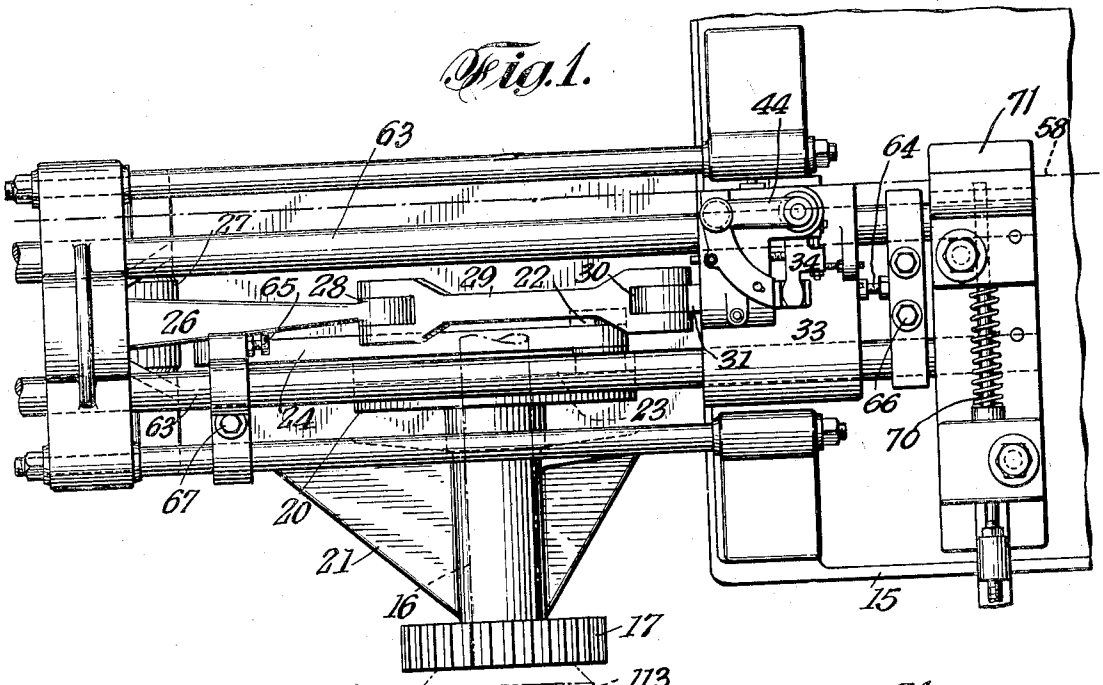
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Fig. 1.



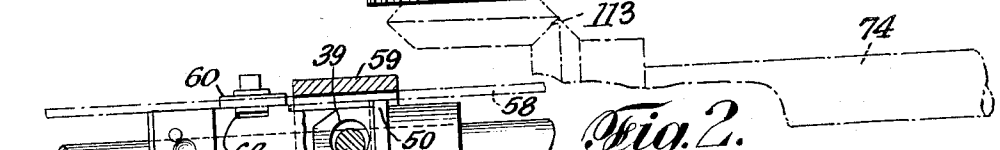


Fig. 2.

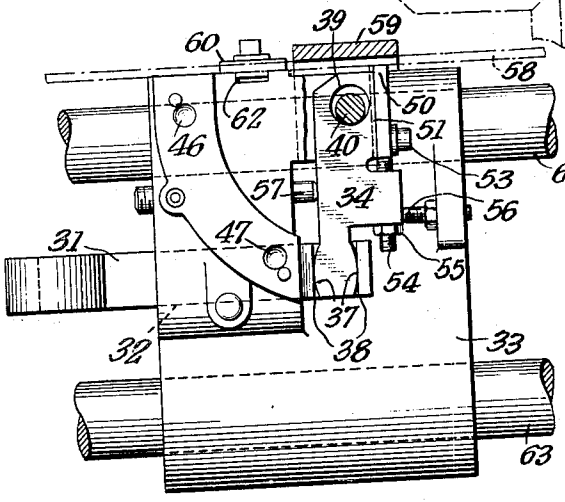


Fig. 3.

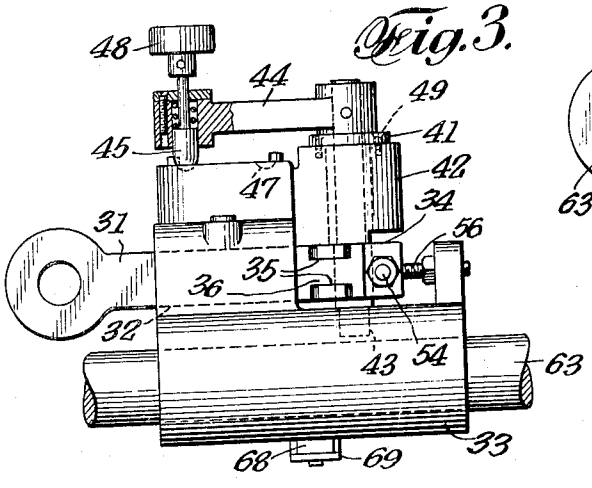
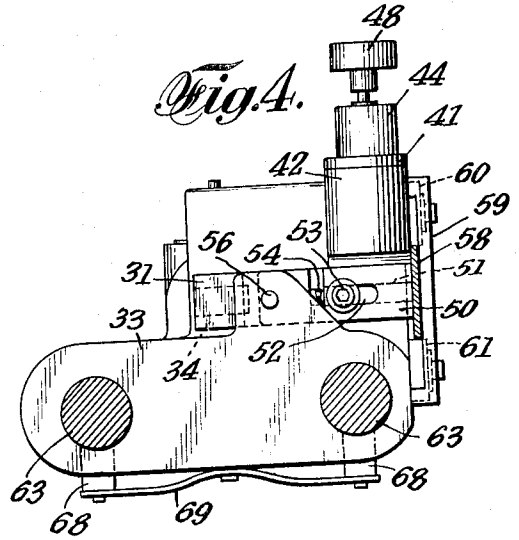


Fig. 4.



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Fig. 5.

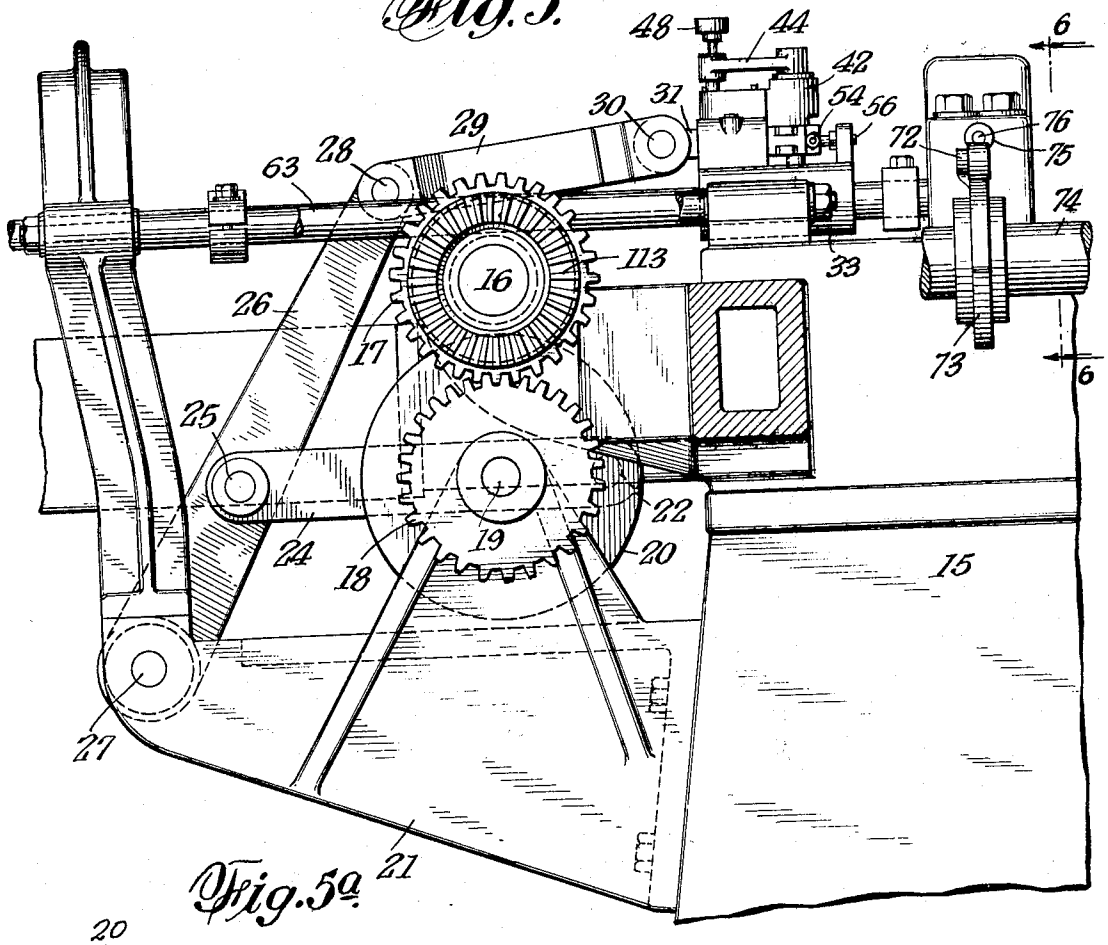


Fig. 5a.

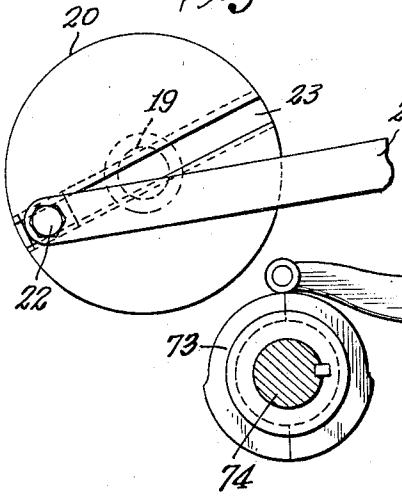
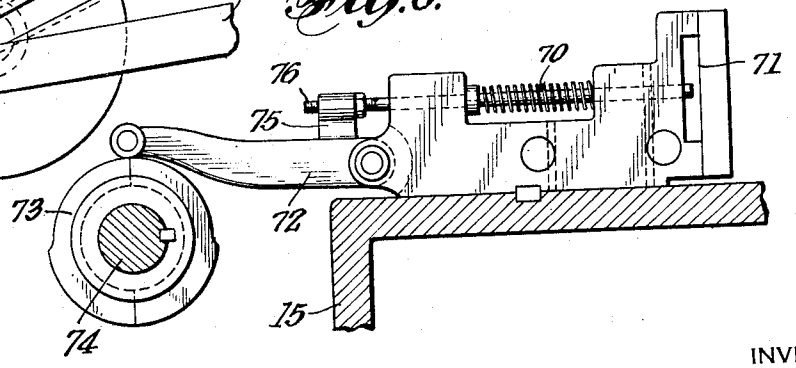


Fig. 6.

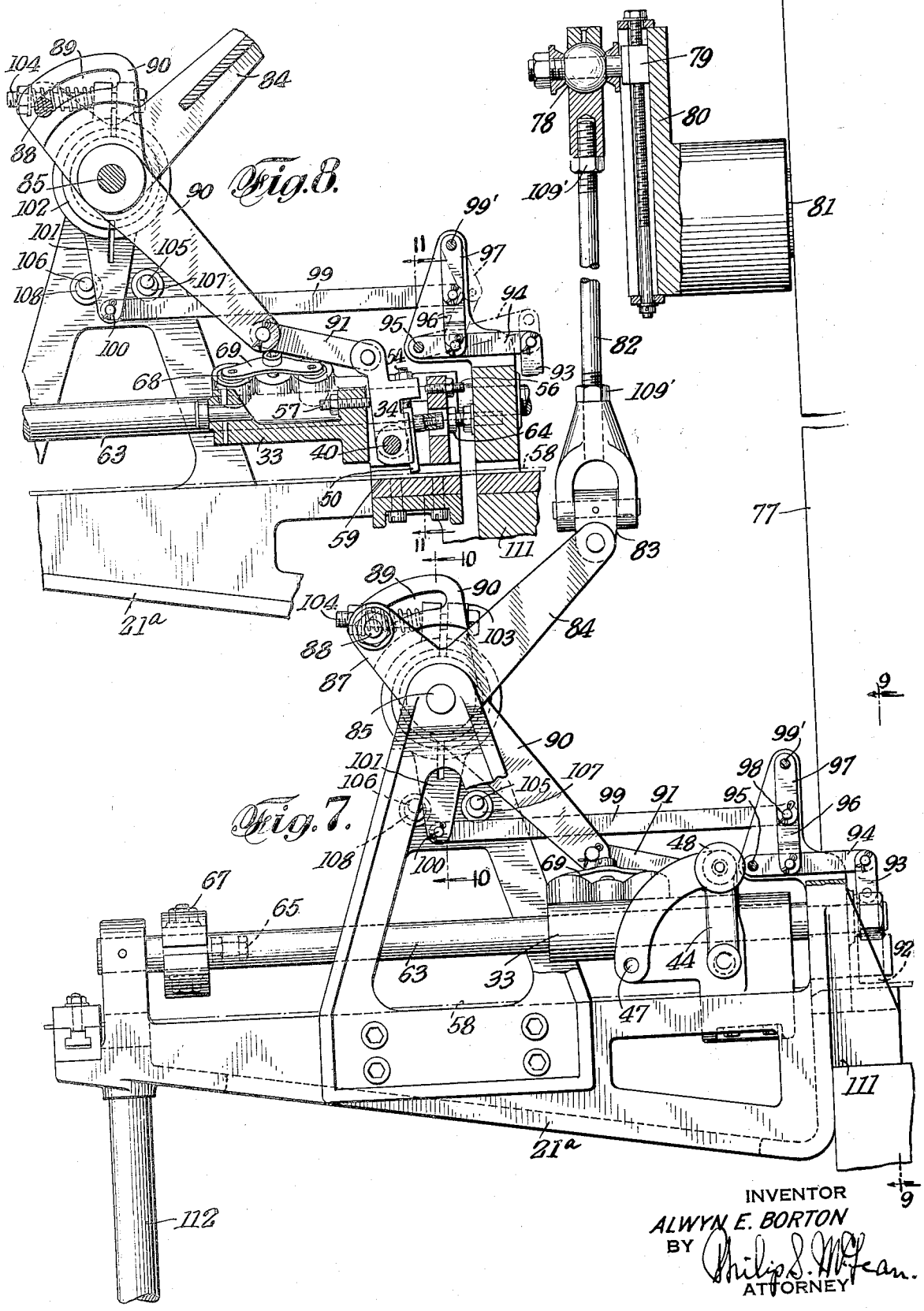


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Fig. 9.

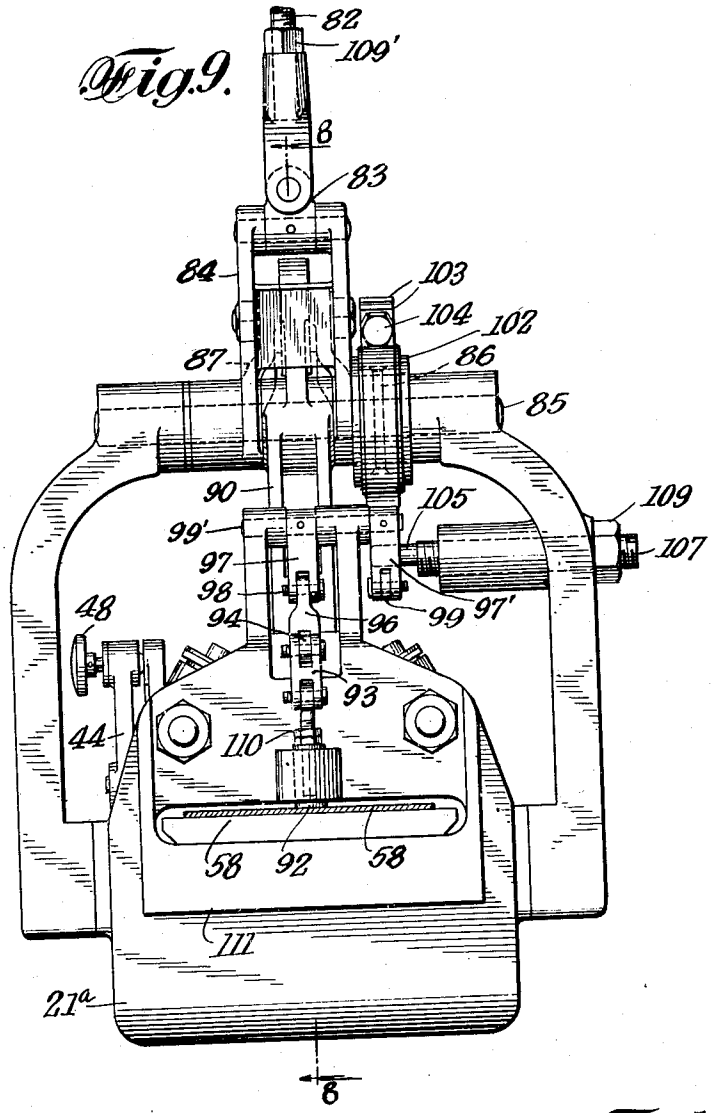


Fig. 10.

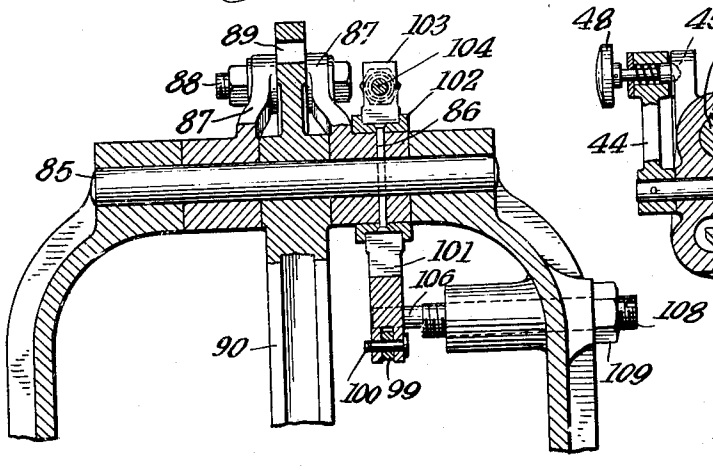
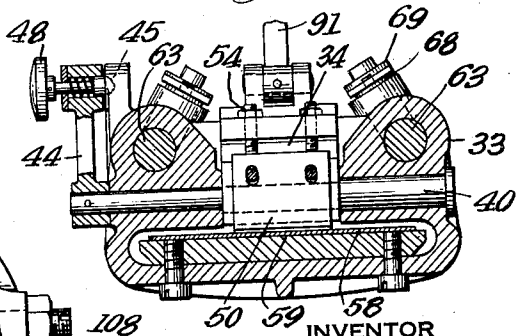


Fig. 11.



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Patented May 22, 1934

1,959,853

UNITED STATES PATENT OFFICE

1,959,853

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Alwyn E. Borton, South Orange, N. J., assignor, by mesne assignments, to Associated Patentees, Inc., Ampere, N. J., a corporation of New Jersey

Application October 18, 1932, Serial No. 638.358

19 Claims. (Cl. 153—2)

This invention relates to the feeding of strip stock and is, in part, a continuation of Patent 1,883,513 of October 18, 1932.

In the patent referred to, the invention is disclosed in conjunction with a metal forming machine known as a "multi-slide", but as the invention is of broader scope, it is disclosed in this case also in its use as a feed for punch presses.

The objects of the invention, stated broadly, have been to provide simple, substantial mechanism for positively feeding strip stock to metal forming machines, punch presses and the like, which would be particularly accurate and reliable in its action, readily adjustable to meet varying requirements and thoroughly practical and efficient in all respects.

These objects have been attained by the novel features of construction, combinations and relations of parts hereinafter disclosed and broadly claimed.

The drawings accompanying and forming part of the specification illustrate different commercial embodiments of the invention and it is to be understood that the structure may be modified and changed in respect to this particular disclosure, all within the true intent and broad scope of the invention.

Fig. 1 is a broken plan view of the feed slide mechanism as applied to and forming part of a multi-slide machine.

Fig. 2 is a broken part sectional plan, illustrating details of the slide on an enlarged scale.

Fig. 3 is a broken and part sectional elevation of the feed slide.

Fig. 4 is an end view of the slide with parts appearing in section.

Fig. 5 is a broken and partly sectional side elevation of the parts shown in Fig. 1.

Fig. 5a is a broken detail view of crank disc 20 and associated parts.

Fig. 6 is a cross-sectional view as on line 6—6 of Fig. 5, showing the intermittently operated grip or "check" for holding the stock upon the return stroke of the feed slide.

Fig. 7 is a broken side elevation of an embodiment of the invention operating in conjunction with a punch press.

Fig. 8 is a broken longitudinal sectional view of the same as on substantially the plane of line 8—8 of Fig. 9.

Fig. 9 is a broken end and part sectional view of the apparatus as taken on substantially the plane of line 9—9 of Fig. 7.

Fig. 10 is a broken cross-sectional detail as on line 10—10 of Fig. 7.

Fig. 11 is a broken cross-sectional detail as on line 11—11 of Fig. 8.

In Figs. 1 and 5, the base portion of the multi-slide machine is shown at 15 and the cam shaft at the entrance end of the machine is indicated at 16. Power for operating the feed slide is taken from this cam shaft by way of a gear 17, on that shaft, meshing with a gear 18 on shaft 19, carrying the slide actuating crank disc 20. Shaft 19 and the various other parts of the slide feed are shown as mounted on a sub-base or frame 21, bolted to the end of the main frame or base of the machine.

For varying the active stroke of the feed slide, the crank pin 22 has a readily adjustable mounting at 23 in the crank disc 20. Connected with this adjustable crank pin is a link 24, pivotally connected at 25 with a rock lever 26, which is pivoted at its lower end on the sub-base or bracket, at 27. To the upper end of the rock lever, there is pivotally connected at 28 a link 29, which in turn is pivotally connected at 30, with one end of a special drag link 31.

As appears more clearly in Figs. 2 and 3, the link 31 has a non-turning longitudinally sliding bearing at 32, in the feed block 33 and is articulated at its forward or inner end to the jaw lever 34. To provide a close positive but free acting joint between the two, the jaw lever is shown as slotted in its end at 35, Fig. 3, to receive the reduced neck portion 36 of the push-pull link 31 and the bifurcated portions of the lever are shown as having rounded bearings 37, Fig. 2, in close rocking engagement with the parallel shoulders 38, at the upper and lower sides of the reduced neck portion of the link.

The jaw lever or grip lever 34 is shown in Fig. 2 as mounted to swing on a bearing 39, formed as an eccentric on the spindle 40. This spindle as will be clear from Fig. 3, is journalled in a bushing 41, set in an upstanding post 42, on the feed block and is stepped at its lower end directly in a bearing 43 in the slide block. The purpose of this eccentric bearing is to enable a quick shifting of the jaw lever into or out of operative relation. A crank handle 44 pinned on the upper end of the bearing spindle provides a means by which the spindle may be turned to throw movable jaw lever into or out of cooperative relation with the companion jaw element, said crank handle having at its free end a spring pressed plunger 45, engageable with locking depressions 46, 47, to hold it in the feed operative or inoperative positions. A knob 48 on the upper end of the spring plunger enables the latter to be easily

withdrawn from the holding recesses and serves as a handle for easily swinging the handle one way or the other.

It will be noted that the rounded bearing connections 37, 38, between the jaw lever and the drag link form a sliding joint enabling the necessary lateral shifting of the jaw lever as the eccentric bearing is turned from one position to the other.

The bearing bushing 41 is of a size larger than the eccentric bearing member 39, so as to enable the insertion of the spindle down in the post 42 and this bushing is held down in its seat by an end screw or screws 49, so that, by engagement at its lower end with the eccentric, it holds the spindle down in place against the uplifting force of the spring detent 45.

The swinging gripping lever 34 carries at its forward side a jaw block 50, Figs. 2 and 4, keyed in the face of the lever at 51 and longitudinally slotted at 52, for the securing bolt 53. For accurate setting of this grip block, an adjustment screw is provided at 54, bearing on the end of the grip block and held by a lock nut 55.

The throw of the stock gripping lever is determined by the adjustable front and back screws 56, 57, which are set to enable the jaw part 50 to firmly grip the stock 58 against the companion fixed jaw plate 59, on the forward rocking movement of the lever and to permit the movable jaw part to fully free the stock on the reverse motion of the lever.

Top and bottom edge gages 60, 61, adjacent the fixed jaw plate 59, are indicated as adjustably mounted at 62, Fig. 2, so as to definitely position the strip for proper engagement by the intermittently acting clamp described.

The feed block 33, which mounts the clamp is arranged to slide on guide rods 63, and these guide rods are further utilized in the illustration for the mounting of the adjustable front and back limit stops 64, 65. As will be seen particularly from Fig. 1, these front and back stops are in the form of adjustable stop screws which can be accurately set for fine adjustments and which, by reason of their adjustable mounting at 66, 67, on the guide rods may be bodily shifted for coarser adjustments.

To insure complete release of the stock at the end of the forward movement of the clamp, the feed slide may be and preferably is, equipped with a friction brake such as illustrated in Figs. 4 and 5, and comprising sliding brake shoes 68, in the bottom of the slide block yieldingly pressed upwardly by spring 69, against the guide rods 63. This brake causes the slide to momentarily rest at the end of its forward stroke, so that the push pull link 31 as it starts back, will rock the lever 34 and thus pull the movable jaw of the clamp open at the commencement of the back stroke of the crank actuated lever 26. At the end of the back stroke, the brake has the effect of holding the slide block when the sliding link 31 reverses its movement to rock the jaw closed against the stock at the proper instant at commencement of the feed stroke. Accordingly, the stock is immediately released at the end of the forward feed stroke and is positively and firmly gripped at the proper moment in the commencement of the feed stroke, this insuring consistent accurate feeding of the stock.

To definitely hold the stock in the position to which it is advanced by the feed slide, there is preferably provided a "check", shown in the form of a spring retracted plunger 70, at one side of the feed line for gripping the stock against the face of a guide plate 71, at the opposite side of the feed line, Figs. 1 and 6. This plunger is forced forward at the proper time, that is, at the end of the feed stroke, by a bell crank 72, having a long arm actuated by a cam 73, on the front cam shaft 74 of the machine and carrying in its shorter upstanding arm 75, an adjustable abutment in the form of a screw 76, positioned to engage the end of the check plunger.

The form of the invention illustrated in Figs. 8 to 11, is generally similar to that described, for which reason, similar reference characters have been used so far as possible.

In the views referred to, the feeding-in side of a punch press structure is indicated at 77 and power for operating the slide is taken from a ball crank pin 78, adjustably mounted at 79, on a crank member 80, carried by the cam shaft 81 of the press.

The crank 78 is connected by link 82, through universal joint 83, with the ends of companion levers 84, pinned on the rock shaft 85, at 86, Fig. 10 and having angularly projecting arms 87, carrying the clamping bolt 88, which passing through slot 89, serves to adjustably couple bell crank levers 84, 87, to the intermediate swinging lever 90. The latter is rotatably adjustable on the rock shaft 85, Fig. 10 and extends down below said rock shaft, where its lower end is connected by pivot link 91, directly with the rocking jaw lever 34.

The feed slide may be variously set by adjustments of the variable throw crank 78 and by proper setting of the connection at 88 and 89, between bell crank levers 84, 87 and the swinging slide operating lever 90.

The check for preventing retrogressive movement of the stock advanced by the feed slide consists in this instance, of a vertically operating clamp plunger 92, overstanding the stock 58 and connected by swinging link 93, to one end of a lever 94, pivoted at 95 and supported by the pivoted toggle links 96, 97, the latter breaking at the elbow 98 or intermediate joint of the same by reason of the push pull link 99, connected by a rock arm 97', Fig. 9, with rock shaft 99' forming the upper joint of the toggle. The link 99 is pivotally connected at its opposite end at 100 with the lower end of a rocking lever 101, frictionally coupled to the rock shaft 85. The friction coupling is provided in the present disclosure through a friction bushing 102, held on the shaft by the cross pin 86, Fig. 10 and on which is engaged the split portions 103 of lever 101. A screw bolt 104 connecting these split portions may be adjusted to determine the frictional grip of the lever on the rock shaft.

The throw of the friction-coupled lever 101 is determined in the illustration by the front and back stops 105, 106, which are shown in the shape of pins eccentrically formed on the inner ends of screw bolts 107, 108. These bolts when rotatively adjusted may be secured by suitable lock nuts as indicated at 109 in Figs. 9 and 10.

In the illustrations, Figs. 7 and 8, the feed slide is started back on its return stroke, the jaw lever being rocked to free the stock and the toggle levers 96, 97, straightened out to force the holding clamp 92 down against the stock. During this movement, the friction operated lever 101 remains stationary, resting against the back stop 106, or held in an intermediate position by engagement of the clamp plunger against the material. On reversal of movement at the end of

the return stroke, the friction lever 101 starts back with the rock shaft, thus releasing the checking grip on the stock as the feed clamp takes hold to advance the next section of stock. In this advance stroke, the friction connected lever comes to rest against the forward stop 105 and remains so during the remainder of the feed stroke, with the check grip thus released from the stock.

By adjusting the throw of the crank 78, the length of the feed stroke may be varied and by varying the connection 88, 89, between the rock lever 84 and the slide actuating lever 90, the position of the feed slide may be varied, so as to come into action at different positions on the guide rods. By adjustment of the frictional grip of the split lever 101 on the rock shaft and by proper setting of the stops 105, 106, the action of the check may be set to suit different requirements. The connecting rod 82 is shown in Fig. 7 as adjustable at its opposite ends at 109' and this enables further regulation in the positioning of the slide on its guide rods. The toggle levers 96, 97, enable a quick positive operation of the check 92 and the latter as shown at 110 in Fig. 9, is readily adjustable for different thicknesses of material. The base or frame 21a may be suitably joined to the press, for example, as shown by providing it with an angled portion 111, Fig. 7, which fits over the corner of the table of the press, the outstanding portion of the base being supported by a suitable stand 112.

In the first form of the invention illustrated, it is to be noted that the shaft which operates the advanced-stock gripping device, that is the front cam shaft 74, Fig. 1, is directly geared at 113, to the end cam shaft 16, which actuates the feed slide and this immediate connection between the two shafts insures the necessary accuracy in the timing of these co-acting mechanisms.

What is claimed is:

1. In a machine of the character disclosed, the combination of mechanisms for operating on strip stock, intermittently operating strip feeding means and an intermittently operating strip holder comprising a reciprocating plunger, a fixed support against which the stock is gripped by said plunger, a bell crank having one arm arranged to operate said plunger and a cam operating on the other arm of said bell crank, a common support for all said parts and a separate base for said strip holder adjustably and removably mounted on said common support.

2. In a machine of the character disclosed, the combination of a reciprocating feed block having a back support for the stock to be fed, a feed lever pivotally mounted on said feed block, a jaw part carried by said pivoted lever for cooperation with the back support to clamp the stock in the pivotal movement of the lever in one direction, a slide link mounted to slide in the feed block in the direction of reciprocating movement of said feed block and connected with said lever to rock the same in opposite directions and means for reciprocating said slide link to rock the lever and thereby to reciprocate the feed block.

3. In a machine of the character disclosed, the combination of a reciprocating feed block having a back support for the stock to be fed, a feed lever pivotally mounted on said feed block, a jaw part carried by said pivoted lever for cooperation with the back support to clamp the stock in the pivotal movement of the lever in one direction, a slide link connected with said lever to rock the same in opposite directions, means for reciprocating said slide link to rock the lever and thereby to reciprocate the feed block and adjustable stops on the feed block for predetermining the swinging movement of the lever in both directions.

4. In a machine of the character disclosed, the combination of a reciprocating feed block having a back support for the stock to be fed, a feed lever pivotally mounted on said feed block, a jaw part carried by said pivoted lever for cooperation with the back support to clamp the stock in the pivoted movement of the lever in one direction, a slide link connected with said lever to rock the same in opposite directions and means for reciprocating said slide link to rock the lever and thereby to reciprocate the feed block, said jaw part comprising a clamp plate and means adjustably securing said clamp plate on one side of the lever in opposition to the back support.

5. In combination, a feed slide, a stock gripping clamp carried thereby actuating means for reciprocating said slide and including a connection with the clamp for effecting stock gripping and stock releasing movements of the same on the reversal of movements of the slide and brake means for holding the slide in the periods of movement reversal, while such operations of the clamp are being effected.

6. In combination, a feed slide, a stock gripping clamp carried thereby, actuating means for reciprocating said slide and including a connection with the clamp for effecting stock gripping and stock releasing movements of the same on the reversal of movements of the slide, brake means for holding the slide in the periods of movement reversal, while such operations of the clamp are being effected, said brake means including a spring pressed brake shoe and a guide for the slide engaged by said brake shoe.

7. In combination, a reciprocating feed member, an oscillating feed clamp on said feed member, reciprocating actuating means connected with said oscillating feed clamp and means for varying the oscillating arc of the feed clamp to render the latter operative or inoperative with relation to the stock to be fed.

8. In combination, a reciprocating feed member, an oscillating feed clamp on said feed member, reciprocating actuating means connected with said oscillating feed clamp, means for varying the oscillating arc of the feed clamp to render the latter operative or inoperative with relation to the stock to be fed and including a bearing for the oscillating feed clamp and a shiftable eccentric mounting for said bearing.

9. In combination, means for intermittently advancing strip stock, intermittently acting means for holding the stock advanced by the first means and driving connections between the two means, including frictionally connected parts operable in reverse directions.

10. In combination, a rocking member, a stock feeding device operated therefrom, an advanced stock gripping device and an actuating lever for the latter having a frictional mounting on said rocking member.

11. In combination, a rocking member, a stock feeding device operated therefrom, an advanced stock gripping device, an actuating lever for the latter having a frictional mounting on said rocking member and stop means adjustable to limit the turning movement of said frictionally mounted lever with said rocking member.

12. In combination, a stock feeding device, a rocking lever connected to reciprocate the same, a rocker for actuating said lever and slotted con-

necting means between said rocker and lever adjustable to vary the stroke imparted to said reciprocating feed device.

13. In combination, a stock feeding slide, a rock shaft, a lever angularly adjusted on said shaft and connected to reciprocate said slide, a rock arm on the shaft and adjustable slotted connecting means between said rock arm and angularly adjustable lever.

14. In combination, a feed slide, a rock shaft, rocker arms on said shaft, a lever positioned between said rocker arms and connected to actuate the slide and variable connecting means between said rocker arms and said lever positioned between the same.

15. In combination, a feed slide, a work holding clamp, a rock shaft, a rocker arm carried by said shaft, a slide actuating lever mounted on the shaft and having a variable connection with the rocker arm, a friction bushing on the rock shaft, a lever frictionally engaged on said bushing and actuating connections from said frictionally mounted lever to said work holding clamp.

16. In combination, a pair of parallel guide rods, a feed slide reciprocating on said guide rods, a rocking stock gripping clamp mounted on said slide between said guide rods, and actuating means for reciprocating said slide and including a connection with the clamp operating in a plane between said guide rods for effecting stock gripping and stock releasing movements of the clamp in the reverse directions imparted to the slide through said clamp.

17. In combination, a reciprocating feed member, a shaft mounted for rocking adjustments on said feed member, an eccentric bearing on said shaft, an oscillating feed clamp mounted on said eccentric bearing, means by which said shaft may be rocked one way or another to vary the position of said eccentric bearing, and actuating means connected with said oscillatingly adjustably mounted feed clamp.

18. In combination, a reciprocating feed member, a clamp supporting shaft mounted for rocking adjustments on said feed member, an eccentric bearing on said shaft, an oscillating feed clamp mounted on said eccentric bearing, means by which said shaft may be rocked one way or another to vary the position of said eccentric bearing, actuating means connected with said oscillatingly adjustably mounted feed clamp, said clamp supporting shaft having concentric end portions journalled in the feed member and the eccentric bearing for the clamp being disposed intermediate said supported concentric end portions.

19. In combination, a reciprocating feed slide, a clamp lever mounted to rock thereon, an adjustable rocking clamp jaw slidably mounted on said lever, a fixed jaw on the feed slide in opposition to said adjustable rocking jaw, screw means on the clamp lever for shifting said adjustable jaw toward the fixed jaw, screw means for locking said adjustable jaw in the position of adjustment on the clamp lever and an eccentric bearing for the clamp lever adjustable on the feed slide to vary the relation of the jaw members independently of adjustments of the adjustable jaw on the clamp lever.

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