April 26, 1932. W. L. CLOUSE 1,856,027

FEEDING MECHANISM FOR METAL WORKING MACHINES

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Fig. 1.

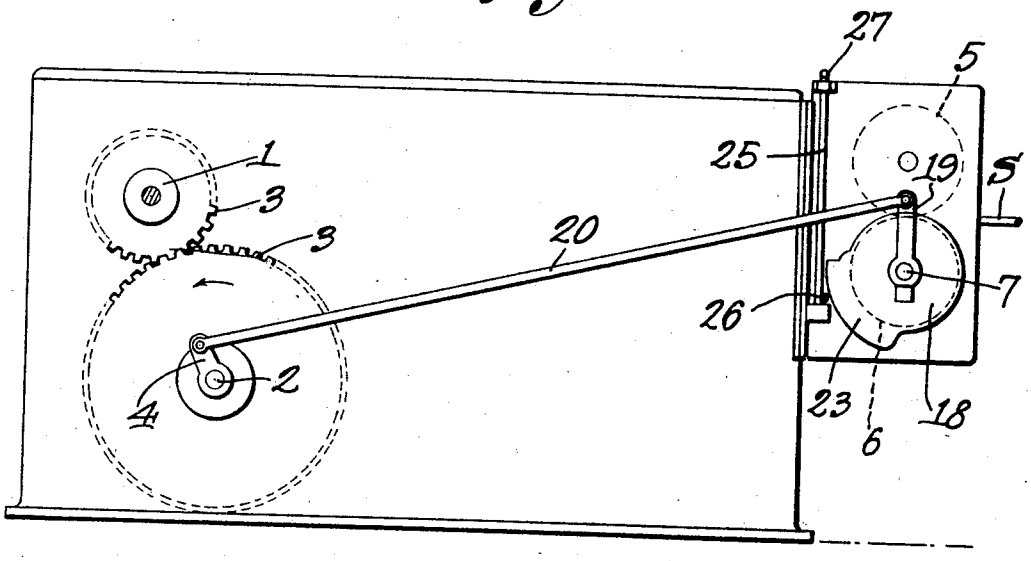

Fig. 2.

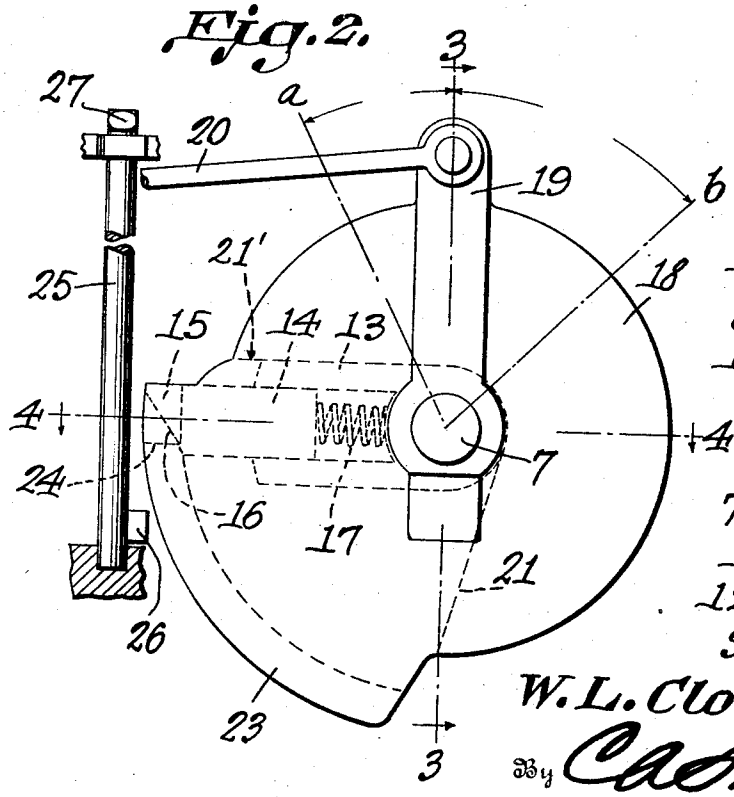

Fig. 3.

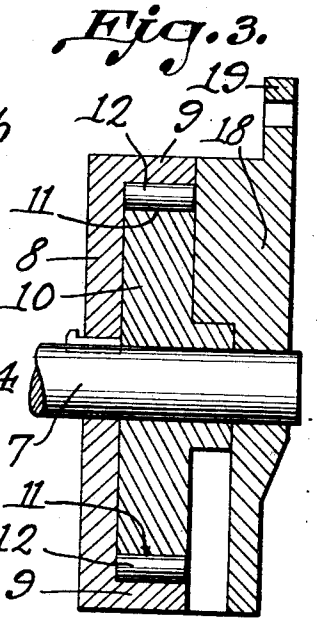

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Fig. 8.

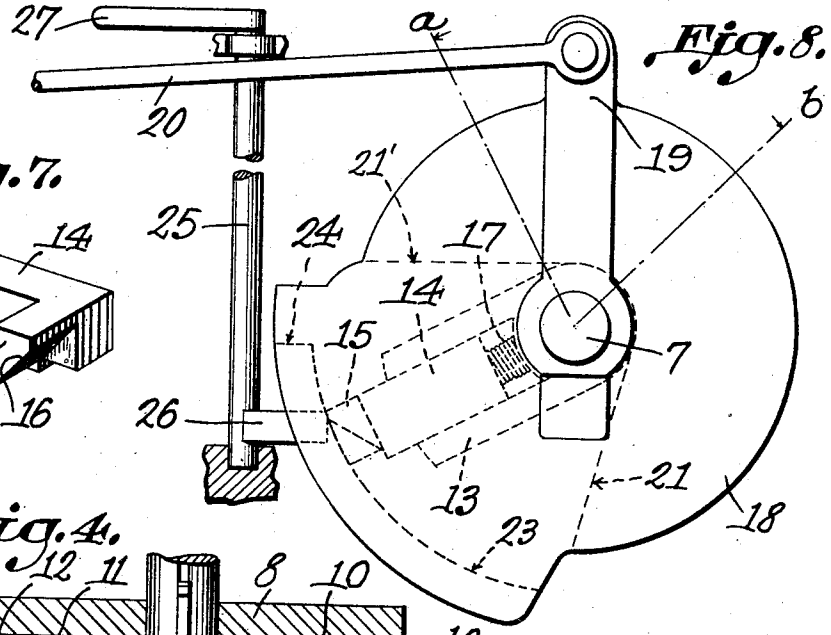


Fig. 7.

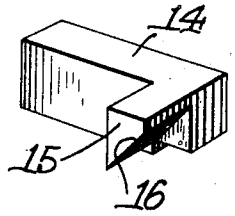


Fig. 4.

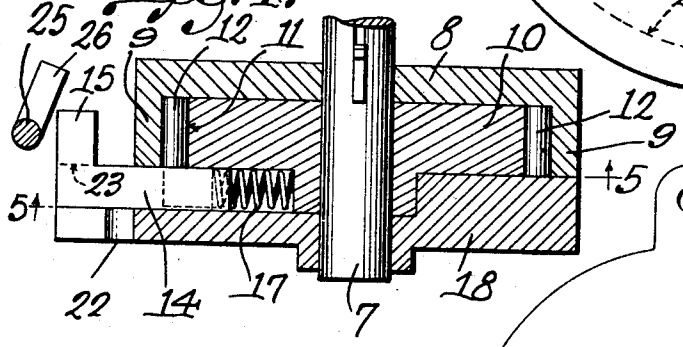


Fig. 6.

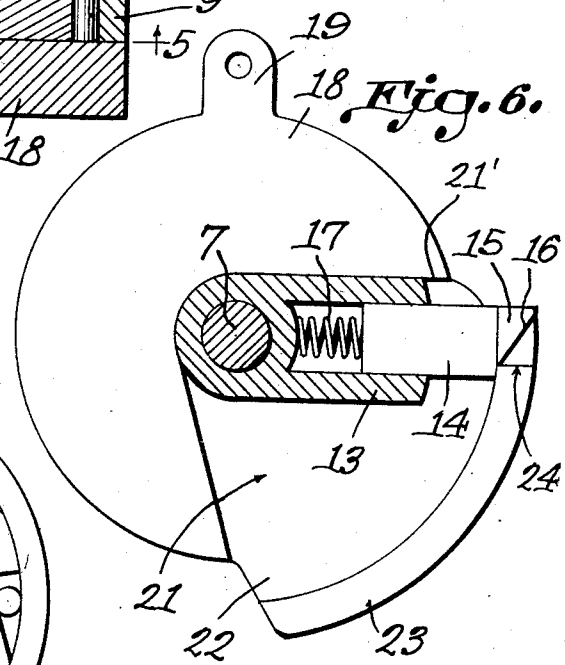
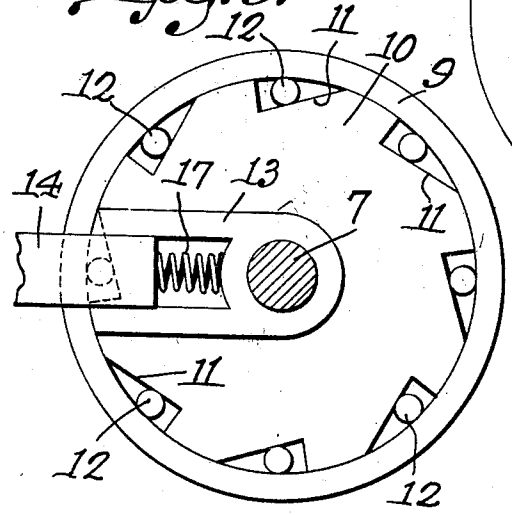


Fig. 5.



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FEEDING MECHANISM FOR METAL WORKING MACHINES

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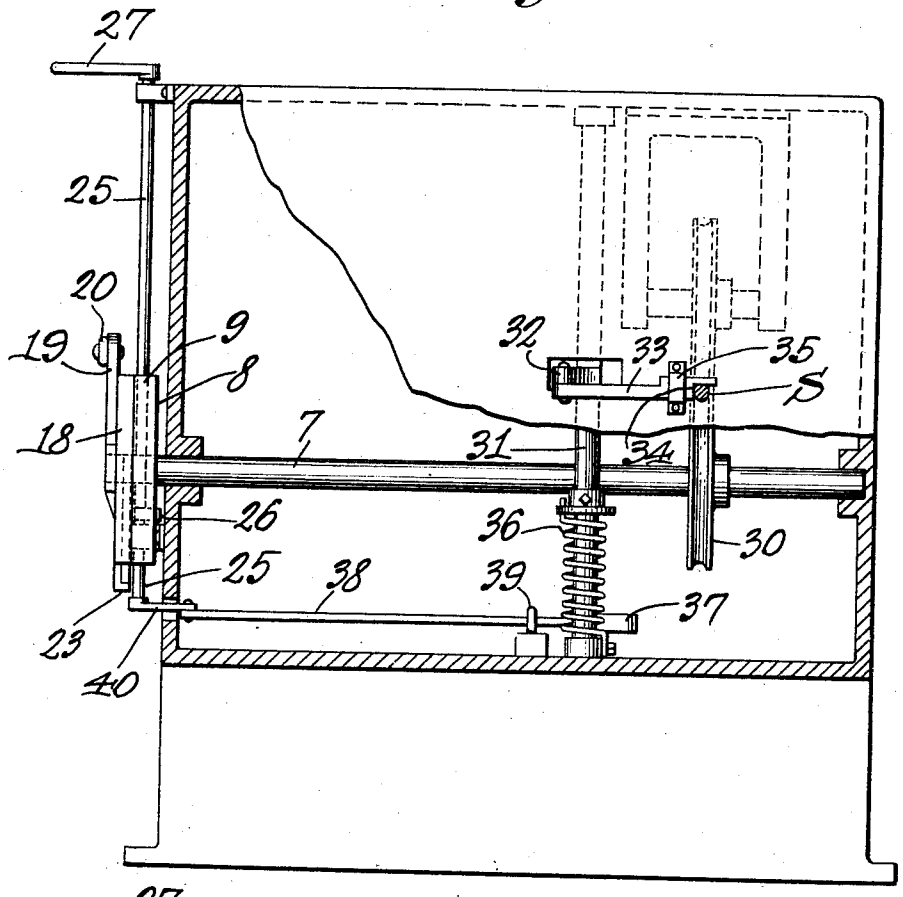
Fig. 9.



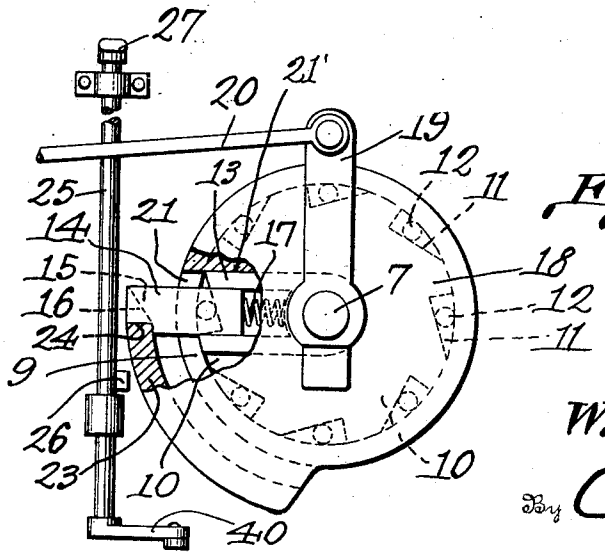


Fig. 10.

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FEEDING MECHANISM FOR METAL WORKING MACHINES

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Fig. 11.

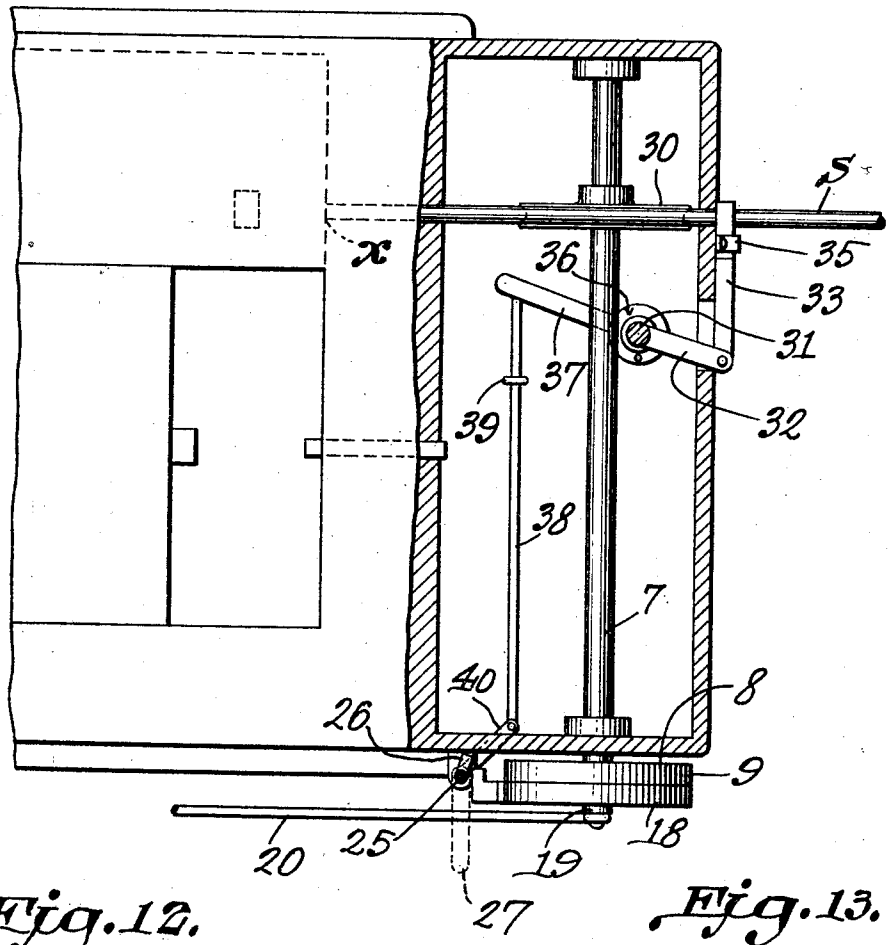


Fig. 12.

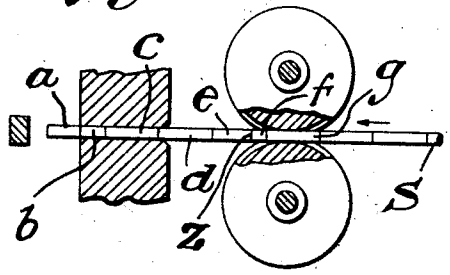
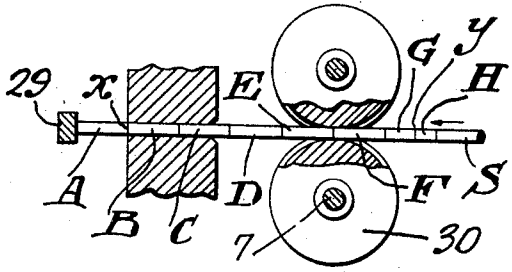


Fig. 13.



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Patented Apr. 26, 1932 1,856,027

UNITED STATES PATENT OFFICE

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FEEDING MECHANISM FOR METAL WORKING MACHINES

Application filed November 10, 1930. Serial No. 494,786.

This invention relates to mechanism for feeding stock to metal working machines such as headers, forging machines, etc.

These machines are generally equipped with driving mechanism for continuously reciprocating the heading slide, and a feed mechanism operatively connected to the driving mechanism. The stock is usually in wire or rod form and the feed mechanism moves it with an intermittent motion into the machine where blanks are cut off and shaped. It frequently happens that the feed mechanism is automatically uncoupled from the driving mechanism by relief means. The operator also finds it necessary from time to time to uncouple the feeding mechanism from the driving mechanism.

Furthermore, during the feeding of stock to the shearing or shaping mechanism of the machine extreme watchfulness has been required. Otherwise the entire length of stock, with the exception of a short end, would be used before a new supply could be started. This has resulted in undesirable waste of stock because as much as two or more lengths have necessarily been cut off undersize by successive shearing operations before the machine could again start to function properly.

It is an object of the present invention to provide a means for automatically stopping the feeding mechanism when the end of the stock reaches a predetermined point, thereby enabling the operator to start a new supply of stock in contact with the end of the stock in advance thereof, so that, when the feeding mechanism is again started, the maximum waste resulting will be produced by a single shearing operation and will be equal to the length of only a single blank. This wasted portion will be composed of the meeting end portions of the two lengths of stock.

Another object of the present invention is to provide a novel feed mechanism for intermittently actuating the stock, the construction being such that although the mechanism can be tripped or uncoupled from the driving mechanism at will, it will always pick up or start feeding the stock only at such time as to insure feeding the correct length into the machine to produce a blank of the desired size.

It is a further object to provide feed mechanism which is simple and compact in construction and will operate efficiently to transmit motion from a rotary driving element so as to feed stock intermittently but always the same distance.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:

Figure 1 is a side elevation showing in outline a header having applied to it the feed mechanism constituting the present invention.

Figure 2 is a side elevation of the coupling mechanism, its tripping means being shown adjacent thereto.

Figure 3 is a section on line 3—3, Figure 2.

Figure 4 is a section on line 4—4, Figure 2.

Figure 5 is a section on line 5—5, Figure 4.

Figure 6 is an inner elevation of the drive plate of the mechanism.

Figure 7 is a detail view of the coupling key.

Figure 8 is a view similar to Figure 1 showing the relative positions of the parts while being tripped.

Figure 9 is a view partly in front elevation and partly in section of a portion of a machine showing automatic controlling means.

Figure 10 is a side elevation of the coupling mechanism partly broken away and having a connection for the automatic control thereof.

Figure 11 is a plan view partly in section, of a machine having the improved automatic stop for the stock-feeding mechanism.

Figure 12 is a view illustrating in diagram the results obtained by old methods of feeding stock.

Figure 13 is a similar view showing how waste is reduced by the present means.

Referring to the figures by characters of reference, 1 designates the drive shaft of the machine which is adapted to operate a heading slide, not shown. A countershaft or timer shaft 2 is operatively connected to shaft 1 by gears 3 and has any suitable means, such as a crank 4, whereby the feeding mechanism will be operated synchronously with the heading slide.

The feed rolls for engaging a length of stock S have been designated at 5 and 6 and can be operatively connected by gears or other suitable means, not shown, for insuring simultaneous rotation.

A shaft 7 can be connected directly to one of the rolls or gearing can be used for transmitting motion from the shaft to the rolls as will be obvious. To this shaft is fixedly connected a driven clutch member 8 having an annular flange 9 adapted to extend around a driving clutch member 10 in the periphery of which are angular recesses 11 holding rollers 12. These rollers act to grip and rotate the member 8 when member 10 is rotated in one direction. However, the member 10 can rotate in the opposite or clockwise direction independently of member 8.

One face of driving clutch member 10 has a radially disposed guide 13 in which is mounted a slidable key 14 the outer end of which has a laterally extended wedge 15. The outer face of the wedge is beveled as shown at 16. A spring 17 seated in the guide 13 bears against the key to hold it normally pressed outwardly from the shaft 7.

Mounted to oscillate on the shaft 7 is a drive plate 18 having a crank extension 19 connected by a rod 20 to the crank 4. This plate can fit snugly against clutch member 10 and has a segmental recess 21 in its inner face in which the guide 13 is mounted for oscillation. A marginal flange 22 is extended from the plate at the recess and has a laterally extended rim 23 one end 24 of which is so spaced from one wall of recess 21 as to allow the outer end of key 14 to lap it when guide 13 is seated against the recess wall. This arrangement of the parts has been shown in Figure 6 and it will be obvious that it results in locking together the plate 18 and member 10 so that they can not rotate independently of each other. The wedge 15 extends laterally beyond the rim 23 as illustrated in Figure 4, but the distance between this rim and the periphery of flange 9 is slightly greater than the thickness of the wedge so that, should the key 14 be pressed inwardly against its spring 17, the wedge would be removed inwardly from the end of rim 23.

In operation the machine, which can include a heading slide, will operate continuously and the gears can be so timed as to produce one rotation of crank 4 to any desired number of rotations of the shaft 1. For example in a two-blow cold header the shaft 1 for operating the heading slide would make two complete rotations to one rotation of shaft 2 which drives the feeding mechanism.

As the crank 4 is rotated in a counterclockwise direction motion will be transmitted therefrom through rod 20 to crank extension 19, so that wall 21′ of recess 21 will thrust against guide 13 and positively actuate the feeding mechanism to positively advance stock the required distance into the machine. If the key 14 is seated in locking position as in Figure 6 the plate 18 will cause the drive member 10 of the clutch to rotate therewith in a clockwise direction. During every movement of plate 18 and member 10 in a clockwise direction the rollers 12 will move freely relative to flange 9 so that clutch member 8 will not be actuated. During their movement in a counterclockwise direction with the positively driven member 10, however, the rollers will take hold of the flange 9 and cause the clutch member 8 to rotate with the parts 10 and 18, thereby actuating shaft 7 and the feed rolls 5 and 6. This will cause the stock S to be fed into the machine a distance determined by the arc of movement of the clutch members. This intermittent advancement of or feeding of the stock will continue as long as the clutch connection is not interfered with.

For the purpose of uncoupling the feed from its drive mechanism a tripping shaft 25 is mounted for rotation near the plate 18 and has a tripping finger 26 adapted to be swung into and out of the path of wedge 15. The finger is located where it will be engaged by the wedge when one of its extreme positions is reached. An arm 27 extends from shaft 25 and by means thereof the shaft can be rotated by hand or by mechanism provided for that purpose.

When it is desired to uncouple the feeding mechanism from its driving mechanism the shaft 25 is rotated to swing finger 26 to one extreme position. This will bring it into the path of the wedge 15, the beveled face of which will bear against finger 26, and press the wedge and key 14 inwardly out of engagement with the end 24 of rim 23. Thus as the extension 19 on plate 18 moves from position *a* in Figure 8 to position *b* the wedge will be left in engagement with the tripping finger, and as the recess 21 is of such area as to permit relative oscillation of the plate 18, the continued oscillation of said plate will not actuate the clutch member 10.

When it is desired to couple the feed mechanism to the drive mechanism the tripping finger 26 is moved away from the key. The plate 18 will continue to move independently of the clutch member 10 until, at one limit

of its movement the end or shoulder 24 is moved past the key. At that time the key 14, which has been pressed lightly by its spring 17 against rim 23 but held against movement therewith by the feed rolls 5 and 6 and their connections, will shift outwardly into the path of the rim 23. Thus as the plate 18 begins its return or clockwise movement, the clutch member 10 will be coupled thereto but will rotate independently of member 8. On the next or counterclockwise movement of the parts the wall 21′ will thrust against guide 13 and a correct length of stock will be fed positively into the machine.

It will be noted that the feeding of the stock can commence only when the plate 18 reaches one extreme position. Consequently, as premature starting and stopping is avoided, short lengths of stock will not be delivered into the machine and there will be no undesirable waste.

Should it be desired to stop the feeding mechanism automatically when the length of stock is nearly exhausted, a mechanism such as shown in Figures 9 to 11 inclusive can be used. This mechanism includes a shaft 31 journaled at any suitable point adjacent to the place where the stock enters the machine, there being an arm 32 extended from the shaft and having a latch 33 pivotally connected to it. This latch, which is adapted to rest on the stock S, has a shoulder 34 which thrusts laterally against the stock. A suitable guide 35 can be provided for the latch and a spring 36, coiled about the shaft, can be used for holding the shoulder 34 normally pressed against the stock.

Another arm 37 is extended from shaft 31 and bears against one end of a push rod 38 mounted in a guide 39 and pivotally connected to an arm 40 extending from tripping shaft 25.

Normally the latch is held against movement by the stock S as shown in Figures 9 and 11 and at that time the tripping finger 26 is held out of the path of wedge 15. Consequently the oscillation of plate 18 will cause intermittent rotation of shaft 7 and wheel 30 so that stock S will be fed into the machine in uniform blank lengths.

When the end of the stock passes from the end of the latch 33, the spring 36 will rotate shaft 31 and cause arm 37 to press against rod 38. Thus arm 40 will be shifted to rotate shaft 25 and bring finger 26 into the path of wedge 15. This will cause the plate 18 to be uncoupled from the shaft 7 and further oscillation of the plate will be without effect after it reaches one limit of its movement, at which time the stock S will be supported flush with the plane X in which the last blank was cut off.

As the feeding mechanism is thus stopped automatically with a portion of the stock S still gripped by its feeding means, the end of another length of stock can be placed thereagainst as indicated at *y* in Figure 13. The tripping shaft can then be shifted by hand to release wedge 15 and at the beginning of the next clockwise stroke of plate 18 it will pick up key 14 and the drive member 10 and carry them in a clockwise direction. Thus on the next counterclockwise movement of the parts the wall 21′ thrusting against guide 13, and the rollers 12 cooperating with flange 9 will feed the stock into the machine positively a distance equal to one full-length blank, as shown at A. Successive actuations of the stock will feed other full blank-lengths of stock as indicated, for example, at B, C, D, E and F. The next full blank-length of stock will consist, probably, of two short lengths, G and H, which comprise the meeting end portions of the two lengths of stock when these are cut off. They will constitute the only waste of stock which will occur until another supply is fed to the machine.

In old methods of feeding the stock has been directed intermittently into the machine until the end has passed from between the feeding wheels or rolls. One end has thus been left spaced from the rolls as shown at *z* in Figure 12 and the other end frequently stops short of the gage 29 or else hits it and rebounds therefrom (see Figure 12). The operator's attention is attracted by the fact that production has stopped. He therefore starts the end of another length of stock between the feed rolls. This will not start the old stock forward until it comes thereagainst, thereby losing an interval in the timed operation of the mechanism. The short blank *a* will be cut off and before the advancing end of the old stock reaches the stop or gage 29 another short length *b* will be sheared off. Thereafter other lengths of proper size will be cut as indicated at *c* and *d*, but when the abutting ends of the old and new stock are fed to the shearing mechanism two short lengths *e* and *f* will be cut off, these totaling in length one full size blank. Thus under old methods as illustrated in Figure 12, the waste of material will always be greater than one full size blank while by using an automatic stopping means such as constitutes the present invention, the loss will never be more than the length of one full size blank.

What is claimed is:

1. The combination with a continuously operating drive mechanism including an oscillating member, of feeding means, cooperating drive and driven clutch members for operating the feeding means in one direction only, and means released by the oscillating member when reaching one limit of its movement, for coupling it to the drive clutch member for joint reciprocation.

2. The combination with a continuously operating drive mechanism including an oscillating member, of feeding means, cooperat-

ing drive and driven clutch members for operating the feeding means in one direction only, means released by the oscillating member when reaching one limit of its movement, for coupling it to the drive clutch member for joint reciprocation, and means for disengaging the coupling means from the oscillating member to permit continued movement thereof independently of the clutch members.

3. The combination with a continuously operating drive mechanism including an oscillating member, of feeding means, cooperating drive and driven clutch members for operating the feeding means in one direction only, a key carried by the drive clutch member, means on the oscillating member for holding the key under restraint, and means for shifting the key into the path of said restraining means when the oscillating member reaches one limit of its movement, thereby to couple said member to the drive coupling member, for joint reciprocation.

4. The combination with a continuously operating drive mechanism including an oscillating member, of feeding means, cooperating drive and driven clutch members for operating the feeding means in one direction only, a key carried by the drive clutch member, means on the oscillating member for holding the key under restraint, means for shifting the key into the path of said restraining means when the oscillating member reaches one limit of its movement, thereby to couple said member to the drive coupling member, for joint reciprocation, a tripping element, and means for moving said element into the path of the key to shift it from the path of the restraining means and hold it during independent movement of the oscillating member.

5. The combination with stock feeding means, and a continuously oscillating drive member, of means co-operating with the drive member and the feeding means for coupling them together solely at the beginning of one stroke of the drive member, and means for uncoupling said member from the feeding means solely at the end of one stroke of the member.

6. The combination with feeding mechanism including a driving clutch member and a driven clutch member adapted to be moved thereby in one direction only, of a key rotatable with and slidable relative to the driving clutch member, a driving member mounted for continuous oscillation having a recess for holding the key during oscillation of said member relative to the clutch members, and co-operating means on the oscillating member and the driving clutch member for placing the key in locking engagement with the oscillating member when said member reaches one extreme position during its oscillation.

7. The combination with feeding mechanism, driving and driven clutch members for actuating said mechanism in one direction only, and driving mechanism including an oscillating member, of a yieldingly pressed key movable with the driving clutch member, a restraining element carried by the oscillating member and normally engaging the key to couple said member and the driving clutch member for oscillation together, a shiftable tripping device, and means on the key for engagement with said device to deflect the key and uncouple the driving clutch member from the oscillating member.

8. The combination with an oscillating drive member, feeding means, an element mounted for back and forth rotation and means operated thereby for actuating the feed mechanism in one direction only, of means released by the oscillating drive member when reaching one limit of its movement for coupling it to said element for joint reciprocation.

9. The combination with an oscillating drive member, feeding means, an element mounted for back and forth rotation and means operated thereby for actuating the feed mechanism in one direction only, of means released by the oscillating drive member when reaching one limit of its movement for coupling it to said element for joint reciprocation, and means for disengaging the coupling means from the oscillating drive member to permit continued movement thereof independently of said element and the feeding means.

10. In a metal-working machine a driving element, means operated thereby for feeding stock intermittently into the machine, and means normally restrained by the stock for uncoupling the feeding means from the driving element when the stock becomes disengaged from said restrained means.

11. The combination with stock feeding means, and a continuously oscillating drive member, of means cooperating with the drive member and the feeding means for coupling them together solely at the beginning of one stroke of the drive member, and means for uncoupling said member from the feeding means solely at the end of one stroke of the member, said means including a stock restrained element, and means for automatically shifting said element when disengaged from the stock.

12. The combination with a continuously operating drive mechanism including an oscillating member, of feeding means, cooperating drive and driven clutch members for operating the feeding means in one direction only, and means released by the oscillating member when reaching one limit of its movement, for coupling it to the drive clutch member for joint reciprocation, said means including a stock restrained element, and means for automatically shifting said element, when disengaged from the stock.

13. In a machine of the class described, a stock-feeding mechanism, operating mechanism for driving said feeding mechanism with intermittent strokes to feed equal lengths of stock to the machine, means for coupling the operating mechanism to the feeding mechanism solely at the beginning of one full stroke of the feeding mechanism, and means for uncoupling said mechanism solely at the end of one full stroke of the feeding mechanism.

14. In a machine of the class described, a stock-feeding mechanism, operating mechanism for driving said feeding mechanism with intermittent strokes to feed equal lengths of stock to the machine, means for coupling the operating mechanism to the feeding mechanism solely at the beginning of one full stroke of the feeding mechanism, and means automatically released when the end of a length of stock reaches a predetermined point for uncoupling said mechanisms solely at the end of one full stroke of the feeding mechanism.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

WILLIAM L. CLOUSE.