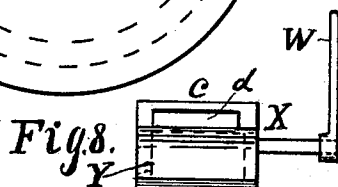
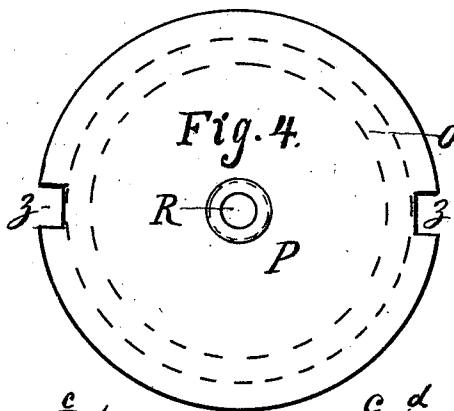
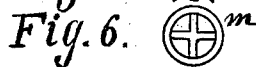
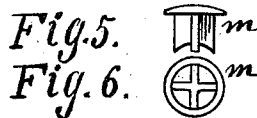
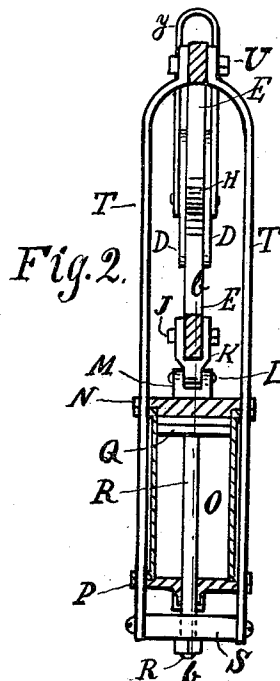
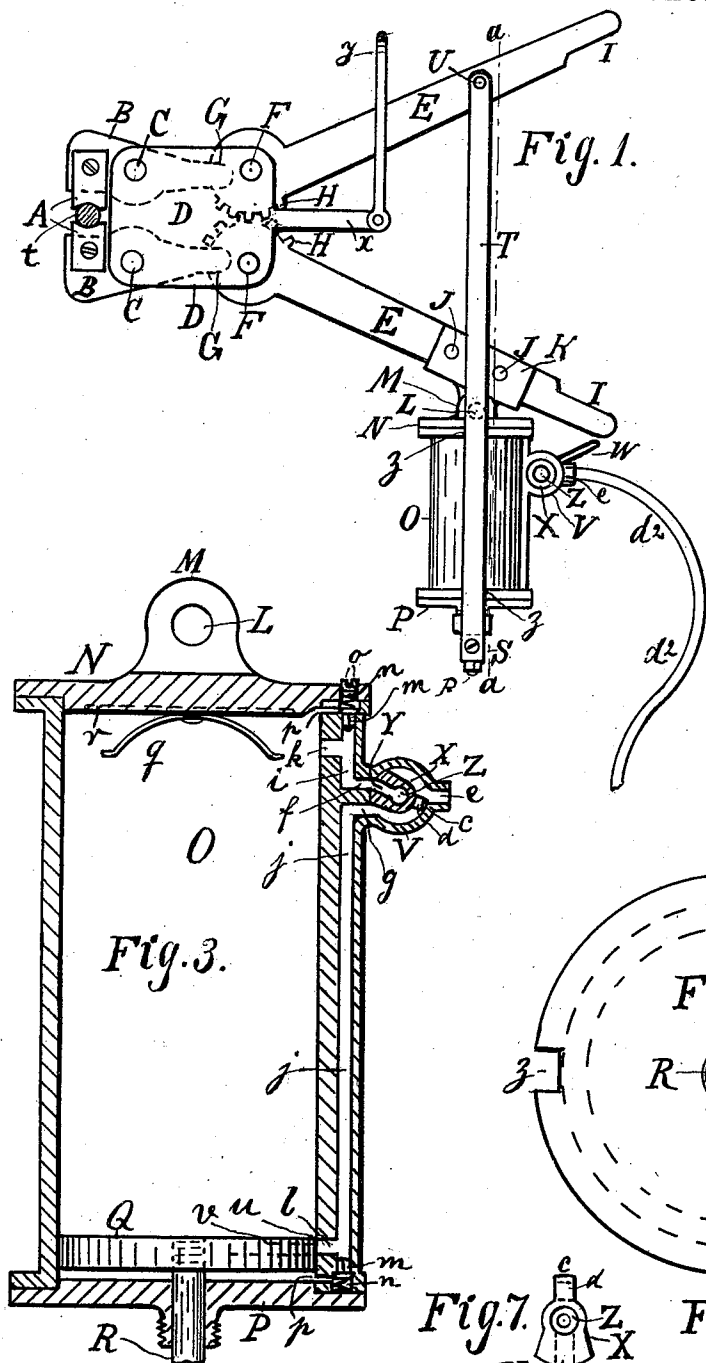


(No Model.)

A. HELWIG.
BOLT OR RIVET CUTTER.

No. 596,066.

Patented Dec. 28, 1897.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ANNA HELWIG, OF ST. PAUL, MINNESOTA.

BOLT OR RIVET CUTTER.

SPECIFICATION forming part of Letters Patent No. 596,066, dated December 28, 1897.

Application filed January 25, 1897. Serial No. 620,512. (No model.)

To all whom it may concern:

Be it known that I, ANNA HELWIG, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Bolt or Rivet Cutters; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in tools for cutting off bolts, rivets, and metallic rods in general; and the objects of my invention are, first, to provide a bolt or rivet cutter or clipper which may be operated by either hand-power or foot-power or by steam or fluid pressure, or especially by compressed air, so that the machine may readily be connected with and operated by the regular compressed-air systems which are fast being adopted by all large workshops; second, to provide a bolt-cutter with an operating cylinder and piston which will work without jar or blow to the parts of the machine at either extremity of the stroke; third, to combine with the cutting-jaws and operating-cylinder of such cutting-machine so light a power-increasing mechanism that the cylinder may be very light and operatively connected with the jaws without mounting the parts in a heavy cumbersome frame or any frame whatever, which is of course a great advantage in a portable machine which is to be lifted, handled, and turned in every direction. These and other minor objects I attain by the novel construction and arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my complete bolt-cutter. Fig. 2 is a vertical section on the line *a a* in Fig. 1. Fig. 3 is an enlarged central sectional view of the cylinder on the line *b b* in Fig. 2. Fig. 4 is a bottom end view of the cylinder. Figs. 5 and 6 are respectively side and bottom views of certain auxiliary valves. Fig. 7 is an end view, and Fig. 8 a side view, of the rotary valve admitting the steam or air to either end of the cylinder.

Referring to the various parts in the draw-

ings by reference letters, A are the bolt-cutting knives, secured in dovetailed sockets (not shown) in the jaw-levers B, pivoted at C between two plates, like D, and operated by the power-increasing levers E, which are pivoted at F between the plates D, engaging the jaw-levers at G, and are geared together by the cogs H to cause both of them to close and spread to the same extent, all of which construction is set forth in Patent No. 444,635, issued on January 13, 1891, to John Helwig, my father, who has since died, and his said patent has become my property, proof of which will be furnished whenever necessary.

The small sizes of these machines may be operated by the hand-levers E and handles I, while for the medium sizes it is preferable, and for the large sizes necessary, to have a power-increasing mechanism or else means for applying artificial power to the levers E. With these facts in view I secure by the bolts J upon one of the levers E the block K, which is pivoted at L to the lips M, provided upon the head N of the cylinder O, of which P is the bottom or other head.

Q is the piston, and R the piston-rod, which projects through the head P and is secured in the cross-head S, which is connected with the other lever E by means of the two connecting-rods T and the bolt U.

V is the operating-valve and is provided with the handle W, located near one of the lever-handles I. This valve may be of any desired shape, but in the present instance I have shown it as having the rotary or oscillating plug X, (best shown in Figs. 3, 7, and 8,) which is fitted in the valve-shell V, provided with the port Y, by which it receives the air or steam alternately from either end of the cylinder and discharges it through the central opening Z in the end of the plug.

c is a rib serving to hold the face of the valve-plug constantly in contact with the inner face of the valve-shell.

d is an opening in the rib *c* for the steam to pass through in either direction.

*d*² is a hose for conducting steam or compressed air or fluid into the cylinder through the valve, and is therefore connected to the inlet-opening *e* of the valve-shell. Said shell is further provided with the two ports *f* and *g*, from which extend the ducts *i* and *j*, open-

ing, respectively, at k and l into the top and bottom end of the cylinder some distance from the cylinder-heads, so as to leave a portion of air unexhausted to serve as a cushion for the piston to strike on in approaching the heads of the cylinder and thus prevent any metallic parts from striking each other under the powerful motion of the piston. The ducts i and j are each extended to the end of the cylinder and there provided with the valves m , (best shown in Figs. 5 and 6,) which are held closed by the springs n , which may bear directly against the flange of the cylinder-head, as in the lower end of Fig. 3, or against an adjustment-screw, as o , in the upper end of said figure. If either of these valves is lifted against the resistance of said springs, air, steam, or fluid may pass from the ducts i and j into the cylinder through the small ports p , but can never return through them from the cylinder, as that would help the springs n to close the valves m at once. By this arrangement it will be seen that should the air-cushion provided between the cylinder-head and the piston partly escape and thus fail to return the piston far enough for the ports k and l to take effect the auxiliary valves m will open for the pressure in the ducts i or j and the piston will be started or moved far enough for the main ports k or l to become active.

The spring q in Fig. 3 is a modified means of taking the blow of the piston instead of the air-cushions, or it may be used simply as a substitute for the valves m --that is, for helping the air-cushion to move the piston back from the cylinder-heads past the ports k and l , such springs being about the same in both ends of the cylinder. Only one is shown in the upper end.

r is a groove in the cylinder-head for receiving the spring q when it is pressed on by the piston.

In operation the hose d^2 is connected with the compressed-air supply, the cutting-knives placed in position for cutting, as shown in Fig. 1, and the valve-handle W moved so as to let the air into the cylinder and close the levers E , whereby the knives are forced toward each other till the bolt t is almost severed, when its resistance to shearing is suddenly diminished and the air in the cylinder expands quickly and would make a blow with the piston or the jaws, but is prevented from so doing by the air-cushion in the end of the cylinder, which covers the entire piston. Should the piston even move with such great force as to compress the air-cushion more than calculated, the piston can still not touch the cylinder-head, because in that event the air-pressure driving the piston will escape through the main ports k or l , as shown at u in Fig. 3, as it is ready to do should the piston move with its top to the dotted line v . By moving the handle W in the opposite direction the valve-plug will occupy the position shown in Fig. 3, allowing the air (or steam or fluid, as the case may be) to enter below the

piston in the manner already described, starting through the valve m , if necessary, and moving the piston upward and cylinder downward opens the levers E and the cutting-jaws, and as this requires but little force the air-pressure is apt to throw the piston against the upper cylinder-head. Hence the air-cushion at that end of the cylinder is also of great advantage for rapid work, as the operator may throw the air-pressure fully on in either direction in a moment and need not take time to feed it in slowly and carefully.

Where air-pressure or steam-pressure is not available, a special air-pump, operated by hand or foot power, may be attached to the hose d^2 , and if water or other fluid be used a return or exhaust hose may be extended from the valve into the vessel containing the fluid, so as to use the same fluid over and over again.

If the machine is to be used temporarily in a place where no pressure is obtainable or for lighter work, the bolts J and U may be removed, the entire air-power mechanism placed to one side, and the cutter used purely as a hand-tool.

From the plates D , I extend rearwardly the arm x , to which I pivot the clevis y , by which the machine when large may be suitably suspended near by the work, and thus need not be supported but only guided by the operator.

The rods T slide guidingly in the notches z in the cylinder-heads and thus cause the cylinder and said rods to move parallel to each other.

I am aware that many of the elements used in my invention are old and well-known, and also that prior to my invention cutting-jaws have been operated by pressure applied in a cylinder. I therefore do not claim the combination of such elements, broadly. The old devices alluded to, however, involve either belting and pulleys or heavy clumsy framework, or both, which render them almost useless as portable tools to be handled around steam-boilers and other structures of iron for cutting off the projecting stay-bolts, bolt ends, and rivet ends. Besides that, they are entirely inoperative where access to steam or air or fluid pressure cannot be had, while my machine may in such cases be operated by hand-power applied either directly to the hand-levers or by the detachable hand-crank and power-increasing rope-and-drum attachment shown in my former patent, No. 444,635, hereinbefore alluded to.

What I claim as my invention, and desire to secure by Letters Patent, is--

1. In a bolt-cutting machine, the combination of the plates D , the jaw-levers B , pivoted between said plates and carrying cutting-knives in their front ends, and the power-increasing levers E , also pivoted between said plates D , and engaging the rear ends of the jaw-levers B , with a cylinder pivotally secured to one of the levers E , and a piston moving in the cylinder and having its rod operatively connected with the other lever E and means

for admitting compressed air to press upon the piston, substantially as and for the purpose specified.

2. In a bolt-cutting machine, the combination of the plates D, the jaw-levers B, pivoted between said plates and carrying cutting-knives in their front ends, and the power-increasing levers E, also pivoted between said plates D, and engaging the rear ends of the jaw-levers B, with a cylinder pivotally secured to one of the levers E, and a piston moving in the cylinder and having its rod operatively connected with the other lever E, said levers E, being geared together by the teeth H and means for admitting compressed air, gas or fluid to press upon the piston, substantially as and for the purpose set forth.

3. In a bolt or rivet cutting machine the combination with a pair of cutting-jaws and operating-levers by which the cutting-jaws are actuated, of a cylinder pivoted to one of the operating-levers and having a piston with a piston-rod extending out of the cylinder, a cross-head secured on the piston-rod, the two rods T, T, connecting said cross-head with the other one of the operating-levers, substantially as and for the purpose set forth.

4. In a bolt or rivet cutting machine the combination with a pair of cutting-jaws and operating-levers by which the cutting-jaws are actuated, of a cylinder pivoted to one of the operating-levers and having a piston with a piston-rod extending out of the cylinder, a cross-head secured on the piston-rod, the two rods T, T, connecting said cross-head with the other one of the operating-levers, said rods T, being guided upon the outer sides of the cylinder so as to move parallel with it, substantially as and for the purposes set forth.

5. In a bolt-cutting machine and suitably framed, the combination with a pair of cutting-jaws and levers for operating same, of a cylinder and piston operatively connected with the levers, to open and close them and

the cutting-jaws; said cylinder having its ports entering it some distance from the cylinder-heads, so as to form air-cushion chambers near the cylinder-heads, for stopping the piston at the end of its stroke, and means for admitting pressure to either side of the piston, substantially as and for the purpose set forth.

6. In a bolt-cutting machine and suitably framed, the combination with a pair of cutting-jaws and levers for operating the same, of a cylinder and piston operatively connected with the levers, to open and close them and the cutting-jaws; said cylinder having its ports entering it some distance from the cylinder-heads so as to form air-cushion chambers near the cylinder-heads, for stopping the piston at the end of its stroke, and auxiliary means for returning the piston from said cushion-chambers, and means for admitting pressure of air, gas or fluid to either side of the piston; substantially as and for the purpose set forth.

7. In a bolt-cutting machine, and suitably framed, the combination with a pair of cutting-jaws and power-increasing levers operating same, of a cylinder and piston operatively connected with the levers, so as to open and close them, said cylinder having in its ends air-cushion chambers for the reception of the piston, beyond the main air-inlet ports *k*, and *l*, the auxiliary ports *p*, *p*, and the spring-held valves *m*, a hand-operated valve having inlet and outlet and communication alternately with the opposite ends of the cylinder, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ANNA HELWIG.

Witnesses:

M. HELWIG,

A. M. CARLSEN.