Oct. 25, 1955 W. P. POWERS 2,721,649

SLIDE FEED

Filed July 12, 1954 3 Sheets-Sheet 1

Fig. 1.

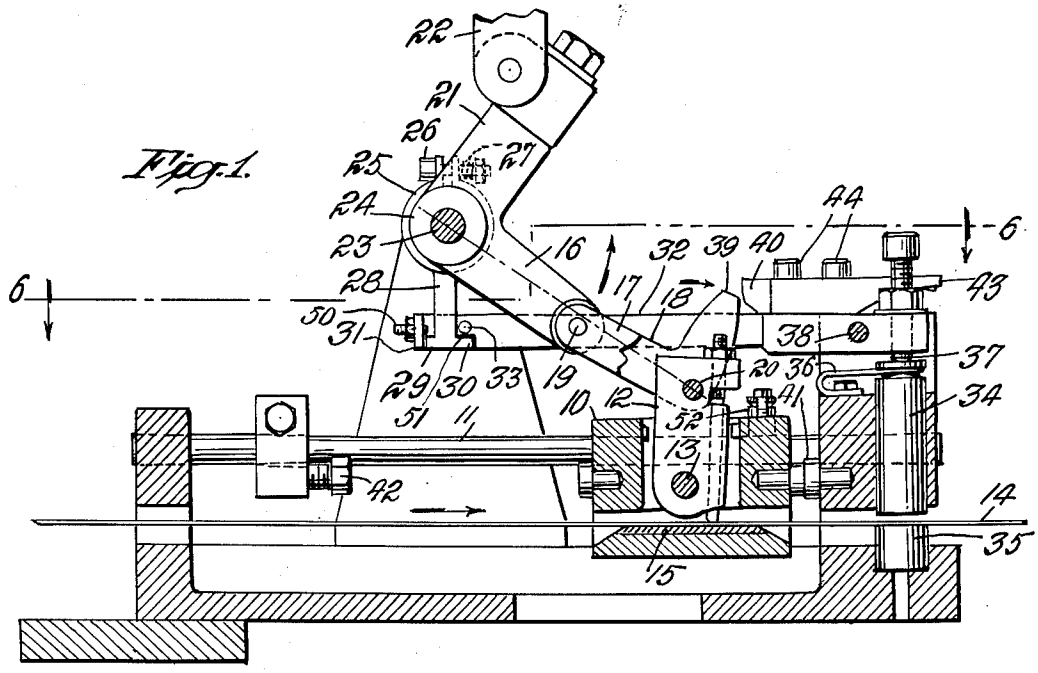
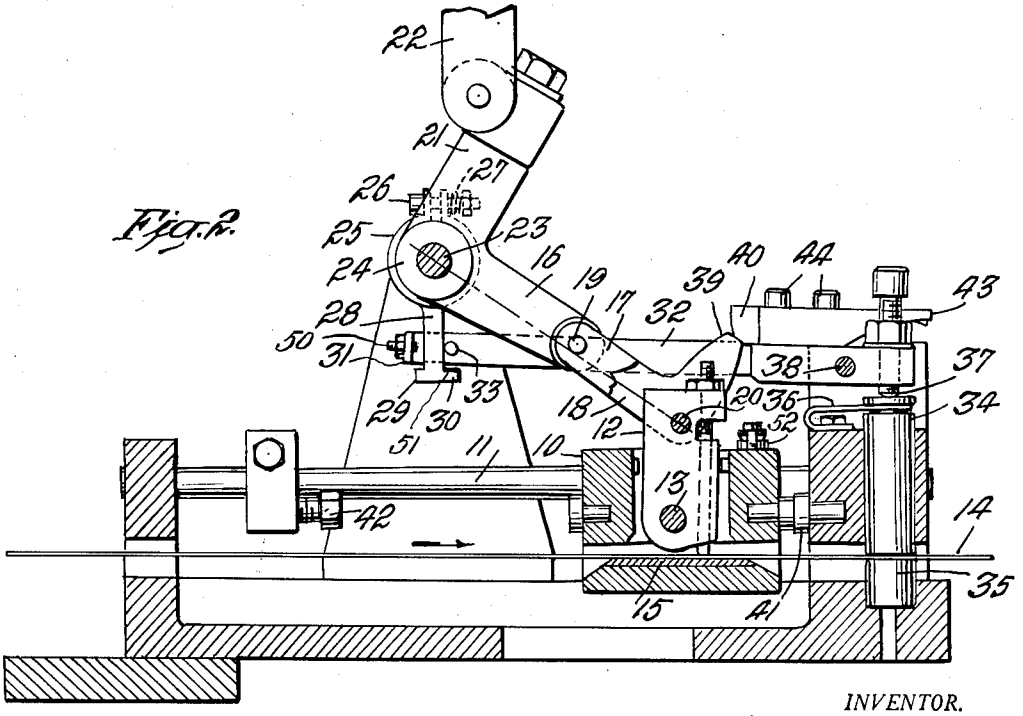


Fig. 2.



INVENTOR.
WALTER P. POWERS
BY Philips & Hoffman.
ATTORNEY

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Fig. 3.

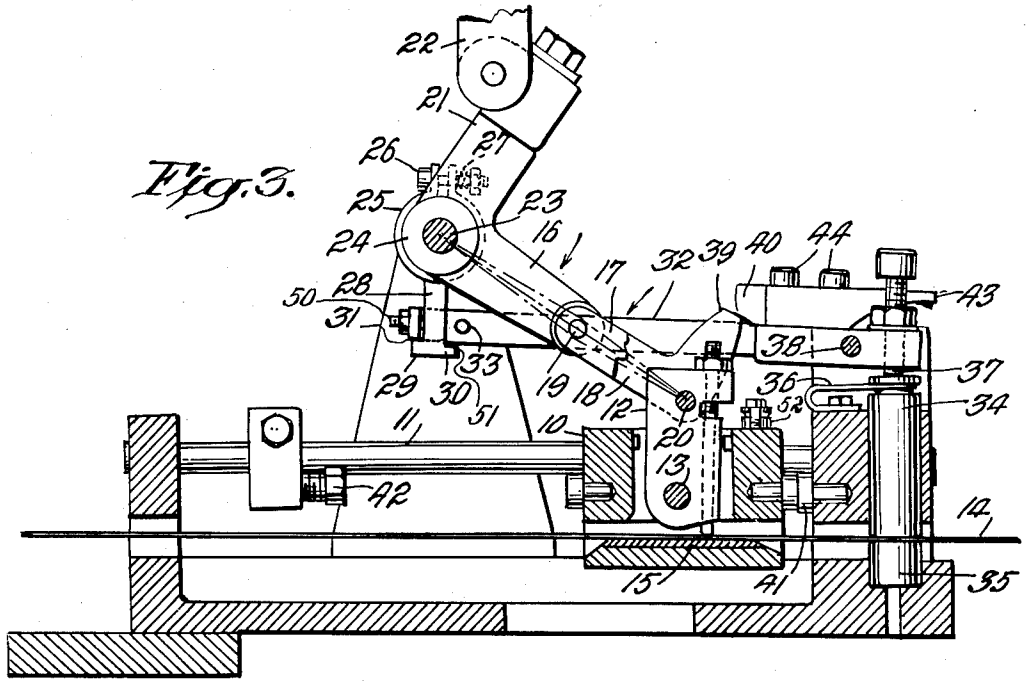
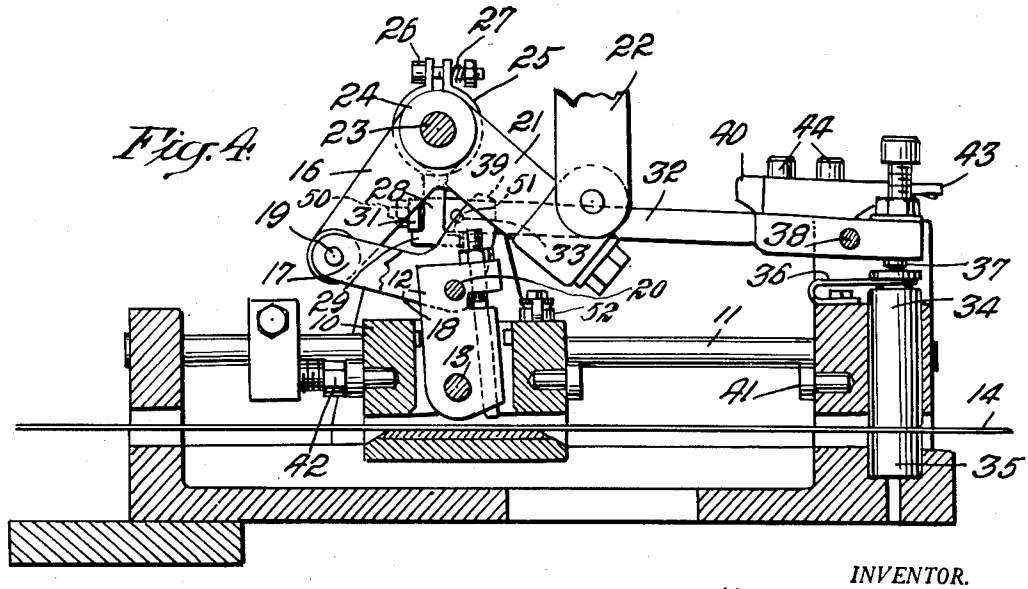


Fig. 4.



INVENTOR.
WALTER P. POWERS
BY
Philip S. McLean.
ATTORNEY

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Fig. 5.

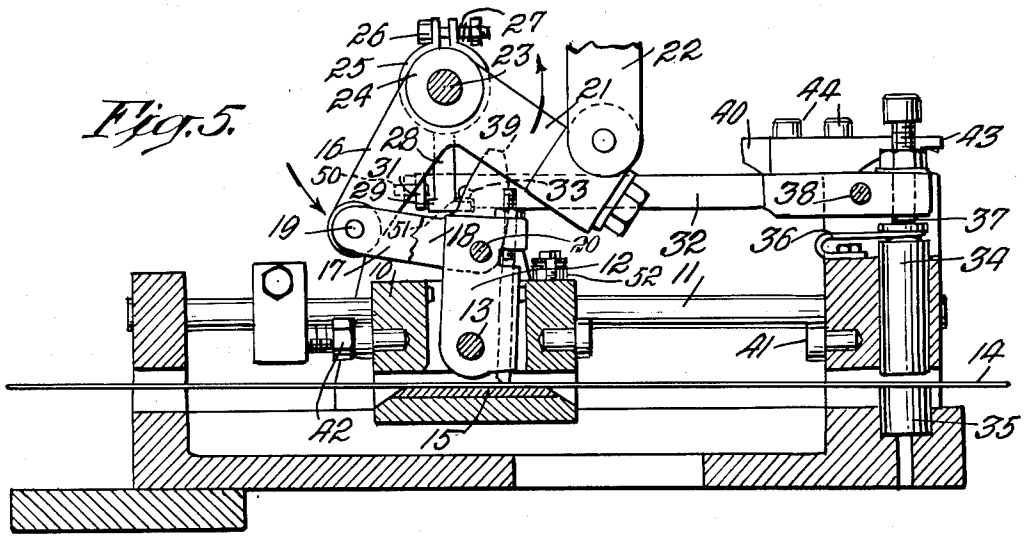
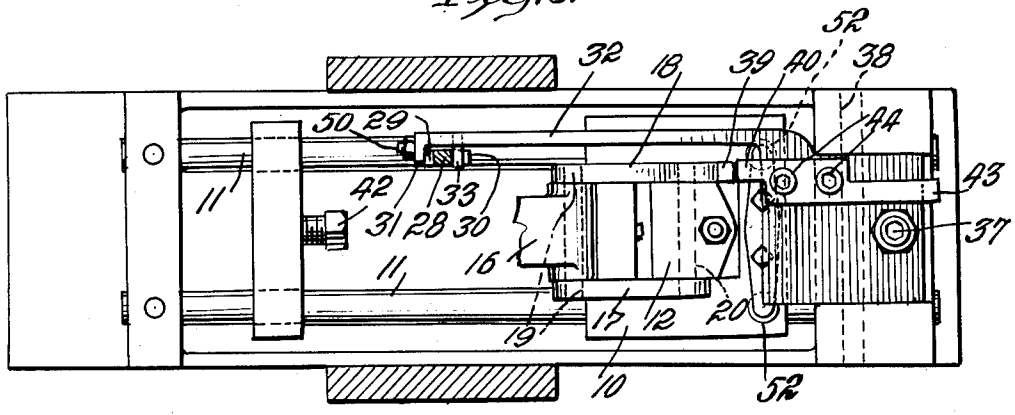


Fig. 6.



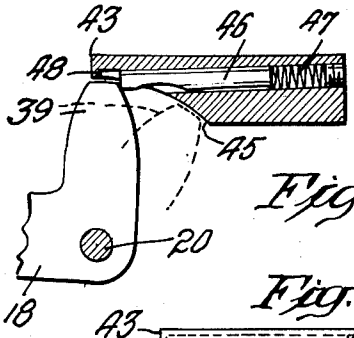


Fig. 7.

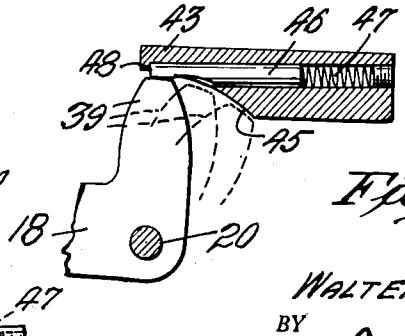
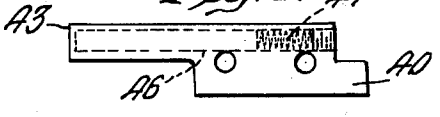


Fig. 8.

Fig. 9.



INVENTOR.
WALTER P. POWERS
BY
Philip S. McCann
ATTORNEY

United States Patent Office 2,721,649
Patented Oct. 25, 1955

2,721,649

SLIDE FEED

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

Application July 12, 1954, Serial No. 442,699

26 Claims. (Cl. 203—131)

The invention herein disclosed relates to slide feeds.

Objects of the invention are to improve construction and operation of such devices, particularly in respect to accuracy and constant uniformity of feed.

Special objects of the invention are to positively control stock check and to automatically effect the checking of the stock on the completion of the feed stroke and release of the stock for feeding only after the gripper has taken hold. By such a combination the stock is held and kept under positive control at all times and uniform, accurate feeding thereby accomplished.

Further special objects of the invention are to enable operation either with or without a pilot.

In the case of pilot operation the stock is automatically released at the proper instant and only for a time sufficient for the pilot to accurately center the stock.

The foregoing and other important objects are attained by novel features of construction, combinations and relations of parts.

In particular the invention involves the novel features of operating the oscillating gripper and slide block with a toggle which goes to fully straightened condition on the feed stroke, then slightly beyond dead center to effect closing of the stock check, and which in returning past dead center sets a catch to hold the check closed during the full recovery stroke, and on completion of recovery stroke and commencement of feed stroke this catch is released to permit the check to let go of the stock at the instant the gripper again takes hold for feeding of the stock.

This combination of using the full straightening movement of the toggle to advance the feed block and then while the feed block is momentarily at rest, swinging the toggle past dead center and then back provides two intervals and a reversal of movement for first closing the check and then securing it closed while the block is stationary and the gripper still holding the stock. In this manner the stock is positively held and controlled at all times and inaccuracies in feed are avoided.

In use with a pilot, adjustments can be made to leave the stock free for that slight increment of time in which the pilot is actually engaging the stock.

Other important novel features of 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 certain present commercial embodiments of the invention, but structure may be modified and changed as regards such illustration, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a broken part sectional front elevation of a slide feed constructed in accordance with the invention and showing the slide block advanced by the toggle into engagement with the front stop, the toggle having reached the substantially straightened condition but not having passed over dead center. In this case the gripper is closed and the stock check is open;

Fig. 2 shows the same parts but with the toggle advanced slightly past dead center to cause a cam projection on one of the toggle links to raise a lever to close the check, the gripper remaining closed, with the block still against the front stop;

Fig. 3 is a similar view showing the toggle started on its return movement in dead center position with gripper still closed and a catch carried by the rocker forming the upper member of the toggle shifted to the left into holding engagement with the check closing lever. At this instant both check and gripper are closed on the stock, this being possible because of the momentary dwell allowed the feed block in the time for travel of the toggle back over dead center;

Fig. 4 is a view of the same mechanism showing the parts at completion of the recovery stroke with the gripper open and the check secured in the closed position;

Fig. 5 is a similar view indicating motion of the rocker reversed to set the gripper on the stock and to release the catch from the check closing lever, this being the condition at commencement of the feed stroke;

Fig. 6 is a broken horizontal sectional view on substantially the plane of line **6—6** of Fig. 1, showing the feed block up against the front stop and the supporting catch free of the check closing lever;

Figs. 7 and 8 are broken part sectional details of the cam mechanism used when the pilot is employed, Fig. 7 showing how the cam on the toggle link will force back a spring plunger without lifting the check closing lever, and Fig. 8 showing how in return movement the cam will ride under the projected spring plunger to lift the lever into the check closing position, the time in which the cam is rocking forward and back to gain a hold on the lever providing the necessary time for the pilot to act on the stock;

Fig. 9 is a top plan view of the reversible cam which carries the spring plunger and which is mounted on the stock closing lever either for pilot operation as in Figs. 7 and 8, or for regular pilotless operation, as shown in Figs. 1 to 6.

In the present disclosure the invention is shown applied to a feed slide of an accepted and more or less standard design involving a block **10** mounted to slide on guide rods **11** and having a gripper lever **12** pivotally mounted thereon at **13** in position to grip the stock **14** against a bottom plate **15**.

This gripper is oscillated to grip and release the stock and to advance and retract the slide block by a toggle made up in this case of a rocker arm **16** and parallel links **17, 18**, the latter pivotally connected with the rocker arm at the toggle center **19** and pivotally connected with the upper end of the gripper at **20**.

The rocker element is in the nature of a bell crank having an upper arm **21** angularly related to the lower rocker arm **16** and usually connected by a link **22** with an actuating crank on the cam shaft of the press or other machine with which the feed slide is used.

Rocker **21** is shown pivotally supported at **23** and as having a circular shoulder or hub **24** at one side over which a split spring clamp **25** is frictionally held by an adjustable screw **26** and spring **27**.

This frictional spring clamp carries a dependent extension **28** provided at the lower end with oppositely projecting shoulders **29, 30** designed to engage respectively, the angularly turned lug **31** on the end of the check closing lever **32** and a pin **33** on the side of that lever.

The check is shown as a plunger **34** cooperating with a base or anvil **35**, said plunger being lifted by spring **36** to clear the stock, and being closed against the stock by abutment screw **37** on the end of lever **32**, the latter pivotally supported on the center **38**.

Lifting of the lever to close the check is accomplished in the illustration by an upwardly extending cam projection **39** on the back toggle link **18** located to engage in under the nose of an inclined cam shoulder **40** on the lever.

The parts are actuated, proportioned and related to bring the feed block **10** up against the front stop **41** when the toggle has substantially reached its point of maximum extension, immediately before dead center position, as indicated in Fig. 1. Then with the block up against the front stop the toggle may rock sufficiently further to carry the center pin over dead center, as in Fig. 2, thereby to cause cam projection **39** on the toggle link to engage under cam shoulder **40** and lift lever **32** to the check closed position.

During feed stroke of the rocker in the left-handed rotational direction indicated by the arrow in Fig. 1, the catch **28** frictioned on the hub of the rocker will be impelled left-handedly, resting against stop pin **33** on the lifting lever.

On the start or reverse rotation of the rocker indicated by the arrow in Fig. 3, the frictionally supported catch **28** impelled by the rocker. will swing in the same direction carrying supporting shoulder **29** beneath the outstanding lug **31** on the lever.

Thus the check closing lever **32**, after lifting by engagement of cams **39**. **40**, will be caught and held by the supporting shoulder **29** on the catch **28**. the latter synchronized by the rocker to secure the check closed even before the gripper lets go.

The relatively slight over-center movements of the toggle are thus utilized first to close the check and then to secure the check closed before the gripper lets go and the block starts back on its recovery stroke.

Fig. 4 shows position of the parts at the end of the back stroke with the block against the backstop **42**. In this position the gripper is still open and the check is still closed.

With reversal of motion for commencement of the feed stroke the rocker rotating left-handedly. as indicated by the arrow in Fig. 5. will shift the catch **28** to the right. thus to remove shoulder **29** from supporting engagement with lug **31**. permitting the check to open at the instant the gripper closes on the stock. The check then remains open for the remainder of the full feed stroke in travel of the parts from the Fig. 5 back to the Fig. 1 position.

To enable the machine being used for either pilot or pilotless feeding. the cam on the stock check closing lever may be made as shown. with the cam shoulder **40** at one end and faced in one direction and an extension **43** offset therefrom at the opposite end and faced in the opposite direction. this cam being reversibly secured on top of the check closing lever by screws **44**.

Figs. 1 to 6 show the cam secured on the check closing lever for pilotless operation. with the stock positively held at all times by the check. the gripper. or both.

When the cam is secured in reversed relation on lever **32**. in the position indicated in Figs. 7. 8 and 9. the end extension **43** will be located in line with and in position to cooperate with the lifting cam **39**.

Figs. 7 and 8 show how the underside of cam extension **43** is relieved on an arc **45** clear of contact by lifting cam **39**.

A plunger **46** guided in cam **43** and impelled by spring **47** up against a forward stop **48**. provides a means for effecting engagement at the proper time for the cam to lift the lever after the pilot has effected registration of the stock.

In the upward. over-center movement of the toggle represented in Fig. 7. the cam **39** will force back the spring plunger and leave the check closing lever in its lowered position, Fig. 1. with the check open. This provides the momentary time for the pilot to center the stock. Then. on reverse movement of the toggle. returning to the Fig. 3 position, the lifting cam **39**, as shown in Fig. 8, will engage the underside of the then projected plunger **46** to lift the check closing lever to the closed, Fig. 2 position, where it will be caught and held as in Fig. 3, as before described.

Thus by releasing of the two screws **44** and by turning the toggle cam **40**, **43** around end-for-end and securing it so on the check closing lever **32**, the machine may be quickly converted either to pilot or non-pilot operation.

By using the full extension of the toggle to carry the slide block up against the front stop an element of time is gained for the carry-over of the toggle center first in one direction to close the check and then in the opposite direction to latch the check in the closed condition, while the block is stationary and the gripper closed. This provides an exact timing and the necessary interval of time, direction of movement and extent of movement required to check the stock while the gripper is closed and stationary.

It is to be noted, furthermore, that in utilizing the full straightening effect of the toggle the feed block is brought to a gradual stop and then after the moment of rest is started with gradual acceleration. This tends to quieter, smoother and more effective operation with less wear on the parts.

The slip drive coupling or connection between the rocker and the catch or holder **28**, while permitting the catch to rest in either the holding or release positions while the rocker continues its movement, causes the catch to act immediately either to secure or to free the lever, Figs. 3 and 5, the instant the rocker reverses movement.

Operation

The rocker **21** is actuated to bring the slide block up against the front stop on the substantial completion of the straightening movement of the toggle indicated in Fig. 1. In this position the gripper is closed on the stock and the check is open.

With the slide block stationary and the gripper closed, the rocker is allowed a sufficient over-travel to carry the knuckle or elbow of the toggle over dead center sufficiently for the cam **39** on the lower toggle link to engage cam shoulder **40** and lift the check closing lever **32** as in Fig. 2, the gripper remaining closed and the block stationary against front stop. In this position lug **31** on the lever is above shoulder **29** on the support or holder **28**.

As motion of the rocker is reversed for the back travel of the slide block, the catch or holder **28** frictionally mounted on the rocker will be shifted to the left, Fig. 3, to set it in holding engagement with the lever and the check will be thereby held closed on the stock, this occurring before the gripper releases its hold on the stock and before the block begins its recovery stroke.

The drag of the rocker on the catch holds the catch in supporting engagement with the check closing lever during the whole of the recovery stroke, Fig. 4, and up to the moment that the gripper is again closed on the stock at commencement of the feed stroke, and whereupon with such reversal of movement the rocker, through the slip drive connection with the catch, will release the catch from supporting engagement with the check closing lever.

The stock is thus kept under constant control both in feeding and return movements of the parts. The action is accurate and uniform.

If the machine to which the stock is being fed operates with a pilot or pilots, the stock is freed at the moment and for the instant of time required for the pilot to register the stock by reversing the cam on the check closing lever, as shown in Figs. 7, 8 and 9, so that lifting cam **39** on the toggle will force back spring plunger **46** at the end of the toggle straightening movement and in the over-center travel of the toggle, will pass beyond, below and free of the pin as in Fig. 7, leaving the check lever down with the check open while the pilot is centering the stock. Then in reverse movement of the rocker the toggle cam

39 engaging under the pin as in Fig. 8, will lift the lever to the check closed position, Fig. 2, ready to be caught by the catch or holder on the rocker.

The mechanism is made up of but relatively few, simple, sturdy parts, compactly arranged.

While parallel push-pull links may be preferred for the lower toggle member, as illustrated, it is contemplated that a single link may be used and that various other changes may be made, all coming within the actual scope of the invention.

The inherent spring in the metal permits a natural overplay past dead center of the toggle after the block has been brought up solidly in engagement with the front stop, and this without injury or strain on any of the parts.

The lug **31** and pin **33** on the check closing lever spaced to opposite sides of the dependent catch **28** limit the free movement of the catch with the rocker, holding the catch yieldably in place where it will instantly react to either hold or to let go the lever, dependent on the direction of reverse movement of the rocker. The spring pin **46** in the pilot operation cam **43** constitutes in effect a one-way drive connection between this cam and the lifting cam **39** on the toggle.

To control the timing of the check release in respect to the gripper closing, Figs. 3, 4 and 5, an abutment screw **50** may be mounted and secured in the lug **31** in position to engage the shank of the catch **28** and thereby form a stop limiting the extent of engagement of the hook or supporting shoulder **29** with the lower edge of lug **31**. The less this engagement the sooner the catch will release the check closing lever, so by adjusting this screw a fine timing of check and gripper can be effected.

To cushion the dropping of the check closing lever into supported engagement on the shoulder **30**, Fig. 5, a small rubber pad **51** or equivalent may be mounted in the projection **30**, in position for engagement by pin **33** on the lever.

The rocker, constituting the drive for the gripper and feed block, provides exact, accurate timing for the check, since this timing is direct, free of joints and pivotal connections.

The feed block is shown as equipped with brake plugs **52** engaging the guide rods **11** in accordance with conventional practice, and it will be appreciated that other details or features considered necessary or desirable may be employed.

What is claimed is:

1. Slide feed with automatic check comprising a reciprocating slide block, a stock gripper mounted to rock on said block into and out of gripping engagement with stock to be fed and forming a connection for effecting feed and recovery strokes of the block and gripper, a push-pull link pivotally connected at one end with said gripper, a rocker pivotally connected with the other end of said link and forming therewith a toggle joint, said rocker having a stroke sufficient to carry the pivotal toggle center connection between the rocker and link past dead center straight line position of the toggle, a releasable check for holding stock advanced by the slide block, a lever for closing the check on and releasing it from the stock, a catch for holding said lever in the check closed position, a cam on said link for shifting said lever into the check closed position on movement of the toggle past said dead center straight line position and a slip drive connection between said rocker and catch for engaging said catch with said lever on return movement of said rocker over said dead center position to effect securing of the check closing lever before the gripper releases the stock and for releasing the catch from the lever on reversal of movement of the rocker on commencement of a feed stroke following completion of a recovery stroke of the block whereby to effect opening of the check on closing of the gripper at the commencement of a feed stroke.

2. The invention according to claim 1, including a front stop for the slide block positioned to stop said block with the toggle just short of the fully straightened position and whereby over-play of the toggle will carry the center of the toggle past dead center while the block is at rest against the front stop with the gripper in closed condition.

3. The invention according to claim 1, with the check located in advance of the slide block, the rocker located above the slide block and the check closing lever extending from the check back to the rocker.

4. The invention according to claim 1, with the catch in the form of a hook element dependent from the rocker, the rocker having a hub and the catch having a split band engaged on said hub and constituting the slip drive aforesaid.

5. The invention according to claim 1, in which the rocker has a hub portion and the catch has a spring closed band yieldingly clamped on said hub portion and constituting the slip drive connection aforesaid, said catch having a hook element engageable with said check closing lever and said lever having opposed shoulders limiting the free movement of the catch with the rocker.

6. The invention according to claim 1, in which the check closing lever has a companion cam shoulder engageable by said cam on the toggle link.

7. The invention according to claim 1, with a cam member reversibly engageable on the check closing lever and having cam elements at opposite ends cooperative with said cam on the toggle link in accordance with the position in which said member is located on said lever.

8. The invention according to claim 7, with one of said cam shoulders cooperative with said toggle link cam for pilotless operation and the other cam shoulder cooperative with said toggle cam for pilot operation.

9. The invention according to claim 1, with a cam shoulder on the check closing lever cooperable with said cam on the toggle link to leave the check open during movement of said cam in one direction and closed during movement of said cam in the opposite direction.

10. The invention according to claim 1, with a cam on said check closing lever having one-way operative engagement by said cam on the toggle link.

11. Slide feed comprising a reciprocating slide block, a stock gripper on said block, a toggle for opening and closing said gripper and for reciprocating said block, said toggle arranged at substantially straightened position to complete the feed stroke of the block and to carry over slightly beyond the straight line dead center position, a stock check and means operable by said toggle in the over-travel past dead center for closing said stock check while the block is in fully advanced position with the gripper closed on the stock.

12. Slide feed comprising a reciprocating feed block, a stock gripper on said block, a front stop limiting feed stroke of the block, a stock check, a toggle connected with said gripper for operating said gripper and reciprocating the block, said toggle arranged to engage the block with said front stop at approximately the fully extended straightened position of the toggle and adapted to carry over beyond the dead center position with the block at rest against the front stop, means operated by the toggle for closing the check on the stock in the over-travel movement of the toggle past dead center and means for holding said check closed in reverse movement of the toggle for effecting the recovery stroke of the block.

13. Slide feed comprising a reciprocating feed block, a stock gripper on said block, a front stop limiting feed stroke of the block, a stock check, a toggle connected with said gripper for operating said gripper and reciprocating the block, said toggle arranged to engage the block with said front stop at approximately the fully extended straightened position of the toggle and adapted to carry over beyond the dead center position with the block at rest against the front stop, means operated by the toggle for closing the check on the stock in the over-travel movement of the toggle past dead center and means for holding said check closed in reverse movement of the

toggle for effecting the recovery stroke of the block, a backstop limiting the recovery stroke of the block, and means for effecting the release of said holding means for the stock check on commencement of the feed stroke movement of the toggle.

14. Slide feed with automatic check comprising a rocker having a rocker arm with a predetermined angular movement, a reciprocating slide block, a gripper mounted to rock on said block, a link pivotally connected between said rocker arm and gripper and forming with said arm a toggle reaching a substantially straightened condition at completion of a feed stroke imparted to the gripper and block and arranged to pass beyond the dead center straightened condition, a stock check and connections between said stock check and rocker for closing the check on overtravel of the toggle past dead center and for holding the check closed during recovery stroke of the gripper and block and for opening the check on commencement of a feed stroke after completion of a recovery stroke.

15. The invention according to claim 14, with a front stop limiting the feed stroke of the block and located to stop the block immediately preceding the fully straightened position of the toggle.

16. The invention according to claim 1, with means for varying the extent of engagement of the catch with the check closing lever.

17. The invention according to claim 12, with the last mentioned means including a check closing member, a catch engageable with said check closing member and a micrometer screw for controlling the extent of engagement of the catch with said member.

18. The invention according to claim 12, with said last means including a check closing member, a catch having oppositely extending shoulders, one for supporting the member in one position and the other for supporting the member in a different position and a resilient element for cushioning engagement of the member with one of said shoulders.

19. The invention according to claim 1, with cam elements on the check closing lever selectively engageable with said cam on the toggle link.

20. The invention according to claim 1, with a cam on the check closing lever having a spring projected pin repressible by the cam on the toggle link in one direction of movement and engageable by the cam on the toggle link in motion of the latter in the opposite direction to impart motion to the check closing lever.

21. Reciprocating stock feed comprising a reciprocating stock gripper having feed and recovery strokes, a front stop limiting the feed stroke of the gripper, a stock check, a toggle connected to advance said gripper to engagement with the front stop at approximately fully straghtened condition and to pass beyond the fully straightened condition and means operable by said toggle in said travel past dead center for effecting closing of the check on the stock while the gripper is still in engagement with the front stop.

22. Reciprocating stock feed comprising a reciprocating stock gripper having feed and recovery strokes, a front stop limiting the feed stroke of the gripper, a stock check, a toggle connected to advance said gripper to engagement with the front stop at approximately fully straightened condition and to pass beyond the fully straightened condition and means operable by said toggle in said travel past dead center for effecting closing of the check on the stock while the gripper is still in engagement with the front stop and including mechanism for holding the check closed during recovery stroke of the gripper and for opening the check at commencement of the succeeding feed stroke.

23. Slide feed comprising the combination of a reciprocating slide block, a stop positioned to be engaged by and limit movement of said slide block in one direction, alternately acting stock feeding and stock check grippers, an oscillating toggle connected to reciprocate said slide block and arranged to advance said block into engagement with said stop at approximately fully extended straightened position of the toggle and movable to the approximate straight line dead-center position of the toggle with the slide block at rest against said stop and means operated by said toggle in movement of the same in approximating the dead-center position with the block at rest against the stop for effecting operation of one of said grippers while the slide block remains in engagement with the stop.

24. Slide feed comprising the combination of a reciprocating slide block, a stock feeding gripper on said block, a stock check gripper, an oscillating toggle connected to reciprocate said slide block and to open and close the stock feeding gripper, means for oscillating said toggle to substantially fully extended straightened position and to the approximately dead-center position of the toggle and means operated by said toggle in the approximate dead-center range of movement of the same for effecting operation of the stock check gripper.

25. Reciprocating stock feed comprising a reciprocating stock gripper having feed and recovery strokes, a stop positioned to be engaged by and limit the stroke of said gripper in one direction, a stock check, a toggle connected to advance said gripper into engagement with said stop at approximately fully extended straightened position and to travel to approximately dead-center position while the gripper is in engagement with said stroke limiting stop and means operated by said toggle in said travel of the same in the approximate dead-center range of movement with the gripper in engagement with the stop for effecting operation of said stock check while the gripper is so engaged with the stop.

26. The invention according to claim 25, in which said means includes separate cam devices selectively operable by the toggle for pilotless or pilot operation of the reciprocating stock feed.

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