JAW ARRANGEMENT FOR PRESS FEED MECHANISMS

Inventors:
Raymond G. Olson
Edward L. Benno

By: Snow and Dunn Allps.
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ABSTRACT OF THE DISCLOSURE

The invention comprises a jaw arrangement for handling strip stock in which a lower base member of the jaw includes a longitudinal piston member, and a longitudinal upper jaw member against which the piston member clamps strip stock is cantilevered over the piston member and is provided with a slot disposed longitudinally thereof and carrying different selected inserts for ideally handling different tapes of strip stock whereby the strip stock is incrementally longitudinally moved transversely of the insert and is periodically clamped between the piston member and the insert.

This invention relates generally to press feed mechanisms, and more particularly to a unique jaw arrangement providing simple and versatile means for gripping many different strip stock materials and permitting such materials to easily slide through said jaw arrangement in the restored or open condition of the jaw arrangement.

The primary object of the present invention is to provide a novel cantilever jaw arrangement for a press feed mechanism for accurately delivering strip stock to a press. An object of the invention is to provide such a jaw arrangement with means for quickly and easily substituting jaw reaction members in the arrangement to permit many different types of strip stock to be efficiently handled by a press feed mechanism including the jaw arrangement. A preferred embodiment of the invention in which it is intended that the present invention be included is shown in U.S. Patent No. 3,125,270, issued Mar. 17, 1964 to Howard W. Ronfeldt. In such a press feed mechanism a cantilevered stationary jaw and a cantilevered movable jaw are provided. The stock receiving jaw openings are aligned in a common plane and a reciprocating cylinder arrangement is connected to the moving jaw to cause the moving jaw to be reciprocatingly moved with its stock receiving opening lying in the mentioned plane. Such a press feed mechanism also includes operating and control means for the stationary and moving jaws, and the cylinder arrangement to cause strip stock to be incrementally moved through the press feed mechanism. This is accomplished by having the stationary jaw operated and clamping the stock when the moving jaw is open and being restored by the cylinder. After the cylinder restores the moving jaw, the moving jaw is operated to clamp the stock and the stationary jaw is opened. The jaws remain in this condition while the cylinder advances the moving jaw in a stock feeding operation. A new cycle begins with the consequent operation of the stationary jaw and the opening of the moving jaw.

From the foregoing it can be appreciated that the stationary and moving jaws not only grip and release the strip stock, but permit it to slide through the jaws in the open conditions thereof. In order that any such jaw arrangement have real utility it is necessary that the jaws properly handle the strip stock. For example, when very soft strip stock is handled they must not be indented or coined. In the handling of highly polished or prepared strip stock materials such as lithographed materials, the jaws must not scratch or otherwise mar the highly finished surfaces. In handling materials requiring high gripping pressures, when for instance the safety of an expensive punch press die is important in regard to slippage, some means must be provided for gripping the stock with a relatively high pressure per unit area to insure against slippage.

The present invention accomplishes the foregoing objects in a novel manner. Other objects and features of the present invention will be apparent upon a perusal of the following specification and drawings in which:

FIGURE 1 is a top plan view of a press feed mechanism including the subject invention;

FIGURE 2 is an enlarged cross sectional view of the structure shown in FIGURE 1 and taken along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged cross sectional view of a portion of the structure shown in FIGURE 1 and taken substantially along the line 3—3 of FIGURE 1;

FIGURE 4 is a bottom plan view of one form of insert member for the subject invention;

FIGURE 5 is an enlarged cross sectional view of the structure shown in FIGURE 4 and taken substantially along the line 5—5 of FIGURE 4;

FIGURE 6 is a bottom plan view of another embodiment of the insert shown in FIGURE 4;

FIGURE 7 is a cross sectional view of the structure shown in FIGURE 6 and taken substantially along the line 7—7 of FIGURE 6;

FIGURE 8 is a bottom plan view of a further enlargement of the insert member shown in FIGURE 4;

FIGURE 9 is a cross sectional view of the insert shown in FIGURE 8 and taken substantially along the line 9—9 of FIGURE 8;

FIGURE 10 is an isometric view of the bottom of still another embodiment of the insert shown in FIGURE 4.

The present embodiments are the preferred embodiments, but it is to be understood that changes can be made in the present embodiments by one skilled in the art without departing from the spirit and scope of the present invention.

For a detailed understanding of the press feed mechanism in which the invention is used, reference is made to the noted Ronfeldt patent. Generally as shown in FIGURE 1, the press feed mechanism comprises a stationary jaw shown generally at 10, and a moving jaw shown generally at 11. The jaws 10 and 11 are carried on spaced apart shafts 12 carried within U-shaped channel members 13. The stationary jaw 10 is secured across the forward ends of the channel members 13. The moving jaw 11 is slidably carried on the shafts 12 within the channel members 13. A plate member 14 is secured to the rearward portions of the channel members 13. The operating and control mechanism for the jaws 10 and 11 is carried in the section 15 rearward of the plate 14.

Brackets 16 are adjustably secured to the channel members 13 and permit the press feed mechanism to be mounted in cooperation with a punch press.

Fluid to operate the stationary jaw 10 is delivered thereto through one of the shafts 12. Fluid for operation of the moving jaw 11 is delivered thereto through the tube 17. The moving jaw 11 is reciprocated by the piston rod 18. A stroke adjustment bar 20 carried on the shafts 12 is provided with locking means for securing the stroke adjustment bar 20 at any selected position on the shafts 12 between the moving jaw 11 and the rear plate 14. The forward limit of the stroke of the movable jaw 11 is determined by its position immediately adjacent to the stationary jaw 10; and the rearward limit of the stroke of the moving jaw 11 is determined by the position of the stroke adjustment bar 20. It thus may be seen that the stroke adjustment bar 20 provides means for varying the increment of strip stock fed during each cycle.
Except for the difference noted above, the stationary and movable jaws 10 and 11 are substantially identical in construction and it will here suffice to merely described the moving jaw 11 in detail. The base member 22 of the moving jaw 11 is generally rectangularly shaped. Each end of the base member 22 is reduced in height and carries a sleeve 23 through which the shafts 12 project. The piston rod 18 is reduced in circumference at its forward end and extends through the base member 22. The extreme end portion of the piston rod 18 is threaded and carries a washer 24 and nut 25. A bumper washer 26 carried on the piston rod 18 absorbs shock when the moving jaw 11 engages the stroke adjustment bar 20.

The upper side of the base member 22 is provided with a longitudinal extending cavity 27. The fluid line 17 is connected into the cavity 27. The upper surface of the base member 22 is provided with a diaphragm 28. The diaphragm 28 is formed of flexible elastomer material. The diaphragm 28 is secured over the cavity 27 by a plate 30. The plate 30 is rectangular and is provided with a rectangular opening therethrough which is slightly larger in area than the area of the cavity 27. A plurality of screws 29 secure the plate 30 to the base member 22. A rectangular piston member 31 having substantially the shape of the opening in the plate 30 is positioned in that opening to rest on top of the diaphragm 28. The piston 31 is slightly thicker than the thickness of the plate 30. It is apparent from the foregoing that if fluid under pressure is directed through the tube 17, the piston 31 will be caused to move upward through the action of the fluid pressure in the cavity 27 on the diaphragm 28. A section of a strip stock is shown at 32 resting upon the piston 31.

The jaw 11 further comprises an upper member 33. The upper jaw member 33 is formed of a substantially rigid material. In order to keep the weight of the jaw to a minimum the base member 22 and the upper jaw member 33 may be cast of a material such as aluminum and alloys thereof. One end of the upper jaw member 33 is secured to one end of the base member 22 by a plurality of fasteners 34. The remaining portion of the upper jaw member 33 extends over the base member 22 in a cantilever fashion. A number of shims 35 are provided between the upper jaw member 33 and the base member 22 for properly spacing the upper jaw member 33 from the piston 31 in the base member 22.

The upper side of the upper jaw member 33 is provided with longitudinally extending ribs to aid in maintaining the upper jaw member 33 rigid. The underside of the upper jaw member 33 in the area thereof which is positioned over the piston 31 is provided with a dovetail slot extending longitudinally thereof and spanning a greater area than the area of piston 31. The various embodiments of the inserts shown at 40, 41, 42, and 43 of FIGURES 4 through 10 are provided for the slot in the underside of the upper jaw member 33. In FIGURES 2 and 3 the dovetail slot is shown as carrying insert 41. Insert 41, or any of the other inserts which may be substituted therefor, is secured in the dovetail slot by a fastener 45 which is threaded through the upper jaw member 33 and engages the insert 41. From the foregoing it is apparent that when the piston 31 is forced upward by fluid under pressure in tube 17, strip stock 32 is projected against the underside of the insert 41 to firmly grip or hold the strip stock.

The insert 41 may be formed of any suitable material, and it may range in hardness from that of hardened steel to a relatively soft elastomer material.

As shown in FIGURE 4 with the insert 40, the surface of the insert which engages the strip stock is shaped to reduce the area of contact with the strip stock to that of a series of small spots. Such a surface configuration of the insert provides for much higher pressures per unit area than that of an insert such as insert 41 while yet maintaining a wide pattern of applied pressure.

In an arrangement such as shown in FIGURES 8 and 9, the stock engaging surface of the insert 42 is provided with diagonally extending grooves. This arrangement provides unit pressures on the strip stock approximately that of the insert 41 while yet effectively permitting any liquid coating to escape from between the insert 42 and the strip stock in operation of the jaw. This arrangement is effective in the feeding of cold strip stock.

In the arrangement of FIGURE 10 the stock engaging surface of the insert 43 is provided by a small button. In comparison to any of the other inserts, this arrangement provides for extremely high unit pressures. In some arrangements the button may be formed of a carbide steel for extreme hardness and excellent wearing characteristics. A contemplated modification of the insert 43 is to provide a threaded hole through an insert such as insert 41 which will be aligned with the threaded hole for the fastener 45. By substituting a faster which is greater in length than the fastener 45 plus the thickness of the insert 41 plus the height of the button of insert 43, that fastener can be threaded through the upper jaw member 33 and the insert 41 to extend below as a stock engaging projection. If that substituted fastener is selected from an extremely hard metal, the advantage of excellent wearing characteristics will also be provided.

From the foregoing description it is apparent that the present invention provides a unique arrangement for the jaws of a press feed mechanism in which the versatility of the jaw arrangement for the handling of different strip stock materials is extremely high and where the adaptation of the jaw arrangement for the handling of those many different materials is extremely simple.

What is considered new and desired to be protected by Letters Patent is:

We claim:

1. In a press feed mechanism having a plurality of fluid operated strip stock handling jaws wherein said jaws are operated and one of said jaws is moved to cause said stock to be incrementally moved through said mechanism, the improvement in said jaws comprising a rectangularly shaped base member having a rectangular fluid operated piston carried longitudinally therein for transverse engagement with strip stock disposed thereon, a rectangular upper jaw member longitudinally aligned over said piston and secured at one end to said base member to cooperate with said piston in a cantilever arrangement, the underside of said upper jaw member being provided with a slot extending from the projecting end of said upper jaw member longitudinally of and over said piston, an interchangeable insert member, said slot being shaped to receive and retain said interchangeable insert member, and means for removably securing said insert member in said slot.

2. In a press feed mechanism as defined in claim 1, wherein the longitudinal side edges of said slot are formed as a dovetail, and the longitudinal side edges of said insert being beveled to cooperate with said dovetail slot.

3. In a press feed mechanism as defined in claim 2, wherein said last mentioned means comprises a fastener threaded through the upper surface of said upper jaw member to engage said insert in a locking arrangement.

4. In a press feed mechanism as defined in claim 1, wherein the underside of said insert is formed of a pattern of relieved areas.

5. In a press feed mechanism as defined in claim 1, wherein the side edges of said insert is formed with oil grooves for the escape of any oil from the surface of said strip stock in a clamping operation of said jaw.
6. In a press feed mechanism as defined in claim 1, wherein the underside of said insert carries a depending strip stock engaging button.

7. An air operated jaw construction for incrementally feeding strip stock to a machine tool comprising a generally rectangularly shaped base cylinder member, a piston cooperating with said base cylinder member and arranged and constructed for vertical movement therein by reason of the admission or exhausting of air to the cylinder, said piston having an upper surface adapted to slidably receive strip stock thereover, a generally rectangularly shaped upper member supported in a position spaced above said base member and lying parallel and in alignment therewith, said upper member having an elongated slot in its lower surface and having lateral undercuts on both sides thereof, and a generally rectangularly shaped interchangeable insert removably mounted in said slot with side extending portions engaging said undercuts and cooperating with said piston member to clamp strip stock therebetween.

8. In a press feed mechanism having a plurality of fluid operated strip stock handling jaws wherein said jaws are operated and one of said jaws is moved to cause said strip stock to be incrementally moved through said mechanism, the improvement in said jaws comprising: a rectangularly shaped base member having a rectangular fluid operated piston carried longitudinally therein for transverse engagement with strip stock disposed thereon; a rectangular upper jaw member longitudinally aligned over said piston and secured at one end to said base member to cooperate with said piston in a cantilever arrangement, the underside of said upper jaw member being provided with a dove-tail slot extending from the projecting end of said upper jaw member longitudinally of and over said piston; an interchangeable insert member removably carried in said slot, said interchangeable insert member having longitudinal side edges beveled to cooperate with said dove-tail slot; and fastener means for removably securing said interchangeable insert member in said slot, said fastener means being threaded through the upper surface of said upper jaw member to engage said interchangeable insert member in a locking arrangement and being further threaded through said interchangeable insert member to depend from the lower surface thereof as a strip stock engaging member.

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RICHARD A. SCHACHER, Primary Examiner