

[54] **FEED MECHANISM FOR PRESSES**

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[51] Int. Cl. **B65g 59/06**

[58] Field of Search **214/8.5 F, 1 BB**

[56] **References Cited**

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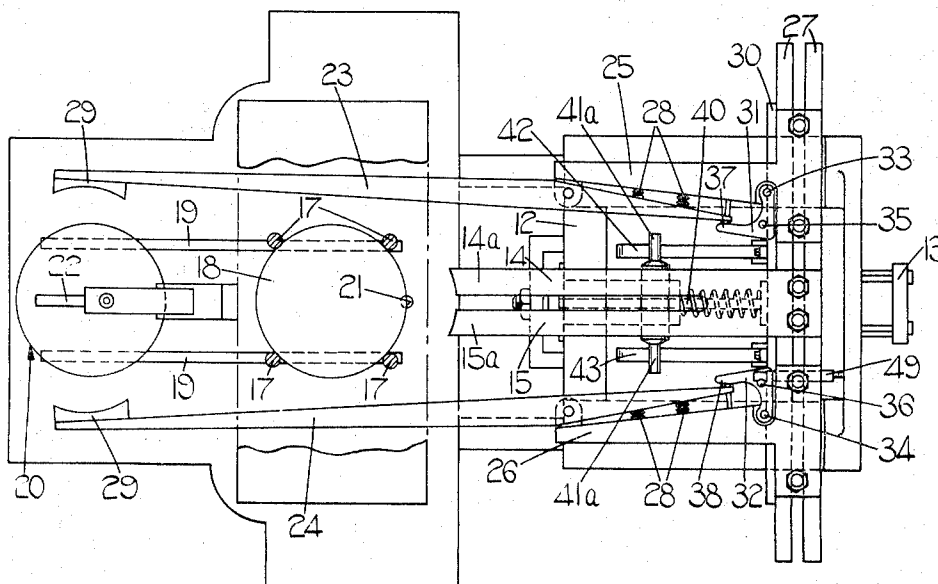
Attorney—Holman et al.

[57] **ABSTRACT**

A feed mechanism for feeding workpieces separately to

a press comprising a base and a reciprocable feeding assembly. The feeding assembly embodies pusher means arranged to engage the lowermost workpiece in a stack of workpieces situated in a hopper on the base so that on reciprocation of said assembly, the pusher means pushes said lowermost workpiece forwardly to an intermediate station on the base. The feeding assembly also includes a pair of calipers adapted at their leading ends to move between open and closed positions so that in the closed position a workpiece previously deposited at said intermediate station will be gripped by the calipers and moved forwardly to the press in which it is to be deposited. Means are provided to open the calipers when the feeding assembly is at the end of its forward stroke in order that the workpiece carried by the calipers will be dropped into the press. The feeding assembly then returns to its rearward position so that the calipers can again pick up from said intermediate station another workpiece deposited there by said pusher means on the previous stroke of the feeding assembly.

4 Claims, 7 Drawing Figures



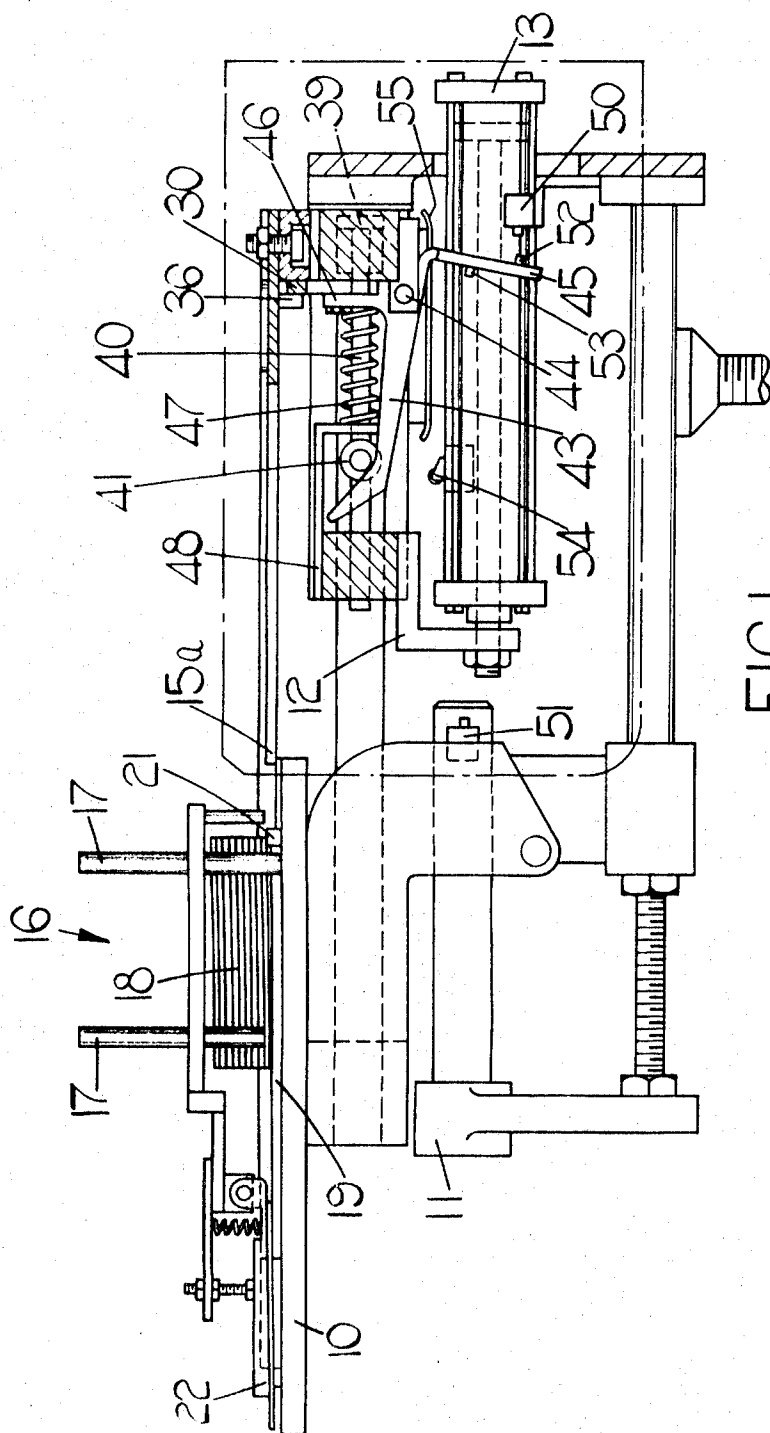
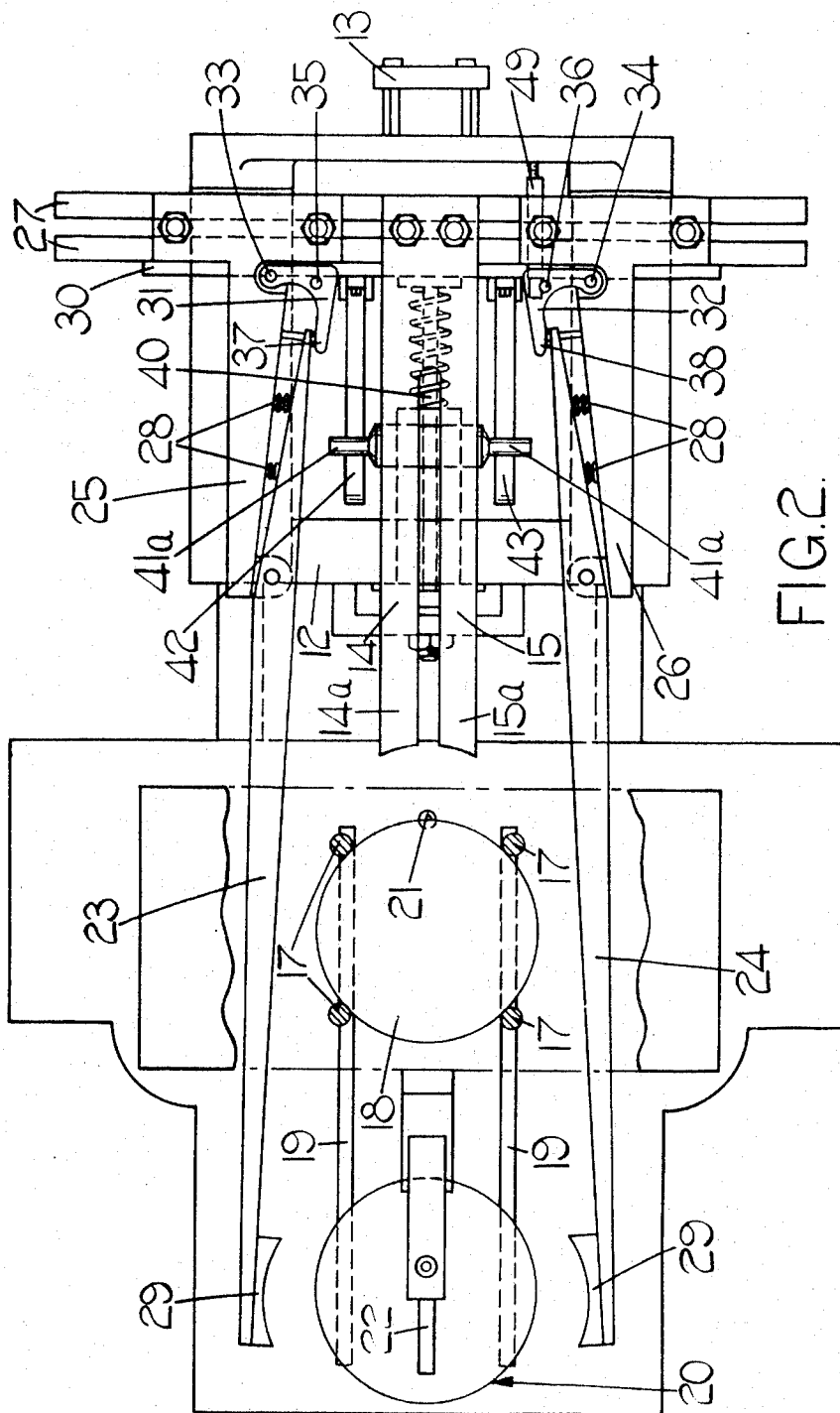


FIG. 1.



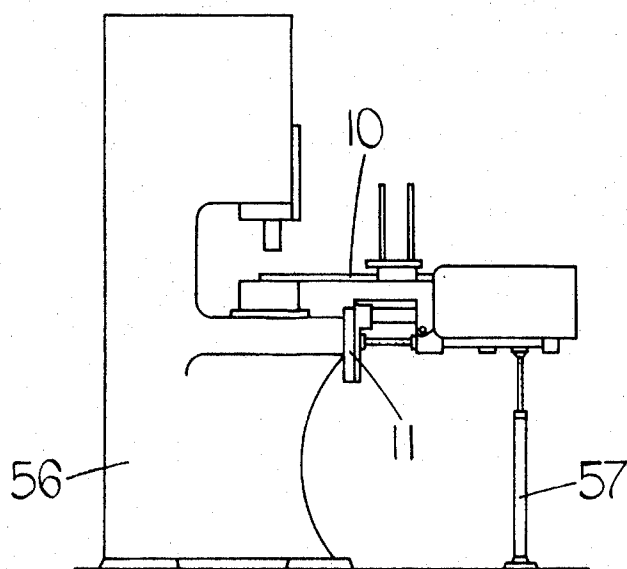


FIG. 3.

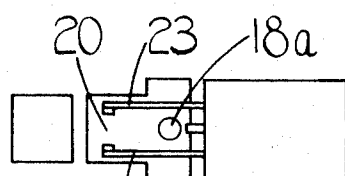


FIG. 4.

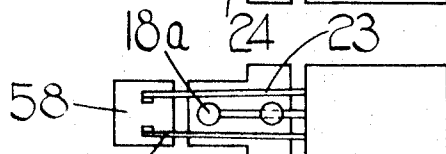


FIG. 5.

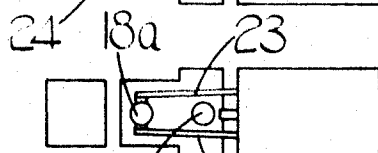


FIG. 6.

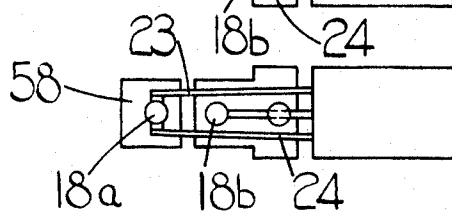


FIG. 7.

FEED MECHANISM FOR PRESSES

This invention relates to a feed mechanism for use in feeding a succession of separate workpieces to a power press or the like, the object of the invention being to provide such a mechanism in an improved form.

In accordance with the invention there is provided a feed mechanism for presses comprising a base and a reciprocable feeding assembly, said assembly embodying pusher means comprising a pair of fingers which are arranged so that they each extend in a direction generally parallel to said direction of reciprocation and which, on reciprocation of said assembly, engage the edge of the lowermost workpiece of a stack of workpieces which are disposed in use over said base so as to push said lowermost workpiece forwardly to an intermediate station on said base, there being provided on said base an upwardly extending projection which is disposed beneath a hopper adapted to hold said stack of workpieces and which is arranged in use to engage the underside of said lowermost workpiece at the rear thereof so as thereby to raise the rear of the workpiece relative to the front, said fingers being arranged so that their leading ends are separated to define a slot which receives said projection as the fingers are advanced, said feeding assembly also embodying a pair of calipers which each extend in a direction which is parallel or substantially parallel to the direction of reciprocation of said feeding assembly, means being provided to close the leading ends of said calipers to grip a workpiece previously deposited on the base at said intermediate station when said assembly is at the rearward end of its cycle whereby forward movement of the assembly from its rearward position will result in said calipers carrying the workpiece forwardly to the die or other tool in which it is to be deposited whilst said pusher means separates another workpiece from said stack to move said other workpiece to the intermediate station, further means being provided to open said calipers when the feeding assembly is at the forward end of its cycle in order to drop the workpiece carried by the calipers into the die or other tool.

The invention will now be more particularly described with reference to the accompanying drawings wherein

FIGS. 1 and 2 are respectively a part-sectional side view and plan view of one example of a feed mechanism in accordance with the invention,

FIG. 3 is a side view, on a smaller scale, showing the feed mechanism connected to a press which is to be fed, and

FIG. 4-7 are diagrammatic plan views illustrating the sequence of operation in a working cycle of the feed mechanism shown in FIGS. 1-3.

Referring to the drawings, the press feed mechanism shown therein is provided with a base or platform 10 mounted on a support 11 which can be attached to a press to which it is required to feed individual workpieces which may be in the form of flat blanks or which may be in the form of partly raised components. Said base and its support are connected together whereby the position of the base can be adjusted as required and when in use the upper surface of said base will be arranged at a vertical height which is level or just above the upper surface of a lower die mounted in the press and in which it is required to locate the workpiece.

The mechanism is also provided with a reciprocable feeding assembly 12 which is movable towards and away from the press by any convenient means such as pneumatic piston and cylinder unit 13. Said feeding assembly includes a pair of fingers 14 and 15 which may be integrally connected together at their rearward ends but which are arranged so that their leading ends 14a and 15a are free and separated from each other so that a gap or slot exists between the two fingers at least part way along their lengths from the leading end thereof. Furthermore, when the feeding assembly is in its rearward position the leading ends of said fingers will be spaced some distance rearwardly of a hopper 16 that is mounted in use above the rearward end of said base. It is incidentally to be noted that in the views shown in FIGS. 1 and 2 the workpieces will be fed in a direction from right to left and the terms "leading" and "rearward" are to be construed accordingly.

The hopper 16 is conveniently formed by a plurality of vertically extending pins 17 which serve to locate a stack of workpieces 18 which are to be fed and on the base is disposed a plurality of strips 19 which each extend in a direction generally parallel to the direction of reciprocation of said feeding assembly, each strip 19 extending from a position beneath said hopper 16 to a position adjacent to the forward end of the base, said latter position providing an intermediate station (indicated by reference numeral 20 in FIG. 2) as will be hereinafter described. Furthermore, each of said strips 19 is of tapered form in side elevation so that its thickness diminishes towards said intermediate station (see FIG. 1). In addition, intermediate said strips at a position between the rearward ends thereof is a short pin 21 which is arranged to pass down the aforementioned gap between the leading ends 14a and 15a of said pair of fingers on the feeding assembly as the latter moves forward. The pin 21 engages the underside of the lowermost workpiece 18 in the hopper at the rear thereof so that said workpieces are slightly tilted with their rearward portions being slightly higher than their forward portions but the leading ends 14a and 15a of said fingers are arranged so that they will engage the rear-most edge of the lowermost workpiece without projecting above said workpiece whereby said workpiece can be separated from the stack of workpieces above it. Thus, when the reciprocable feeding assembly is moved by said piston and cylinder unit 13 from its rearward position towards the hopper the aforementioned distance between the leading ends 14a and 15a of the fingers and the hopper will enable said fingers to acquire sufficient momentum to ensure that the lowermost workpiece will be separated from the stack even though there be burrs or oil or grease on the workpieces which might otherwise cause the lowermost workpiece to stick. The tapered form of said strips 19 will also assist the separation of said lowermost workpiece. As previously explained the fingers 14 and 15 will carry the separated lowermost workpiece forwardly to the aforesaid intermediate station 20 at or adjacent to the forward end of the base 10 and will leave the workpiece in the intermediate station as the feeding assembly next returns rearwardly in its cycle of reciprocation. If desired, there may be arranged at said intermediate station a spring-loaded and adjustable arresting bar 22 which is disposed just above the base 10 and which is arranged to frictionally engage the upper surface of the workpiece as it arrives at the intermediate station in

order to ensure that the workpiece is stopped and retained in the correct position.

The feeding assembly also includes a pair of calipers 23 and 24 which extend along opposite sides of the mechanism so that each caliper extends in a direction substantially parallel to the direction of reciprocation of the feeding assembly. Said calipers are pivotably connected towards their rearward ends to cross-pieces 25 and 26 which can be laterally adjusted in guides 27 in order to vary the lateral setting of said calipers. Between the pivot of each caliper and its rearward end there is provided one or more springs 28 which act to push the rearward end of the caliper inwardly and therefore the forward end of the caliper outwardly. Thus said springs 28 act to move the forward end of the calipers to a relatively open position as shown in FIG. 2. The forward end of each caliper is adapted to receive a removable gripping piece 29 shaped to suit the contour of a workpiece which is to be gripped.

In addition there is provided means for closing the forward or leading ends of said calipers 23 and 24 when desired. Said means includes a laterally extending bar 30 which is mounted on the reciprocable assembly so as to be movable through a short distance in a direction generally parallel to the direction of reciprocation. For example said bar 30 may be provided with suitable downwardly extending legs which are connected to said assembly by means of pivots (not shown). There is also provided a pair of L-shaped levers 31 and 32 (see FIG. 2) which are each pivoted to said cross-pieces 25 and 26 at the ends of said levers indicated by reference numerals 33 and 34 respectively. Depending from each of said levers is a pin 35 or 36 which is arranged to engage the forward surface of said bar 30 and the other ends of said levers indicated by reference numerals 37 and 38 respectively are arranged to engage the inner surfaces of the rearward ends of the calipers 23 and 24. Thus, looking at FIG. 2 it will be understood that if the bar 30 is moved slightly to the left from the position shown in FIG. 2 then the pins 35 and 36 will be similarly moved forward to pivot the levers 31 and 32 on their pivots 33 and 34 thereby causing the ends 37 and 38 of said levers to engage the rearward ends of the calipers 23 and 24 and pivot said calipers so that the gripping pieces 29 will be moved towards each other to grip the workpiece previously deposited at the intermediate station 20, the springs 28 being compressed by such pivotal motion of the calipers.

For the purpose of removing said bar 30 to the left there is provided a further piston and cylinder unit 39 (see FIG. 1) and the piston rod 40 of this unit extends forwardly and is connected to a cross-piece 41 having end portions 41a and 41b which engage the upper surfaces of levers 42 and 43. Each of said levers 42 and 43 is pivoted about a horizontal axis which in the case of lever 43 is indicated by reference numeral 44 in FIG. 1 and furthermore each lever has a downwardly extending portion (indicated in the case of lever 43 by reference 45), together with an upwardly extending portion (indicated in the case of lever 43 by reference 46). There is also provided a coil spring 47 which surrounds the aforesaid piston rod 40 so as to engage at one end a part connected to the bar 30 and at the other end a bracket 48 through which the piston rod 40 can slide. The upwardly extending portions 46 of the levers 42 and 43 are connected as by means of bolts to said part connected to the bar 30. Furthermore as will be

seen from FIG. 1 the upper surfaces of the levers 42 and 43 at the leading ends thereof are inclined to the horizontal so that when the piston rod 40 carrying with it the cross-piece 42 is moved forwardly from the position shown in FIGS. 1 and 2 on actuation of the piston and cylinder unit 39 the ends 41a and 41b of said cross-piece will ride along said inclined portions of said levers 42 and 43 to depress the levers which in turn will have the effect of moving the portions 46 slightly forwardly thereby similarly carrying the bar 30 forwardly to engage the pins 35 and 36 and pivot the levers 31 and 32 as previously described.

The two units 13 and 39 are actuated by a pressurised fluid and are controlled by a series of valves which do not form part of the present invention. However, for sake of completeness there is indicated in FIG. 2 a valve 49 which travels with the aforesaid reciprocable assembly and which is connected to the supply of pressurised fluid such as compressed air, said valve 49 controlling the admission of pressurised fluid to the unit 39. Thus, when said assembly is in its rearmost position as indicated in FIG. 2 a part projecting from said valve 49 engages a suitable abutment or stop to set the valve in a condition in which air can be admitted to the unit 39. At the forward end of the stroke of the reciprocable assembly said valve 49 is engaged by another fixed abutment (not shown) which is arranged to exhaust fluid from the unit 39. There are also provided as shown in FIG. 1 further valves 50 and 51. The downwardly extending portion 45 of the lever 43 carries an abutment 52 which is adapted to engage the valve 50 when said lever 43 is pivoted consequent upon the piston rod 40 and cross-piece 41 moving forwardly. The valve 50 controls the admission of pressurised fluid to the piston and cylinder unit 30 to carry the reciprocable assembly forwardly. Thus, the unit 13 will not be actuated until the unit 39 has been actuated to pivot the lever 43 as aforesaid. In other words, the forward ends of the calipers 23 and 24 will be moved into their closed position to grip a component at the intermediate station 20 before the unit 13 is actuated to carry the reciprocable assembly forwardly.

At the forward end of the stroke of said assembly the valve 49 is actuated as previously explained to exhaust the unit 39. The spring 47 then returns the levers 42 and 43 to the positions indicated in FIG. 1 so that the bar 30 will be moved to its relatively rearward position thereby permitting the forward ends of the calipers to open under the influence of springs 28. The workpiece or component carried forward from the intermediate station 20 by the calipers will thus be deposited in the die of the press. During this movement of course another component or workpiece will have been separated from the bottom of the stack in the hopper 16 by the leading ends 14a and 15a of said fingers 14 and 15 to deposit said other workpiece in the intermediate station. Furthermore, the downwardly extending portion 45 of said lever 43 carries a further abutment 53 which is arranged, after the unit 39 has been exhausted (thereby causing the lever 43 to pivot to the position shown in FIG. 1) to engage said valve 51 which is itself arranged to admit pressurised fluid to the other end of the unit 13 thereby effecting return stroke of said reciprocable assembly.

There is also provided yet a further valve 54 which is engaged by a cam 55 so that when said cam 55 is clear of the valve 54 (in other words when the reciprocable assembly is in its rearmost position) the valve 54 is

cable assembly is at or near its rearmost position) the press to which the feeding mechanism is attached can be operated, said valve 54 being connected in a hydraulic or pneumatic circuit which controls the operation of said press.

FIG. 3 is a side view showing a feeding mechanism as above-described attached to a press 56, the mechanism being additionally supported by an adjustable stand 57. FIGS. 4-7 illustrate diagrammatically the various stages in the feeding cycle. Thus, in FIG. 4 there is initially no workpiece in the intermediate station indicated by reference numeral 20 whilst the reciprocable assembly is in its rearmost position. On the first forward stroke of said assembly, illustrated in FIG. 5, a workpiece 18a is carried forward from the hopper by the fingers to the intermediate station 20 whilst there is of course no workpiece to be carried forwardly by the calipers 23 and 24 into the die 58. In FIG. 5 said calipers 23 and 24 are shown in the closed position just before they are opened prior to the return stroke of the reciprocable assembly. In FIG. 6, said assembly has completed its return stroke and the calipers 23 and 24 have again closed after having been opened on the return journey of said assembly before the assembly is again ready to move forwardly. On the second forward stroke another workpiece 18b is separated from the hopper and carried forward to the intermediate station as seen in FIG. 7 whilst the previously separated workpiece 18a is carried forward by the calipers 23 and 24 into the die 58. The calipers will then open as previously described to deposit said workpiece 18a in the die prior to return movement of the assembly for picking up of the workpiece 18b and separation of yet a further workpiece from the hopper.

I claim:

1. A feed mechanism for presses comprising a base and a reciprocable feeding assembly, said assembly embodying pusher means comprising a pair of fingers which are arranged so that they each extend in a direction generally parallel to said direction of reciprocation and which, on reciprocation of said assembly, engage the edge of the lowermost workpiece of a stack of workpieces which are disposed in use over said base so as to push said lowermost workpiece forwardly to an

intermediate station on said base, there being provided on said base an upwardly extending projection which is disposed beneath a hopper adapted to hold said stack of workpieces and which is arranged in use to engage the underside of said lowermost workpiece at the rear thereof so as thereby to raise the rear of the workpiece relative to the front, said fingers being arranged so that their leading ends are separated to define a slot which receives said projections as the fingers are advanced, said feeding assembly also embodying a pair of calipers which each extend in a direction which is parallel or substantially parallel to the direction of reciprocation of said feeding assembly, means being provided to close the leading ends of said calipers to grip a workpiece previously deposited on the base at said intermediate station when said assembly is at the rearward end of its cycle whereby forward movement of the assembly from its rearward position will result in said calipers carrying the workpiece forwardly to the die or other tool in which it is to be deposited whilst said pusher means separates another workpiece from said stack to move said other workpiece to the intermediate station, further means being provided to open said calipers when the feeding assembly is at the forward end of its cycle in order to drop the workpiece carried by the calipers into the die or other tool.

2. A feed mechanism as claimed in claim 1 wherein the base is provided with a plurality of spaced parallel strips which serve as guides over which a workpiece engaged by said pusher means can slide, said strips each extending in said direction of reciprocation and each being tapered so as to be of diminishing thickness towards the intermediate station.

3. A feed mechanism as claimed in claim 1 wherein reciprocation of said assembly is effected by means of fluid pressure actuated piston and cylinder unit and wherein said means for closing the leading ends of said calipers embodies a further fluid pressure actuated piston and cylinder unit.

4. A feed mechanism as claimed in claim 1 wherein means are provided for variably spacing said pair of calipers in a direction at right angles to said direction of reciprocation.

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