the upper piston member 20 by means of the connecting column 26 so that movement of the piston 20 is concomitant with the piston 24. The piston 20 has an internal bore 27 that engages the outer periphery of the lower member 21 and is adapted to reciprocate thereon.

The die cushion 25 is positioned within the chamber 17 provided in the bed of the press and is located upon a pair of tracks 30 that are cut in the bottom wall 31 of the bed of the press that extends from the front to the rear of the press as illustrated in Figures 3 and 4. The supporting plate 22 of the die cushion 25 rests in the L shape tracks 30 so that the entire die cushion can slide from a position in the front of the bed of the press, as illustrated in Figure 3 to a position at the rear of the bed of the press as illustrated in Figure 4. The side columns 12A and 12B of the bed 12 of the press are tied together through the bottom wall 31 by means of the tie bolts 33 having the spacing tubes 34 thereon.

The upper piston 20 of the die cushion 25 is provided with a turned surface 35 on the upper end thereof that slides within the bore 19 provided in the upper wall 18 of the bed of the press, and thereby is guided in its reciprocal movement during operation thereof. The internal bore 27 of the upper piston 20 of the die cushion 25 is hydraulically connected with the internal bore 23 of the lower member 21 of the die cushion 25 by means of the transverse bore 36 and the vertical

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bore 37 provided in the connecting column 26. This arrangement thereby renders both chambers formed by the bores 23 and 27 effective as fluid chambers to receive fluid under pressure that may be compressed and/or discharged from the chambers during downward operative movement of the pistons 20 and 24 of the die cushion 25.

Fluid under pressure is supplied to the chambers formed by the bores 23 and 27 of the die cushion 25 through a port 38 opening into the chamber formed by the bore 23, this port 38 being connected to the source of fluid under pressure by means of the flexible conduit 40.

As illustrated in Figure 4, the conduit 40 may be connected to a supply tank 41 that is supplied with fluid under pressure from a supply line 42 through a pressure regulating valve 43 which regulates the maximum pressure applied in the tank 41. A check valve 44 may be provided to prevent pressure in the tank 41 being applied upon the pressure relief valve 43 during the down-operating stroke of the die cushion, but which permits flow of fluid into the tank 41 to cause the up-stroke of the die cushion. A pressure relief valve 45 may be connected to the tank 41 to exhaust pressure at a predetermined value, such as is produced when the die cushion 25 is operated on the down stroke thereof. A shut-off valve 46 may be provided in the supply line 42 to cut off the supply of fluid under pressure to the tank 41, and a bleed-off valve 47 may be provided for exhausting the tank 41 when the valve 46 is closed. Alternately, a shut-off valve 48 may be provided in the conduit 40 between the tank 41 and the die cushion 25 to shut-off the supply of fluid under pressure to the die cushion, and the bleed-off valve 49 may be provided between the valve 48 and the die cushion 25 to exhaust the chambers formed by the bores 23 and 27 in the die cushion 25.

The base plate 22 of the die cushion 25 is provided with a hole 50 at each forward corner thereof to receive a pin 51. The lower ends of the pins 51 extend into holes 52 provided in each forward corner of the bottom wall 31 of the press bed 12. The pins 51 thus locate the die cushion 25 in the forward part of the press bed 12 so that the upper cylinder 20 of the die cushion 25 will be in axial alignment with the opening 19 provided in the upper wall 18 of the press bed 12. With the die cushion 25 located in the forward part of the press bed 12 as illustrated in Figures 1, 2 and 3, and with the pins 51 in position to prevent movement of the die cushion 25 relative to the press bed 12 fluid under pressure can be supplied from the tank 41 to elevate the upper piston 20 relative to the lower member 21 of the die cushion 25 upon the entry of fluid under pressure into the chamber formed by the bore 23 in the lower member 21. The upper piston 20 will move upwardly until it is stopped either by engagement with the platen 15 or by engagement of the lower piston 24 with the top wall 55 of the lower member 21. With the die cushion 25 in position, as illustrated in Figure 2, the die cushion is ready for work so that when the upper movable platen of the press moves downwardly to form work pieces, the cushion pins that cooperate with supporting members in the dies may pass through the opening or openings 16 in the stationary plate or platen 15 to engage the upper piston 20 of the die cushion 25 to force the same downwardly against the fluid pressure within the die cushion. This operation of the die cushion is the same as conventional with any standard

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die cushions being manufactured. As long as work is being performed that requires the use of a die cushion, the die cushion 25, can remain in the position illustrated in Figures 1 to 3 and if work is being performed that does not require the use of a die cushion, and does not require that the work be pushed through an open bottom die, the die cushion can remain in the position illustrated in Figures 1 to 3.

However, if work is desired to be done that requires the use of an open bottom die, or in case of punching operations which require the work pieces to be forced out the bottom of the die, the die cushion 25 can be quickly and easily removed from the operating position shown in Figures 1 to 3 to a position in the rear part of the bed of the press that will place the die cushion completely out of the way for forming or punching operations.

This is accomplished by first exhausting the chambers formed by the bores 23 and 27 of the die cushion 25 so that the upper piston 20 will drop upon the lower member 21. When the upper piston 20 is in its complete downward position, the top wall 60 of the piston 20 is beneath any protrusion that extends downwardly from the upper wall of the press 18, such as the protrusion 61, and the piston 20 drops out of the bore 19 provided in the bed of the press. To exhaust the fluid under pressure from the die cushion 25, the shut-off valve 46 may be closed in the supply line 42 and the bleed-off valve 47 opened to thereby exhaust the die cushion 25 and the tank 41. However, if it is not desired to exhaust the tank 41, but only the die cushion 25, then the shut-off valve 48 can be closed and the bleed-off valve 49 can be opened to exhaust the die cushion 25. After the die cushion 25 is exhausted, it can then be slid upon the tracks 30 from the position in the forward part of the press bed as illustrated in Figure 3 to a position in the rear part of the press bed 12. In the latter position of the die cushion 25, it will be apparent that it is completely out of the way for any work that is desired to be performed through the opening 19 in the press bed 12, and that a suitable container could be placed in the front portion of the press bed to receive parts punched through dies carried on the platen 15.

The arrangement of the sliding die cushion provided in the bed of the press is such that the press can be more readily changed from a die cushion operation to other types of operations, and therefore make the press more versatile in its use when quick changeovers between various types of work is desired.

It will also be apparent that, if desired, the die cushion 25 could be held in the rear part of the bed of the press as illustrated in Figure 4 by means of pins, similar to pins 51, placed in suitable holes provided in the two rear corners of the supporting plate 22 for the die cushion 25, the pins being received in suitable holes provided in the lower wall 31 at the rear corners thereof for this purpose.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a press, the combination of, a press bed having an opening positioned beneath the force applying member of the press and substantially in alignment therewith, a die cushion having an extended operative position when fluid under pressure is supplied thereto and a collapsed inoperative position when fluid is exhausted there-

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from, said die cushion being disposed within the bed of the press, and guide track means in the bed of the press slidably supporting said die cushion to permit movement thereof into alignment with said opening when said die cushion is placed in extended operative position and out of alignment with said opening when said die cushion is placed in collapsed inoperative position.

2. In a press, the combination of a press bed having a front and rear portion, said front portion having an opening positioned below the movable platen of the press, a collapsible die cushion movably supported in said bed and means for positioning said die cushion in the front portion of said bed so that it is in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be movable to the rear portion of said bed.

3. In a press, the combination of a press bed having front and rear portions, said front portion having an opening positioned below the movable platen of the press, a collapsible die cushion slidably supported in said bed and means for positioning said die cushion in the front portion of said bed in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be slidable to the rear portion of said bed.

4. In a press, the combination of a press bed having front and rear portions, said front portion having an opening positioned below the movable platen of the press, a collapsible die cushion slidably supported in said bed and means for positioning said die cushion in the front portion of said bed in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be slidable to the rear portion of said bed, said opening forming guide means for said die cushion in its extended position.

5. In a press, the combination of a press bed having front and rear portions, said front portion having an opening positioned below the movable platen of the press, a collapsible die cushion slidably supported in said bed and means for positioning and securing said die cushion in the front portion of said bed in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be slidable to the rear portion of said bed upon releasing and securing means.

6. In a press, the combination of a press bed having front and rear portions, said front portion having an opening positioned below the movable platen of the press, a collapsible die cushion movably supported in said bed and means for positioning and securing said die cushion in the front portion of said bed in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be movable to the rear portion of said bed upon releasing said securing means, said opening forming guide means for said die cushion in its extended position.

7. In a press, the combination of a press bed having a front and rear portion, said front portion having an opening positioned below the movable platen of the press, means for movably supporting a collapsible die cushion in the bed of said press, and means for positioning said die cushion in said front portion in alignment with said opening when in its extended position, said die cushion in its collapsed position being so

dimensioned as to be movable to the rear portion of said bed.

8. In a press, the combination of a press bed having a front and rear portion, said front portion having an opening positioned below the movable platen of the press, guide track means for slidably supporting a collapsible die cushion in the bed of said press, and means for positioning said die cushion in said front portion in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be slidable to the rear portion of said bed.

9. In a press, the combination of a press bed having a front and rear portion, said front portion having an opening positioned below the movable platen of the press, guide track means for slidably supporting a collapsible die cushion in the bed of said press, and releasable securing means for positioning said die cushion in said front portion in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be slidable to the rear portion of said bed upon releasing said securing means.

10. In a press, the combination of a press bed having a front and rear portion, said front portion having an opening positioned below the movable platen of the press, guide track means for slidably supporting a collapsible die cushion in the bed of said press, fluid means for expanding said die cushion, and releasable securing means for positioning said die cushion in said front portion in alignment with said opening when in its extended position, said die cushion in its collapsed position being so dimensioned as to be slidable to the rear portion of said bed upon releasing said securing means.

11. In a press, the combination of a press bed having a front and rear portion, said front portion having an opening positioned below the movable platen of the press, guide track means

for slidably supporting a collapsible die cushion in the bed of said press, fluid means for expanding said die cushion, and releasable securing means for positioning said die cushion in said front portion in alignment with said opening when in its extended position, said opening forming guide means for reciprocally receiving said extended portion of said die cushion, said die cushion in its collapsed position being so dimensioned as to be slidable to the rear portion of said bed upon releasing said securing means.

12. In a press, the combination of a press bed having a front and rear portion, said front portion having an opening positioned below the movable platen of the press, guide track means for movably supporting a collapsible die cushion in the bed of said press, releasable securing means for positioning said die cushion in said front portion in alignment with said opening, fluid means for expanding said die cushion so that the extended portion of said die cushion is positioned in said opening, said opening forming guide means for reciprocally receiving said extended portion of said die cushion, said die cushion in its collapsed position being so dimensioned as to be movable to the rear portion of said bed upon releasing said securing means.

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