

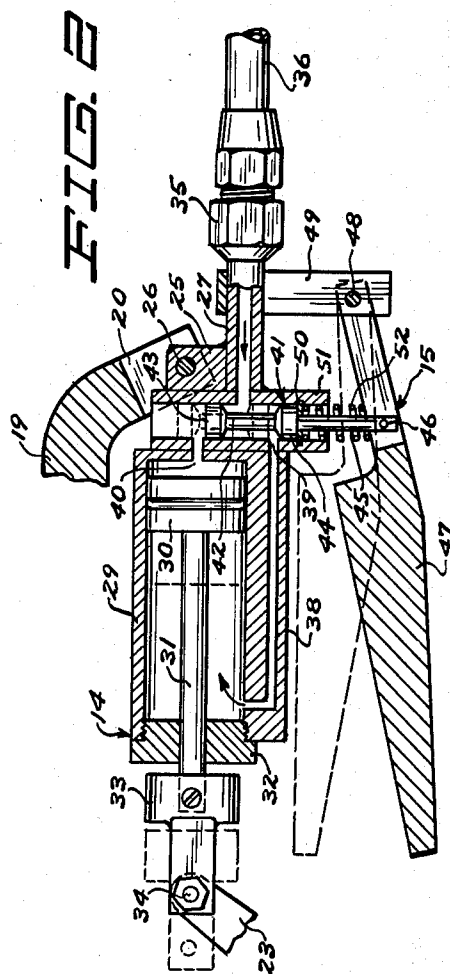
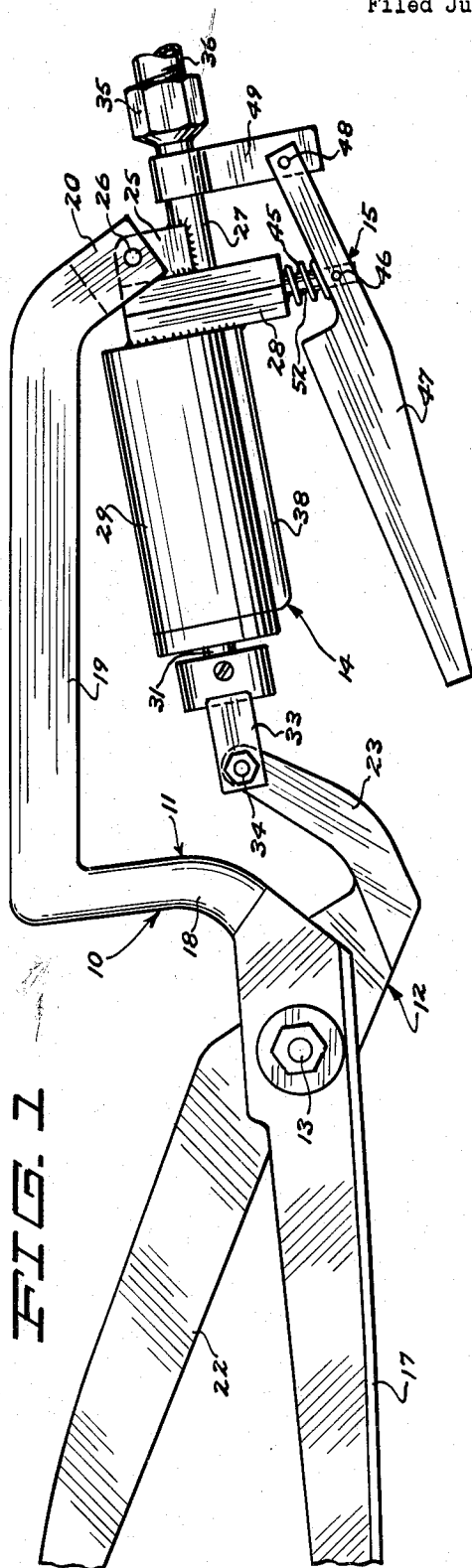
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POWER SHEARS

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1

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POWER SHEARS

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This invention relates generally to improvements in tools of the pincer or shear type having scissor-like action and which are normally manually operated, and more particularly to a means for operating such tools wherein fluid pressure is utilized to augment the manual operating action.

There are various tools which comprise two members pivoted together for relative opening and closing movement to grip, squeeze or cut an article between opposing work performing ends of the two members. These tools might be generally categorized as scissor action tools. Frequently such tools must be continuously operated by hand over long periods of time causing severe strain on the arm and hand muscles of the operator. Yet in certain types of work it is not desirable to completely power such tools from outside sources, as it is necessary for the operator to have the "feel" of operating the tool by his own power.

I have particularly in mind cloth cutters in the garment industry. Such cutters work with large shears frequently cutting several thicknesses of material simultaneously while following a pattern. For the safest and most accurate cutting it is desirable that the shears be operated by hand in the manner of a conventional scissors. Such operation being very tiring on the operator, it would be very beneficial to the industry if a shears were provided which was subject to operation by hand in the normal scissors action manner but wherein the hand power is supplemented by outside force doing the greater portion of the actual work.

With this in mind the principal object of my invention is to provide a scissors action tool wherein the opening and closing movements are controlled by hand in the normal manner of operation of the tool but having means for utilizing power from an outside source to actually perform the work involved in the opening and closing movements.

Another object of the invention is to provide an improved cutting shears which is operated by pneumatic power.

Still another object of the invention is to provide a shears adapted to be operated by power from a suitable power source but which is controlled manually with the same "feel" and squeezing and releasing actions as a conventional, completely manually operated shears.

Still another object of the invention is to provide a pneumatically operated shears which is light in weight, durable, and relatively inexpensive to manufacture.

Still another object is to provide a scissor action tool which is manually controlled by one hand squeezing and releasing actions, but which has mechanism for allowing the tool to be powered from an outside source, and said mechanism so arranged as to have the weight thereof centered in the controlling hand.

With these and other objects in mind my invention broadly comprises a tool having a pair of work members pivotally interconnected intermediate the end portions of each for scissor action between the members to perform

2

work between the end portions lying on one side of the pivot, a piston and cylinder device connecting the portions of the members lying on the opposite side of the pivot to augment manual relative actuation of the members about the pivot, means for connecting the cylinder to a source of air under pressure for power operation of the device, a valve mechanism for controlling the flow of air to the cylinder, a hand lever for controlling the valve mechanism, said lever arranged in such a position as to be operable when the device is manually held in the conventional manner of such a tool not having such a device to augment the manual operation.

The above-mentioned and still additional objects of the invention will be brought to light during the course of the following specification, reference being made to the accompanying drawing, in which—

Fig. 1 is a side elevation of a tool in released or open condition and incorporating my improved structure.

Fig. 2 is a fragmentary longitudinal vertical section showing the piston-cylinder and valve mechanisms.

Referring now more particularly to the drawing reference numerals will be used to denote like structural parts or features in the different figures. The invention is shown and described in use with a long bladed shears, denoted generally at 10, such as used in the garment making industry for the cutting of cloth. The shears comprise generally a fixed cutting member 11, a movable cutting member 12 pivoted to the member 11 as at 13, an extensible piston and cylinder mechanism 14 adapted to receive air pressure for its extension and retraction and connecting the operating ends of the two cutting members, and a lever and valve mechanism 15 for controlling the directional flow of air pressure into the mechanism 14.

The shown construction will now be described in greater detail. The member 11 has a forward cutting blade 17 with an upwardly angled extension 18 at the rear of the blade rigidly connecting the blade with an elongated handle 19. The rearmost end of handle 19 is curved downwardly as at 20 where it is bifurcated for pivotal connection with the mechanism 14.

Movable cutting member 12 has a forwardly extending blade 22 with an upwardly hooked extension 23 at its rear end. The blades 17 and 22 are pivotally connected at 13 to slide by one another and have their opposing edges sharpened whereby a cutting action between the two will be effected as they are relatively closed about their pivot. Extension 23 is arranged to lie flush against the rear face of the portion 18 when the blades are closed.

The mechanisms 14 and 15 for actuating the member 12 about its pivot 13 for opening and closing movements of blade 22 relative to blade 17 will now be described. A bracket 25 has one of its ends pivoted on pin 26 extending between the separated ends of the handle portion 20. To the other end portion of bracket 25 there is welded or otherwise secured the rigid air feeder tube 27, the forward end of which is rigidly attached to the side wall of a tubular valve housing 28. It will be noted that tube 27 joins housing 28 at substantially the longitudinal center of the latter and lies at right angles thereto. At the opposite side of housing 28 the rear end of a forwardly extending cylinder 29 is welded as shown. A piston 30 is slidable longitudinally within the cylinder with a piston rod 31 extending forwardly through an end plug 32 threaded in the forward end of the cylinder. The extended end of the rod 31 has a forked coupling member 33 mounted thereon which is pivotally connected to the extension 23 as at 34. The rearmost end of tube 27 is provided with a coupling 35 for connecting the tube to air hose 36 extending from a suitable air pressure source (not shown).

A small tube 38 is secured to the underside of the

cylinder to provide an open passageway between the forward part of the cylinder interior and the valve housing 28, the tube opening into the housing through aperture 39 (Fig. 2) located just below the center of the forward wall of the housing. Spaced above the aperture 39 the rear wall of the cylinder and the adjacent wall of the housing are provided with aligned openings to form a passageway 40 connecting the interior of the housing 28 with the rear end of the cylinder chamber.

Housing 28 is constantly open to the reception of air under pressure from line 36 through the tube 27. The heretofore mentioned lever and valve mechanism 15 is provided for controlling the flow of air into the cylinder 14 to selectively actuate the piston in the desired direction. The valve denoted generally at 41 is of the piston type, sometimes referred to as a "dumbbell valve" and comprises an elongated stem 42 with sealing rings 43 and 44 mounted in spaced relation thereon. The valve stem has an extension 45 which projects downwardly out of the open lower end of the housing 28. The lower end of extension 45 is pivotally connected as at 46 to a midpoint on control lever 47 which has its rear end pivoted at 48 to the lower portion of a bracket 49 depending rigidly from the tube 27. It will be understood that the valve 41 is longitudinally slidable in the housing 28 and is so moved by operation of the control 47 about its swinging axis 48. There is a relatively loose association between the lever 47 and the pivot pin at 46 to allow the pin to travel on the moving axis of the valve though the lever travels in a slight arc.

The lower portion of the passageway through the valve housing is slightly enlarged to provide an internal shoulder 50. A stop washer 51 bears against the shoulder 50 and a coiled compression spring 52 is interposed between the washer 51 and the lever 47 and around the valve stem extension 45. This spring functions to bias the control lever toward its lowermost position such as shown in full lines in both Figs. 1 and 2.

In operation the shears are connected to a source of air under pressure so that tube 27 and housing 28 are constantly open to the source. With spring 52 biasing the control lever downwardly the valve is in such a position that sealing ring 43 closes the valve passage at a point intermediate the air inlet tube 27 and passage 40, and ring 44 lies below the passage 39 and against the stop washer 50. Accordingly, tube 38 is open to the housing admitting the air under pressure to the forward end of cylinder 29 to urge the piston 30 to the rearward position shown, the cylinder chamber rearward of the piston 30 being open to the atmosphere through passage 40 and the open upper end of housing 28. In this condition the piston rod 31 is obviously retracted, holding the pivot 34 substantially on a line between the pivots 13 and 26 so that the blades 22 and 17 are in open or separated position as shown in Fig. 1.

To cause the blades to close the operator squeezes the lever 47 toward the handle 19 against the bias of spring 45. This moves the lever 47 and valve 41 to the positions shown in broken lines, ring 43 moving upwardly past the passage 40 and thereby opening the passage to the feed tube 27, and ring 44 moving upwardly to a position intermediate tube 27 and the passage 39. Accordingly the air pressure enters the rear end of the cylinder moving the piston forwardly, the air in the forward chamber being exhausted through tube 38, passage 39 and out the lower end of the valve housing. With forward movement of the piston under air pressure, the rod 31 is extended forwardly moving the pivot 34 upwardly about the axis 13 until the extension 23 engages the extension 18 and blade 22 is swung downwardly past the upper cutting edge of blade 17. Obviously, as pivot 34 is moved upwardly the entire cylinder and valve mechanisms swing about pivot 26 toward the handle 19 until the cylinder 29 and lever 47 lie substantially parallel thereto.

As lever 47 is released, it and the valve 41 are again moved downwardly under the expanding action of spring 45 and the air under pressure is again directed into the forward part of the cylinder chamber to cause retraction of the piston and return of the cutting member 12 to its relatively open position.

The arrangement and action of the control lever 47 relative to the handle 19 is of particular importance in my invention. It will be noted that the lever is of a sufficient length to allow manual gripping by all of the fingers of the hand and that it extends forwardly directly under the handle 19 so that the operator will have the same "feel" as though operating a conventional non-powered shears. Accordingly, the operating lever, the valve and the actuating cylinder all move simultaneously in the same general direction within the hand holding the instrument as it is selectively opened or closed. The importance of this feature lies in both maximum accuracy and safety in use of the shears. Obviously, operation of the shears may be immediately grasped by any one familiar with the operation of a conventional non-powered scissors or shears as the manual action is virtually identical.

It is also significant that the power cylinder is disposed so that the weight thereof is centered in the tool gripping hand. This gives the tool the proper balance allowing easy and safe manipulation thereof. While the device has herein been shown and described as pneumatically operated, it may, of course, with slight alteration also be adapted for hydraulic operation. Accordingly where the term "fluid" is used herein it is intended to be inclusive of both air and liquid. Air operation is preferred, however, due to quicker action, inexpensiveness, and the fact that it may be allowed to escape into the atmosphere upon its exhaustion from the jack.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. In a power shears a stationary cutting member having a blade at its forward end portion and an elongated handle at its rear end portion, a movable cutting member having a blade at its forward end portion and a relatively short extension at its rear end portion, the movable cutting member being pivoted to the stationary cutting member intermediate the end portions of the members for cutting action between the blades, means for moving the movable member about said pivot comprising a piston and cylinder device having its forward end pivoted to the extension and its rear end pivotally associated with the handle, means for selectively extending and retracting said device, said forward end pivot of the device operating between the handle and a straight line between the cutting member pivot and rear end pivot of the device.

2. In a power operated scissor action tool, a stationary member having a forwardly directed jaw and a handle extending upwardly from the rear end of the jaw and then rearwardly, a movable member having a forwardly directed jaw pivoted to the first mentioned jaw on a transverse axis and having a relatively short extension at its rear end, and power means for selectively moving said movable jaw about the pivot in relative closing or opening directions with respect to the stationary jaw, said power means comprising an elongated jack having one end pivoted to the short extension and the other end pivotally associated with the handle, means for connecting said jack to a power source, control means for selectively admitting power to the jack for the extension or retraction thereof, an operating lever on the control means extending forwardly under the handle and pivoted at its rear end for swinging movement toward or away from the handle, said jack extending generally longitudinally of the handle and being disposed intermediate the handle and lever.

5

3. In a power operated scissor action tool, a stationary member having a forwardly directed jaw and a handle extending upwardly from the rear end of the jaw and then rearwardly, a movable member having a forwardly directed jaw pivoted to the first mentioned jaw and having a relatively short extension at its rear end, and power means for selectively moving said movable jaw about the pivot in relative closing or opening directions with respect to the stationary jaw, said power means comprising an elongated jack having one end pivoted to the short extension and the other end pivotally associated with the handle, means for connecting said jack to a power source, control means for selectively admitting power to the jack for the extension or retraction thereof, an operating lever on the control means extending forwardly under the handle and pivoted at its rear end for swinging movement toward or away from the handle, said jack extending generally longitudinally of the handle and being disposed intermediate the handle and lever, and all of said pivots having parallel transverse axes.

4. In a scissors action tool a stationary member having a work performing jaw and an elongated handle extension, a movable member having a work performing jaw and a relatively short extension, said members being pivotally interconnected intermediate their respective jaws and extensions whereby as the movable member is moved about the pivot the jaws are relatively opened and closed, an elongated extensible jack member connecting the extensions and having means for connection to a source of fluid under pressure, a valve on the jack member for controlling the fluid entrance to the jack to extend or retract the jack to move the movable member about its pivot, an elongated actuating lever on the valve, said lever and jack both extending generally parallel to the handle extension, and said jack lying intermediate the handle extension and lever whereby as the handle extension and lever are encircled by the hand of an operator the jack will be enclosed therein.

5. In a power shears for cutting cloth or the like laying on a horizontal plane, a first cutting member having a forwardly extending blade with a sharp upper edge and a handle arching upwardly and rearwardly from the rear end of the blade, a second cutting member having a forwardly extending blade having a sharp bottom edge arranged in upwardly and forwardly crossing relation to

6

the blade of the first cutting member, said members being pivotally connected at their point of crossing for opening and closing cutting movement between the blades, said second cutting member having an extension extending upwardly within the arch formed by said handle, an extensible jack mechanism extending longitudinally under the handle and having its front end pivotally associated with the rear end of the handle, said jack having means for connection to a source of fluid pressure, a control means associated with the jack for admitting fluid from the source to selectively extend or retract the jack, said means including an elongated operating lever extending under the jack and swingable toward and away from the handle.

6. In a power shears for cutting cloth or the like laying on a horizontal plane, a first cutting member having a forwardly extending blade with a sharp upper edge and a handle arching upwardly and rearwardly from the rear end of the blade, a second cutting member having a forwardly extending blade having a sharp bottom edge arranged in upwardly and forwardly crossing relation to the blade of the first cutting member, said members pivotally connected at their point of crossing for opening and closing cutting movement between the blades, said second cutting member having an extension extending upwardly within the arch formed by said handle, an extensible jack mechanism extending longitudinally under the handle and having its front end pivotally associated with the rear end of the handle, said jack having means for connection to a source of fluid pressure, a control means associated with the jack for admitting fluid from the source to selectively extend or retract the jack, said means including an elongated operating lever extending under the jack and swingable toward and away from the handle, the lever being operative to extend the jack and move the extension forward to close the blades as the lever is moved toward the handle, and said lever being pivoted to move into substantial alignment with the blades when they are closed.

References Cited in the file of this patent

UNITED STATES PATENTS

878,548	Marcy	Feb. 11, 1908
2,602,224	McKay	July 8, 1952