July 7, 1964 H. A. HEATH ETAL 3,140,087

PNEUMATICALLY OPERATED VISE JAW CONSTRUCTION

Filed June 5, 1962 3 Sheets-Sheet 1

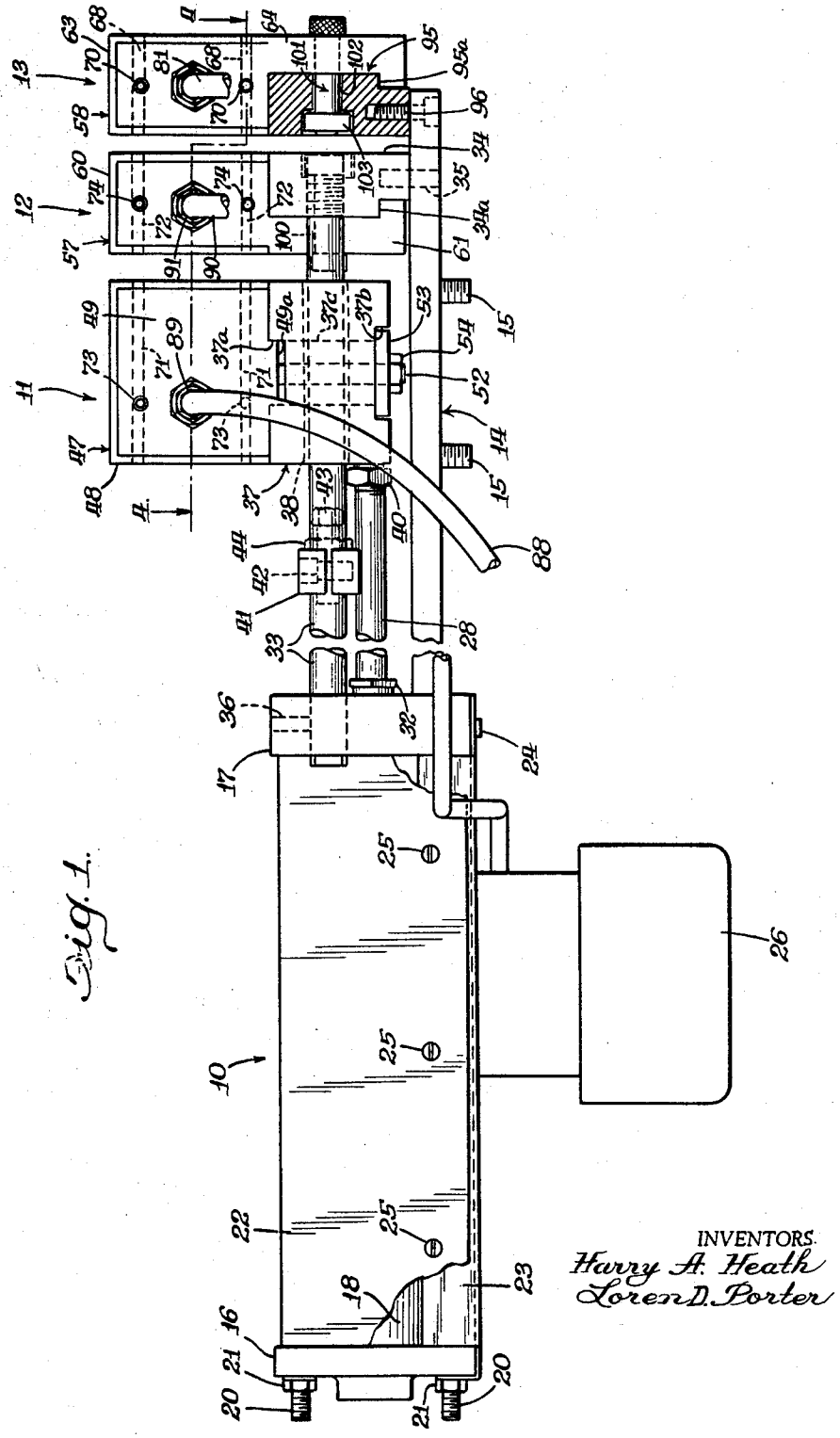


Fig. 1.

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Filed June 5, 1962 3 Sheets-Sheet 2

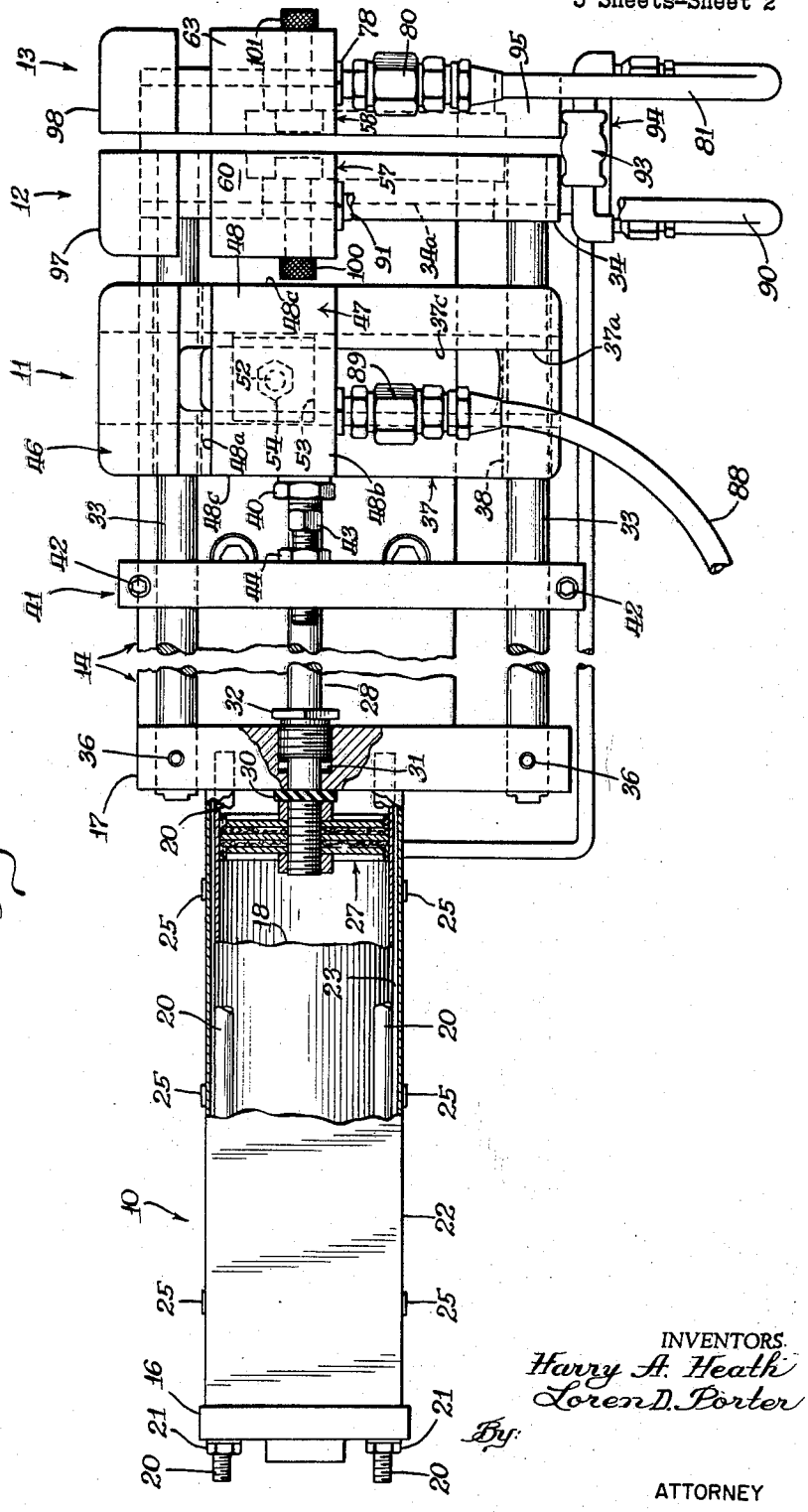


Fig. 2.

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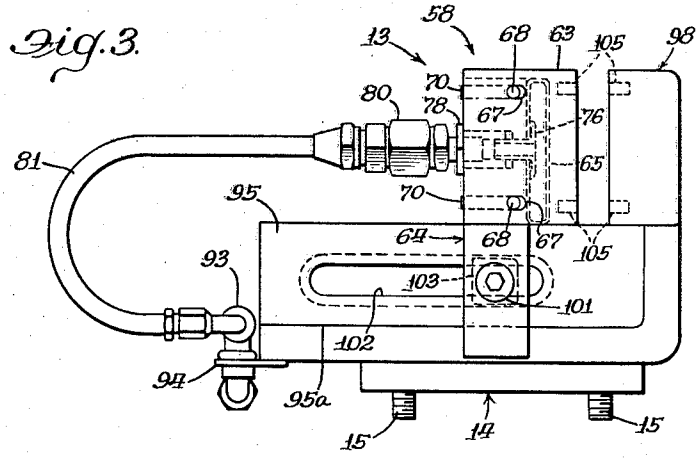
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PNEUMATICALLY OPERATED VISE JAW CONSTRUCTION

Filed June 5, 1962 3 Sheets-Sheet 3

Fig. 3.



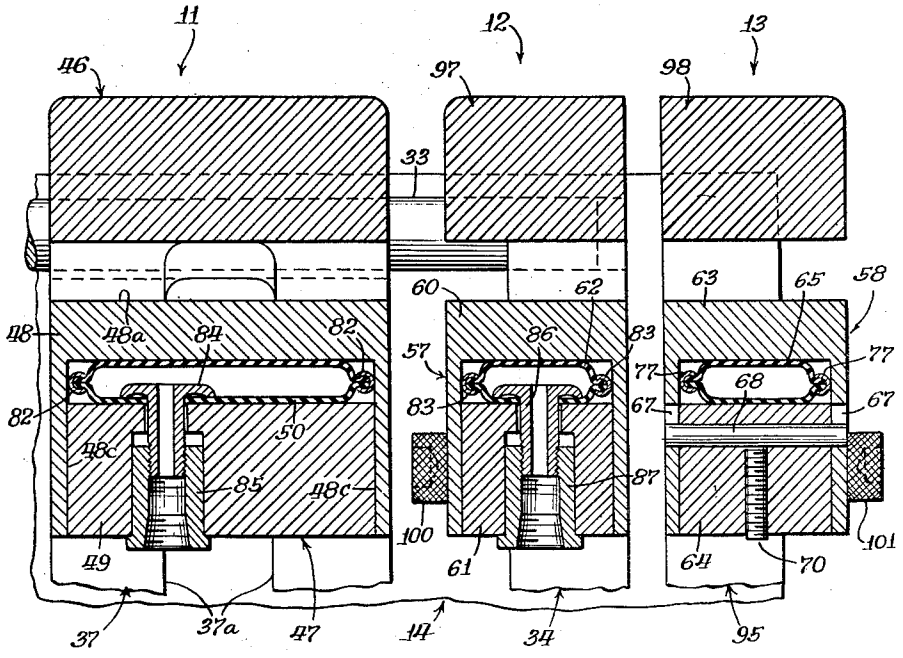


Fig. 4.

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3,140,087

PNEUMATICALLY OPERATED VISE JAW CONSTRUCTION

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Filed June 5, 1962, Ser. No. 200,196
6 Claims. (Cl. 269—22)

This invention relates generally to pneumatically operated stock feed arrangements, and to vise jaw constructions adapted particularly for use in pneumatically operated stock feeding devices of the type additionally serving to grip the stock in a vise arrangement to hold the stock for working thereon by some tool.

A primary object of the present invention is to provide a novel pneumatically operated jaw construction for use in a stock feed and vise arrangement which is relatively simple in construction and highly accurate in operation.

A further object is to provide a novel arrangement of a pneumatically operated jaw construction for use in a stock feed construction wherein the jaw construction will firmly grip a length of stock for feeding of the stock and will securely hold the stock while the stock is worked by some tool.

It is another object to provide a novel holding jaw arrangement which may be used in pairs in a vise construction to permit a cutting tool such as a saw to enter between the vise jaws and cut through and below stock held by the jaws.

It is still another object to provide novel air responsive means in the vise or jaw members of any of the preceding paragraphs which will produce a substantially greater holding force for any given gripping surface area of the vise or jaw members than heretofore known in the art.

A feature of the present invention is a novel and unique vise bladder made from a resilient hose material.

Other objects and features of the invention will be apparent upon a perusal of the following specification and drawings in which:

FIGURE 1 is a side elevational view of an air operated stock feed and vise arrangement constructed according to the invention;

FIGURE 2 is a top plan view of the structure shown in FIGURE 1;

FIGURE 3 is an end elevational view of the structure shown in FIGURES 1 and 2 looking from the vise end of the structure; and

FIGURE 4 is a cross sectional view of the structure shown in the drawings and taken substantially along the line 4—4 of FIGURE 1.

The present embodiment is the preferred embodiment, but it is to be understood that changes can be made in the present embodiment by one skilled in the art without departing from the spirit and scope of the present invention.

Generally, the construction as shown in the drawings comprises a reciprocating air cylinder assembly, a moving jaw and a pair of stationary vise jaws. The entire construction is carried on a rectangular plate which is provided with a plurality of depending studs for mounting the construction in cooperation with some tool.

Stock of some length greater than the total length of the jaws is delivered to the arrangement from the head end of the air cylinder assembly. The stock then passes through the gripping portions of the movable jaw and thence through the gripping portions of the pair of stationary vise jaws. The movable jaw is substantially wider than either stationary jaw and the stationary jaws are constructed as mirror images of each other. Each end of the base portion of the movable jaw is journaled on a rod for reciprocating longitudinal movement therealong. The

pair of rods are secured between the rod end of the air cylinder assembly and the base portion of one of the stationary jaws. The piston rod of the air cylinder assembly is connected to the base portion of the movable jaw for moving the moving jaw in a reciprocating movement on the pair of rods responsive to the operation of the air cylinder assembly. A stroke adjustment bar is also carried on the pair of rods and is positioned between the movable jaw and the rod end of the air cylinder assembly. The stroke adjustment bar functions to limit the movable jaw on its return stroke to some preselected position. The stroke adjustment bar also carries a unique and simple vernier adjustment for finely determining the exact return stroke limit that is desired. The limit of the forward stroke of the movable jaw is determined by a bumper carried in the air cylinder assembly at the rod end thereof and engaged by the air piston in the extreme forward position of the movable jaw.

The base portion of the movable jaw is a substantially rectangular member having a longitudinally centrally disposed slot both in the upper and lower surfaces thereof with a further slot formed vertically through the base portion between the upper and lower slots. The remainder of the movable jaw comprises two stock gripping jaw portions, one which is fixed on the base portion and the other which may be selectively fixed at a selected position on the base portion longitudinally thereof. The selectively fixed jaw portion is operable within a limited range to cause stock to be gripped or clamped between the two jaw portions. The selectively fixed jaw portion of the movable jaw comprises a face plate member, a backup member and a bladder. The backup member is a substantially rectangular block with a depending central portion which permits the backup member to rest upon the base member of the movable jaw with the depending portion of the backup member disposed in the upper slot of the base member of the movable jaw. A stud extends from the underside of the backup member through the base member to the underside thereof. A plate and a nut are carried on the lower end of the stud to permit the backup member to be securely fixed at any position along the base member. The face plate member is formed in a somewhat boxlike shape with an open bottom and an open back. The face plate member cooperates with the backup member to substantially cover the backup member, and the vertical space between the face plate member and the front of the backup member is occupied by the air bladder which provides for the operation of the movable jaw when air under pressure is delivered to the bladder. A certain pin arrangement limits the range of movement of the face plate member relative to the backup member.

The stationary jaws differ in construction from the movable jaw primarily in the shape of the base members and the shape of the backup members of the selectively fixed jaw portions. The base member of each stationary jaw is secured to the base plate by dowels and bolts. The backup member of each selectively fixed jaw portion of each stationary jaw is provided with a depending flange which is disposed on one side of the base member. The base member is further provided with a certain horizontally disposed slot arrangement and a certain bolt and plate assembly is carried through that slot and through the depending flange portion of the backup member of the selectively fixed jaw portion to permit the selectively fixed jaw portion to be fixed in any desired spaced relationship to the fixed jaw portion thereof to accommodate stock of different widths.

The air cylinder assembly carries a control valve assembly on the underside thereof for operating the air cylinder assembly and the movable and stationary jaws. Any suitable type of air control valve known in the art may be used to deliver and exhaust air to and from the

air cylinder assembly and the movable and stationary jaws. The general sequence of operation may be described with the assumption that the movable jaw is initially in its forwardmost position and that a length of stock is disposed between the fixed and selectively fixed jaw portions of the movable and stationary jaws. Air under pressure is then supplied from the valve means to the pair of stationary jaws to cause a firm gripping of the stock. The stock may then be worked by some tool such as a saw which may cut the stock by a cutting operation thereon between the pair of stationary jaws. While the stock is being cut, the bladder in the movable jaw is connected to exhaust and air under pressure may then be delivered to the rod end of the air cylinder assembly to cause a return of the movable jaw to the rearward limit determined by the stroke adjustment bar. As the movable jaw is moved on the return stroke the surfaces of the movable jaw which engage the stock may freely slide along the stock. When the cutting operation on the stock is completed some form of control signal is transmitted to the valve means to firstly cause air under pressure to be delivered to the movable jaw to cause its operation to firmly grip the stock, to secondly exhaust the pair of stationary jaws whereby the stationary jaws will release their grip on the stock, and to thirdly apply air under pressure to the head end of the air cylinder assembly to cause the movable jaw to be moved on its forward stroke to advance a new portion of the stock into the pair of stationary jaws. As the uncut stock is advanced, the piece which has been cut therefrom is pushed out of the forwardmost stationary jaw. At the end of the forward stroke of the movable jaw, the valve means is operated to deliver air under pressure to the pair of stationary jaws to cause those jaws to firmly grip the stock for further work on the stock by the tool means. The valve means may then exhaust the movable jaw to release the stock and again air under pressure may be delivered to the rod end of the air cylinder assembly to return the movable jaw to its rearwardmost position in engagement with the stroke adjustment bar. From the foregoing it may be seen that the present invention operates to incrementally deliver a length of strip stock to the stationary jaws whereupon the stationary jaws firmly grip the stock for working thereon by some tool means with the cycle being repeated upon the completion of the work of the tool on each incrementally advanced portion of the stock. With the present invention, each incrementally worked portion of stock will be substantially identical in length to every other incrementally worked portion of stock for any one setting of the stroke adjustment bar.

In detail, the structure of the invention as shown in the drawings comprises an air cylinder assembly **10**, a movable jaw **11**, a stationary jaw **12** and a stationary jaw **13** cooperatively carried as a unit on a base plate **14**. The base plate **14** carries a plurality of depending studs **15** by which the feed and vise arrangement of the subject invention may be mounted in cooperation with some tool means.

The air cylinder assembly **10** comprises a plate **16** at the head end thereof and a plate **17** at the rod end thereof. The plate **17** is secured to the rearward end of the base plate **14** by any suitable means. An air cylinder **18** is carried between the plates **16** and **17** by four tie rods **20**. The forward ends of the tie rods **20** are threaded into suitable tapped holes provided in the rearward surface of the plate **17**, and the rearward ends of the tie rods extend through holes provided in the plate **16**. Nuts **21** threaded on the rearward ends of the tie rods **20** permit the assembly of the two plates **16** and **17** and the air cylinder **18** to be secured firmly together as an air tight unit. The air cylinder assembly **10** further comprises a cover assembly of an upper cover portion **22** and a lower cover portion **23**. The lower cover portion **23** is formed as a plate having upturned sides and an upturned flange at the rearward end thereof. A pair of holes is provided through the upturned rearward flange of the lower cover portion to permit the rearward end of the lower cover portion **23** to be carried on the lower pair of tie rods **20**. The forward end of the lower cover portion **23** is secured to the underside of the plate **17** by fasteners **24**. The upper cover portion **22** is U-shaped and is mounted over the cylinder **18** and between the plates **16** and **17**. The lower marginal edges of the upper cover portion **22** overlap the upturned sides of the lower cover portion **23** and fasteners **25** secured through the lapped portions of the upper and lower cover portions **22** and **23** secure the upper cover portion **22** in place.

Any suitable type of valve assembly **26** which will properly control the operation of the invention is conveniently secured to the underside of the lower cover portion **23** to depend therefrom.

The air cylinder assembly **10** further comprises a piston **27** and a piston rod **28**. The piston rod **28** is carried through an opening in the plate **17**, and the piston **27** is secured to the rearward end of the piston rod **28**. The piston **27** may be formed in any manner known in the art for effective sliding reciprocating movement in the cylinder **18** by the application of air under pressure and exhaust alternately to the head and rod ends of the cylinder **18**. As shown in FIGURE 2, the piston **27** comprises a pair of leather cups mounted in an alternate stacked arrangement with a plurality of steel discs on the rearward end of the piston rod **28**. The ports for admitting air to the rod and head ends of the cylinder **18** are not shown as these may take any well known form and may for example be formed through the plates **16** and **17**. An elastomer bumper **30** is provided at the rod end of the cylinder **18** and about the piston rod **28** to cushion the shock of the piston **27** in bottoming at the rod end of the cylinder **18**. Air leakage from the cylinder **18** and about the surface of the piston rod **28** is effectively prevented by a sealing ring assembly **31** carried in the plate **17** and about the piston rod **28**. The sealing ring assembly **31** is maintained in air sealing position by a bushing **32** disposed on the piston rod **28** and threaded into the forward side of the plate **17**.

The movable jaw **11** is slidably carried on a pair of rods **33**. The rods **33** are secured in a parallel spaced apart relationship to each other between the plate **17** and the base member **34** of the stationary jaw **12**. As may be seen in the drawings, the base member **34** of the stationary jaw **12** is shaped substantially as a rectangular bar. The base member **34** is secured to the upper surface of the base plate **14** transversely thereof by dowel means **35**. The forward end of each of the rods **33** is threaded into suitable tapped holes in the base member **34** of the stationary jaw **12**, and the rearward ends of the rods **33** extend through the plate **17**. Screws **36** applied through the upper surface of the plate **17** engage the portions of the rods **33** extending through the plate **17** to firmly lock the rods **33** in the plate **17**.

The base portion **37** of the movable jaw **11** is provided with a pair of holes formed therethrough which carry bushings **38** permitting the base portion **37** to freely slide on the rods **33**. The forward end of the piston rod **28** is threaded into the base member **37** of the movable jaw **11** and secured therein by a nut **40**. Thus it may be seen that as the air cylinder assembly **10** is operated, the movable jaw **11** will be moved longitudinally of the rods **33** with the forward limit of movement of the movable jaw **11** being determined by the bumper **30**.

The rearward limit of movement of the movable jaw **11** is determined by a stroke adjustment bar **41**. The stroke adjustment bar **41** comprises a substantially rectangular bar with an opening formed through each end thereof. The openings are spaced apart a distance substantially equal to the spacing of the rods **33** thereby permitting the stroke adjustment bar **41** to be slidably carried on the rods **33**. Each end of the stroke adjust-

ment bar **41** is provided with a slot cut into the openings for the rods **33**. A fastener **42** is journaled through each end portion of the stroke adjustment bar **41** above the slot and is threaded into the end portion of the stroke adjustment bar below the slot thereby permitting the stroke adjustment bar **41** to be clamped to the rods **33** by an appropriate tightening of the fasteners **42** to effectively reduce the diameter of the openings for the rods **33**. The stroke adjustment bar **41** further carries a vernier adjustment assembly of a bolt **43** and a nut **44**. The bolt **43** is threaded horizontally through the stroke adjustment bar **41** between the rods **33** with the head of the bolt **43** extending toward the base member **37** of the movable jaw **11**. The nut **44** is threaded on the bolt **43** to lock the bolt **43** in any selected position. The movable jaw **11** in moving rearwardly on its return stroke will be stopped when the base member **37** of the movable jaw **11** engages the head of the bolt **43**. The return stroke limit of the movable jaw **11** is set by first loosening the fasteners **42** and sliding the stroke adjustment bar **41** along the rods **33** to the approximate desired limit. The fasteners **42** are then tightened to clamp the stroke adjustment bar **41** to the rods **33**. The nut **44** is then loosened and the bolt **43** threaded inwardly or outwardly of the stroke adjustment bar **41** to arrive at the exact desired limit of the return stroke of the movable jaw **11**. The nut **44** is then tightened to complete the setting of the return stroke for the movable jaw **11**.

The movable jaw **11** in addition to the base member **37** comprises two stock gripping or clamping members, a fixed jaw member **46** and a selectively fixed jaw member **47**. The fixed jaw member **46** is secured at one end of the base member **37** to upstand therefrom by any means such as welding. The fixed jaw **46** thus provides one vertically disposed clamping surface which is parallel to the axis of reciprocation of the air cylinder assembly **10**.

The selectively fixed jaw member **47** of the movable jaw **11** comprises a face plate member **48**, a backup member **49** and a bladder **50** which may be seen in FIGURE 4. The backup member **49** is a substantially rectangularly shaped block having a centrally disposed depending flange portion **49***a* which may be particularly seen in FIGURE 1. The depending flange portion **49***a* of the backup member **49** is of a width substantially equal to the width of a slot **37***a* formed in the upper surface of the base member **37**. The slot **37***a* is positioned longitudinally and centrally of the upper surface of the base member **37**. The underside of the base member **37** is also provided with a slot **37***b*. The slots **37***a* and *b* are in substantial vertical alignment with the slot **37***b* having a width greater than the width of the slot **37***a*. The base member **37** is further provided with an opening **37***c* extending between the two slots **37***a* and *b*. The described arrangement of the slots **37***a* and **37***b* and the opening **37***c* provide for the selective longitudinal positioning of the backup member **49** on the upper surface of the base member **37**. This is accomplished by a stud **52** which depends from the underside of the backup member **49** through the opening **37***c* and below the base member **37**. A rectangular plate **53** having a hole therethrough is positioned on the lower end of the stud **52** and within the confines of the slot **37***b* and is maintained therein by a nut **54** threaded onto the lower end of the stud **52**. Thus it may be seen that by loosening the nut **54**, the backup member **49** may be slid in the slot **37***a* of the base member **37** to any desired position longitudinally thereof and the backup member **47** will be secured in the selected position upon the tightening of the nut **54**. It should be noted that the opening **37***c* in the base member **37** has a length less than the spacing between the rods **33**.

The face plate member **48** of the selectively fixed jaw member **47** of the movable jaw **11** is shaped substantially as a rectangular box without a bottom or a back wall.

The face plate member **48** is mounted on the backup member **49** and comprises a clamping surface **48***a*, a top wall **48***b* and a pair of side walls **48***c*. The clamping surface **48***a* is substantially greater in thickness than the top and side walls of the face plate member **48**. As may be seen in FIGURE 4, the space between the forward side of the backup member **49** and the rearward side of the clamping surface **48***a* of the face plate member **48** is occupied by the bladder **50**. It should be noted that the aforedescribed construction of the backup member **49** and the face plate member **48** provide for a bladder area which is only slightly less than the area of the clamping surface **48***a*. This important feature provides that for a given air pressure delivered to the bladder **50**, the clamping force will be substantially the product of the delivered air pressure and the area of the clamping surface **48***a*.

In further describing the construction of the movable jaw **11** it may be noted that the details of the bladder construction and the detailed arrangement by which the base plate member **48** and the backup member **49** are maintained in cooperation are substantially identical except for size to the corresponding constructions in the stationary jaws **12** and **13** and it is believed that a detailed description of the construction of the stationary jaws **12** and **13** will aid in understanding those construction details in the movable jaw **11**. The selectively fixed jaw members of the stationary jaws **12** and **13** are respectively designated **57** and **58**. The selectively fixed jaw member **57** comprises a face plate member **60**, a backup member **61**, and a bladder **62** corresponding to the similar elements in the selectively fixed jaw member **47** of the movable jaw **11**. In the case of the selectively fixed jaw member **58** of the stationary jaw **13**, the face plate member is designated **63**, the backup member is designated **64** and the bladder is designated **65**. Considering the detailed construction of the selectively fixed jaw member **58** of the stationary jaw **13** which is shown in side elevation in FIGURE 3 in addition to the views shown in the other figures, it may be seen that the side walls of the face plate member **63** are each provided with a pair of slots **67** which are disposed in a vertically spaced relationship and with the long axis thereof disposed horizontally. The backup member **64** is provided with a pair of openings therethrough with one opening being aligned with the upper slots **67** and with the lower opening in alignment with the lower slots **67**. A pin **68** is positioned through each of the openings in the backup member **64**, and each pin **68** has a length sufficient to permit the ends of the pins **68** to extend into the slots **67**. The pins **68** are secured in the backup member **64** by a pair of screws **70** which are threaded into the rear surface of the backup member **64** perpendicularly to the axes of the pins **68**. It should be understood that the same construction exists in the movable jaw **11** and the stationary jaw **12**. In the movable jaw **11** the pins corresponding to pins **68** are designated **71**, and in the stationary jaw **12** the pins corresponding to pins **68** are designated **72**. In the movable jaw **11** the screws corresponding to screws **70** are designated **73**, and in the stationary jaw **12** those screws are designated **74**.

The bladder **65** of the selectively fixed jaw member **58** of the stationary jaw **13** is formed of an elastomer hose material. A section of hose of a length substantially equal to the distance between the side walls of the face plate member **63** is provided and an opening is formed through the surface of the hose section substantially centrally thereof. The hole in the hose section admits the stem member **76** which may be seen in FIGURE 3. The hose material is selected of a natural diameter such that when the hose section is pressed into a flattened condition, the flattened width of the hose is substantially equal to the height of the backup member **64**. This collapsed condition of the hose section is particularly shown in

FIGURES 3 and 4. The open ends of the hose section are sealed by clamping members 77 which are substantially C-shaped in cross section as may be seen in FIGURE 4. The completed bladder 65 is positioned against the forward face of the backup member 64 with the stem member 76 extending into a hole formed through the backup member 64 as shown in FIGURE 3. A threaded bushing member 78 is then inserted from the rearward side of the backup member 64 into the hole therethrough and threaded onto the stem member 78 to draw the stem member into air sealing relationship with one side of the bladder 65. An air conduit coupling 80 is threaded into the bushing 78 for delivering air from an air conduit 81 to the bladder 65. The face plate member 63 is then mounted on the backup member 64 with the rearward side of the clamping face of the face plate member 63 against the bladder 65. The pins 68 are then inserted through the slots 67 and the appropriate holes in the backup member 64, and the screws 70 are threaded into the backup member 64 to secure the pins 68 in place. It should be understood that the aforedescribed construction of the bladder 65 is substantially the same for the movable jaw 11 and the stationary jaw 12. In the movable jaw 11 the clamping members corresponding to the C-shaped clamping members 77 are designated 82, and those members in the stationary jaw 12 are designated 83. The stem member and the threaded bushing in the movable jaw 11 which correspond to the stem member 76 and the bushing member 78 are respectively designated 84 and 85, and those corresponding members in the stationary jaw 12 are respectively designated 86 and 87. The air conduit and coupling for delivering air to the bladder 50 of the movable jaw 11 are respectively designated 88 and 89, and the air conduit and coupling for delivering air to the bladder 62 in the stationary jaw 12 are respectively designated 90 and 91. Portions of the various air conduits and couplings have been removed in some of the views to aid in a showing of the construction of the present embodiment. The stationary jaws 12 and 13 which are intended to be operated substantially simultaneously are supplied with air from coupling 93 into which the air conduits 81 and 90 are connected. The coupling 93 is secured to a plate 94 which in turn is secured to the underside and at one end of the base members of the stationary jaws 12 and 13 as may be seen in FIGURES 2 and 3.

The arrangements by which the selectively fixed jaw members 57 and 58, respectively of jaws 12 and 13, are selectively secured in any adjusted position are different from that previously described for the selectively fixed jaw member 47 of the movable jaw 11. The base member 34 of the stationary jaw 12 is formed as a substantially rectangular bar with a rabbet portion 34*a* on one lower side thereof. The base member 95 of the stationary jaw 13 is substantially a mirror image of the base member 34 with a rabbet portion 95*a*. The rabbet portion 95*a* is clearly shown in side elevation in FIGURE 3. The base member 95 of the stationary jaw 13 is secured to the base plate 14 in a spaced relationship to base member 34 by any means such as bolts 96. The spacing between the base members 34 and 95 is selected to permit a tool such as a saw to enter therebetween. The backup members 61 and 64 of the stationary jaws 12 and 13 respectively, are each formed to have a depending flange with a turned lower edge permitting the backup members 61 and 64 to slide along the upper surface of the base members 34 and 95 with the turned lower edge of the backup members 61 and 64 extending into the rabbet portions 34*a* and 95*a* respectively of the base members 34 and 95. This cooperation of the backup members 61 and 64 with the base members 34 and 95 is clearly shown in FIGURE 1. FIGURE 3 shows the depending flange portion of the backup member 64 of the movable jaw 13 in side elevation. This described arrangement of the backup members 61 and 64 and the base members 34 and 95 presents the forward faces of the face plate members 60 and 63 as vertical clamping surfaces similar to the vertical clamping surface 48*a* of the movable jaw 11. These vertically disposed clamping surfaces of the face plate members 60 and 63 cooperate with the fixed jaw members of the stationary jaws 12 and 13 in clamping any stock. The fixed jaw member 97 of the stationary jaw 12 is secured to the upper surface of the base member 34 by any means such as welding, and the fixed jaw member 98 of the stationary jaw 13 is secured in a similar manner to the upper surface of the base member 95.

The selectively fixed jaw members 57 and 58 of the stationary jaws 12 and 13 respectively are selectively secured in any desired spaced position relative to the fixed jaw members 97 and 98 by a pair of bolts, bolt 100 for the stationary jaw 12 and bolt 101 for the stationary jaw 13. Considering the movable jaw 13, the bolt 101 is journaled through the depending flange portion of the backup member 64 and through a horizontally disposed slot or opening 102 formed through the base member 95. The side of the slot or opening 102 opposite from that engaged by the depending flange portion of the backup member 64 is enlarged to accommodate a nut member 103. The bolt 101 is threaded into the nut member 103 to secure the backup member 64 and consequently the selectively fixed jaw member 58 to the base member 95. The length of the slot or opening 102 provides for selective adjustment of the selectively fixed jaw member 58 through a range comparable to that of the selectively fixed jaw member 47 of the movable jaw 11. The base member 34 of the stationary jaw 12 is provided with a slot or opening corresponding to slot 102 and the bolt 100 is provided with a nut member corresponding to nut member 103 to provide adjustment of jaw 12 in a manner similar to jaw 13.

In adjusting the jaws 11, 12 and 13 to feed and clamp any particular width of stock, the nut 54 of jaw 11, bolt 100 of jaw 12 and bolt 101 of jaw 13 are loosened. With the stock between the vertically positioned stock gripping surfaces of the jaw members of each of the jaws 11, 12 and 13, the selectively fixed jaw members 47, 57 and 58 are moved in engagement with the stock until the pins 71, 72 and 68 respectively of jaws 11, 12 and 13 are positioned at the forward ends of the cooperating slots in the face plate members 48, 60 and 63. The nut 54 is then tightened as are the bolts 100 and 101. It may be seen that if air under pressure is then delivered to air conduits 88, 90 and 81, the respective bladders 50, 62 and 65 of the jaws 11, 12 and 13 will be expanded to move the face plate members 48, 60 and 63 to securely clamp the stock against the fixed jaw members 46, 97 and 98. Upon the exhaust of the air under pressure in the bladders 50, 62 and 65, the stock is free to slide between the cooperating jaw members of the jaws 11, 12 and 13.

FIGURE 3 by a number of dotted lines designated 105 shows a plurality of tapped holes in the stock gripping surfaces of the face plate member 63 and the fixed jaw member 98 of the stationary jaw 13. These tapped holes are provided for the attachment of any desired type of jaw liner, and it is to be understood that the movable jaw 11 and the stationary jaw 12 are also provided with jaw liner attaching means.

Having described the invention what is considered new and desired to be protected by Letters Patent is:

1. An air operated vise comprising, a substantially rectangular base member, a fixed jaw member secured on one end of said base member to extend upwardly therefrom with one side of said fixed jaw member defining a vertical stock gripping surface, a first member and a second member, a slot formed through said base member with the longitudinal axis of said slot disposed longitudinally of said base member, said first member carried on the upper side of said base member, clamping means carried between said first member and through

said slot in said base member for selectively securing said first member on said base member in any selected spaced position from said fixed jaw member, the portion of said first member extending above said base member defining a substantially rectangular block having a front wall disposed toward said fixed jaw member, a back wall, a pair of spaced apart side walls and a top wall, said second member comprising, a pair of side walls spaced apart a distance substantially equal to the distance between said side walls of said first member, a front wall having a height substantially equal to the height of said front wall of said first member, and a top wall integrally interconnecting the upper marginal edges of said side walls and said front wall of said second member, said second member mounted over said first member with said front wall of said second member positioned between said front wall of said first member and said fixed jaw member, the side of said front wall of said second member disposed toward said fixed jaw member defining a second stock gripping surface, means on said side walls of said first member and said second member for limiting the range of movement of said second member relative to said first member in a direction perpendicular to said first and second stock gripping surfaces and to a certain amount in that direction, a bladder carried between the forward side of said first member and the rearward side of said second member, the pressure area of said bladder being substantially equal to the area of said second stock gripping surface of said second member, and means carried through said first member from the rear wall thereof to the front wall thereof for delivering air to said bladder to expand said bladder to move said second stock gripping surface of said second member toward said first stock gripping surface of said fixed jaw member.

2. In an air operated vise as defined in claim 1, wherein said slot through said base member extends from the upper surface to the lower surface thereof, wherein said clamping means comprises a stud depending from the underside of said first member through said slot to the underside thereof, and a plate and nut, said plate carried on the lower end of said stud in engagement with the underside of said base member, and said nut threaded onto the lower end of said stud and against the underside of said plate whereby said first member is clamped to the upper surface of said base member responsive to a tightening of said nut.

3. In an air operated vise as defined in claim 1 wherein said slot in said base member is formed to extend from one side of said base member horizontally through said base member to the other side thereof, said first member having a depending flange extending along one side of said base member, a bolt journaled through said depending flange and extending horizontally through said slot in said base member, a nut threaded on the extending end of said bolt and engaging the other side of said base member whereby said first member is secured to the upper side of said base member responsive to a tightening of said nut.

4. An air operated vise comprising a substantially elongated base member, a fixed jaw member secured on one end of said base member to extend upwardly therefrom with one side of said fixed jaw member defining a vertical stock gripping surface, a first member and a second member, a slot formed in said base member with the longitudinal axis of said slot disposed longitudinally of said base member, clamping means carried between said first member and said slot in said base member for selectively securing said first member on the upper side of said base member in any selected spaced position from said fixed jaw member, said second member comprising a stock gripping surface and a pair of side walls extending in a parallel spaced apart relationship from said stock gripping surface, said second member mounted in cooperation with said first member with said stock gripping surface of said second member disposed between said first member and said stock gripping surface of said fixed jaw member and with said pair of side walls extending on each side of said first member in a telescoping relationship therewith, a bladder carried between said second member and said first member, means carried between said first member and said side walls of said second member for limiting the movement of said stock gripping surface of said second member toward and away from said stock gripping surface of said fixed jaw member, and means for delivering air through said first member to said bladder to expand said bladder to move said stock gripping surface of said second member away from said first member and toward said stock gripping surface of said fixed jaw member.

5. In an air operated vise as defined in claim 4, wherein said slot in said base member extends from the upper surface to the lower surface thereof, wherein said clamping means comprises a fastening member depending from the underside of said first member and through said slot to the underside of said base member whereby said first member is clamped to the upper surface of said base member responsive to a tightening of said fastening member.

6. In an air operated vise as defined in claim 4, wherein said slot in said base member is formed to extend from one side of said base member horizontally through said base member to the other side thereof, said first member having a depending flange extending along one side of said base member, and fastening means carried through said depending flange and said slot to the other side of said base member whereby said first member is secured to the upper side of said base member responsive to the tightening of said fastening member.

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