

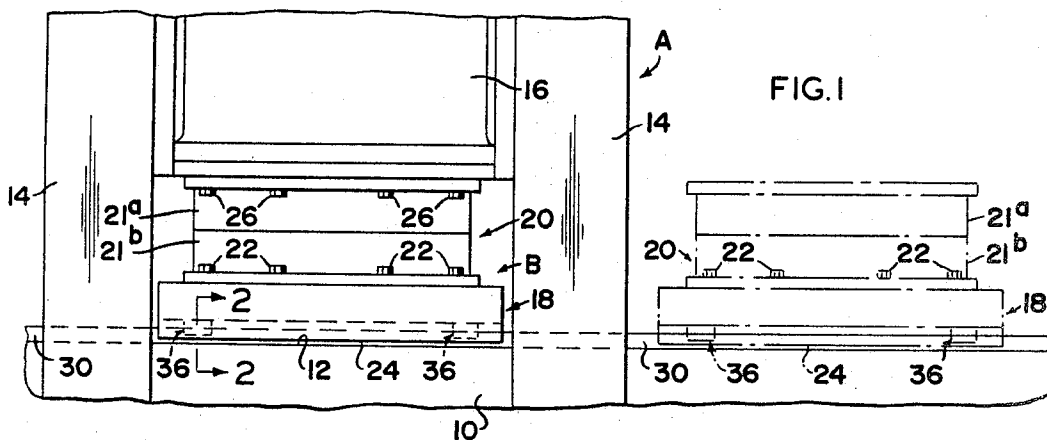
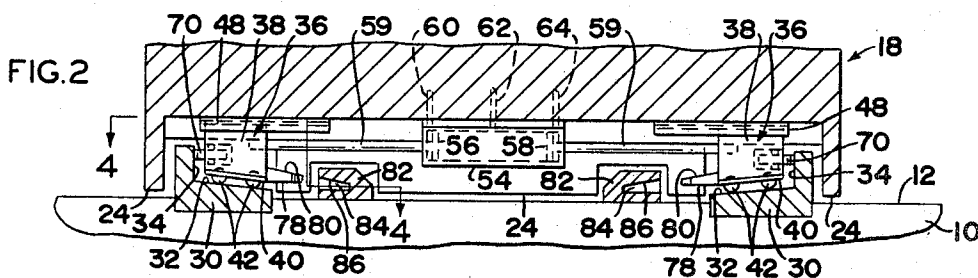
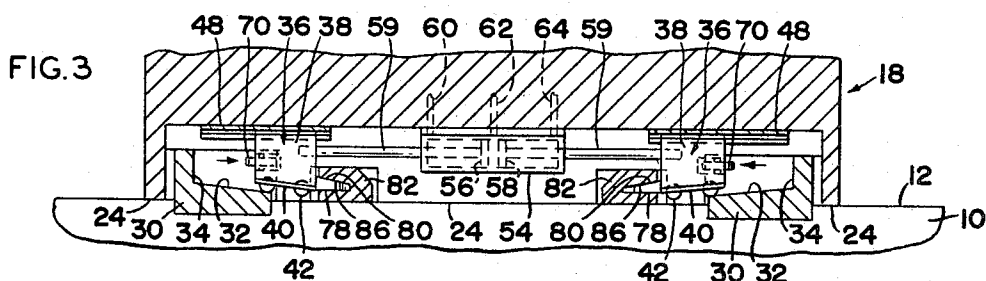
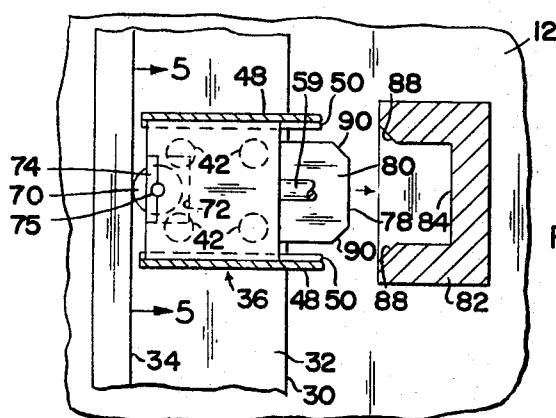
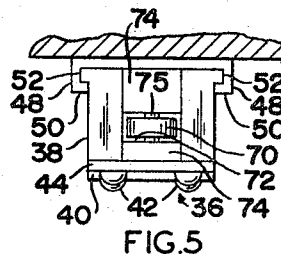
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MOVABLE PRESS BOLSTER

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3,422,661

MOVABLE PRESS BOLSTER

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ABSTRACT OF THE DISCLOSURE

A forming press including a die carrier movable from a first position outside the press to a second position within the press. Improved means are disclosed for guiding the carrier between the first and second positions and lowering it into engagement with the press bed in the second position. These means include track forming members defining at least two horizontally spaced, upwardly facing support surfaces extending in a first direction between the first and second positions. The support surfaces are downwardly inclined in opposite directions perpendicular to the first direction. At least two support members extend from the carrier into engagement with separate ones of the support surfaces; and, actuator means are provided for selectively moving each of the support members relative to the carrier and the support surfaces in a direction to move the support members down the incline of their respective support surfaces to thereby lower the lower surface of the carrier into engagement with the bed.

The present invention is directed to the press art and, more particularly, to an improved arrangement for simultaneously lowering and clamping a movable bolster or carrier into engagement with the bed of a press.

The invention is particularly suited for use in changing dies in metal working presses and will be described with particular reference thereto; however, the invention is capable of broader application and could be used wherever it is desired to lower a movable material carrier into engagement with a subjacent surface.

In the press art it is general practice to provide metal working presses with movable carrier or bolsters to facilitate die changing. Normally these carriers are arranged for guided movement from a first position outside the press to a second position in the press and beneath the ram. For this purpose a pair of tracks extend from within the press room into and across the press bed. The bolster or carrier is provided with wheels which support the bolster for movement into and out of the press on the tracks.

When it is desired to bring a die set into working position in the press the die set is positioned on the carrier while the carrier is outside the press. Normally, the lower die half is firmly bolted to the carrier and the upper die half is firmly bolted to the carrier and the upper die half positioned in mated relationship on the lower half. The carrier and die set is then rolled into the press and the carrier lowered to bring its bottom surface into engagement with the upwardly facing surface of the bed to relieve the load from the carrier wheels so that the carrier may remain in the press during subsequent press operation. Subsequent to the lowering of the carrier, the carrier is firmly clamped to the press bed and the press ram or slide lowered into engagement with the upper die half and bolted thereto. The press is then ready for normal operation.

In the past the carrier has been lowered into engagement with the press bed by providing lowerable sections of tracks within the press bed, or, by arranging the carrier wheels so that they may be selectively raised or lowered relative the carrier frame. Additional structure is usually provided to clamp the carrier to the press bed.

One of the major disadvantages of this prior art structure is the complexity of the mechanisms required. For example, in the type which uses lowerable track sections the press bed must be provided with air cylinders or other types of power actuators positioned in the bed. Additionally, clamping actuators are also required. This additional structure in the press bed takes up space which is otherwise required for housing die cushions, knockout cylinders, etc. The same type of problems are present in the wheel raising type of assemblies. Normally these assemblies utilize various eccentric or lever arrangements that tend to unduly complicate the bolster construction. Further, additional clamping mechanism must be built into the press bed.

The present invention overcomes these problems by providing a simplified bolster lowering arrangement which permits simultaneous lowering and clamping of the carrier by common carrier mounted actuators. Further, the invention can be readily applied to existing presses without any substantial modification of the press bed or other press structure.

In accordance with the present invention, a press of the general type described, is provided with improved means for guiding the carrier from a first position outside the press to a second position within the press with the lower surfaces of the carrier spaced above the bed and, while in the second position, selectively lowering the lower surface into engagement with the bed. The improved means include track forming members defining at least two horizontally spaced, upwardly facing support surfaces extending in a first direction between the first and second positions. The support surfaces are downwardly inclined in opposite directions perpendicular to the first direction. At least two support members extend from the carrier into engagement with separate ones of the support surfaces; and, actuator means are provided for selectively moving each of the support members relative to the carrier and the support surfaces in a direction to move the support members down the incline of their respective support surfaces to thereby lower the lower surface of the carrier into engagement with the bed.

Because the lowering of the carrier is accomplished by movement of the support members only, the system does not require track lowering mechanisms within the press bed. Further, because the movement of the support members is not vertical, complicated raising and lowering mechanisms are not required in the bolster such as must be used with the wheel raising type arrangements. Additionally, because the movement of the support members can be horizontal, clamping means can be readily provided for clamping the carrier to the press bed simultaneously with the lowering.

Accordingly, a primary object of the present invention is the provision of an improved carrier lowering arrangement especially suited for use in die changing in metal working presses.

A further object of the present invention is the provision of a carrier lowering arrangement which allows simultaneous lowering and clamping of the carrier.

A still further object is the provision of a carrier lowering arrangement wherein all movements of the lowering and clamping mechanisms are horizontal.

A still further object is the provision of a carrier lowering arrangement wherein the final locating of the position of the carrier takes place simultaneously with the lowering.

These and other objects and advantages will become apparent from the following description when read in conjunction with the accompanying drawings wherein:

FIGURE 1 is a partial side elevation, somewhat diagrammatic, of a metal working press provided with an improved carrier guiding and lowering mechanism con-

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structed in accordance with the preferred embodiment of the present invention;

FIGURES 2 and 3 are cross-sectional views taken on line 2—2 of FIGURE 1 and showing the carrier in its raised and lowered positions respectively;

FIGURE 4 is a cross-sectional view taken on line 4—4 of FIGURE 2; and,

FIGURE 5 is a cross-sectional view taken on line 5—5 of FIGURE 4.

Referring now to the drawings wherein the showings are for the purpose of illustrating preferred embodiment of the invention only and not for the purpose of limiting same, FIGURE 1 shows the overall arrangement of a metal working press A provided with an improved die carrier guiding and lowering arrangement B constructed according to the present invention.

The actual construction of press A is not important to the present invention; however, as shown in FIGURE 1, the press includes a bed 10 having an upwardly facing horizontal surface 12. A plurality of uprights 14 extend vertically upwardly from the bed and support the press ram or slide 16 for guided movement toward and away from the bed. Although only two uprights 14 have been shown it is to be understood that a second pair of uprights are positioned directly behind those shown in FIGURE 1 and spaced a distance therefrom sufficient to allow the carrier 18 to be moved from a first position outside the press (shown dotted) to a second position within the press and beneath the ram 16.

The arrangement thus far described is conventional and allows die sets to be readily changed. For example, when it is desired to install a die set in the press the carrier is moved to the position shown dotted in FIGURE 1. At this time a die set 20 comprised of upper and lower die halves 21a and 21b respectively, is positioned on the upwardly facing surface of the carrier and the lower die half 21b connected thereto such as by bolts 22. The carrier and die set is then rolled into the press to the position shown in solid lines in FIGURE 1. At this time, mechanism functions to lower the carrier to bring its lower surface 24 into engagement with the upwardly facing surface 12 of the press bed. With the carrier in engagement with the press bed, the ram is lowered down into engagement with the upper die half 21a. Die half 21a is then clamped or bolted such as by bolts 26 with the ram and the press is then ready for operation.

Of particular importance to the present invention is the arrangement of the guiding and lowering mechanism B. In the past, as previously discussed, these guiding and lowering systems have comprised conventional rails or tracks extending from outside the press into and across the press bed. The carriers were provided with wheels adapted to ride along the tracks for guided movement into and out of the press. In order to lower the carriers to the press bed, track sections within the bed were provided with means which allowed them to be selectively raised and lowered. Alternately, the carriers were provided with mechanism which permitted their wheels to be raised relative to the carrier frame to lower the carrier into engagement with the bed. According to the present invention these guiding and lowering functions are performed by an arrangement which eliminates the need for lowerable track sections or complicated wheel raising mechanisms. Additionally, the arrangement allows locating and clamping of the carrier to be accomplished simultaneously with its lowering.

According to the preferred embodiment of the invention these improved guiding and lowering means include a pair of horizontally spaced track forming members 30 which extend into and across the press bed. Track forming members 30 are arranged so as to have upwardly facing support surfaces 32 which extend horizontally into and across the press bed. As shown in FIGURE 2, the two support surfaces 32 are oppositely inclined in directions perpendicular to the path of movement of the car-

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rier. The track forming members 30 also define a pair of vertically extending surfaces 32 which extend throughout the path of movement of the carrier.

The means for supporting the carrier so that its lower surface 24 is spaced upwardly from the upper surface 12 of the bed during its movement into and out of the press comprise two pairs of vertically downwardly extending support members 36 mounted on the bottom of the carrier at opposite ends. Although FIGURE 2 shows the pair on the left end of the carrier (as viewed in FIGURE 1) it is to be understood that a second pair is mounted on the right end.

Support members 36 each include a generally wedge shaped body portion 38 having a lower surface 40 inclined in a direction corresponding to the inclination of its respective support surface 32. In order to permit the support members to move freely along its support surfaces 32, roller balls 42 are received in sockets formed in the lower surface 40 of the support members. Although four balls are shown on each support member, it is apparent that a single large ball or any number of smaller balls could equally well be utilized. The balls are retained in the sockets by a retainer plate 44 connected to the surface 40. Each of the retainer plates is formed so that openings through which the roller balls extend have a lower diameter slightly less than the diameter of the roller balls. Consequently, the balls are retained in the support member but are free to roll relative thereto.

Each of the support members 36 are mounted so as to be capable of moving horizontally relative to the carrier and the support surface 32 between a first position shown in FIGURE 2 and a second position shown in FIGURE 3. In order to permit the necessary movement of the members 36 they are mounted for sliding movement in guideway forming channel members 48. These guideway forming members 36 are positively connected to the undersurface of the bolster in any convenient manner so as to provide a rigid slideway for the support members. As best shown in FIGURE 5, each of the members 48 have downwardly extending sides which carry inwardly extending portions 50. The support members each have outwardly extending portions 52 which are engaged by portions 50 to retain the members in the slideway.

As is apparent, with the support members moved to the position shown in FIGURE 2 a carrier is supported so that its lower surface 24 is spaced upwardly a short distance above the upwardly facing surface 12 of the bed 10. The carrier is then free to move longitudinally along the track forming members so that it can be freely moved into and out of the press. However, when the support members are moved in a direction down the incline of the support surfaces 32, the carrier is lowered so that its lower surface 24 comes into engagement with surface 12 of the bed. The weight of the carrier and die set is then supported entirely by the bed. Consequently, during subsequent press operation all of the impact forces are transmitted directly through the carrier to the press bed and none are transmitted through the support members.

A variety of means could be utilized for selectively moving the support members between their first and second position; however, according to the preferred embodiment, the means utilized include a hydraulic cylinder 54 connected to the under surface of the carrier. Positioned within the cylinder and movable longitudinally relative thereto are a pair of pistons 56 and 58. Piston rods 59 are connected to each of the pistons and extend outwardly into engagement with separate ones of the support members. Three hydraulic lines 60, 62 and 64 are respectively connected to the left end, the center and right end of the cylinder. As is apparent, by supplying fluid under pressure through line 62 the pistons 56 and 58 are caused to move apart driving the support members to their outermost positions shown in FIGURE 2. However, when the fluid is supplied to lines 60 and 64

the pistons are moved inwardly pulling the support members down the incline of their respective support surfaces to lower the carrier into engagement with the press bed.

Any convenient source could be utilized to supply the necessary pressurized hydraulic fluid; however, a hydraulic pump and reservoir (not shown) is preferably mounted directly on the carrier. Further, any type of control system, either manual or automatic, could be utilized for controlling the supply of fluid to the hydraulic cylinder.

In order to provide additional lateral stability for the carrier when it is in the raised position, roller members 70 are mounted in the outer ends of the support members. As best shown in FIGURE 5 rollers 70 are positioned in opening 72 formed in the end of body 38. The rollers are retained in position by a pair of plates 74 connected to the end of body 36 and clamping the axles 75 of the rollers. Consequently, when the support members are in their outermost position as shown in FIGURE 2 the rollers 70 engage the vertically extending surfaces 34 of track forming members 30. In this manner the carriers is prevented from shifting transversely of the tracks.

Because all movements of the support members are horizontal, simultaneous locating and clamping of the carrier can be easily accomplished. As shown, each of the support members 36 are provided with a laterally inwardly extending wedge clamp member 78 having a downwardly inclined clamping surface 80. Positioned on the bed and rigidly connected thereto are second clamping members 82. Members 82 are provided with an inwardly extending opening 84 arranged to receive members 78. The upper surface 86 of each opening 84 is inclined in the same direction as surfaces 80 of the wedge clamp members 78. Consequently, as the support members move inwardly to lower the carrier the wedge clamps 78 enter the openings 84. The final inward movement of the members 78 cause engagement of surfaces 80 and 86 to firmly clamp the carrier to the press bed.

This arrangement also allows final locating of the carrier longitudinally of the track to be accomplished simultaneously with the lowering and clamping. For this purpose the outer end of clamp members 78 have vertically extending inclined surfaces 90. The outer sides of openings 84 are similarly inclined as shown at 88. Consequently, if the carrier is slightly out of position longitudinally of the track, as the support members are moved inwardly to lower the carrier one of the inclined surfaces 86 will engage the corresponding one of the inclined surfaces 88 to shift the bolster longitudinally to the final location.

The invention has been described in great detail sufficient to enable one of ordinary skill in the press art to make and use the same. Obviously, modifications and alterations of the preferred embodiment will occur to others upon a reading and understanding of the specification and it is my intention to include all such modifications and alterations as part of my invention insofar as they come within the scope of the appended claims.

Having thus described my invention, I claim:

1. In a press having a bed; a ram movable vertically toward and away from said bed; a carrier having upper and lower surfaces and movable from a first position outside said press to a second position within said press and beneath said ram; the improvement comprising: improved means for guiding said carrier between said first and second positions with said lower surface spaced above said bed and, while in said second position, selectively

lowering said lower surface into engagement with said bed; said means including: track forming members defining at least two horizontally spaced upwardly facing support surfaces extending in a first direction between said first and said second positions, said support surfaces being downwardly inclined in opposite directions perpendicular to said first direction; at least two support members extending from said carrier into engagement with separate one of said support surfaces; and, actuator means for selectively moving each of said support members relative to said carrier and said support surfaces in a direction to move said support members down the incline of their respective support surfaces to thereby lower said lower surface of said carrier into engagement with said bed.

2. The improvement as defined in claim 1 wherein said support members extend vertically downwardly and are arranged for horizontal movement.

3. The improvement as defined in claim 1 wherein each of said support members has a lower surface inclined in a direction corresponding to the incline of its respective support surface.

4. The improvement as defined in claim 1 including first clamp members movable with said support members and engageable with second clamp members carried by said bed.

5. The improvement as defined in claim 4 wherein said first clamp members are connected to said support members and are moved simultaneously therewith.

6. The improvement as defined in claim 1 including first clamp members carried by said support members and having locating means for positioning said carrier simultaneously with the movement of said support members.

7. Improvement as defined in claim 1 including a plurality of transversely extending wedge clamps simultaneously movable with said support members, and a plurality of wedge clamp receiving members positioned on said bed.

8. Apparatus comprising: track means defining at least two horizontally spaced elongated upwardly facing support surfaces extending in a first direction, each of said support surfaces being downwardly inclined in opposite directions perpendicular to said first direction; a carrier having an upwardly facing article carrying surface; support means extending from said carrier into engagement with said support surfaces for supporting said carrier for movement in said first direction with the article carrying surface at a first elevation, said support means including at least first and second members each in engagement with different ones of said support surfaces; and, means for selectively moving said members relative to said carrier in said second direction to vary the elevation of said article carrying surface.

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