

[54] DIE CHANGING APPARATUS

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[51] Int. Cl. B26d 7/26

[58] Field of Search 72/446, 448; 29/568; 100/214; 83/698, 700

[56]

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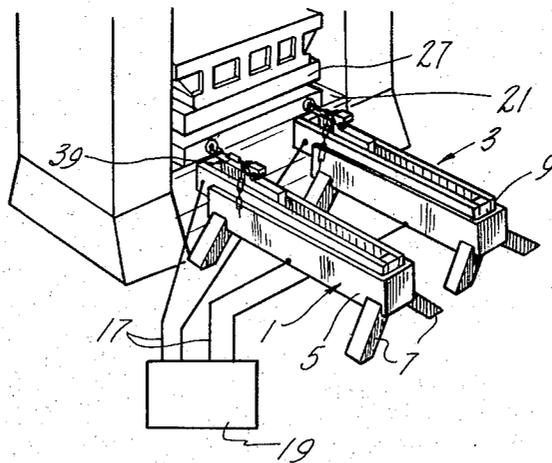
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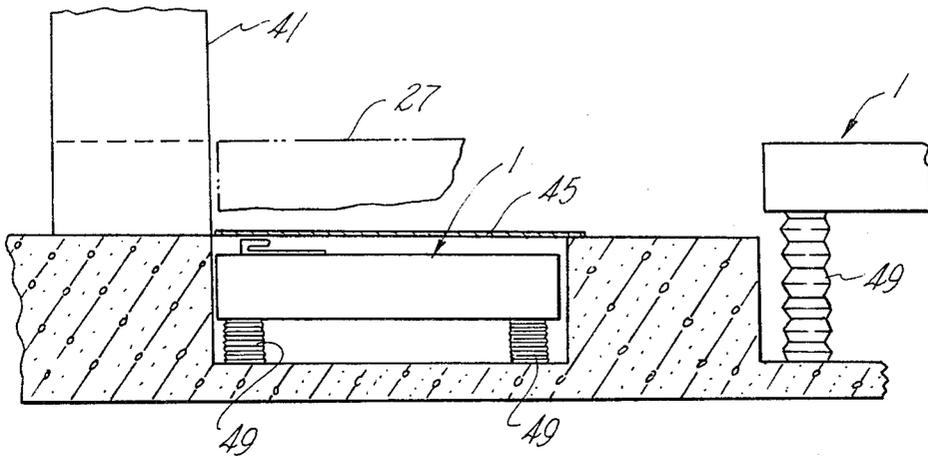
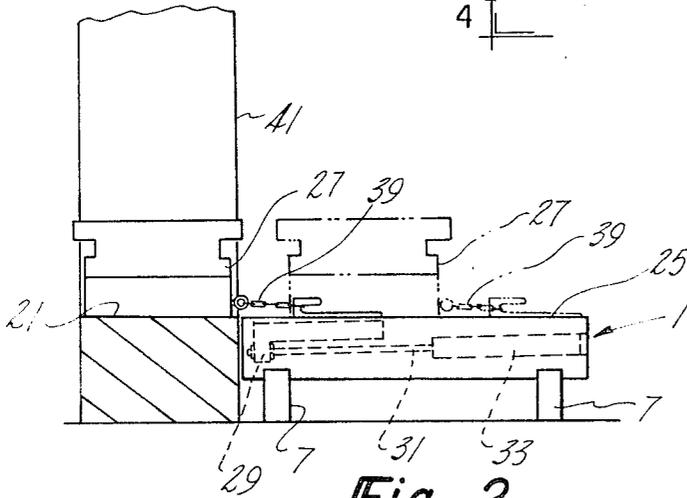
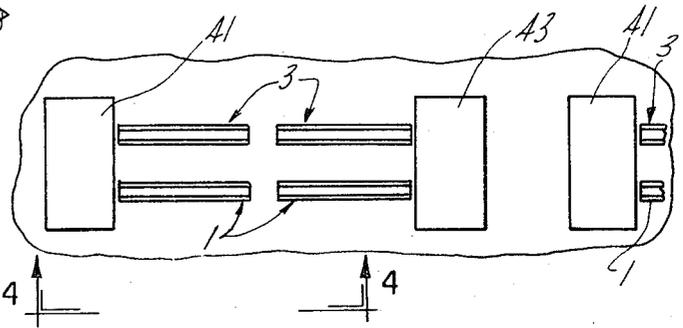
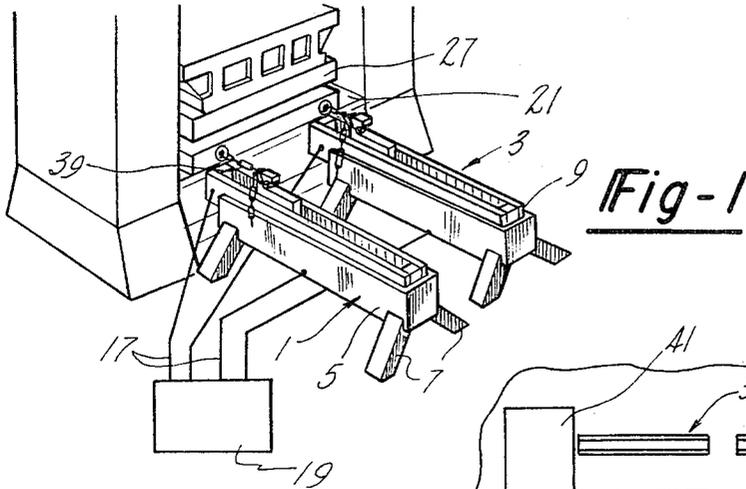
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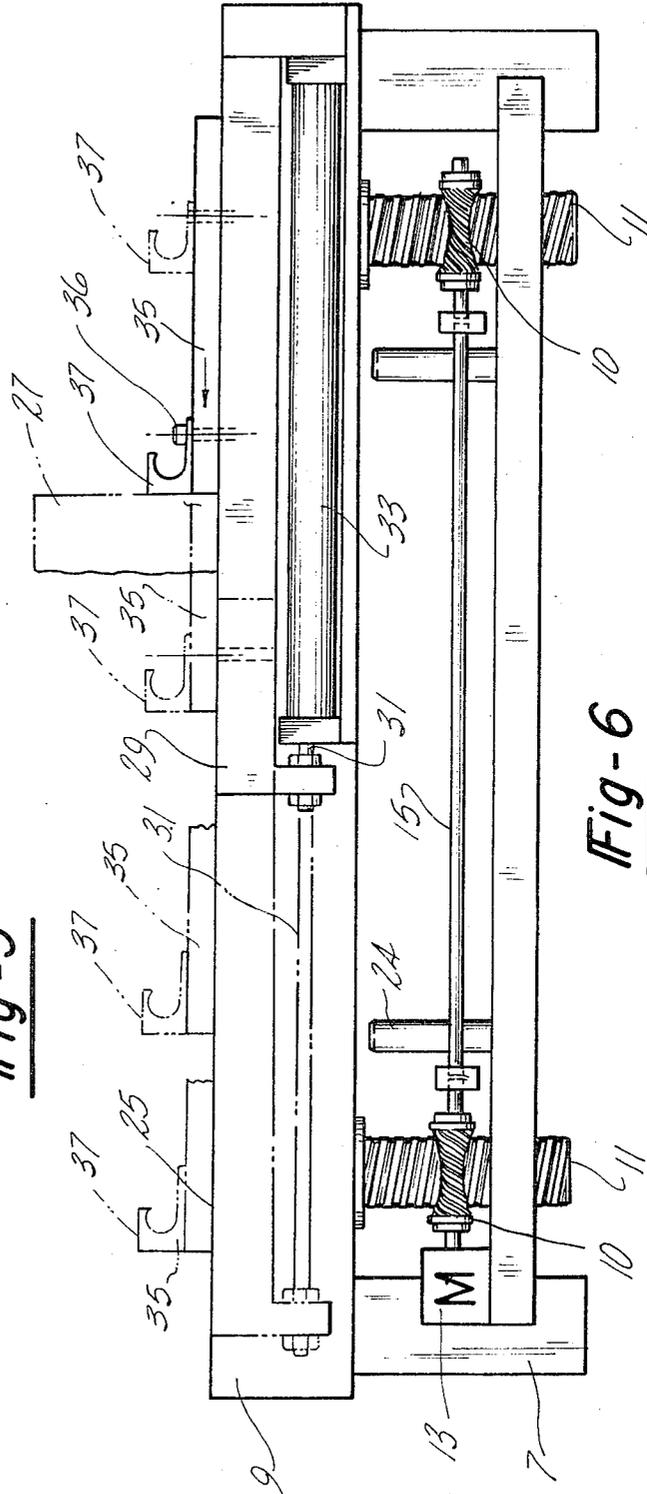
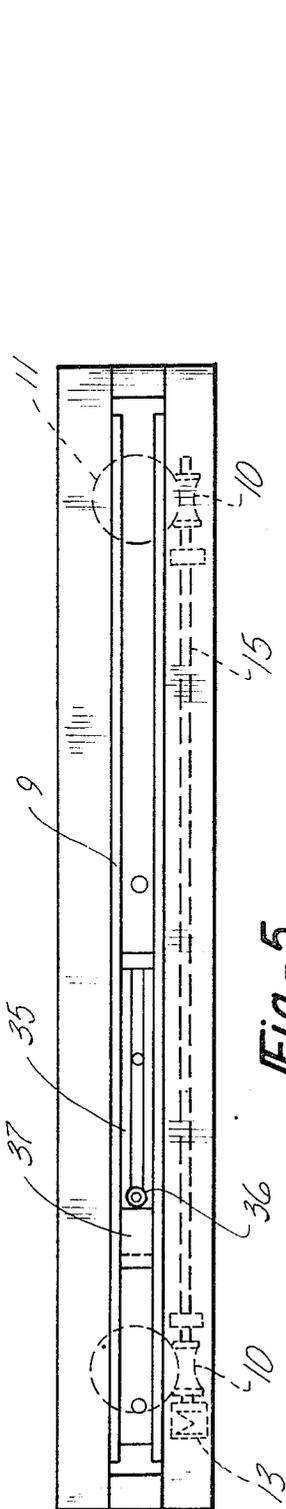
[57] ABSTRACT

A die changing apparatus includes a vertically adjustable die support member carrying a horizontally reciprocable die moving member, an adjustably mounted die pulling and pushing member is carried on the moving member, a first hydraulic motor actuates the die moving member and a second hydraulic motor vertically adjusts the die support member, the die support member may be carried by an above-the-floor support or may be carried by a below-the-floor support so that it may be retracted below the level of the floor. Portable hydraulic supply and control means can be connected to the motors for operation of the same.

15 Claims, 6 Drawing Figures







DIE CHANGING APPARATUS

This invention relates to an apparatus for changing dies in a press and more particularly to such an apparatus that can be easily and safely used with any press.

In order to change dies and particularly to remove and replace heavy dies from large vertical presses it has been the practice to utilize fork lift trucks or overhead cranes. Since these are not always feasible for one reason or the other and require considerable time for proper positioning and alignment of the die there has been proposed the use of die changers built into the press itself. There are expensive, can interfere with press operation and do not solve the problem for existing presses. Still other devices have been proposed which utilize a die carrying bolster that is movable on wheels running on tracks formed in the press bed and on the pressroom floor. Such tracks are usually not provided and hence such devices are not universally usable.

It would be desirable to provide a die moving apparatus that can be moved from press to press or can be permanently installed in an out-of-the-way location. Such an apparatus should be easily adjustable to be operable with different height press beds, should be able to remove a die completely from the bed and replace the same, be remotely controlled for safe operation, able to accommodate the largest heavy dies and yet not be unduly expensive.

It is therefore an object of the invention to provide a die moving apparatus that will accommodate itself to virtually every size press and size of die.

Another object is to provide a die moving apparatus that can be easily and quickly moved from press to press.

Still another object is to provide die moving apparatus that is effective to completely remove and replace a die from a press without requiring movement of the apparatus itself.

These and other objects and advantages will be readily apparent from the following description and accompanying drawings in which:

FIG. 1 is perspective view of a portable form of the die-changing apparatus shown in position to begin removal of a die from a press;

FIG. 2 is a side elevational view of the apparatus of FIG. 1 showing in solid line the position of a die when in the press and in broken line the die fully removed from the press;

FIG. 3 illustrates the placement of a pair of permanently located devices between two presses;

FIG. 4 is a view taken on the line 4-4 of FIG. 3 showing a modified form of the die moving apparatus with the same normally located below the floor level;

FIG. 5 is a top schematic view of one of the devices of FIGS. 2 or 3 showing the height adjusting mechanism; and

FIG. 6 is an enlarged schematic view showing various relative positions of the die moving parts with a die positioned to be pushed onto a press bed.

The apparatus of FIGS. 1, 2, 5 and 6 includes a pair of support horse assemblies generally indicated 1 and 3. Since the assemblies 1 and 3 are identical only the details of 1 will be described. A main open-top box-like frame 5 is supported on legs 7. Telescoped within the frame 5 is an inner die support assembly or platform 9

itself forming a box-like structure. The inner support member 9 is vertically adjustable relative to the outer frame 5 by any suitable means, preferably remotely controlled hydraulic means. The apparatus shown in FIG. 1 includes a pair of worm drives 10 meshing with a pair of spaced vertical standards 11 connected to and carrying the inner frame 5. The worm drives can be driven by any suitable means including, for smaller devices, a manually operated crank. The preferred apparatus utilizes a rotary hydraulic motor 13 connected to drive a shaft 15 secured to the worms 10. The motor 10 can be connected by detachable hydraulic lines 17 to a remote portable hydraulic supply and control unit generally indicated 19. The unit 19 contains a suitable electric motor driven hydraulic pump and associated control valves for controlling the hydraulic motor 10 as well as for controlling a reciprocating hydraulic motor described below. The details of the valves and pump are not shown since they form no part of the invention.

It will be apparent that bidirectional operation of the rotary motor 10 will cause the inner frame 9 to move up and down relative to the main frame 5 and hence relative to the floor and the bed 21 of a press 23. Stops 24 limit the downward movement of the moving assembly. The top surface 25 of the inner frame 9 forms a slide and die support platform for receiving the die 27 and by proper adjustment of the height of the frame 9 serves as a level continuation of the press bed.

In order to move the die to and from the press bed and the platform, a reciprocating power means is provided. In the preferred apparatus this includes an elongated die puller and pusher assembly including a L-shaped member 29 is connected by suitable means to the end of a piston rod 31. The rod 31 extends from a cylinder 33 secured to the frame 9. Member 29 is guided within the sides of the support platform or frame 9. Anti-friction means or grease fittings may be provided to aid in movement of the member 29. An adjustable pulling and pushing member 35 is detachable secured by one or more bolts 36 to the upper surface of the member 29 and has a hook portion 37 formed thereon. Controlled operation of the piston will cause back and forth movement of the pulling and pushing means 29 and connected member 35. If a chain 39 is connected to the die 27 the die 27 will be pulled onto the platform surface 25.

Since it is desirable to pull the die completely out of the press onto the center of the apparatus and because of the limited length of stroke of the cylinder the apparatus is constructed to permit a series of successive reciprocating strokes to pull the die one step at a time or alternatively to push the die onto the press. As mentioned above the member 35 is adjustably attached to the L-shaped member 29 so that it can be located at a plurality of positions on that member. This can be accomplished by providing a series of bolt receiving holes 36 spaced along the member 29. A first full stroke movement of the member 29 and die by the piston acts to move the die a distance equal to the piston stroke. The member 35 is then removed, the piston operated to make a return stroke and the member 35 attached again to the member 29, whereupon the piston is again operated to cause a full stroke further movement of the die. This can be repeated enough times to move the die the required distance whether it be to pull the die from

the press onto the support or push the die back onto the press bed.

FIG. 6 illustrates the two extreme positions of the piston and member 29 with the solid line illustration of the piston and member 29 showing the hydraulic apparatus contracted and the broken line showing the hydraulic apparatus extended. Also shown are the extreme positions of the push and pull member 35 which can be seen to be spaced apart a distance equal to twice the distance between the extreme positions of the member 29.

FIG. 3 illustrates the placement of four permanently located die changing units, two for each of two spaced presses 41 and 43. These units are shown mounted in a subfloor manner as seen in FIG. 4. Instead of supporting the units on the horse legs 7 of FIG. 1 which makes them relatively mobile, the units are supported on permanent pads or other means, not shown. In their lowered position as shown in the solid line left hand unit of FIG. 4, the die moving apparatus is down out of the way and covered by a door 45. When a die is to be changed or repaired, the door is opened and the hydraulic lift mechanism operated to raise the die supporting surface of the changing apparatus up to the level of the press bed associated with the die changer, as shown in the right hand side of FIG. 4. Bellows 49 act to protect the toothed vertical standards 11 from damage or dirt.

The hydraulic unit 19 may be used to power a number of die changing units and moved from press to press. The hydraulic lines 17 can first be connected to the vertical actuation motor 13 to cause the same to move, by means of the shaft 15, worm 10 and toothed standard 11, the inner die support platform member 9 to the desired position. The hydraulic lines are then connected to the cylinder 33 to actuate the die pulling and pushing assembly including member 29 and attached member 35 in the manner described above, to pull by means of the chain 39 the die from the press bed onto the support surface 25. The die can then be repaired or easily lifted and removed by an overhead crane and replaced by another die.

After the original die has been repaired or replaced by another die, the chain 39 is removed and the die pushed directly by the member 35 along the supporting surface 25 onto the press bed. Again the die can be moved a total distance greater than the cylinder stroke by detaching and reattaching the push-pull member 35 on the piston actuated member 29. The hydraulic lines can then be detached from the cylinder and in the case of the portable apparatus of FIG. 1 that apparatus can be removed to another press site, or in the case of the permanent apparatus of FIG. 4 the lines 17 reconnected to the motor 13 and the same actuated to lower the die supporting and moving assembly back down below the floor level.

It will be obvious that other types of hydraulic motors could be utilized both for the vertical and horizontal actuations. Changes and modifications can also be made within the scope of the invention which is limited only by the following claims:

I claim:

1. Apparatus for removing dies from a vertical press having a bed for receiving the dies, comprising support means, a die support member carried by the support means and vertically adjustable relative thereto, and having a die carrying upper surface therein, means for

vertically moving said die support member relative to the support means whereby the die carrying upper surface can be vertically aligned with the bed of the press, a die moving member mounted on said support member for reciprocating movement, means for reciprocating said die moving member and push and pull means carried by said die moving member adapted to be connected by a tension member to a die in the press whereby the die can be pulled by said die puller onto said die supporting surface, or to directly contact the die to push it onto the press.

2. The apparatus of claim 1 wherein a pair of support means are provided each having a die supporting member therein.

3. The apparatus of claim 1 wherein said means for reciprocating said die moving member constitutes a hydraulic ram.

4. The apparatus of claim 1 wherein said means for vertically moving said die support member relative to said support means comprises a pair of vertically disposed support columns carried by said support means and guided for vertical movement, a pair of worm gears engaging gear teeth on said support columns and motor means to rotate said worm gears in unison whereby said columns and die support member are vertically moved up and down relative to the support means.

5. The apparatus of claim 4 wherein said motor comprises a hydraulic motor operated and controlled from a remote source of hydraulic fluid.

6. The apparatus of claim 1 wherein said push and pull means carried by said die moving member is adjustably attached to the die moving member at a plurality of points, whereby a die may be pulled onto or pushed off of the die supporting surface through a succession of reciprocating movements of the die moving member, each with the push and pull means attached to the die moving member at a point further or closer to the press.

7. The apparatus of claim 6 wherein said means for reciprocating said die moving member constitutes a hydraulic ram having a given stroke and whereby a die may be pulled onto the die supporting surface a distance greater than said stroke by said succession of strokes.

8. The apparatus of claim 1 wherein said push and pull means carries a hook member and said tension means constitutes a chain member connectable to a die.

9. The apparatus of claim 1 wherein said support means is located below the floor level of the press and wherein said support member normally rests below said floor level and is raised by said means for vertically moving the support to a point above the floor and at a level whereby said die supporting surface is in the same plane as the press bed.

10. A die changing apparatus for removing a die from the bed of a press including a die support member having a die supporting surface adapted to slidably receive and support the die, a die pulling member mounted on said member for reciprocation relative thereto, hydraulic ram means connecting said support member and die pulling member for reciprocating said pulling member back and forth a first predetermined distance relative to the die supporting member, die pulling means, means for attaching said die pulling means on said die pulling member at a plurality of longitudinally spaced points whereby said die pulling means and a die con-

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nected thereto can be moved a total distance equal to the first predetermined distance plus the distance between said longitudinally spaced points.

11. The apparatus of claim 10 wherein said die support member is carried on a support frame and can be vertically adjusted relative thereto so as to permit planer alignment of the die supporting surface with the die bed.

12. The apparatus of claim 11 wherein second hydraulic operated means are provided to vertically adjust the die support member.

13. The apparatus of claim 12 wherein a remote source of hydraulic fluid under pressure is provided to selectively actuate the hydraulic ram means and the second hydraulic operated means.

14. The apparatus of claim 13 wherein a second combination of die supporting frame, supporting member, die pulling member and die pulling means and hydraulic operating means is located parallel to the first combination of such elements and wherein said remote source of hydraulic fluid under pressure is connected to simultaneously reciprocably actuate both die pulling means and vertically actuate said die supporting members.

15. The apparatus of claim 10 wherein said die pulling means has a surface adapted to contact a die on the die supporting surface to push the same off of the surface onto a press bed.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,841,141

Dated October 15, 1974

Inventor(s) Stanley Rachwal

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 13, after "itself." change "There" to
--These--.

Signed and sealed this 31st day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents