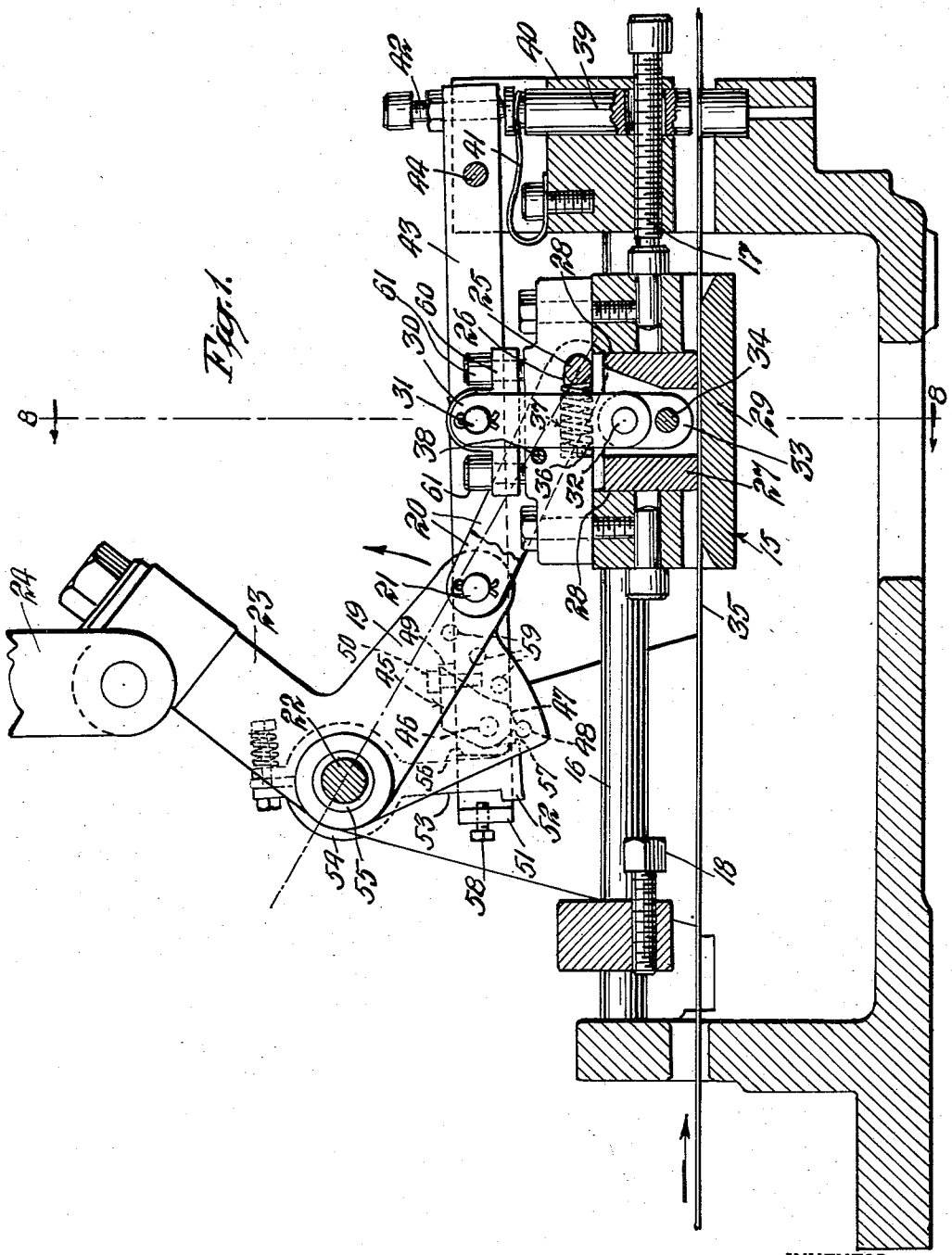
Aug. 20, 1957 W. P. POWERS 2,803,456

SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

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Fig. 1.



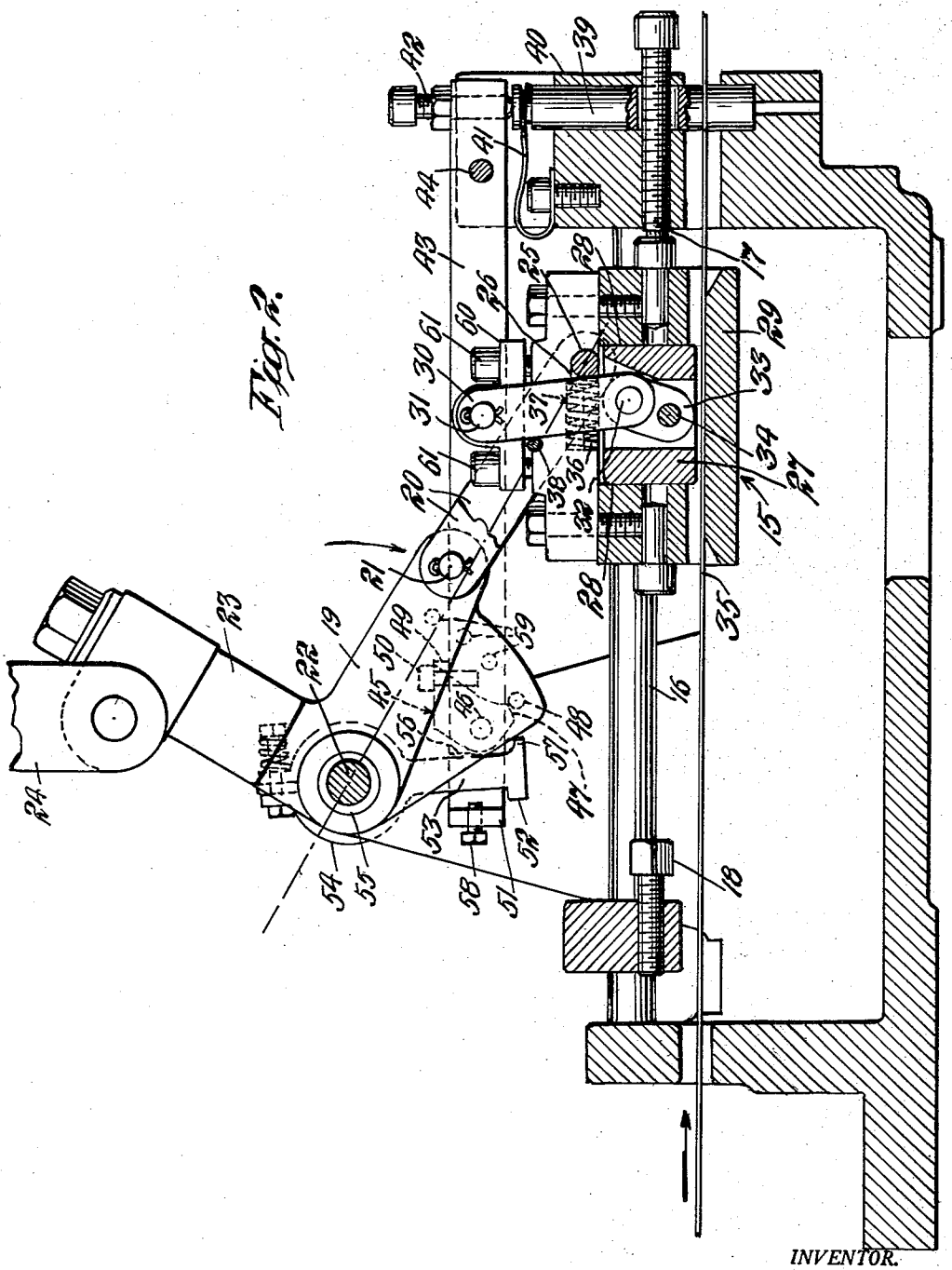
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SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

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Fig. 2.



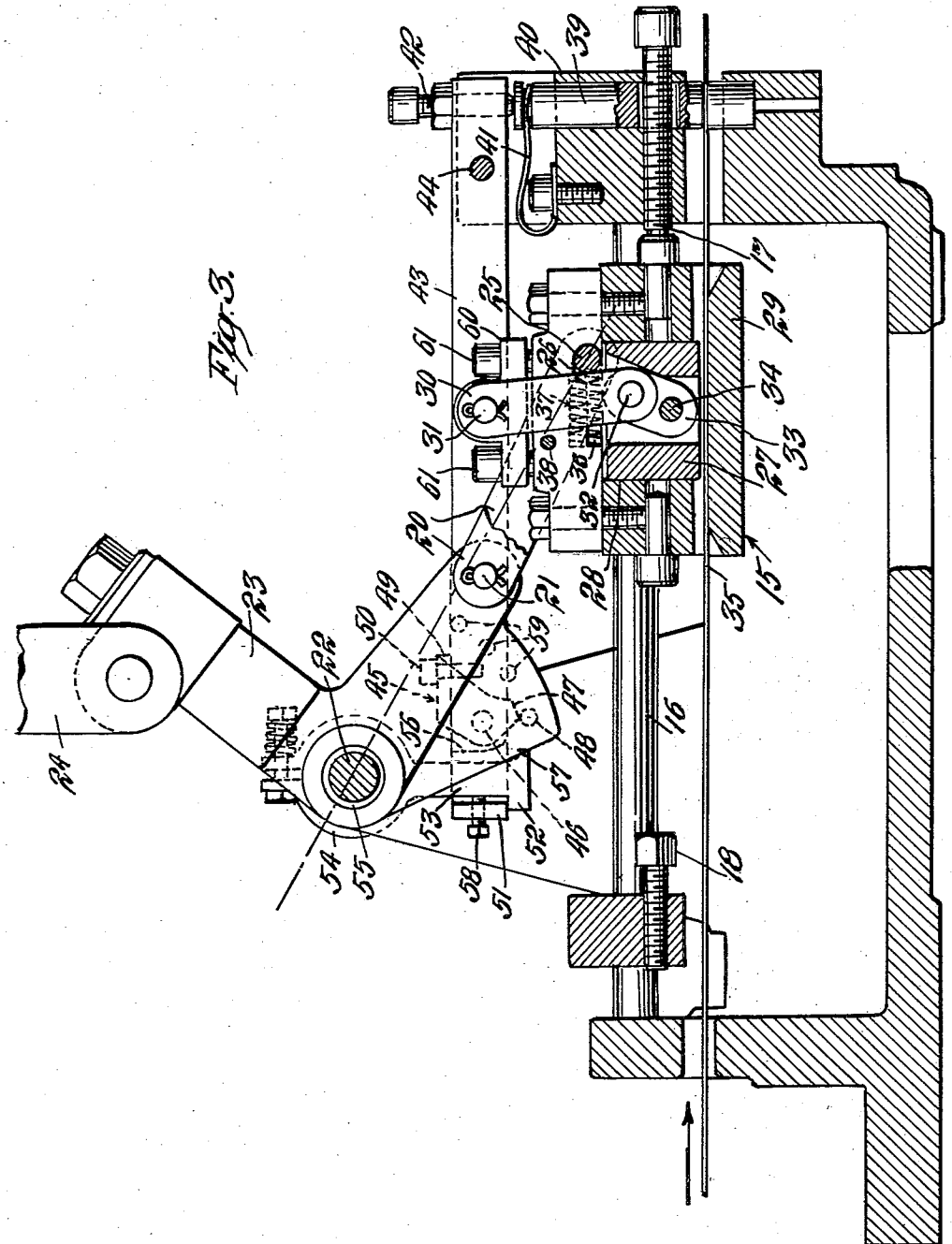
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SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

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Fig. 3.



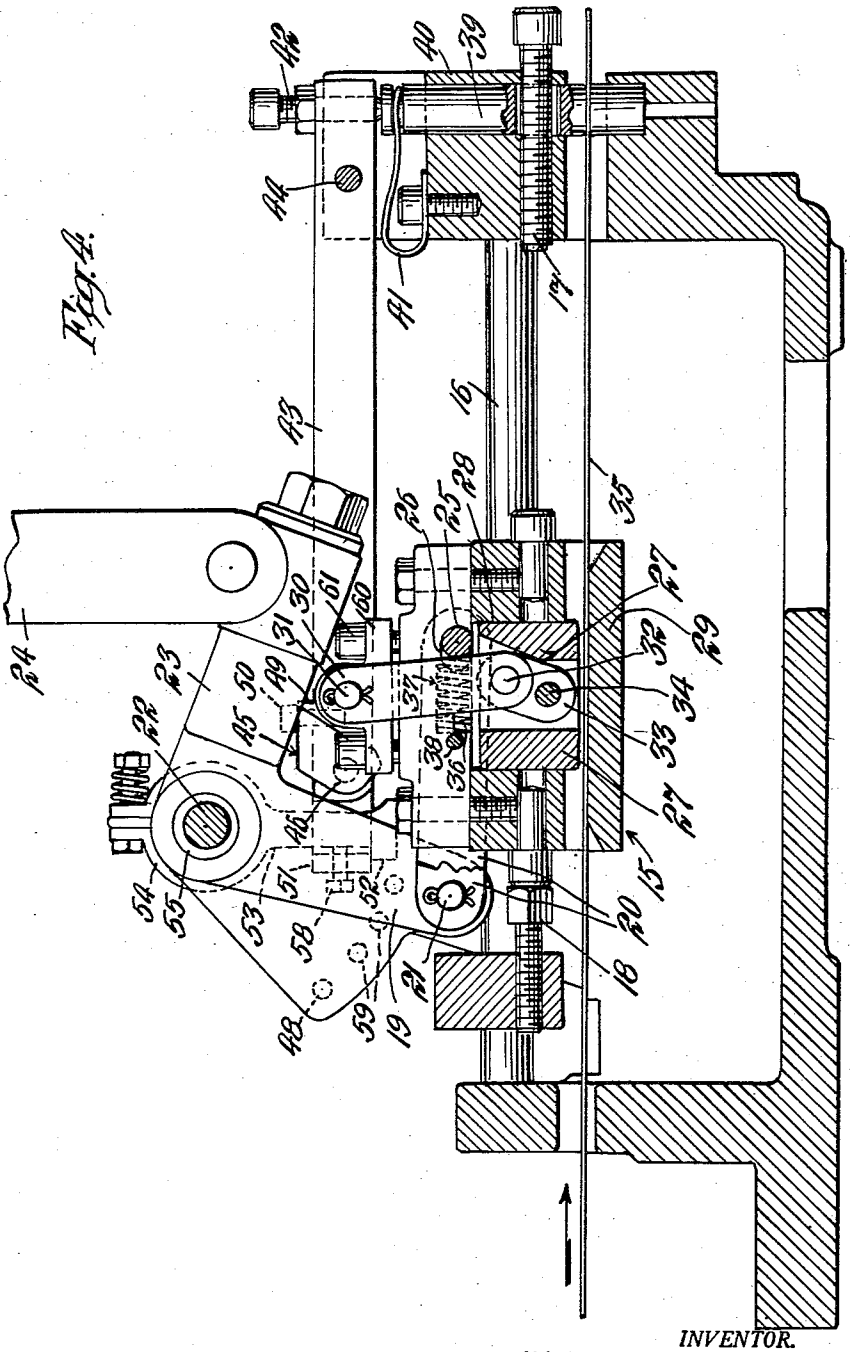
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SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

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Fig. 4.



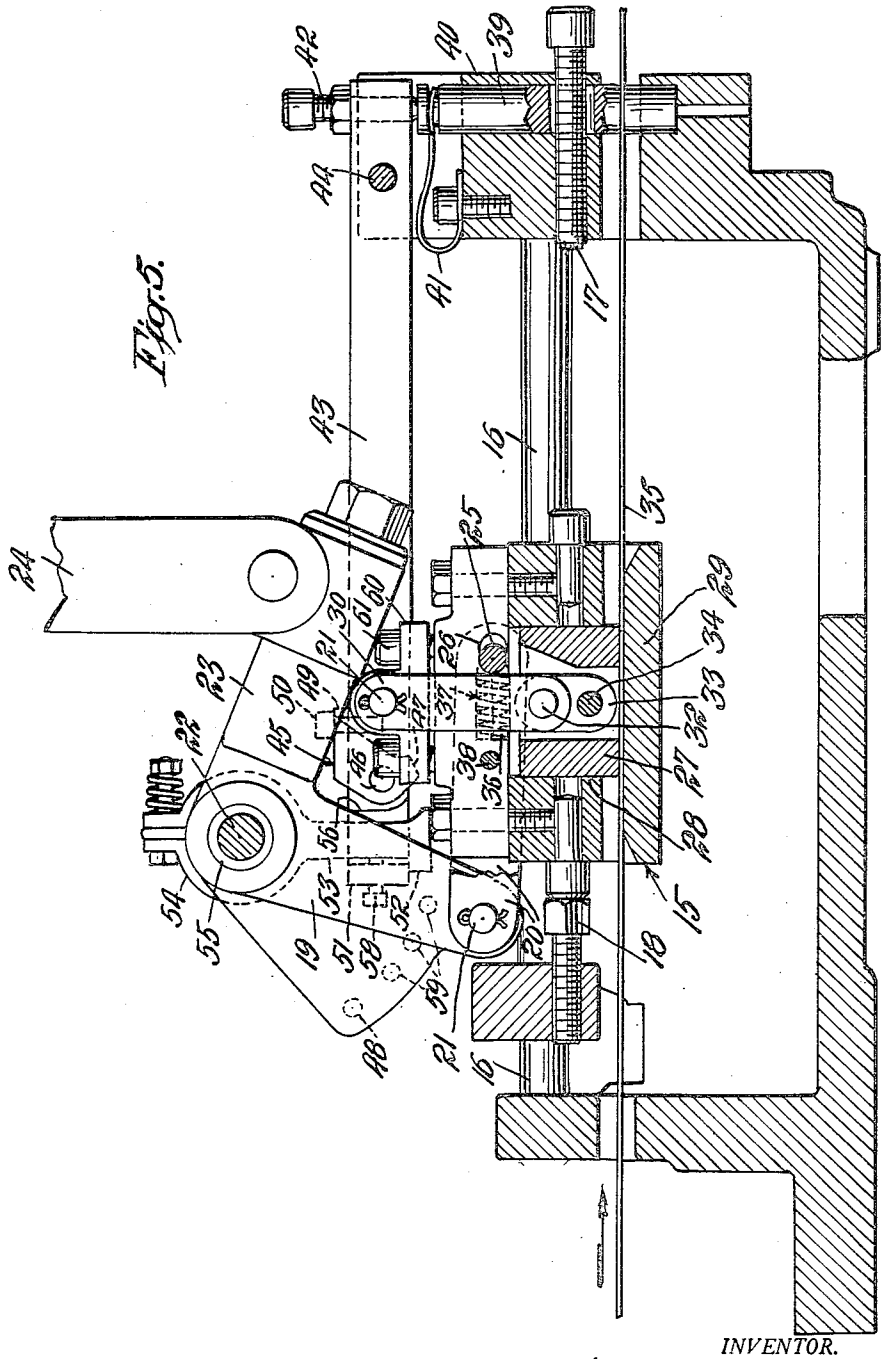
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SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

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Fig. 5.



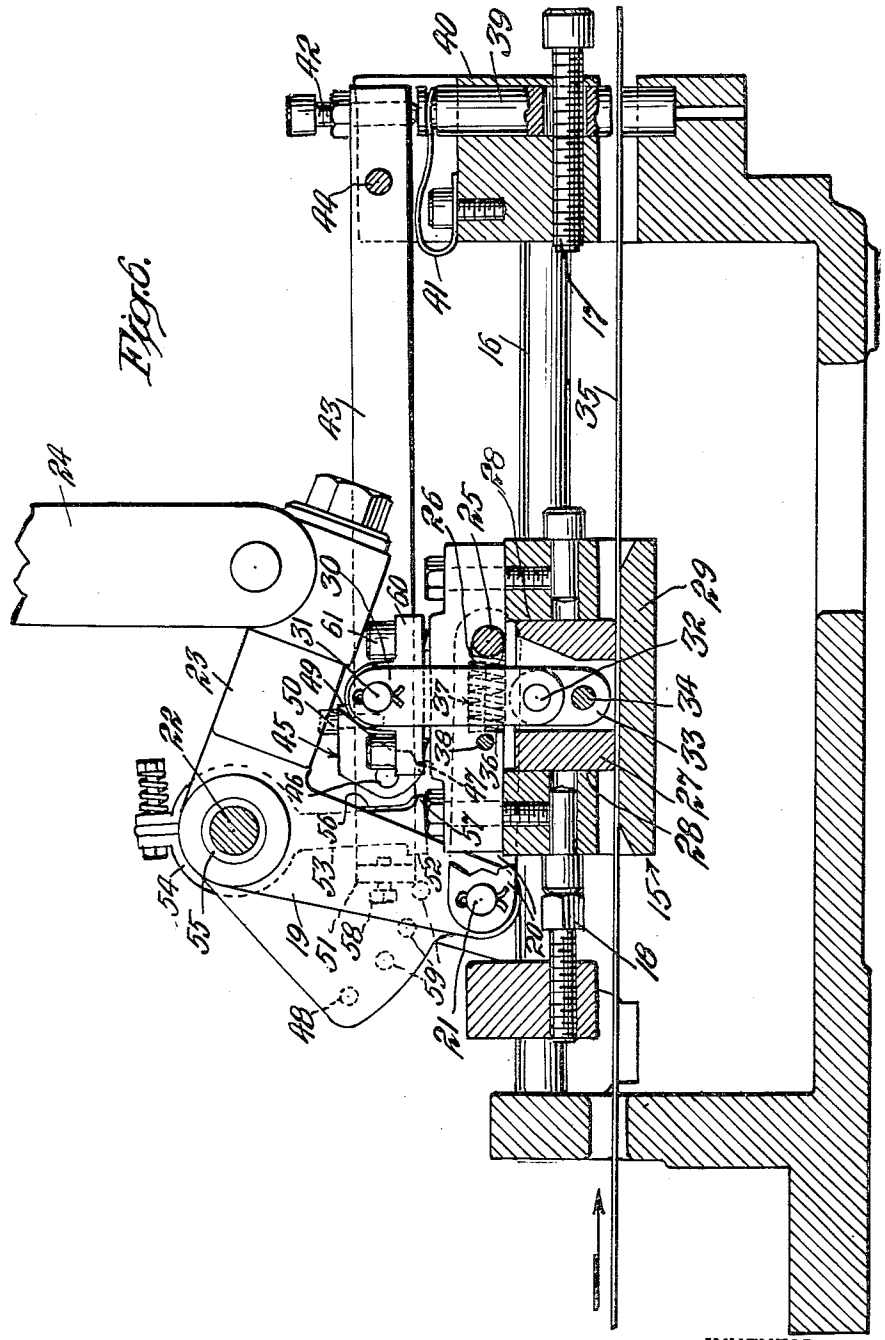
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SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

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Fig. 6.



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SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

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Fig. 7.

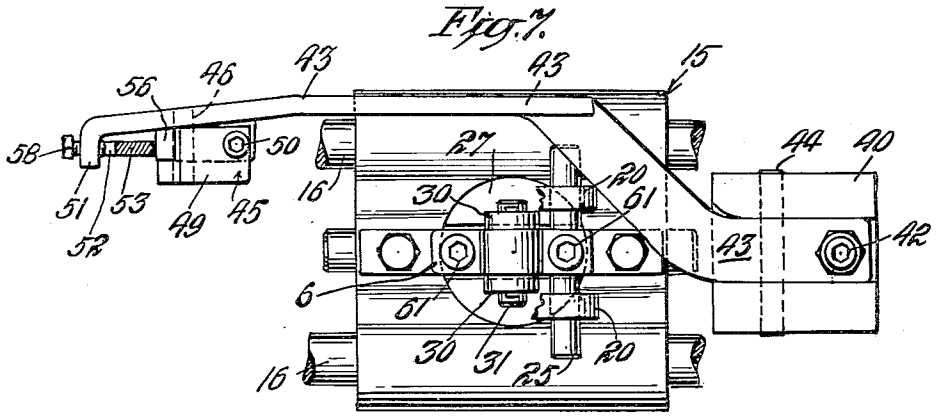


Fig. 8.

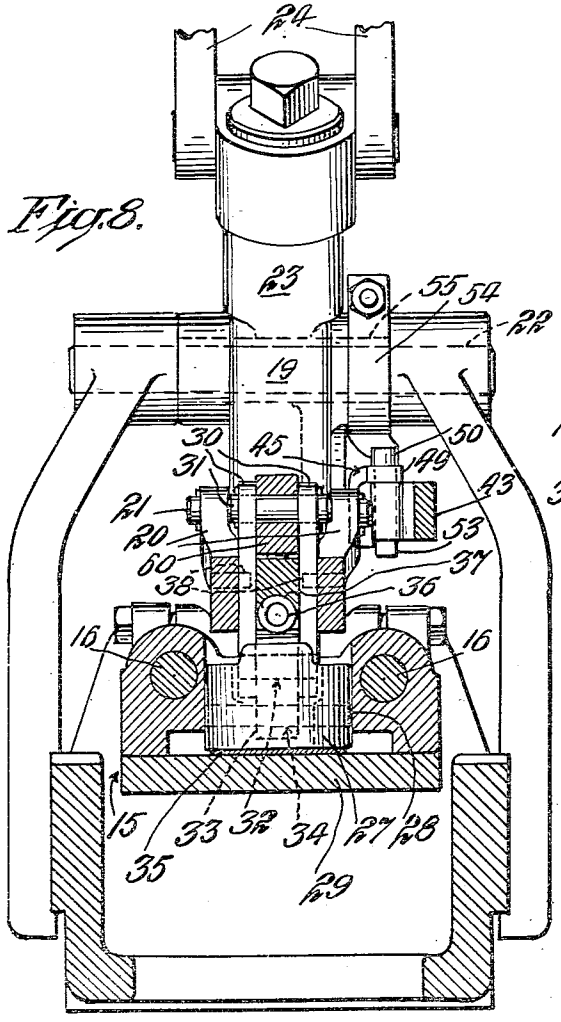
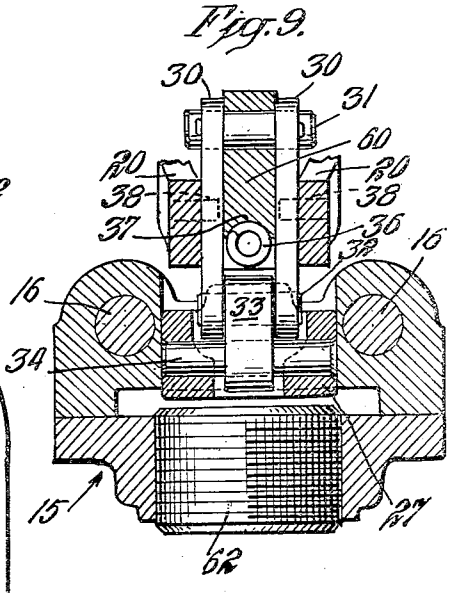


Fig. 9.



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United States Patent Office

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2,803,456

SLIDE FEED WITH TOGGLE ACTUATED GRIPPER

Walter P. Powers, Spring Lake, N. J., assignor to C. Todd, Rutherford, N. J., as trustee

Application October 18, 1955, Serial No. 541,221

8 Claims. (Cl. 271—2.5)

The invention herein disclosed relates to slide feeds.

Objects of the invention are to accomplish accurate, uniform feed of stock; to effect firm, positive gripping of the stock without indenting or marring the same; to check the stock against retrograde movement and to hold the stock under full control at all times.

These and other desirable results are attained by employment of a toggle actuated form of gripper and by correlating this with the stock check so that at the end of the feed stroke the stock check takes hold when or before the gripper lets go and so that at the end of the recovery stroke the gripper takes hold when or before the check releases its hold on the stock.

This timing of gripper and check is effected by employing a toggle for shifting the slide block which carries the gripper and operating it to substantially fully straightened condition and possibly slightly beyond dead-center, providing a slight dwell or time interval in which the slide block is at rest for effecting the correlated opening and closing actions of gripper and check.

Another important feature of the invention is the choice of operating the slide feed either with or without a pilot. In a preferred form the mechanism may include a special cam which when a pilot is employed, may be set to permit momentary release of the stock while the piloting step is being effected.

Other important features of the invention and desirable results attained with the invention are set forth and will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate a present commercial embodiment of the invention. Structure, however, may be modified and changed as regards the immediate illustration, all within the true intent and broad scope of the invention.

Fig. 1 in the drawings is a broken front elevation of the slide feed with parts appearing as at the end of the forward feed stroke up against the front stop, the toggle actuating the slide block shown as having reached substantially straightened position, the toggle for the gripper shown in the straightened, gripper-closed position and the check open, clear of the stock;

Fig. 2 is a similar view showing the feed toggle advanced slightly past dead-center to "break" the gripper toggle and to lift the check closing lever, the slide block then at rest against the front stop with gripper released from and check closed on the stock;

Fig. 3 is a similar view showing the feed toggle started on the return stroke and having passed back over dead-center sufficiently to rock the support for the check closing lever into position for holding the check closed during the recovery stroke, just starting, of the slide block;

Fig. 4 is a broken front view showing parts at the end of the return stroke with the block up against the back stop, with gripper open and check closed on the stock;

Fig. 5 is a like view showing how with slight further backward movement, compressing a recovery spring, the feed toggle straightens the gripper toggle to close the

gripper on the stock while the check is still closed on the stock and the block is stationary against the back stop;

Fig. 6 is a like view showing the feed toggle started on the forward feed stroke with straightening pressure on the gripper toggle released and the check closing lever dropped to open the check;

Fig. 7 is a top plan view of the slide block and stock-check;

Fig. 8 is a cross-sectional view on substantially the plane of line 8—8 of Fig. 1;

Fig. 9 is a cross-sectional view of a modified form of the invention, in which adjustment for thickness of stock is effected at the bottom instead of at the top of the slide block as first shown.

In the several views the slide block is indicated at **15**, riding on guide rods **16** between front and back stops **17**, **18** and reciprocated in opposite directions by a toggle made up of levers **19**, **20** pivoted together at their meeting ends at **21**, the first lever being the lower arm of a bell crank fulcrumed at **22** and having an upper arm **23** usually connected by a link **24** with an operating crank or eccentric on the press or other machine with which the slide feed is used, the other lever **20**, consisting of parallel links carrying at the free end a cross-pin **25** extending through a slot or oversize opening **26** in the block.

A special feature of this oscillating toggle, as in the companion copending applications Serial No. 442,699, filed July 12, 1954, now Patent No. 2,721,649, October 25, 1955, Serial No. 506,141, filed May 5, 1955 and Serial No. 541,253, filed October 18, 1955, is that it is designed, as shown, to complete the feed stroke substantially as it reaches the straightened condition and thus to allow for a certain limited amount of motion or overthrow past or in the region of dead-center which can be utilized to effect a desirable coordination of stock gripper and stock check while the block is at rest against the stop.

The feed gripper is shown as a plunger **27** operating in a vertical guideway **28** in the top of the block in cooperative gripping relation to the anvil or bottom plate **29**.

This gripper plunger is operated by a toggle made up of upper parallel toggle links **30** pivoted at their upper ends on the block at **31** and pivoted at their lower ends at **32** to the upper end of a toggle link **33** pivoted to the plunger by a cross-pin **34**.

This gripper toggle is arranged in the straightened or slightly past dead-center position shown in Fig. 1, to hold the plunger in gripping engagement with the stock **35** and in the broken position, Fig. 2, to fully release the stock.

A coil spring is shown at **36** seated in a horizontal bore **37** in the block and acting against cross-pin **25** to normally hold the same at the forward end of the slot **26**, as in Fig. 1.

The gripper toggle is actuated from the feed toggle, in the gripper opening direction, by cross-pins **38** on the links **20** and disposed at the back of the gripper toggle links **30** and, in the gripper closing direction, by the pin **25** which extends across the front of the upright parallel links **30**.

The stock check is shown as a plunger **39** guided for vertical movement in the base or frame **40** of the machine at a point adjoining the front stop, lifted by a spring **41** and adapted to be closed down on the stock by abutment screw **42** in the end of the check closing lever **43** pivoted on the base at **44** and carrying at its free end lifting and supporting lugs cooperative with elements of the oscillating feed toggle.

The lug by which check closing lever **43** is lifted is designated **45** and is shown as a small plate pivoted on the lever at **46** and having an inclined cam face **47** on the lower edge thereof engageable by a lifting pin **48** on toggle lever **19**.

This cam plate, by reason of its pivotal mounting on

the lever, may be operated as a ratchet to lift and pivot freely on the upward counter-clockwise movement of pin **48** and on the reverse clockwise movement of this pin, to hold and serve as a cam for lifting lever **43**. This ratcheting action is utilized when the slide feed is operated with a pilot, the free lifting of the cam giving time for the pilot to engage and center the stock and after this is accomplished, the reverse movement of pin **48** will then, operating on cam **47**, lift the lever to close the check on the stock.

Fig. 7 shows the cam plate **45** as having an angular flange **49** at the top which reaches over the upper edge portion of the lever on which the plate is mounted to limit downward movement of the cam plate and render this plate rigid under the clockwise movement engagement of pin **48**.

For the usual pilotless operation of the slide feed the cam plate is fixedly secured on the lever by a screw **50** extended down through the stop flange **49** into the body of the lever. This screw remains in place while the machine is operated without a pilot and is removed or sufficiently released to permit rocking action of the cam plate when pilot action is in use.

The lug for supporting check lever **43** in the check closed condition is shown as an angularly extended piece **51** on the free end of the lever located for engagement by a laterally projecting shoulder **52** on the lower end of lever **53** having a friction band mounting **54** on the hub portion **55**, Fig. 8, of the rocking bell crank toggle member **23**.

The upright shoulder **56** on lever **43** limits rocking movement of the frictional lever **53** in the right-handed or counter-clockwise direction, Figs. 1 and 6, and a shoulder **57** at the right-hand side of this lever is engageable by the shoulder **56** of lever **43** to limit the drop or check opening movement of this lever.

A stop screw **58** extending through the supporting shoulder **51** on the end of the lever limits the left-handed movement of friction lever **53**, Fig. 3, and thus can be set to determine the extent of engagement of the lever supporting shoulders **52** and **51** to time the stock check action.

The upper or live toggle lever **19** is shown as extended in the nature of a quadrant so as to carry the check lever lifting pin **48** in proper position to engage the cam on that lever, and the thus extended toggle lever is further shown as carrying an arcuately arranged series of screw openings **59** for the lift pin, providing timing adjustment for setting this pin to operate the check lever either sooner or later in the stock feeding cycle.

Adjustment for thickness of stock is effected in the first illustrated form of the invention, Figs. 1 to 8, by mounting the upper toggle pin **31** in a bridge or bracket **60** adjustable vertically on the block by hold-down screws **61**. This top adjustment is convenient but for some purposes bottom adjustment may be preferred.

Fig. 9 illustrates a form of the latter in which the bottom plate is replaced by a vertically adjustable anvil plug **62** screwed in the bottom of the slide block. A lock screw or the like may be provided for securing this anvil plug in any vertically adjusted position.

Operation

Fig. 1 shows the feed toggle **19, 20** as having nearly reached the fully straightened condition, with the slide block up against the front stop **17**, the gripper toggle **30, 33** in straightened condition with the gripper closed on the stock and the stock check **39** open, the condition of parts at end of the feed stroke. At this time the friction lever **53** is rocked forwardly, to the right, against abutment **56** on check closing lever **43**, with the supporting shoulder **52** clear of shoulder **51** on the end of lever **43**, which is in the dropped, check open position.

Fig. 2 shows how with slightly further straightening movement in the region of or possibly slightly past dead-center, the pins **38** on lever links **20**, by engagement with rearward edges of upright gripper toggle links **30**, will "break" gripper toggle **30, 33** to open or free the gripper from gripping engagement with the stock, and how in this slightly further forward movement the pin **48** on live toggle lever **19** will engage cam **47** on the check closing lever **43** to close the check down on the stock. Thus the stock is gripped by the check while the slide block is still up against the front stop and before return movement is started.

Fig. 3 shows the feed toggle started back over dead-center and how in this slight movement of the toggle prior to start of the recovery stoke the dependent supporting lever **53** is swung to the left to carry the supporting or holding shoulder **52** beneath shoulder **51** on the uplifted check closing lever **43**. Lever **43** is thus locked in the raised, check closed position before or at the time the slide block starts its recovery stroke.

Fig. 4 shows the block against back stop **18** at the end of the recovery stroke, with gripper open and check closed on the stock, lever **43** being still supported in upraised, check closed position.

Fig. 5 shows how with slight further retrograde movement of live toggle lever **19** the cross-pin **25** is pulled back in its guide slot **26**, compressing spring **36** while straighteninng toggle **30, 33** to close gripper **27** on the stock. In this slight further retrograde movement check **39** remains closed on the stock. Thus the gripper is closed on the stock while the stock is still held by the check and the slide block is still up against the back stop, preparatory to feed stroke of the block.

Fig. 6 illustrates the condition at commencement of feed stroke or just before the slide block leaves the back stop. In this slight initial movement of the feed toggle, while pin **25** is taking up lost motion in slot **26**, the reaction of spring **36** holds the block against back stop **18** while the supporting lever **53** is moving to the right sufficiently to clear lug **52** from lug **51** to drop the end of check closing lever **43** and permit check **39** to open before the slide block starts forward.

Thus it will be seen the stock is held under control at all times. The invention permits a slight amount of overlap to be introduced at both ends of the slide block movement, at which times the stock will be held by both the gripper and the check, or at least one will not let go before the other has taken hold of the stock. This enables quick, accurate, uniform feeding.

The gripper plunger may be of any desired size and shape to best engage and hold the stock and the extended area thus made possible insures firm, positive gripping without injuring or deforming the stock, a distinct advantage, particularly in the handling of thin, soft and more or less fragile strip material.

In operating with a pilot the stock, at the end of the feed stroke, is released momentarily for registration by the pilot. This is accomplished in the machine illustrated by releasing or removing the hold-down screw **50** which permits the cam piece **45** to operate as a ratchet, lifting freely on the upward, right-handed movement of the pin **48**, Fig. 2, while piloting action is being accomplished and serving as a ratchet cam to lift the check closing lever **43** in the reverse, left-handed movement of pin **48**, Fig. 3.

The pins **38** on the feed toggle in conjunction with the rear edge of the gripper toggle, engaging as in Fig. 2, constitute companion opposing abutment elements for breaking the gripper toggle at the end of the feed toggle straightening movement and conversely the cross-pin **25** at the end of the feed toggle, in engaging the opposite forward edge of the gripper toggle as illustrated in Fig. 5, at the end of the recovery stroke, constitute companion opposing abutment elements for closing the gripper at the end of the recovery or return stroke of the slide block.

What is claimed is:

1. Slide feed comprising the combination of a reciprocating slide block, a gripper on said block and including a toggle for opening and closing the same in respect to the stock being fed, an oscillating feed toggle connected to reciprocate said slide block and means on said oscillating toggle for effecting stock gripping and releasing movements of said gripper toggle, including shoulders on said feed toggle spaced to opposite sides of said gripper toggle and engageable therewith to operate said gripper toggle in the actuation of the feed toggle in opposite directions, said feed toggle having a lost motion connection with the slide block and spring means included in the connection of the feed toggle with the block for holding the feed toggle separated from the gripper toggle but yieldable to enable operative engagement of the feed toggle with the gripper toggle.

2. Slide feed comprising the combination of reciprocating slide block, an oscillating feed toggle pivotally connected at its free end to said slide block and operating from a toggle broken to a substantially straightened toggle position to complete feed stroke of the slide block, a stock gripper on said slide block, a gripper actuating toggle on the slide block mounted to oscillate in substantially the same general plane as said feed toggle and operable from a broken to a substantially straightened condition to effect closing of the gripper on the stock, companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the straightening movement of the feed toggle to effect breaking movement of the gripper toggle and opening of the gripper at completion of the stock feeding movement, and companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the reverse, toggle breaking movement of said feed toggle for effecting straightening, gripper closing movement of the gripper toggle at the opposite end of oscillating movement of the feed toggle and closing of the gripper on the stock at the end of recovery stroke of the slide block.

3. Slide feed comprising the combination of reciprocating slide block, an oscillating feed toggle pivotally connected at its free end to said slide block and operating from a toggle broken to a substantially straightened toggle position to complete feed stroke of the slide block, a stock gripper on said slide block, a gripper actuating toggle on the slide block mounted to oscillate in substantially the same general plane as said feed toggle and operable from a broken to a substantially straightened condition to effect closing of the gripper on the stock, companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the straightening movement of the feed toggle to effect breaking movement of the gripper toggle and opening of the gripper at completion of the stock feeding movement, and companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the reverse, toggle breaking movement of said feed toggle for effecting straightening, gripper closing movement of the gripper toggle at the opposite end of oscillating movement of the feed toggle and closing of the gripper on the stock at the end of recovery stroke of the slide block, said companion abutment elements including pins mounted in spaced relation on the feed toggle, disposed on opposite sides of the gripper toggle and engageable with the opposite rearward and forward edges of the gripper toggle.

4. Slide feed comprising the combination of reciprocating slide block, an oscillating feed toggle pivotally connected at its free end to said slide block and operating from a toggle broken to a substantially straightened toggle position to complete feed stroke of the slide block, a stock gripper on said slide block, a gripper actuating toggle on the slide block mounted to oscillate in substantially the same general plane as said feed toggle and

operable from a broken to a substantially straightened condition to effect closing of the gripper on the stock, companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the straightening movement of the feed toggle to effect breaking movement of the gripper toggle and opening of the gripper at completion of the stock feeding movement, and companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the reverse, toggle breaking movement of said feed toggle for effecting straightening, gripper closing movement of the gripper toggle at the opposite end of oscillating movement of the feed toggle and closing of the gripper on the stock at the end of recovery stroke of the slide block, said pivotal connection of the feed toggle with the slide block including a cross-pin on the feed toggle and the block having a slot for receiving said cross-pin and providing therewith a lost motion connection between the feed toggle and block, and spring means for yieldingly taking up lost motion in said connection in one direction of travel of the block.

5. Slide feed comprising the combination of reciprocating slide block, an oscillating feed toggle pivotally connected at its free end to said slide block and operating from a toggle broken to a substantially straightened toggle position to complete feed stroke of the slide block, a stock gripper on said slide block, a gripper actuating toggle on the slide block mounted to oscillate in substantially the same general plane as said feed toggle and operable from a broken to a substantially straightened condition to effect closing of the gripper on the stock, companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the straightening movement of the feed toggle to effect breaking movement of the gripper toggle and opening of the gripper at completion of the stock feeding movement, companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the reverse, toggle breaking movement of said feed toggle for effecting straightening, gripper closing movement of the gripper toggle at the opposite end of oscillating movement of the feed toggle and closing of the gripper on the stock at the end of recovery stroke of the slide block, a stock check and connections from said feed toggle for effecting stock engaging and disengaging operations of said stock check at opposite ends of the travel of said feed toggle, including an actuating member on said feed toggle and a two-position cam shiftable into one position for actuation by said actuating member for pilot operation of the slide feed and into a different position for pilotless operation of the slide feed.

6. Slide feed comprising the combination of reciprocating slide block, an oscillating feed toggle pivotally connected at its free end to said slide block and operating from a toggle broken to a substantially straightened toggle position to complete feed stroke of the slide block, a stock gripper on said slide block, a gripper actuating toggle on the slide block mounted to oscillate in substantially the same general plane as said feed toggle and operable from a broken to a substantially straightened condition to effect closing of the gripper on the stock, companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the straightening movement of the feed toggle to effect breaking movement of the gripper toggle and opening of the gripper at completion of the stock feeding movement, companion abutment elements in opposing relation on said feed toggle and gripper toggle in position engaging in the reverse, toggle breaking movement of said feed toggle for effecting straightening, gripper closing movement of the gripper toggle at the opposite end of oscillating movement of the feed toggle and closing of the gripper on the stock at the end of recovery stroke of the slide block, a stock check and

connections operable by said feed toggle for effecting stock engaging and disengaging operations of said stock check at opposite ends of travel of said feed toggle, including a check operating lever and companion abutments on said lever and feed toggle engageable in the oscillating movement of said feed toggle and relatively shiftable to alter the time of said engagement in the oscillating cycle of said feed toggle.

7. Slide feed comprising the combination of reciprocating slide block, an oscillating feed toggle connected to reciprocate said block, a stock gripper on said slide block, means operated by said feed toggle for imparting stock gripping and releasing movements to said gripper at opposite ends of travel of said slide block, a stock check and connections operable by said feed toggle for effecting stock engaging and disengaging operations of said stock check at opposite ends of travel of said feed toggle, including a lever for opening and

closing said check, a ratchet member mounted on said lever, and an abutment on the feed toggle positioned to freely pass said ratchet member in one direction of toggle movement and to engage said ratchet member and thereby actuate said check lever in the opposite direction of movement of said feed toggle.

8. The invention according to claim 7 with means for securing said ratchet member immovable on the lever and whereby said abutment on the toggle will be effective through engagement with said ratchet member in its fixed relation to actuate the check lever on movement of the feed toggle in both directions.

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