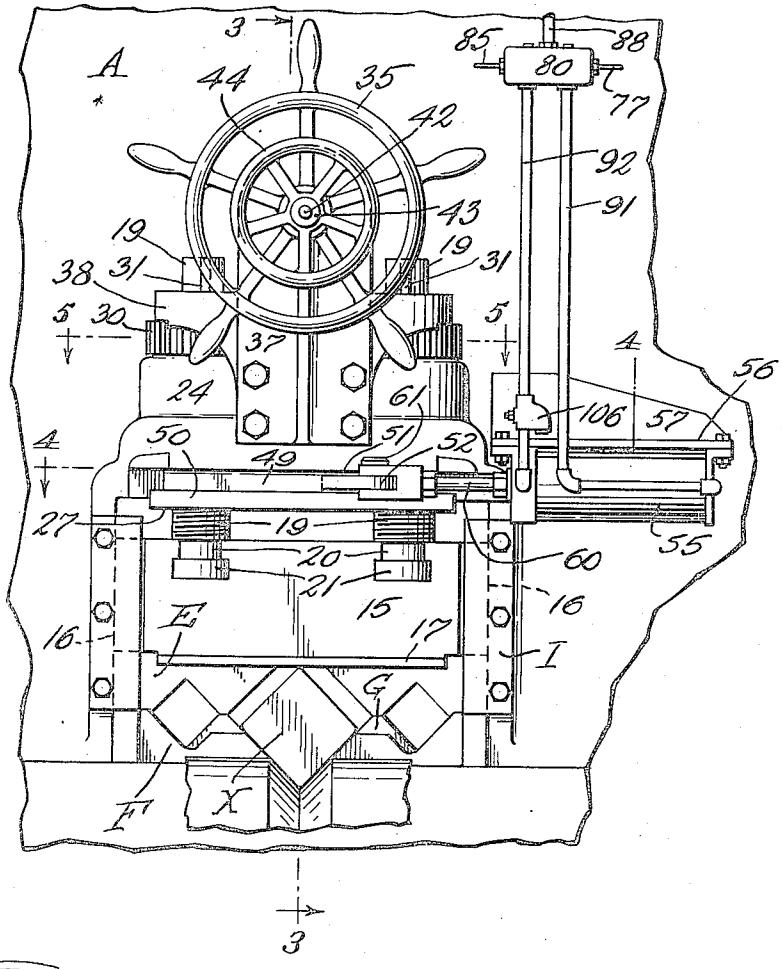
Oct. 4, 1938. W. C. TUCKER 2,132,136

HOLDING OR STRIPPING MECHANISM FOR SHEARING MACHINES

Filed Aug. 4, 1937 3 Sheets-Sheet 1

Fig. 1.



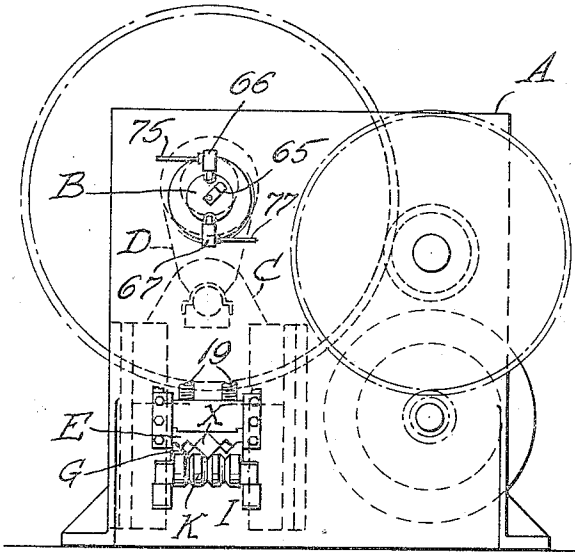


Fig. 2.

INVENTOR
William C. Tucker,
BY
Parker, Prochnow & Farmer,
ATTORNEYS

Oct. 4, 1938. W. C. TUCKER 2,132,136

HOLDING OR STRIPPING MECHANISM FOR SHEARING MACHINES

Filed Aug. 4, 1937 3 Sheets-Sheet 2

Fig. 3.

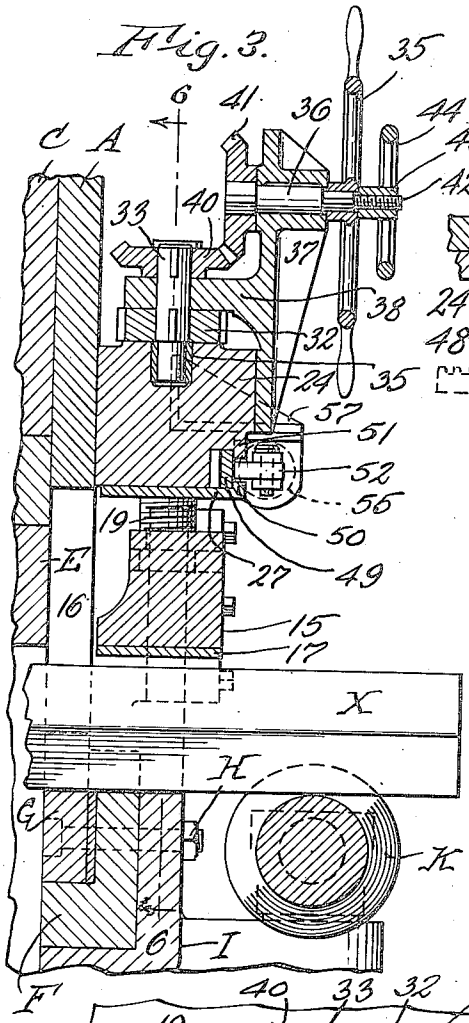


Fig. 4.

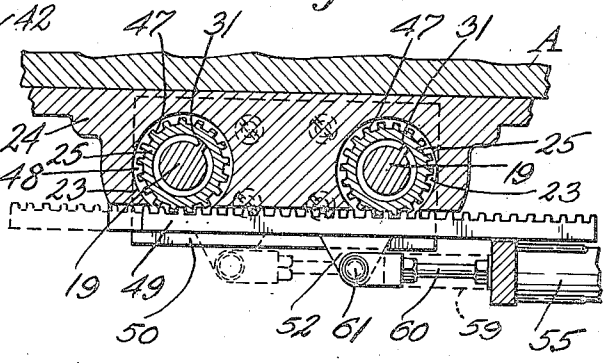
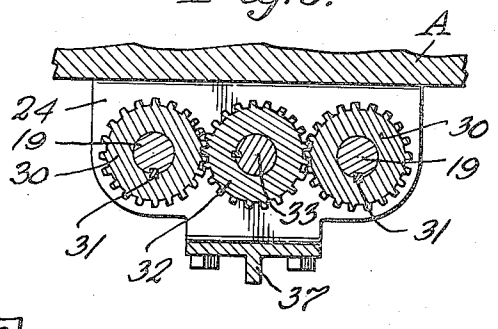


Fig. 5.



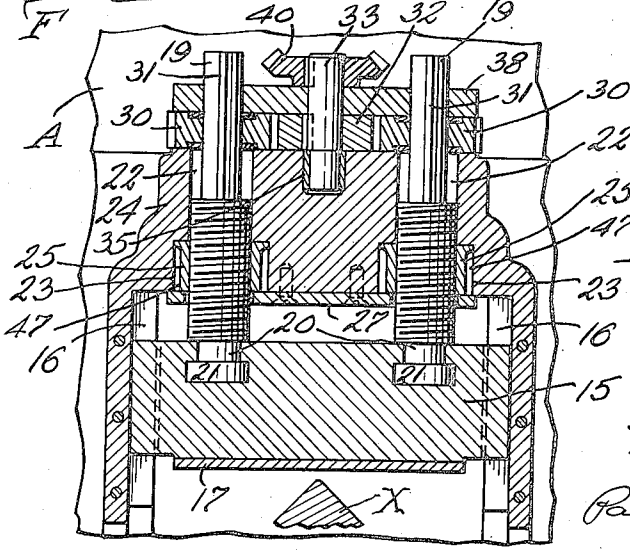


Fig. 6.

INVENTOR
William C. Tucker
BY
Parker, Prickett & Farmer
ATTORNEYS

Oct. 4, 1938. W. C. TUCKER 2,132,136

HOLDING OR STRIPPING MECHANISM FOR SHEARING MACHINES

Filed Aug. 4, 1937 3 Sheets-Sheet 3

Fig. 7.

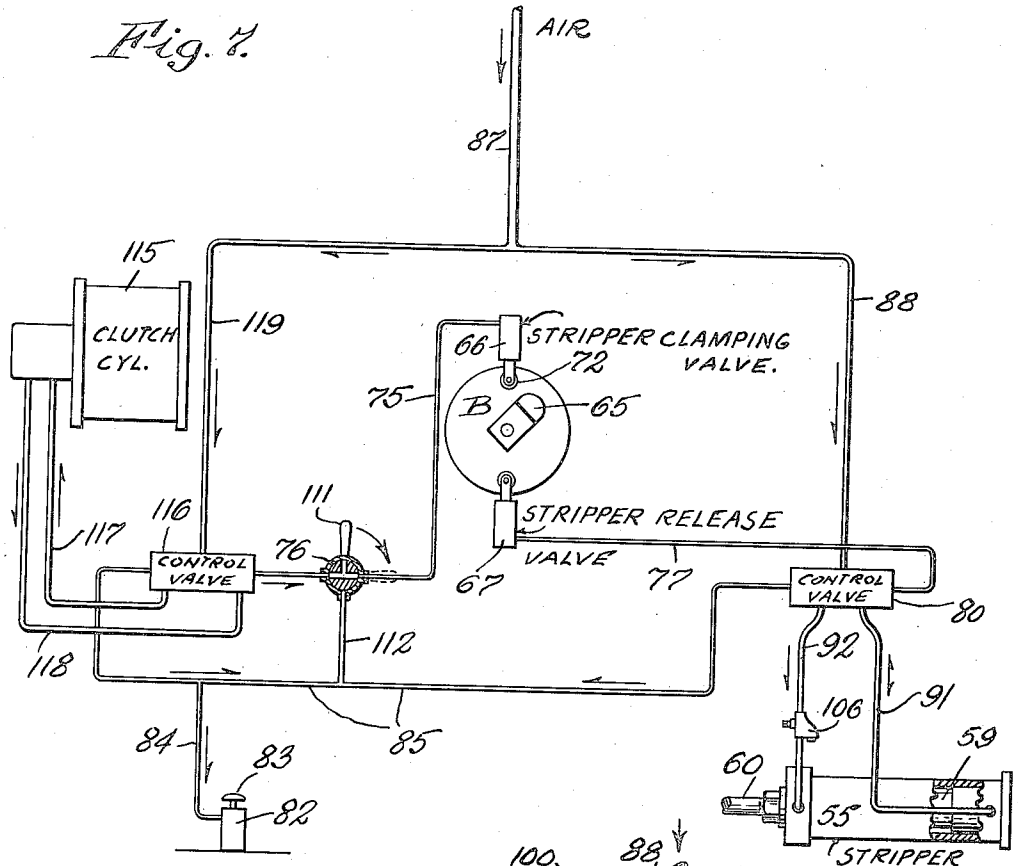


Fig. 8.

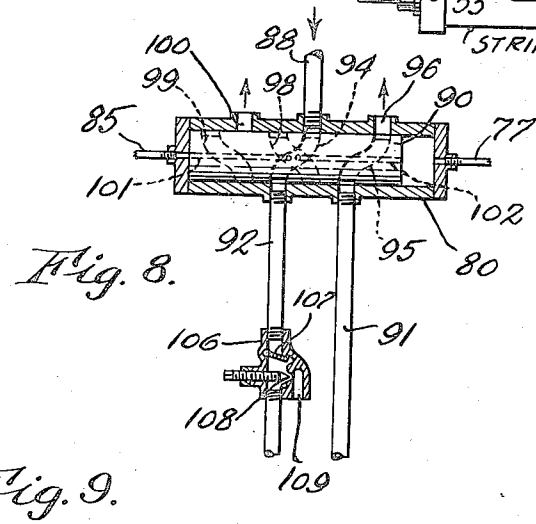
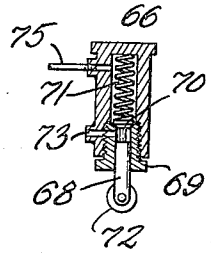


Fig. 9.



INVENTOR
William C. Tucker
BY
Parker, Prochnow & Farmer.
ATTORNEYS

Patented Oct. 4, 1938 2,132,136

UNITED STATES PATENT OFFICE

2,132,136

HOLDING OR STRIPPING MECHANISM FOR SHEARING MACHINES

William C. Tucker, Kenmore, N. Y., assignor to Buffalo Forge Company, Buffalo, N. Y.

Application August 4, 1937, Serial No. 157,356

18 Claims. (Cl. 164—52)

This invention relates to improvements in shearing machines and particularly to hold-down or stripping mechanisms for use on such machines.

An object of this invention is to provide a mechanism of this kind with two different actuating means, one for positioning the holding device or stripper in proximity to the work and another for moving the holding device into and out of gripping engagement with the work. Another object of this invention is to provide a hold-down or stripping mechanism of improved construction which may be operated by power. Another object of the invention is to provide a holding or stripping mechanism which is power operated and manually adjustable. Another object of this invention is to provide a power operated holding mechanism which is capable of a wide range of adjustments so as to be adaptable for use in connection with work of a wide variety of sizes. Another object is to provide a holding mechanism which may be operated automatically and in properly timed relation to the operation of the movable knife of the shearing machine. It is also an object of this invention to provide a holding mechanism which is operated by fluid pressure controlled automatically by the operation of the machine. Another object is to provide a fluid operated mechanism which is so constructed as to be capable of exerting greater pressure for releasing the holding member than for pressing the same into engagement with the work.

A further object of this invention is to provide a holding or stripping mechanism for shearing machines which is operated by fluid pressure applied through suitable mechanism, in such a manner that any force exerted by the work against the holding mechanism will not produce reverse movement of the same.

Other objects of this invention will appear from the following description and claims.

My improved holding or stripping mechanism may be applied to any suitable shearing or cutting machine in which it is necessary or desirable to hold the work for stripping the same from a cutting knife or to hold the work securely while being cut, or to hold that part of the work which has been cut off against movement which might result in damage or injury to an operator. In the accompanying drawings, I have shown my invention as applied to a billet shear, but it will be understood that it is not intended to limit this invention to a shear of this kind.

In the accompanying drawings:

Fig. 1 is a fragmentary front elevation of a shearing machine having a work holding or stripping mechanism embodying this invention applied thereto.

Fig. 2 is a front elevation, on a reduced scale, of a billet shear showing a portion of my improved holding or stripping mechanism applied thereto.

Fig. 3 is a sectional elevation of a portion of my improved holding or stripping mechanism, the section being taken on line 3—3, Fig. 1.

Figs. 4 and 5 are respectively sections thereof, on lines 4—4 and 5—5, Fig. 1.

Fig. 6 is a sectional elevation thereof, on line 6—6, Fig. 3.

Fig. 7 is a diagrammatic view of the fluid pressure connections for the automatic operation of my improved holding or stripping mechanism.

Fig. 8 is a sectional view of a control valve.

Fig. 9 is a sectional view of another valve used in connection with my automatic control system.

Referring first to Fig. 2, in which I have illustrated by way of example a billet shear or bar cutter of a well known type to which my improved holding or stripping mechanism may be applied, A represents the frame of the machine, which may comprise a pair of parallel plates spaced apart and on which the various parts of the machine may be mounted. This machine includes the usual eccentric shaft B having an eccentric arranged thereon between the two plates of the frame A. The eccentric actuates a vertically movable plunger C through the medium of an eccentric strap or ram D. E represents the upper or movable knife which is mounted on the lower end of the plunger C, the ram and plunger being shown in broken lines in Fig. 2, and being also arranged between the two plates of the frame A. F represents the usual lower knife seat to which the lower knife G is secured, Fig. 3, the knife seat being in turn secured to the front plate of the frame A and to a lower knife holder casting or part I, which may be welded or otherwise secured to the front face of the front plate of the frame A. The lower knife seat and knife may be held in place by means of bolts H. K represents an anti-friction roller suitably journalled on the front of the frame of the machine which facilitates the feeding of the work into operative relation to the knives. X represents a bar or billet which is to be cut.

In accordance with this invention, I provide a holding or stripper bar 15 which is slidably mounted on the upper part of the lower knife housing or casting I in any suitable manner, for example, by means of guide grooves 16, Fig. 6, in which the opposite side edges of a holding bar 15

are slidably arranged. If desired, the holding bar 15 may be provided at the lower face thereof with a wear plate 17 which may be made of harder material than the stripper bar and which contacts with the work to be cut.

The holding or stripper bar 15 may be adjusted vertically in any suitable or desired manner, for example, by one or more adjusting screws 19, two such screws being shown, the lower ends of which are rotatably embedded in the holding bar 15, for example, by forming these screws with reduced neck portions 20 and enlarged end portions 21 which extend into undercut slots or recesses extending in a direction lengthwise of the machine through the upper portion of the holding bar. If desired, the ends of these recesses may be closed by welding or otherwise to confine the heads 21 therein. Any other means for rotatably connecting the ends of the screws with the holding bar 15 and preventing lengthwise movement of the screws relatively to the holding bar may be employed, if desired.

The threaded portions of the screws extend through upright apertures 22 formed in a forwardly projecting portion 24 of the housing I and each screw has a threaded engagement with a nut 25 arranged in an enlarged portion or cavity 23 which forms an extension of the aperture 22 through which the screw extends. These nuts may be held against endwise movement in the enlarged portions of the apertures in any suitable manner, for example, by means of a retaining plate 27 secured to the lower face of the part 24 and engaging the lower faces of the nuts 25. Consequently, if the nuts 25 are held against turning, the holding plate or member 15 may be adjusted vertically by rotation of the screws 19.

One of the features of this invention is that I provide two separate and individually operable means for moving the screw or screws in the direction of their length. This makes it possible, for example, to provide hand operated means for positioning the holding bar into close proximity to the work, so that the work may be freely fed between the stationary knife and the holding bar, and the other operating mechanism may then be used to move the holding bar quickly through the remaining short distance into and out of gripping engagement with the work. The latter means may be power operated and the operation may be automatically controlled by the shearing machine.

One of these means moves the screws by turning the same about their axes and the other means moves the screws by turning the nuts. Either or both means may be operated by power. Preferably, however, the screws are turned manually for bringing the holding bar close to the work and the nuts are turned by power operated mechanism for moving the holding bar into and out of work clamping position, and this preferred embodiment of the invention is illustrated in the drawings.

The manually operated means for turning the screw or screws may be similar to mechanism of this kind and as heretofore used.

If more than one screw is used, means are preferably provided for simultaneously turning both of the screws. These means, as illustrated, include a pair of pinions 30 splined to the stems of the screws, splines 31 being clearly shown in Figs. 1 and 5. These pinions 30 mesh with a driving gear 32 arranged between the two pinions and keyed or otherwise secured to upright shaft 33, the lower end of which may be arranged in a bearing 35 within the housing part 24. Consequently, by rotating the shaft 33, the gear 32 will impart motion to both pinions.

Any suitable means may be provided for rotating the driving shaft 33, and for sake of convenience, this may be done by means of a hand wheel 35 mounted on a horizontal shaft 36 at the front end of the machine. The shaft 36 is preferably journalled in a bracket 37, the lower end of which is arranged on the front face of the housing part 24 and this bracket has an inwardly extending flange or ledge 38 which extends over the upper faces of the pinions 30 and the gear 32 and which has apertures through which the stems of the screws 19 and the shaft 33 extend, the apertures also forming bearings for the stems and shaft. On the upper end of the shaft 33 above the shelf or ledge 38 is arranged a bevel gear 40 which meshes with another bevel gear 41 secured on the shaft 36 of the hand wheel 35. Consequently, it will be obvious that by turning the hand wheel 35, the shaft 33 will be turned through the medium of the bevel gears 40 and 41, thus turning the gear 32 which in turn imparts rotary motion to the screws 19.

If it is desired to lock the adjusting mechanism so that the holding plate 15 will remain in the position in which it is placed, this can easily be done, for example, by providing the front end of the shaft 36 with a screw threaded portion 42 and providing thereon a lock or jamb nut 43. When this nut is turned in a direction to press against the hub of the hand wheel 35, it presses the hand wheel into contact with the bracket 37 and thus locks it against turning. If desired, for sake of convenience, the lock nut 43 may form the hub of a small hand wheel 44, so that the larger hand wheel 35 can readily be locked in position by turning the smaller hand wheel 44.

The adjustment of the screws 19 by turning the nuts 25 may be effected in any suitable or desired manner. In the construction illustrated, the nuts 25 are provided on their peripheral portions with gear teeth 47 and these nuts are rotatably arranged in the cavities or recesses 23 in the projection 24 of the lower knife holder housing or casting I and these cavities terminate in a front wall of this casting in such a manner that the gear teeth of the nuts 25 extend beyond a portion of the front wall of the housing I. The gear teeth of the nuts mesh with corresponding teeth on a rack bar 49 which is slidably mounted on the housing or casting I. Any suitable means for slidably arranging the rack bar in correct relation to the gear teeth 47 may be employed, and in the construction illustrated, see particularly Figs. 3 and 4, the rack bar 49 is confined partly by the supporting plate 27 which also engages the lower faces of the nuts 25 and which has at its front end an upwardly extending lip or flange 50 which engages the lower portion of the outer face of the rack bar 49. The upper portion of this face of the rack bar is engaged by a downwardly extending flange or lip 51 formed on the portion 24 of the support for the lower knife holder. The rack bar in the particular construction shown is also provided with an outwardly extending lug or projection 52 by means of which the rack bar may be moved back and forth to turn the nuts 25.

Any suitable or desired means may be provided for imparting reciprocatory motion to the rack bar for clamping the work in place prior to the cutting stroke of the upper knife and for releasing the work upon completion of the cut.

In the particular construction illustrated, fluid pressure actuated means are provided for this purpose and include a cylinder 55 which is suitably mounted on the frame of the shearing machine, for example, on the under face of a horizontally extending plate or flange 56 of a bracket 57 secured to the machine frame A. The cylinder is provided with a piston having a piston rod 59, shown in broken lines in Fig. 4. This piston rod may be connected with the lug 52 of the rack bar in any suitable manner, for example, by means of a connecting rod 60 which is bolted or otherwise secured at 61 to the lug 52.

In the operation of the holding or stripping mechanism thus far described, when the piston is moved to the right in Figs. 1 and 4 by means of fluid pressure, the rack bar 49 will also be moved to the right to a sufficient distance to cause the holding or stripper bar 15 to engage the work X and clamp the same in fixed position. After the cut has been made, fluid pressure is admitted into the cylinder 55 at the opposite side of the piston so that the piston forces the rack bar to the left in Figs. 1 and 4, for example, into the dotted line position shown in Fig. 4, so that the holding bar 15 is moved upwardly out of engagement with the work X to release the same. By means of this arrangement, it will be noted that the piston will be moved to the right or into work engaging position with materially less force than in the opposite direction, due to the fact that the piston rod 59 is of considerable diameter with relation to the piston diameter so that fluid pressure acts on a reduced area of the piston when the rack bar is moved into work engaging position. When moved in the opposite direction, the piston is acted upon throughout the entire area of the head thereof by the fluid pressure so that a materially greater force may be exerted for releasing the work. This has been found desirable, for the reason that the cutting of the work sometimes results in a jamming of the same against the holder plate so that considerably greater force is frequently necessary to release the work than to clamp it. Consequently, by the arrangement described a very positive operation of the releasing mechanism is assured.

It is also a feature of this invention to provide means whereby the stripper or holding bar 15 may be automatically actuated in timed relation to the movement of the movable knife. Any suitable or desirable means may be employed for this purpose, and I have illustrated by way of example a construction whereby this automatic arrangement can be effected, and as shown in the drawings, the automatic operation is effected through the medium of compressed air. This is desirable for the reason that many shearing machines are now equipped with pneumatically operated clutches, so that a pneumatic mechanism for operating the stripper bar may readily be applied to such machines. It will, of course, be understood that this automatic operation of the stripper may be effected hydraulically or by any other fluid medium or source of power. The arrangement for effecting the automatic operation which is diagrammatically illustrated in Fig. 7, and partially illustrated in Figs. 1 and 2 is merely illustrative of one form of arrangement whereby the automatic operation can be effected, and it will be understood that it is not intended hereby to limit this invention to the particular arrangement shown.

As clearly shown in Figs. 2 and 7, the automatic means are actuated by a cam member 65 which is suitably secured upon the main or eccentric shaft B of the shearing machine. During each rotation of the shaft B, the cam member 65 actuates the stems of two valves 66 and 67 which extend into the path of movement of the cam, the valves being secured on a fixed part of the frame of the machine. The structure of one of these valves is shown in detail in Fig. 9, in which the stem 68 is slidably arranged in a bushing 69, the inner end of which forms a valve seat with which a valve 70 cooperates. The valve 70 is mounted on a reduced portion of the stem 68 and the valve is urged into seating position by means of a spring 71, this spring also urging the valve stem 68 outwardly. If the valve stem 68 is pushed into the housing by the engagement of the cam 65 with an anti-friction roller or wheel 72 arranged on the end of the stem, air will be discharged from the valve housing through a bleeder passage 73, due to the lifting of the valve 70 from its seat. The intreior of the valve housing 66 is connected with a pipe 75 which leads to a manually operable valve 76 and the valve housing 67 is connected by means of a pipe 77 to one end of a control valve having a housing 80. The valve 66 effects the movement of the holding or stripping bar 15 into clamping position when the shearing machine is set for a continuous operation and the valve 67 acts to release the holding or stripper bar from the work after the completion of the cut regardless of whether the machine is set for continuous operation or for intermittent operation. If the machine is used for intermittent operation, a valve for starting the operation of the machine is actuated by the operator, and in the construction shown, 82 represents this valve, which may be substantially identical in construction with the valve shown in Fig. 9, except that the valve stem extends upwardly and is provided with a head 83 which the operator may press downwardly with his foot to release the air pressure from the interior of the valve and from a pipe or duct 84 which connects with this valve. This pipe or duct 84 connects with a pipe 85 which terminates at that end of the control valve housing 80 which is opposite to the end at which the pipe 77 terminates.

The control valve housing may be of any suitable or desired construction for controlling the admission of compressed air from a suitable source of air supply connected for example by means of pipes or ducts 87 and 88 to the middle portion of the control valve housing 80.

The control valve may be of any suitable or desired construction, and as illustrated in Fig. 8, the housing 80 is of cylindrical form and contains a reciprocatory piston or plunger 90 which also acts as a slide valve and is movable endwise in the housing 80 but held against rotation therein. The housing is also provided with two ports, one of which is connected by means of a pipe 91 to the head end of the cylinder 55 and the other port is connected by means of a pipe 92 to the other end of the cylinder 55. The air supply pipe 88 may connect with a passage 94 in the slide valve 90 when the valve is in the position shown in Fig. 8, so that compressed air flows through the valve to the pipe 92, thus forcing the piston in the cylinder 55 to the right in Figs. 1, 7 and 8, so that the holding bar is pressed against the work. When the valve 90 is in this position, the pipe 91 is connected through a valve passage 95 with an air

discharge port 96. The cylindrical slide valve 90 also has two other passages 98 and 99. When the slide valve is moved to the right in Fig. 8, the valve passage 98 establishes a communication between the air supply pipe 88 and the pipe 91 leading to the head end of the cylinder 55 and at the same time, the valve passage 99 establishes communication between the pipe 92 and a vent or discharge opening 100 in the valve housing 80. This, consequently, causes the piston in the stripper cylinder 55 to move to the left in Figs. 1 and 7 and move the stripper bar 15 out of engagement with the work.

The slide valve 90 is provided with a bleeder passage 101 extending from the left end of this valve to the valve passage 94 and a bleeder passage 102 extends from the right-hand end of the slide valve 90 to the valve passage 98.

From the foregoing description, it will be obvious that when air is discharged from the pipe 85, for example, by having the operator depress the foot treadle 83 of the valve 82, then compressed air on the left side of the valve 90 will be discharged and the compressed air on the other side thereof will force the slide valve 90 into the position shown in Fig. 8, thus moving the stripper bar 15 into work engaging position. During this time interval air under pressure will pass through the bleeder passage 101 to the left side of the slide valve 90 and into the pipe 85. The flow of air through the bleeder 101 will not change the position of the slide valve 90, but will merely result in a balancing of the pressure on opposite ends of the valve. When the cam 65 engages the stripper release valve 67, air will be discharged from the pipe 77, thus permitting air on the opposite side of the slide valve 90 to move the slide valve to the right in the housing 80. This will cause the stripper bar to be moved in the opposite direction through the medium of the cylinder 55. Compressed air will also flow from the valve passage 98 through the bleeder passage or duct 102 to the right hand end of the slide valve 90 and into the pipe 77 so that the valve is ready to be again actuated by the operator by depressing the stem of the air valve 82.

I preferably arrange in the pipe 92 a speed control valve for controlling the movement of the piston in the cylinder 55 into work releasing position, to prevent pounding of the piston against the end of the cylinder 55 when the stripper bar 15 is moved out of engagement with the work. This speed control valve includes a housing 106 containing a check valve 107 which is opened by air rushing through the pipe 92 to the cylinder 55, but which will be closed when exhaust air flows in the opposite direction from the cylinder 55. Upon the closing of the check valve 107, the air exhausted from the cylinder 55 must pass through a small aperture controlled by a needle valve 108 into a discharge passage 109. By retarding the discharge of air from the left end of the cylinder 55, the movement of the piston into stripper releasing position is also retarded, and by adjusting the needle valve 108, the speed at which the piston moves toward the piston rod end of the cylinder 55 may be controlled as desired.

If it is desired to operate the shearing machine continuously, the valve 76 may be turned through one-quarter of a revolution by moving the handle 111 of the valve in the direction shown by the arrow into the dotted line position shown in Fig. 7. When this is done, the pipe 75 connected with valve 66 will be in communication through the valve 76 with a pipe 112 connecting with the pipe 85. Consequently, when the cam 65 pushes the stem of the valve 66 inwardly, air is discharged from the left side of the control valve housing 80 in the same manner as when the valve 82 is actuated by an operator, so that the slide valve 90 will be moved to the left, thus moving the piston toward the head end of the cylinder and moving the holding bar into work engaging position. Consequently, when the valve 76 is set for continuous operation of the shearing machine, the cam 65 when engaging the stripper clamping valve 66 will cause the stripper bar to move into work clamping position. While the cam 65 is moving from engagement with the valve 66 to engagement with the valve 67, the cut is made in the work, and consequently, when the valve 67 is actuated, the stripper cylinder 55 will return the stripper bar 15 into a position out of engagement with the work. During the time that the cam 65 travels from the valve 67 to the valve 66 to complete the circle, the work may be advanced and positioned for the next cut.

115 represents a pneumatically operated clutch cylinder which may be actuated by means of another control valve 116, similar to the control valve described and which is connected with the clutch cylinder by means of pipes 117 and 118. The control valve 116 is also connected with the air supply pipe 87 by means of a branch pipe 119. The valve 76 controls the operation of the clutch as well as of the stripper and when in the position indicated in full lines in Fig. 7, the operation of the machine is automatically stopped when the cam 65 actuates the valve 66. The machine is started by the operator in actuating the foot valve 82. If the valve 76 is turned through one-quarter of a turn so that the handle 111 thereof occupies the dotted line position in Fig. 7, the machine will operate continuously since the valve 66 will in that case not be in communication with the right hand end of the housing of the control valve 116 shown in Fig. 7, so that the machine will not be stopped, but will operate continuously. The clutch operating mechanism of itself is no part of this invention and is illustrated merely to show how my stripper actuating means may be employed in conjunction with a clutch operating mechanism. It will be understood, however, that my stripper and its actuating means may be employed with any other suitable means for stopping and starting the machine.

By means of the control mechanism described, the stripper bar 15 will be automatically actuated regardless of whether the shearing machine is operating continuously or intermittently. When this mechanism is operated in connection with an air controlled clutch, the mechanism for operating the stripper bar requires no attention whatever on the part of the operator, since the operation of the stripper bar operating mechanism is either automatically controlled by the valves 66 and 67, or is operated intermittently by the operator by means of the foot valve 82. The movement of the stripper bar 15 out of engagement with the work is effected automatically in either case by the stripper release valve 67.

The work holding or stripper mechanism described also has the advantage that the same can be very readily changed to cooperate with work of different sizes and shapes. If the machine is to be adjusted for operating on work of a differ-

ent size, it is merely necessary to release the lock nut or hand wheel **44** and to adjust the hand wheel **35** so that the holding or stripper bar **15** will be positioned immediately above the work, but out of contact with the work so that the work can be fed between the lower knife holder and the stripper bar and so that only a small movement of the screws **19** is necessary by means of the nuts **25**. The adjustment of the screws by means of the hand wheel **35** requires no corresponding adjustment of the power operated mechanism for the nuts, since the nuts are not moved endwise by the hand operated adjusting mechanism. While the screws are turned by hand wheel **35**, the nuts are held against turning by the piston in the cylinder **55** and the rack bar **49**. When the rack bar turns the nuts, the screws are held against rotation by hand wheel **35** and locking wheel **44**.

I claim as my invention:

1. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, and independent means for turning said nut to move said bar toward and from the work.

2. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, and power operated means for turning said nut relatively to said screw for moving said bar into and out of holding relation to the work.

3. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work for clamping the work in fixed relation to said stationary knife, a screw having one end connected with said bar, a nut having a threaded engagement with said screw and held against endwise movement on a part of said machine, and power operated means for turning said nut relatively to said screw to move said bar toward and from the work.

4. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work for clamping the work in fixed relation to said stationary knife, a screw having one end connected with said bar, a nut having a threaded engagement with said screw and held against endwise movement on a part of said machine, teeth on a peripheral portion of said nut, and power operated means engaging said teeth for turning said nut relatively to said screw for moving said holding bar toward and from the work.

5. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work for clamping the work in fixed relation to said stationary knife, a screw having one end connected with said bar, a nut having a threaded engagement with said screw and held against endwise movement on a part of said machine, teeth on a peripheral portion of said nut, and a rack bar engaging said teeth for moving said holding bar toward and from the work.

6. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work for clamping the work in fixed relation to said stationary knife, a screw having one end connected with said bar, a nut having a threaded engagement with said screw and held against endwise movement on a part of said machine, teeth on a peripheral portion of said nut, a rack bar engaging said teeth, and fluid pressure actuated means for moving said rack bar to turn said nut to move said holding bar toward and from the work.

7. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, gear teeth on the peripheral portion of said nut, a rack bar meshing with said gear teeth, and fluid pressure actuated means for moving said rack bar to turn said nut for moving said holding bar toward and from the work.

8. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a plurality of screws, each having one end connected with said holding bar, a nut for each screw and having a threaded engagement therewith and held against endwise movement on a fixed part of said machine, means for simultaneously turning said screws relatively to said nuts for moving said holding bar toward and from the work, and means for simultaneously turning said nuts relatively to said screws for moving said holding bar toward and from the work.

9. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in

fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, means independent of said screw turning means for turning said nut to move said holding bar toward and from the work, and power operated mechanism for actuating one of said turning means to move said holding bar into and out of position to grip the work.

10. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a plurality of screws, each having one end connected with said holding bar, a nut for each screw and having a threaded engagement therewith and held against endwise movement on a fixed part of said machine, means for simultaneously turning said screws relatively to said nuts for moving said holding bar toward and from the work, means for simultaneously turning said nuts relatively to said screws for moving said holding bar toward and from the work, and fluid pressure operated mechanism, including a cylinder and a piston for actuating one of said turning means for moving said holding bar into and out of position to grip the work.

11. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, means independent of said screw turning means for turning said nut to move said holding bar toward and from the work, and fluid pressure operated mechanism including a cylinder and a piston for actuating one of said turning means for moving said holding bar into and out of position to grip the work, said piston having a piston rod arranged to move into said cylinder to move said holding bar to the work and out of said cylinder to move said holding bar from the work.

12. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, means independent of said screw turning means for turning said nut to move said holding bar toward and from the work, power operated mechanism for actuating one of said turning means to move said holding bar into and out of position to grip the work, and means operated by the movement of said movable knife for actuating said power operated means to cause said holding bar to move into engagement with the work before said movable knife engages the work and to move out of engagement with the work after the cut is completed.

13. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, means independent of said screw turning means for turning said nut to move said holding bar toward and from the work, fluid pressure operated mechanism including a cylinder and a piston for actuating one of said turning means for moving said holding bar into and out of position to grip the work, and a valve actuated by a movable part of said machine before said movable knife engages the work for admitting fluid to said cylinder to move said holding bar into work engaging position before said movable knife engages the work.

14. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a screw having an end rotatably secured in said bar, a nut having a threaded engagement with said screw and held against endwise movement on a stationary part of said machine, means for turning said screw relatively to said nut for moving said bar toward and from said work, means independent of said screw turning means for turning said nut to move said holding bar toward and from the work, fluid pressure operated mechanism including a cylinder and a piston for actuating one of said turning means for moving said holding bar into and out of position to grip the work, and a valve actuated by a movable part of said machine, after the movable knife has completed a cut, for admitting fluid to said cylinder to move said holding bar out of engagement with the work.

15. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work for clamping the work in fixed relation to said stationary knife, a screw having one end connected with said bar, a nut having a threaded engagement with said screw and held against endwise movement on a part of said machine, power operated means for turning said nut relatively to said screw to move said bar toward and from the work, and means actuated by a movable part of said machine for actuating said power operated means to move said holding bar into engagement with the work before said movable knife engages the work.

16. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work for clamping the work in fixed relation to said stationary knife, a screw having one end connected with said bar, a nut having a threaded engagement with said screw and held against endwise movement on a part of said machine, power operated means for turning said nut relatively to said screw to move said bar toward and from the work, and means actuated by a movable part of said machine for actuating said power operated means to move said holding bar out of engagement with the work after the cutting operation by said movable knife is completed.

17. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a plurality of screws each having one end rotatably secured in said bar, a nut for each screw having threaded engagement with its screw and held against endwise movement on a stationary part of said machine, gear teeth on the peripheral portions of said nuts, a rack bar engaging the gear teeth of said nuts and movable to simultaneously turn all of said nuts, a cylinder, a piston cooperating with said cylinder and secured to said rack member, means for supplying fluid under pressure to said cylinder at opposite sides of said piston to move said rack bar in opposite directions for moving said holding bar into and out of engagement with the work, and hand operated means for simultaneously turning all of said screws independently of said nuts for moving said holding bar toward and from the work.

18. In a shearing machine having a stationary knife and a movable knife, the combination of a holding mechanism for holding the work in fixed relation to the stationary knife during the cutting operation of said movable knife, including a holding bar guided on said machine for movement toward and from the work, a plurality of screws each having one end rotatably secured in said bar, a nut for each screw having threaded engagement with its screw and held against endwise movement on a stationary part of said machine, gear teeth on the peripheral portions of said nuts, a rack bar engaging the gear teeth of said nuts and movable to simultaneously turn all of said nuts, a cylinder, a piston cooperating with said cylinder and secured to said rack member, means for supplying fluid under pressure to said cylinder at opposite sides of said piston to move said rack bar in opposite directions for moving said holding bar into and out of engagement with the work, a valve actuated by a movable part of said machine for controlling the admission of fluid to said cylinder to actuate said piston to move said holding bar into work holding position before said movable knife engages the work and to move said holding bar out of engagement with the work when the cut is completed, and means independent of said piston and cylinder for simultaneously turning all of said screws relatively to said nuts for adjusting the position of said holding bar relatively to the work.

WILLIAM C. TUCKER.