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W. W. COLLINS

2,663,275

DRAW PRESS FEEDING DEVICE

Filed Oct. 11, 1950

2 Sheets-Sheet 1

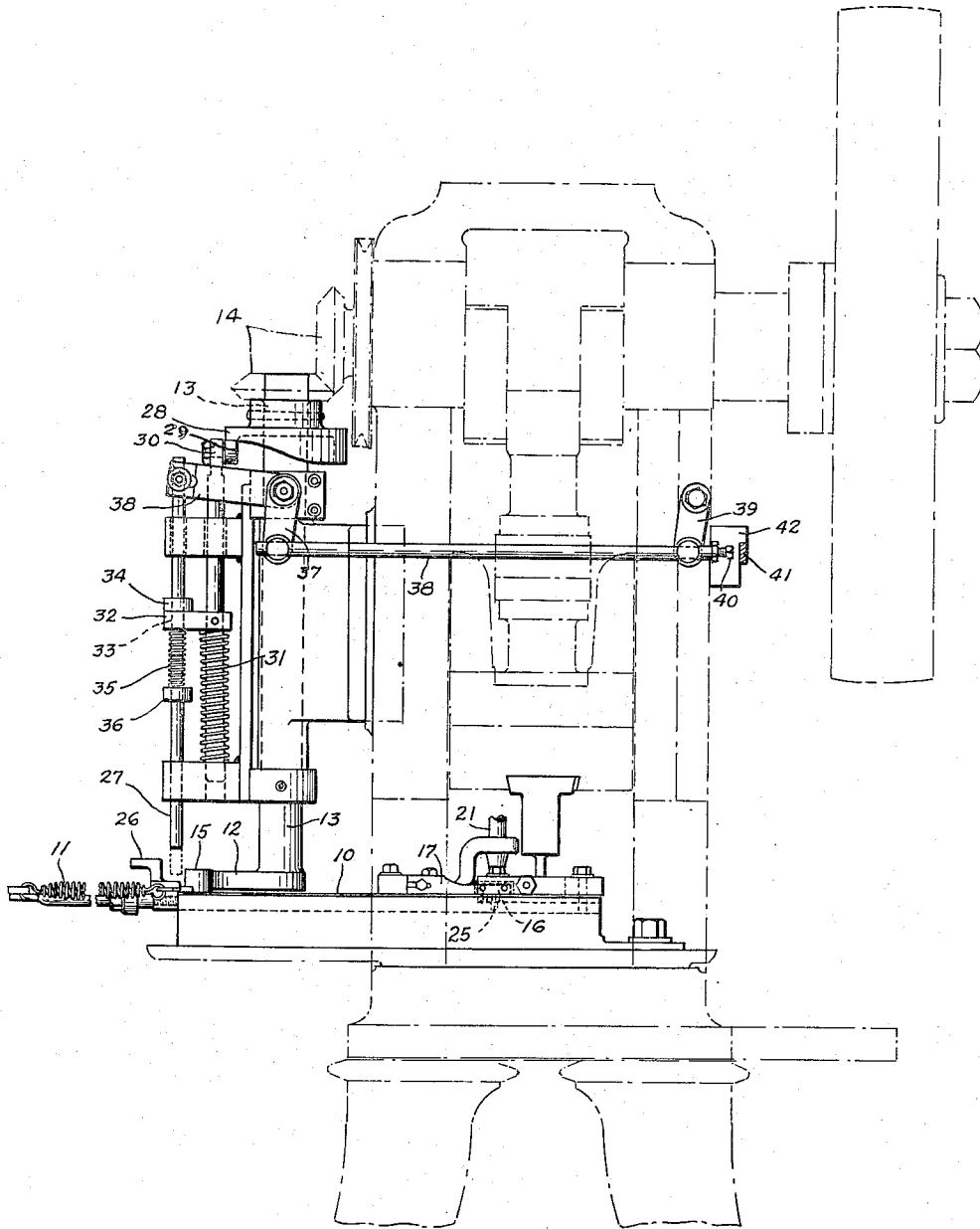


Fig. 1

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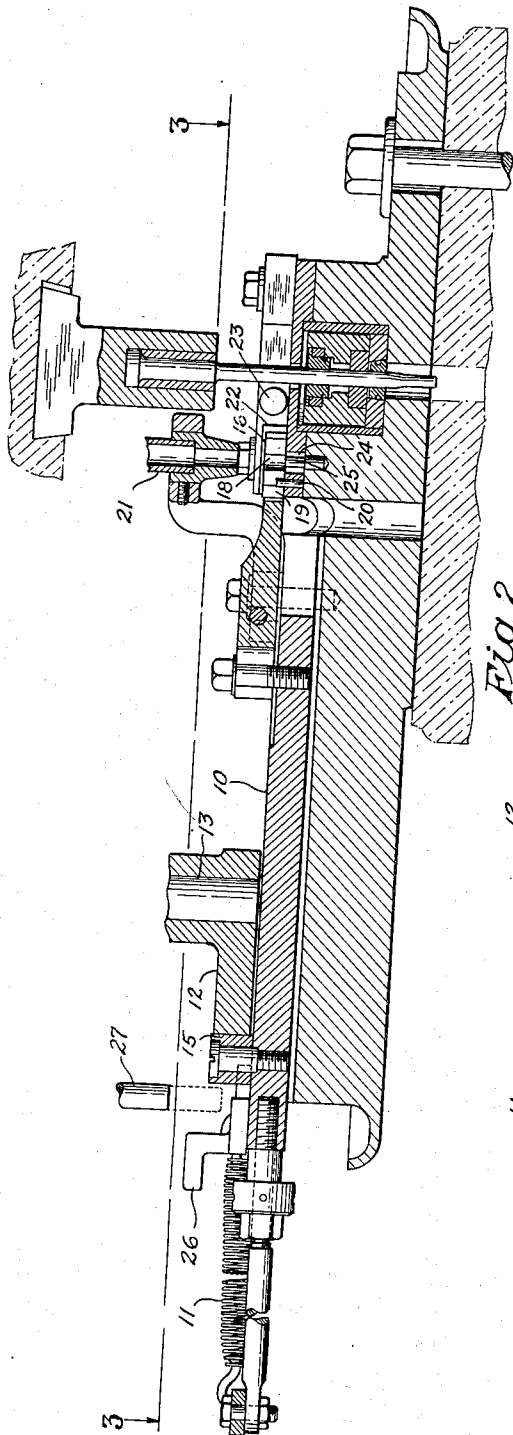


Fig. 2

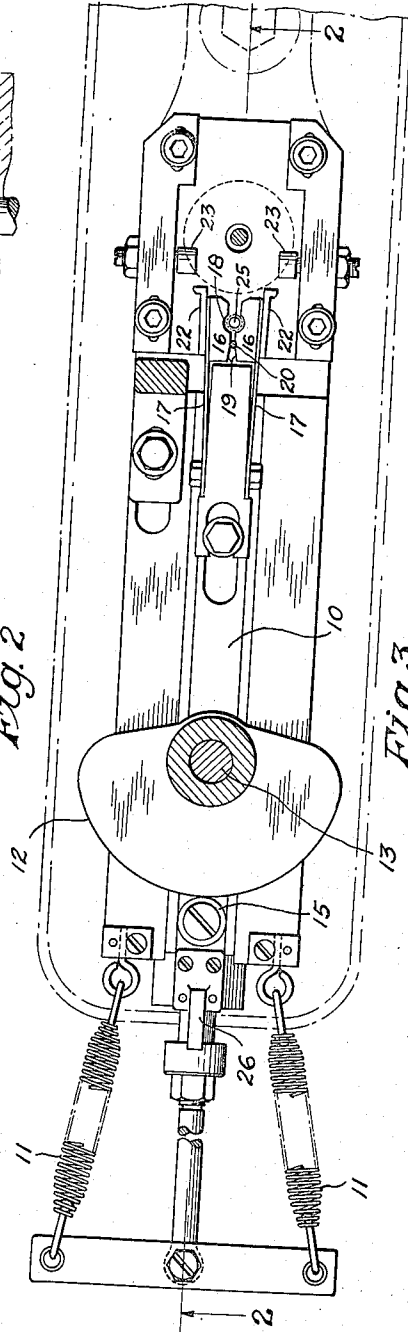


Fig. 3

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DRAW PRESS FEEDING DEVICE

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8 Claims. (Cl. 113—38)

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This invention relates to a device for feeding workpieces to a draw press and has particular reference to a feeding device arranged to stop the press in the event the workpiece is too large, cocked, or inverted.

In the metal working industry it is relatively common practice to deliver cupped workpieces by gravity or otherwise into jaws mounted on a reciprocating transfer bar which transfers the workpiece, open mouth up, to a station between an appropriate punch and its related die. In the event that a workpiece is too large or is fed in a cocked or inverted position to the station between the punch and die, the load may be greater than the punch can stand or the punch may be deflected laterally into direct engagement with the die. In either case, the result is a costly and time-consuming tool smashup with strong probability of other resulting damage to press alignment, guide ways, and the like.

It is the object of this invention to provide a press feeding mechanism which functions with facility equal to any previously employed and which simultaneously prevents the feeding of an improper workpiece of the type referred to above and stops further operation of the press until the improper workpiece has been cleared from the feeding device.

It is contemplated that this objective may be best achieved by the use of a spring-urged reciprocating transfer bar which will be unable to shift from feeding position to the drawing position in the face of any material resistance. Contemplated means of providing such resistance under conditions which might lead to a smashup include the utilization of the feed jaws themselves, as calipers for the workpiece, and the provision of opposed gage screws between which the feed jaws must pass to reach the feed position. If the workpiece is cocked or oversize, the feed jaws will be held open thereby and will be unable to pass between the gage screws. Protection against inverted workpieces may be provided by positioning a cavity with a centrally disposed pin beneath the feed jaws in the feed position. Any workpiece fed mouth-down will fall into the cavity with the pin received in the workpiece and thereby block the advancing movement of feed slide and feed jaws. A workpiece fed base-down will rest on the end of the pin and, if not cocked or oversize, will feed normally.

It is contemplated that the best mode of

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stopping the press in response to a failure to feed properly is the provision of a detector finger which, after each stroke of the feed slide, will feel for the end of the slide. Unless the feed slide is in the normal position for that portion of the cycle, an overtravel of the detector finger will be communicated through suitable linkage to a push rod arranged to kick out the press clutch which is, in turn, interlocked with the brake.

The exact nature of the invention as well as other objects and advantages thereof will more clearly appear from consideration of the following specification referring to the attached drawings in which:

Fig. 1 is a front elevational view partially in section, showing the feed mechanism of this invention. In dot-dash lines there is shown the outline of a typical crank press to which the invention might be applied.

Fig. 2 is a partial vertical sectional view on the line 2—2 of Fig. 3.

Fig. 3 is a plan view partially in section on the line 3—3 of Fig. 2.

Referring to the drawings, it will be noted that the feed slide 10 is arranged to be slidably mounted on the press bed and that the slide is continuously urged by springs 11 to move to the right or toward the position in which the draw punch reciprocates through the die. The position of the slide 10 is controlled by a cam 12 mounted on a generally vertical shaft 13 which is driven through suitable gears 14 from the crank shaft of the press. A roller 15 on the slide bears on the outer periphery of the cam which is so shaped and timed as to permit the feed slide to advance under the urging of the spring 11 just prior to the descent of the punch and to dwell there until the workpiece has been started into the die. At that point the slide is positively retracted by the cam to its initial position, where it dwells, while a new workpiece is received, until just prior to another descent of the punch.

Mounted on the feed slide are a pair of feed jaws 16, each supported by a spring 17 urging the jaws into engagement with each other. The inner faces of the jaws are formed to define a generally cylindrical workpiece receiving recess 18 and a pair of cam surfaces 19 which engage with a pin 20 secured in the press bed to cam the feed jaws open when the slide is retracted to its left-hand position. With the feed jaws thus opened, a workpiece may be dropped from a tube 21 or otherwise between them. When the

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cam 12 has been turned far enough to release the feed slide for a feeding stroke, the feed jaws will clear the pin 20 and close upon the workpiece. If the workpiece is only slightly cocked, the spring-urged closing movement will straighten it out but, if tipped completely over or badly cocked, the jaws will be unable to close. The outside of each feed jaw is provided with a gage plate 22 and, provided the workpiece is of the proper diameter and properly positioned, these plates pass between the gage screws 23 adjustably mounted on the press bed as the feed slide advances. Should the feed jaws be held apart by a cocked or oversize workpiece, the gage plates will hang up on the gage screws and prevent the delivery of the faultily fed workpiece to the drawing station.

In the case of an inverted workpiece, a cavity 24 is formed in the press bed beneath the feed station of ample diameter to receive any workpiece which may be fed to the machine. A pin 25 is centrally mounted in the cavity and is flush or slightly above the level of the press bed. This pin insures that a component, properly fed mouth-up, will not fall into the cavity but in no way interferes with the descent of a mouth-down workpiece into the cavity. With such an inverted workpiece received in the cavity, the feed slide will be unable to move to the right and must remain in place.

Although the stopping of the feed slide avoids the greatest danger in faultily fed workpieces, it should be realized that it is undesirable to allow a draw press to run idle. To a considerable extent, production presses are self-aligning and depend upon the presence of the draw piece to accurately center the punch in the die. In such a case, continued operation of the press after a feed interruption might result in contact between the punch and die with resultant damage to one or the other. Further, if the press continued to run, the continued attempts to feed the faulty workpiece might result in damage to the gage plates or gage screws and, in the case of an inverted component, might eventually deform the component to a point permitting it to be forced out of the cavity. Accordingly, it is desirable to utilize the interruption of the movement of the feed slide as a means of stopping the press.

In this invention the feed slide has been provided with a gage block 26 extended above the upper face of the slide. Supported for reciprocation on a path intersecting the movement of the gage block 26 is a detector slide 27. These elements are so positioned relative to each other that, in the event the feed slide moves to the right far enough to pass the gage plates 22 between the gaging screws 23, the gage block 26 will intercept the detector slide 27 and permit only a relatively short movement thereof. If the feed jaws hang up on the gaging screws, or if an inverted workpiece is caught in the cavity, the feed slide will not be able to move far enough to bring the block 26 into the path of the slide 27 and it will be free to reciprocate for a full stroke.

The detector slide is yieldingly urged downward and retracted in time with the movement of the feed slide by means including a cam 28 on the shaft 13. The cam 28 engages a cam follower 29 on a slide 30, positively moving that slide down against the force of a retracting spring 31 once during each cycle of press operation. A lug 32 rigidly secured on the slide 30 is provided with

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a bore 33 embracing the detector slide 27, where it is confined between an upper stop collar 34, and a detector spring 35 and lower collar 35. Obviously, as the slide 30 moves downwardly when urged by the cam 28, the detector spring 35 will urge the detector slide to move the same distance. However, if the feed slide has moved to its proper right-hand position, the detector slide will be intercepted and the further movement of the slide 30 will simply compress the detector spring 35. As the slide 30 is retracted by its spring 31, it will carry with it the detector slide 27 by reason of the engagement of the lug 32 with the stop collar 34.

The upper end of the detector slide 27 has a pin and slot connection with a bell crank 37 to which a link 38 is connected. The opposite end of this link is hung from a lever 39, with the result that vertical reciprocation of the detector slide is transformed into horizontal reciprocation of the link 38. An adjustable contact screw 40 in the end of the link 38 is arranged to nearly contact the clutch lever 41 when the detector slide is intercepted on top of the feed slide gage block 26. When the detector slide is not so intercepted, indicating a faultily fed or inverted workpiece, the greater movement permitted the detector slide results in engagement of the contact screw 40 with the clutch lever 41 to push the clutch lever from beneath the abutment 42 and permit the clutch to disengage the drive from the press crank. Preferably, the clutch will be supplied with a strong spring urging the lever toward disengaging position and also preferably will be interlinked with a brake to insure stopping the press within one revolution or less of the time the clutch lever is released.

Although only the preferred embodiment has been illustrated and the invention has been described quite specifically by reference to that embodiment, it should be understood the mechanical equivalents exist for most of the elements, linkages, etc., combined in this embodiment. Accordingly, the invention is to be considered as limited only by the scope of the claims appended hereto.

I claim:

1. A feeding device for a draw press having a frame, said feeding device comprising in combination a feed member movably mounted on said frame and spring-urged to move from a workpiece receiving station to a drawing station; a pair of opposed jaws provided with workpiece grasping recesses substantially complementary in shape to the shape of the workpiece, said jaws being spring-mounted on said feed member and arranged to yieldingly grasp between them a workpiece received at said receiving station and convey same to the drawing station; and a pair of opposed gage members fixedly mounted on said frame between which said jaws must pass to reach said drawing station, said gage members being so spaced as to deny passage to the feed jaws if the jaws are separated by an amount greater than required by the presence between them of a properly positioned and not oversized workpiece.

2. A feeding device for a draw press having a frame, said feeding device comprising in combination a feed member movably mounted on said frame and spring-urged to move from a workpiece receiving station to a drawing station; a pair of opposed jaws provided with workpiece grasping recesses substantially complementary in shape to the shape of the workpiece, said jaws

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being spring-mounted on said feed member and arranged to yieldingly grasp between them in said recesses a workpiece received at said receiving station and convey same to the drawing station; and a pair of opposed gage members fixedly mounted on said frame between which said jaws must pass to reach said drawing station, said gage members being so spaced as to deny passage to the feed jaws if the jaws are separated by an amount greater than required by the presence between them of a properly positioned and not oversized workpiece, the frame of said press including means defining a cavity with a centrally disposed pin beneath said jaws at said workpiece receiving station, said cavity having a diameter greater than the outside diameter of said workpiece and said pin having a diameter less than the inside diameter of said workpiece, the end of said pin being coplanar with the surface in which said cavity is defined whereby the pin will support a mouth-up workpiece between said jaws and the cavity will receive and retain a mouth-down workpiece in position to block feeding movement of said feed member and the opposed jaws thereon.

3. A feeding device as described in claim 2, the frame of said press having mounted thereon a device including detector means associated with the feed member and actuated after each feeding movement thereof to determine whether said feed member has moved completely from said receiving station to said drawing station, and power disconnecting means interlinked with said detector means and movable thereby in the event said feed member has not moved completely to said drawing station to disconnect the source of power from the draw press.

4. A feeding device as described in claim 3, said detector means comprising a reciprocable detector projected toward the feed member in synchronism with the movement of the feed member, said detector being urged to move into the position which is occupied by a portion of the feed member only when the said feed member has moved to the drawing position, said portion of the feed member in drawing position limiting movement of the reciprocable detector to less than that required to actuate said disconnecting means.

5. In a draw press including a frame and a feed member movable on said frame in a normal, full movement between a workpiece receiving position and a drawing position, the combination of means fixed on said frame to obstruct and to prevent normal, full movement of the feed member to the drawing position if a workpiece received at said receiving position is improperly positioned in said feed member; a detector mounted on said frame and projectable toward

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said feed member in synchronism with the normal full movement thereof; abutment means on the feed member movable therewith during said normal full movement into the line of projection of said detector to limit the amount of projection of the detector to an amount less than that which would be had in the absence of said normal full movement and the accompanying movement of said abutment means into the line of projection of said detector; and draw press stopping means including a clutch and brake operator interlinked with said detector and operable by full movement of the detector whenever there is a failure of said abutment means to limit projection of the detector and thereby to stop the draw press in case the workpiece received at said receiving station is improperly positioned in the feed member.

6. The combination described in claim 5, said detector being projected by means including a slide reciprocable on said frame in synchronism with the normal full movement of the feed member; and a yieldable connection between said slide and the detector, whereby said detector will be projected with said slide unless the projection of the detector is stopped by engagement with said abutment means and said connection yields.

7. The combination described in claim 6, said linkage between said detector and the clutch and brake operator including a crank coupled to the detector and a link coupled thereto and engageable with said operator, said link being movable in proportion to the movement of said detector and having insufficient movement to function said operator when movement of the detector has been stopped by said abutment.

8. The combination described in claim 7, including spring means arranged to move said clutch and brake operator toward press stopping position, a detent with which said operator may be engaged to releasably hold the operator out of press stopping position, and means on said link engageable with said operator to move same out of engagement with the detent when said detector has been projected without having been stopped by said abutment.

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