March 5, 1968 E. A. MUNSCHAUER, JR 3,371,515

DIE LOADING APPARATUS FOR POWER PRESSES

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FIG. 1.

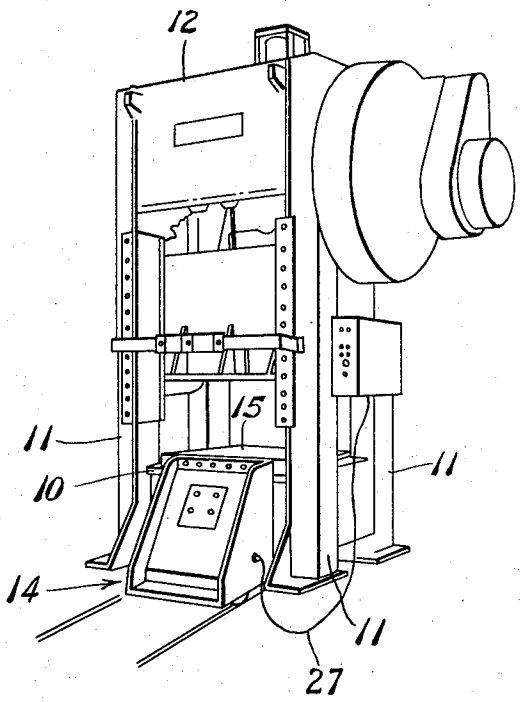
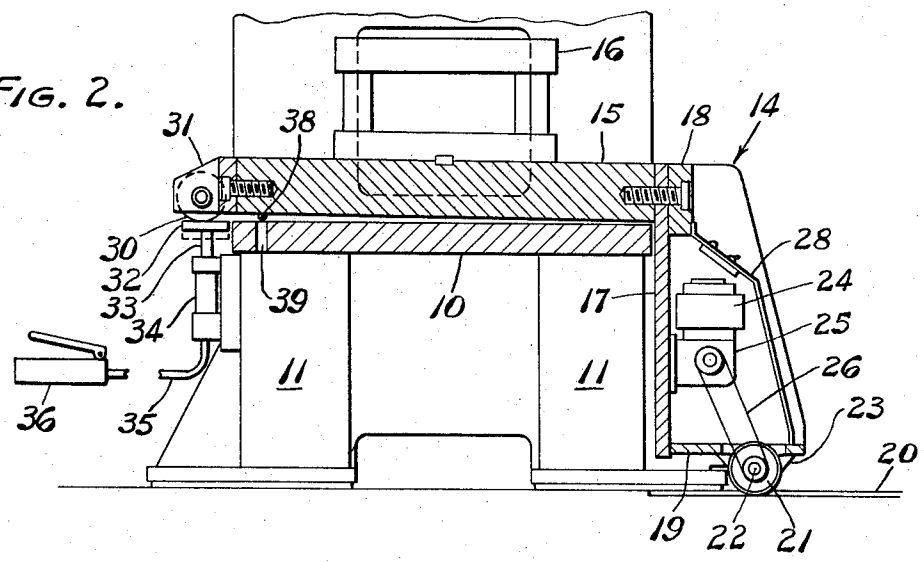



FIG. 2.




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FIG. 3.

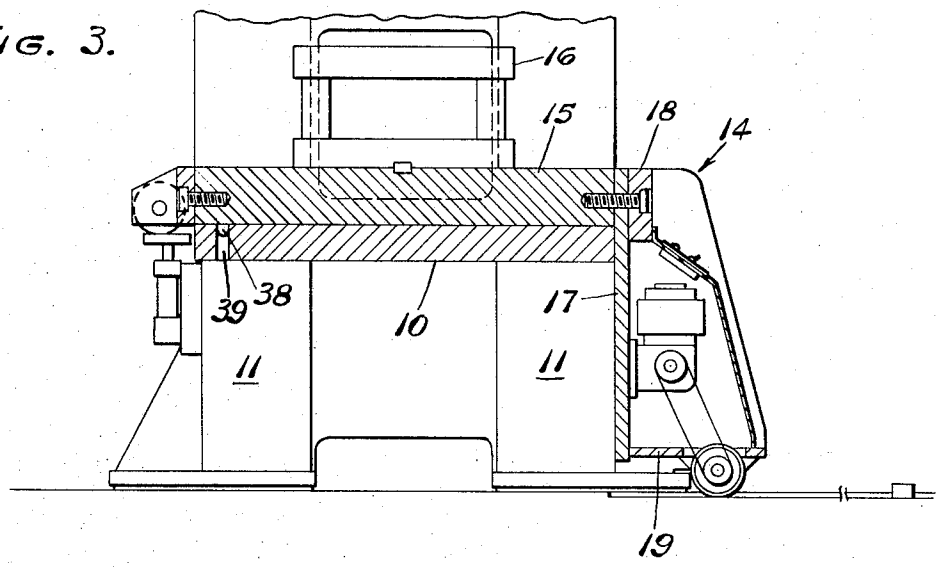
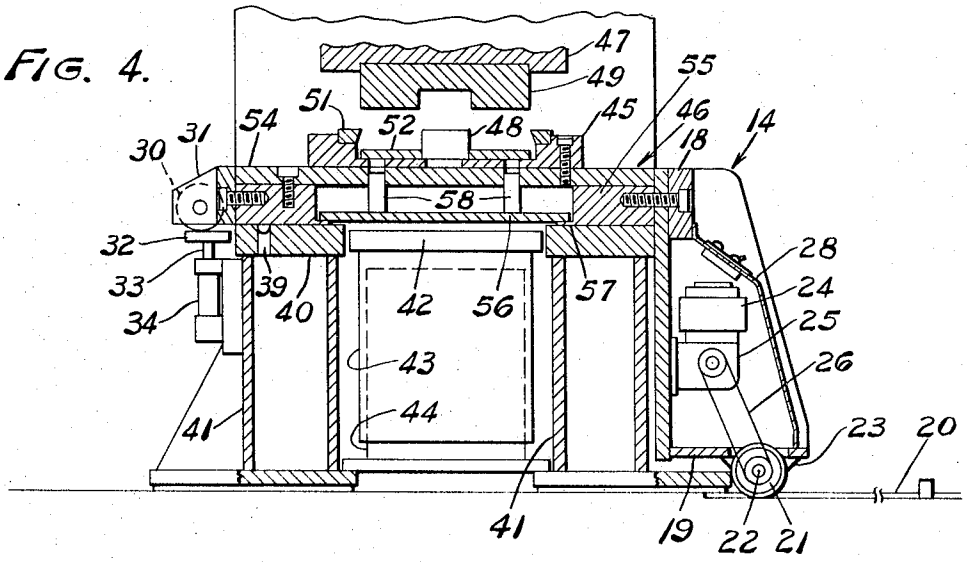



FIG. 4.



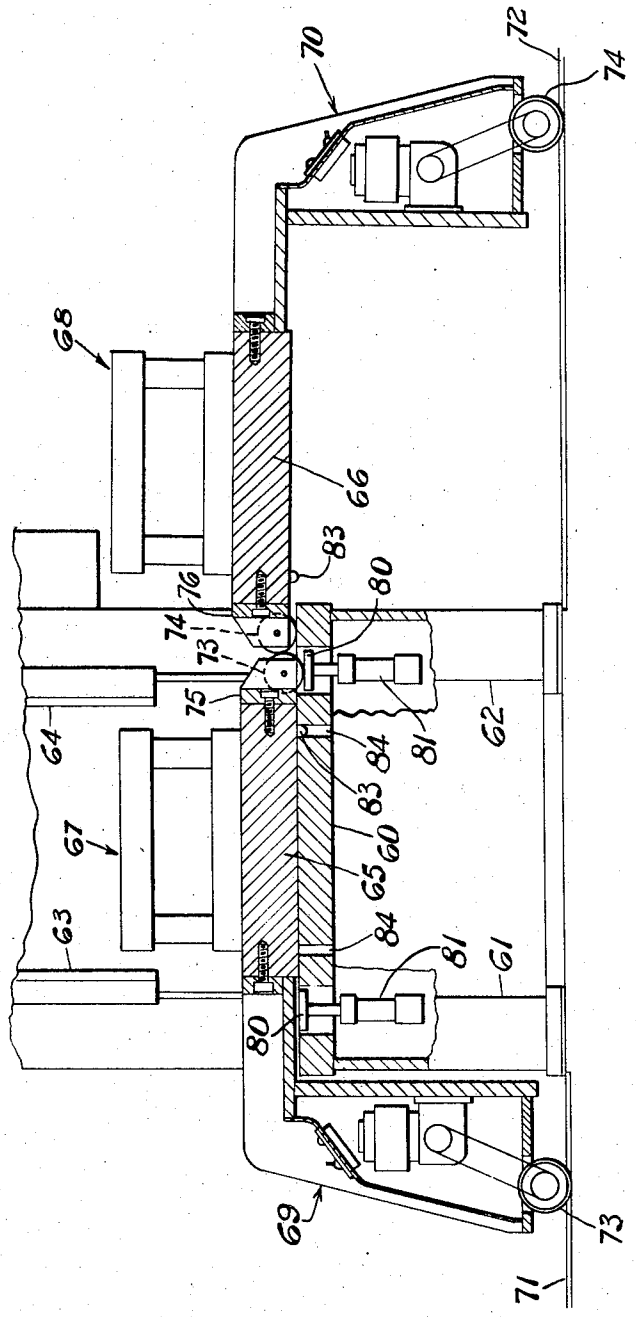

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FIG. 5.




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# DIE LOADING APPARATUS FOR POWER PRESSES

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10 Claims. (Cl. 72—446)

This invention relates to apparatus for changing dies in conventional power presses, that is, for moving a die into working position on the bed of a press and for removing such die when another die is to be introduced.

Dies such as are used in power presses for performing metal stamping operations are frequently of such size and weight that bringing them to working position on the bed of a power press presents a substantial problem. Traveling cranes such as are used in power press rooms can bring the die to a point adjacent to the press but the superstructure of the press prevents depositing the die directly on the press bed by the crane.

Apparatus for moving die mechanisms from a point adjacent to a power press to the operating position on the press bed have been proposed, as in United States Patents No. 3,183,828 dated May 18, 1965, and No. 3,207,065 dated Sept. 21, 1965. These patents provide carriages upon which a die may be placed with the carriage adjacent to the press, whereupon the carriage is moved into the press over the bed thereof to bring the die into position beneath the ram or slide of the press.

In these prior art devices the supporting wheel upon which the carriages move are supported on eccentric axles or shafts and the eccentricity of the axles or shafts must be adjusted to lower a die onto the press bed or raise it therefrom. This eccentric adjustment of the wheel supporting shafts is costly to manufacture and complicated in operation, particularly since the carriages are preferably power driven and both of the aforesaid prior patents require eccentric adjustment of the power driven wheels of the carriages.

The apparatus of the present invention provides a carriage mechanism wherein the lowering and raising movements necessary to effect placement of a die on the press bed or removal therefrom are accomplished by a simple expedient involving no adjustment of the wheel axes with respect to the carriage supported thereby.

Further objects of the die loading apparatus of the present invention consist in providing die loading means which is readily adaptable to power presses of various types and sizes and means involving simple controls for successively moving a die set into a press then lowering to the press bed, or vice versa.

While several specific embodiments of the principles of the present invention are illustrated in the accompanying drawing and described in detail in the following specification, it is to be understood that such embodiments are by way of example only and that various mechanical modifications may be made without departing from the spirit of the invention, the scope of which is limited only as defined in the appended claims.

In the drawings:

FIG. 1 is a perspective view of one form of conventional power press with a die loading apparatus constructed according to one form of the present invention associated therewith and shown in its inner position with respect to the press;

FIG. 2 is a fragmentary cross sectional view taken on a fore and aft vertical plane through the bed portion of the power press of FIG. 1 and through the associated die loading apparatus;

FIG. 3 is a view similar to FIG. 2, but with the parts in a final position in the die loading cycle;

FIG. 4 is a view similar to FIG. 3 showing the die loading apparatus of the present invention modified to accommodate a die set and power press which employs a conventional pressure pad;

FIG. 5 is a fragmentary cross sectional view taken on a vertical plane extending from side to side of the bed portion of a power press showing apparatus for alternatively employing either of a pair of die sets.



Like characters of reference denote like parts throughout the several figures of the drawings and, in the embodiment of FIGS. 1 through 3, and referring particularly to FIG. 1, a conventional power press is shown having a bed **10**, four corner columns **11**, and a crown **12**. The die loading apparatus of the present invention is designated generally in FIG. 1 by the numeral **14** and in the form illustrated comprises a bolster **15** upon which a die set is mounted and secured in the usual manner. In FIGS. 2 and 3 the die set is designated **16**.

A generally vertical plate **17** is secured along its upper edge to the front edge of bolster **15** by means of a retaining bar **18**. Plate **17** serves as a frame member for a front carriage support for bolster **15**, which carriage includes a bottom plate **19** which is fixed to the lower portion of plate **17**.

The front carriage support rides on a pair of tracks **20** by way of wheels **21** mounted on a shaft **22** which is journaled in bearing brackets **23** fixed to the underside of bottom plate **19**. An electric motor **24** and a reducer unit **25** are mounted against plate **17** and the output shaft of reducer **25** drives wheel shaft **22** by way of a chain and sprocket or belt and pulley connection as at **26** in FIG. 2. As shown at **27** in FIG. 1, motor **24** may be connected to the general control panel of the power press. An enclosure for the foregoing wheel drive mechanism is shown at **28** in FIGS. 2 and 3.

A pair of wheels **30** are carried for free rotation by brackets **31** fixed to the rear face of bolster **15**. The lower peripheries of rear wheels **30** project below the lower face of bolster **15**. In the forward position of the foregoing die loading apparatus the bolster **15** extends out to the right of bed **10** as viewed in FIGS. 2 and 3, that is, forwardly of the power press, with the wheels **30** resting on the front upper surface of bed **10**. In this position the upper surface of bolster **15** is freely accessible from above so that a die set may be deposited thereon or removed therefrom by a traveling crane or other hoisting or lifting apparatus.

When a die set has thus been deposited on bed **10** the motor **24** is activated and the bolster **15** and the front carriage thereof moves to the left as viewed in FIGS. 2 and 3, the wheels **30** rolling freely on bed **10**. If desired guiding grooves or tracks may be provided on bed **10** for wheels **30**. After wheels **30** thus traverse bed **10** from front to rear the wheels **30** move onto supports **32** which comprise plate members fixed to the upper end of rods **33** which connect with pistons (not shown) of fluid pressure cylinders **34**.

Various means may be employed for selectively energizing the fluid pressure cylinders **34** to raise the support plates **32** to the full line position illustrated in FIG. 2 or lower them to the position illustrated in FIG. 3 By way of example, conduits **35** from cylinders **34** may lead to a hand pump **36** of a type known and employed in this art for operating hydraulic jacks which are employed in raising die sets on power press beds in order to permit fork lifts to engage beneath the die sets. Other sources of fluid pressure with appropriate control valves may be employed.

In their upper positions the support plates **32** form rearward continuations of the upper surface of bed **10** so that upon movement of the carriage toward the press to bring the bolster into working position on the press bed the wheels **30** move across the bed and onto the

support plates **32** as shown in FIG. 2. It will be noted that the under surface of bolster **15** is at an angle to the top of bed **10** when the parts are in position shown in FIG. 2. This angle is such that, when the bolster and carriage apparatus is pivoted on wheels **21** in a counterclockwise direction from the position illustrated in FIG. 2 the bottom of bolster **15** comes down flat against the upper surface of bed **10**. Ideally, the lower surface of bolster **15** is tangent to an arc struck from the axis of wheel shaft **22** and of a radius equal to the vertical distance from such axis to the surface of bed **10**.

One or more locating pins **38** carried by bolster **15** are adapted to enter holes **39** in bed **10** when the bolster is in working position. The locating pins may be spring backed so as to yield upwardly until they come into registry with holes **39**, such construction being well known in this art.

The embodiment illustrated in FIG. 4 is the same as the primary embodiment excepting that the bolster element is modified to cooperate with a power press equipped with an air cushion, such cushions being commonly employed when metal drawing dies are used in a power press. In FIG. 4 a press bed **40** is supported by columns or legs **41** and has a central opening for receiving a pressure pad **42** at the upper end of a cylinder **43** which fits over a stationary piston **44**, the pad being urged upwardly by the application of compressed air to the interior of cylinder **43** beneath pressure pad **42**.

FIG. 4 shows, somewhat schematically, a conventional draw die apparatus comprising a die holder **45** secured to a bolster designated generally **46** and a punch holder **47** which is attached to the slide of the press for vertical reciprocation in a conventional manner. A male die **48** is fixed to die holder **45** and a complementary female die **49** is fixed to punch holder **47**. In the present instance the die set is a combination blanking and draw die and a blanking die ring **51** is fixed to the die holder, the female die **49** comprising the complementary blanking punch.

A draw ring **52** surrounds the die **48** and when the air cushion is in operation draw ring **52** is held resiliently upwardly in a position approximately co-planar with the top of die **48** and with the blanking die ring **51**. To accomplish this result while still providing for free horizontal movement of bolster **46** the following novel bolster construction is provided. For convenience in fabrication bolster **46** comprises a top plate **54** and a lower plate **55** which are screwed together. Lower plate **55** has a central opening which receives a pressure plate **56** which in its lowered position rests upon a ledge **57**.

Pressure pins **58** are slidable in upper plate **54** of bolster **46** and rest upon pressure plate **56**. When pressure is applied within cylinder **43** pressure pad **42** acts upwardly against plate **56** and pins **58** transmit this upward movement to draw ring **52** to raise the same to working position. However, with the pressure off as shown in FIG. 4 there are no upward or downward projections from bolster **46** so that the latter may be moved freely to and from working position in a manner identical to that previously described in connection with the embodiment of FIGS. 1 through 3. The mechanism for actuating bolster **46** is identical with the corresponding elements of FIGS. 2 and 3 and accordingly the same reference numerals have been applied thereto and the detailed description of this mechanism will not be repeated.

In the embodiment of FIG. 5 two die loading and unloading structures of the type shown in FIGS. 2 and 3 are provided so that two die sets fixed to and carried by two separate bolsters may be selectively and alternatively positioned on a press bed. This permits a quick change as between two die sets which are used successively and alternately and also permits a die set to be unfastened and removed from one of the bolsters and another die set to be secured thereon while the other



bolster is in position on the press bed and a die set thereon is in use or in condition for use.

While the embodiment of FIG. 5 may be employed fore and aft, in the present instant the bolsters move onto the press bed from opposite sides thereof. In FIG. 5 the press bed is designated **60** and opposite side columns are designated **61** and **62**. The guides which support opposite sides of the vertically reciprocable slide of the press are designated **63** and **64**. The two alternatively employable bolsters are designated **65** and **66**, the former being in working position on bed **60** and having a die set **67** mounted thereon while a die set **68** mounted on idler bolster **66** is in position to be removed or on standby.

As in the preceding embodiments, the bolsters **65** and **66** have floor support carriages designated **69** and **70** which move on tracks **71** and **72** by means of motor-propelled wheels **73** and **74**. At their proximal ends the bolsters **65** and **66** are supported by idler wheels **73** and **74** carried by brackets **75** and **76**. As shown in the case of bolster **65**, as a bolster reaches working position the wheels **73** thereof move onto a support **80** carried by hydraulic lift means **81** the same as in the first embodiment, the latter then being lowered to deposit bolster **65** solidly on bed **60** as shown in FIG. 5. Here again locating pins **83** at the underside of bolster **65** engage openings **84** in bed **60**. Similar reference characters designate corresponding elements for raising and lowering the other bolster **66** when the latter is in working position on bed **60**. In the illustrated instance the supports **80** operate through openings in bed **60**.

What is claimed is:

**1.** Apparatus for moving die sets to and from working position on a power press bed disposed above the adjacent floor, said apparatus comprising a bolster for detachable securement to such press bed and adapted to have a die set secured thereon, support means at an edge of said bolster extending downwardly toward said floor, wheel means at the lower end of said support means to mount the same for rolling movement toward and away from said press bed, and other wheel means at the opposite edge of said bolster and projecting below the lower surface thereof for rolling movement on said press bed as said bolster moves to and from its working position on said press bed, means at the edge of said press bed opposite to said support means having surface portions substantially coplanar with said press bed whereby said other wheel means roll thereonto as the bolster reaches its working position on the press bed, said wheel means supporting said bolster during rolling movement with the lower surface of the bolster inclined upwardly with respect to the press bed in a direction toward said other wheel means, and means for selectively lowering said other wheel means to lower said bolster directly onto said press bed by pivotal movement thereof about the axis of said first mentioned wheel means and raising said last mentioned means to dispose said surface portions coplanar with said press bed for free rolling movement of said other wheel means on said surface portions and said press bed.

**2.** Apparatus according to claim **1** wherein the lower surface of said bolster is substantially tangent to an arc struck from the axis of said first mentioned wheel means and of a radius equal to the vertical distance from said axis to said press bed.

**3.** Apparatus according to claim **1** wherein said selective raising and lowering means comprises hydraulic pressure means.

**4.** Apparatus according to claim **2** wherein said selective raising and lowering means comprises hydraulic pressure means.

**5.** Apparatus according to claim **1** including power means for selectively moving said bolster and said support means toward and away from working position with respect to said press bed.

**6.** Apparatus according to claim **3** including power

means for selectively moving said bolster and said support means toward and away from working position with respect to said press bed.

7. Apparatus according to claim 1 including electric motor means carried by said support means for rotating said first mentioned wheel means for moving said support means and said bolster toward and away from working position with respect to said press bed.

8. Apparatus according to claim 3 including electric motor means carried by said support means for rotating said first mentioned wheel means for moving said support means and said bolster toward and away from working positon with respect to said press bed.

9. A pair of die set moving apparatuses according to claim 1 disposed at opposite sides of a power press bed for alternative movement of either apparatus to working position with respect to said press bed with the other apparatus in withdrawn position.

10. A die supporting bolster for use with power presses equipped with air cushions and adapted to transmit upward air cushion forces to die mechanism mounted thereon, said bolster comprising a body member having a lower surface adapted to move upon a press bed to and from



working position on said bed, a chamber in said body member and a vertically movable horizontal platen member in said chamber, an opening in the underside of said body member communicating with said chamber whereby activation of a power press die cushion causes the same to engage upwardly against said plate member and move the same resiliently upwardly, a plurality of pressure pins mounted for vertical sliding movement in said body member above said chamber and resting upon said plate member, whereby vertical movement of the latter moves said pressure pins upwardly to act against said die mechanism.

**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,625,896 | 1/1953 | Immenroth | 72—328 |
| 3,134,350 | 5/1964 | Danly | 72—416 |
| 3,183,828 | 5/1965 | Clements | 100—299 |
| 3,207,065 | 9/1965 | Danly | 100—299 |
| 3,212,430 | 10/1965 | Clements | 100—35 |


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