No. 675,880. Patented June 11, 1901.

J. A. CARLISLE.

PORTABLE PNEUMATIC RIVETER.

(Application filed Aug. 9, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

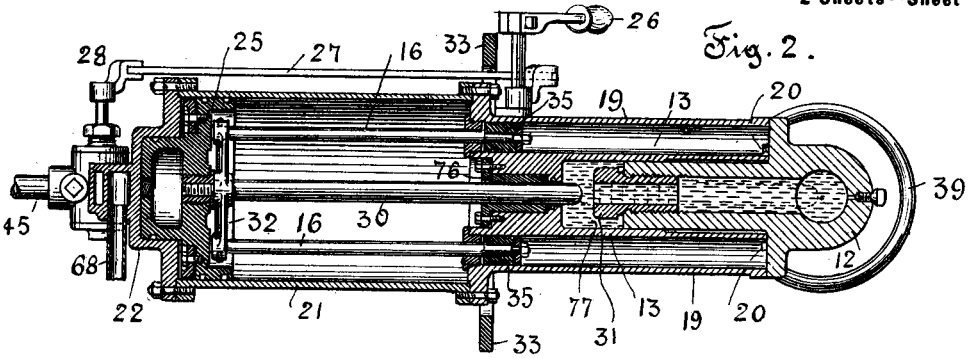


Fig. 4.

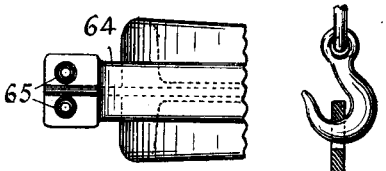


Fig. 1.

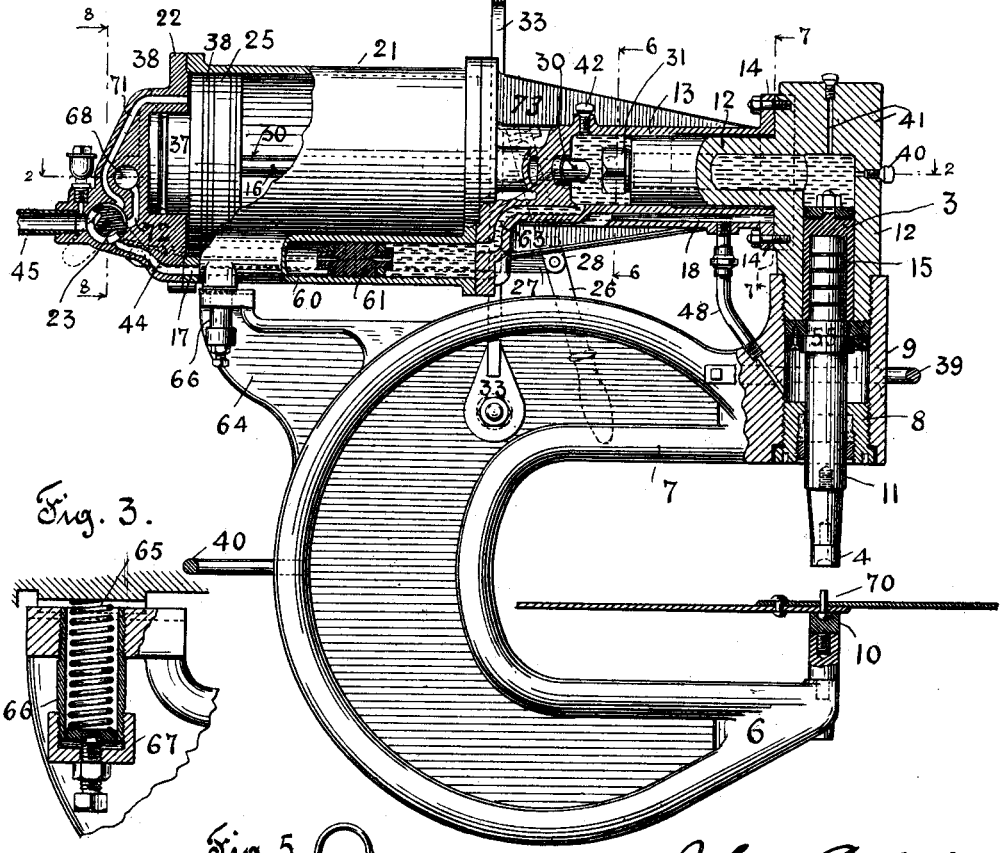


Fig. 3.

Fig. 5.

Witnesses
Charles Hanimann
Edward Lawrence

John A. Carlisle
Inventor

By his Attorney
Chas. F. Burke

No. 675,880. Patented June 11, 1901.

J. A. CARLISLE.

PORTABLE PNEUMATIC RIVETER.

(Application filed Aug. 9, 1900.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 6.

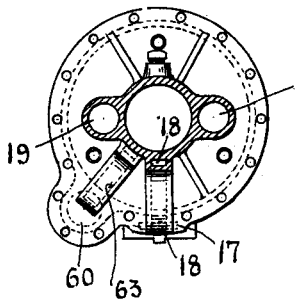


Fig. 7.

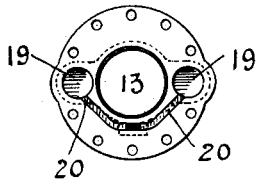


Fig. 8.

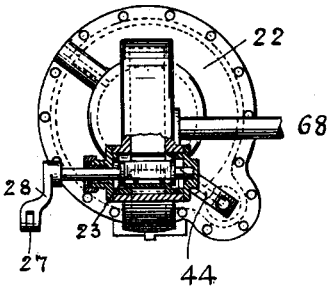


Fig. 9.

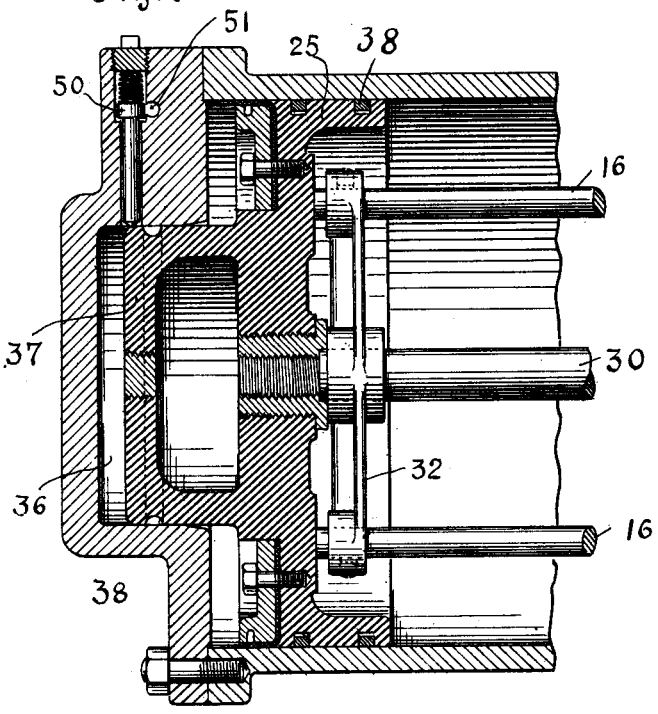
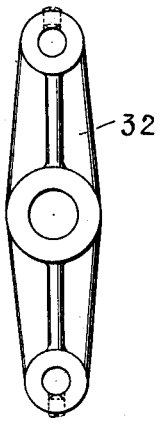


Fig. 10.



Witnesses
Charles Hanimann
Edward Laurence

John A. Carlisle
Inventor

By his Attorney
Chas. H. Forbes

UNITED STATES PATENT OFFICE.

JOHN A. CARLISLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE PEDRICK & AYER COMPANY, OF SAME PLACE.

PORTABLE PNEUMATIC RIVETER.

SPECIFICATION forming part of Letters Patent No. 675,880, dated June 11, 1901.

Application filed August 9, 1900. Serial No. 26,323. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. CARLISLE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Portable Pneumatic Riveters, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention consists in certain improvements in pneumatic riveting-machines wherein the pressure is transferred from the pressure-cylinder to the riveting-die through a body of liquid, and wherein the die is moved in contact with the work under a reduced volume of the motive fluid preliminary to the exertion of the maximum pressure that forms the rivet, and wherein the operative parts are returned to their normal or starting position with a minimum volume of the motive fluid, all as hereinafter particularly described.

In order that others may understand and use the invention, I will first proceed to describe the construction, relative arrangement, and operation of its parts and subsequently will point out in the claims its novel characteristics, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation, partly in section, of a machine embodying my improvements; Fig. 2, a longitudinal section on the line 2 2, Fig. 1; Fig. 3, an enlarged sectional view of the yielding support of the pressure-cylinders; Fig. 4, a partial top view of the yielding support; Fig. 5, a view of the tool used for withdrawing or adjusting the floating piston in the minor cylinder; Fig. 6, a sectional view on the line 6 6, Fig. 1; Fig. 7, an end view on the line 7 7, Fig. 1, showing the ports to the returning-cylinders; Fig. 8, a view of the main-cylinder cover with the valve-casing in section; Fig. 9, an enlarged sectional view of the end of the main cylinder with expedients for checking the speed of the piston and positively operating the relief-valve shown, and Fig. 10 a back view of the coupling-yoke connecting the piston-rods of the return-cylinders.

In the drawings, 6 and 7, respectively, are the arms of the steel yoke-frame of the usual type, the lower arm 6 carrying a die 10, faced to correspond to the shape of the rivet-head, and the upper arm 7 constructed with a cylinder 9, into the top of which a hollow forged T-piece 12 is screwed, forming a cylinder extension of the cylinder 9 and a chamber in which the power-transmitting liquid is confined. This T-piece 12 projects into the hollow casting 13, which is secured thereto by bolts 14 through flanges, as shown in Fig. 1. The casting 13 embodies two auxiliary cylinders 19, as shown in Fig. 2, and the combined structure is flanged and bolted to the main cylinder 21 and braced therewith by the integral webs 73, as shown in Fig. 1. The head 22 of the main cylinder 21 forms also the casing for the operating-valve 23 and dash-pot 36 and is provided with the inlet 45 and exhaust-port 68 and passages communicating with the valve 23 and the respective cylinders.

A minor cylinder 60 is arranged adjacent to and parallel with the main cylinder and is preferably cast integral therewith, as shown in Figs. 1 and 8, and communicates with the operating-valve and transmitting-liquid chamber through passages 44 63.

The main cylinder 21, with its extension-casing 13, is rigidly secured to the hollow T-piece 12, as described, while its opposite extremity rests upon a yielding support. (Shown in the enlarged and detached view, Fig. 3.) The support consists of a bracket 64, carrying a pair of coiled springs 65, contained in a suitable casing 66, having a removable cap 67 and adjusting-screw, all as shown in Figs. 3 and 4. The object of this yielding support is to compensate for any change in the relative position of the cylinder that is occasioned by the spring of the arms 6 7 of the frame when operating under great pressure, by which the main and auxiliary pistons and rods are thrown out of alinement.

The machine is suspended in the bail 33 and turned or swung into any desired position by the hand-rods 39 40.

The valve 23 is operated by means of the hand-lever 26, connecting-rod 27, and arm 28, the hand-lever being located convenient to the attendant, as shown.

The parts of the machine so far referred to

comprise the structure and manipulating devices.

I will now refer to the operative parts of the machine incidentally with an explanation of its method of operation, it being understood that the motive fluid (preferably compressed air) enters into the inlet 45 and is governed by the valve 23, operated by the hand-lever 26.

The operative parts are shown in the drawings in their relative starting position, the rivet 70 to be acted upon being placed through a lapped plate, its head resting in the lower die 10, and its shank projecting upward ready to receive the riveting-die 4 when the dolly-rod 11 is forced downward by its connected plunger 15, as shown in Fig. 1. The valve 23, as shown in Fig. 1, is set to register with motive-fluid inlet 45, the port 44 communicating with the minor cylinder 60 and its floating piston 61, the port 17 leading to the passage 18 and pipe 18 to the cylinder 9 and ports 20 of the auxiliary returning-cylinder 19, the port 71 leading from the main-cylinder piston 25, communicating through the valve 23 with the exhaust-port 72 and exit 68 to the atmosphere. The communication between the pressure-supply 45 and the floating piston 61 is always open through the port 44 in all possible positions of the valve 23, the inlet and exhaust to and from the main piston and to and from the auxiliary pistons 35 and plunger-piston 55 through the port 17, channel 18, ports 20, and pipe 48 (shown in Fig. 1 and end view, Figs. 6 and 7) being controlled by the valve in the respective forward and return strokes of the main piston 25 and plunger-piston 55, the latter presenting a greater area than the floating piston 61, and consequently returns the same and the interposed liquid to its normal position coincidently with the return of the main piston 25, which is effected by the small auxiliary cylinders 19, with pistons 35 and rods 16 connected to the main-piston rod 30 by the cross-yoke 32, as shown in Fig. 2.

By the employment of the small auxiliary cylinders 19 to effect the return movement of the main piston 25 a less volume or amount of the motive fluid is used than would be in admitting the same to the larger main piston. Consequently in this respect great economy in the use of the motive fluid is obtained in practice.

The communication with the valve 23 and the auxiliary cylinders 19 is through the port 17, channel 18, and ports 20, the admission of the fluid-supply pressure being coincident with its admission to the pipe 48, leading to the cylinder 9, and beneath the piston 55 of the dolly-plunger 11.

The return movement of the operative parts is illustrated as complete in Figs. 1 and 2 of the drawings; but in the enlarged view, Fig. 9, the main piston 25 is illustrated with its dash-pot extension 37 approaching the termination of its return stroke and in operative connection with the relief-valve 50 and escape-orifice 51, the valve being opened by the beveled contact with the extension 37, as shown, to release the confined-air cushion and seated on the advance stroke of the main piston by the connected coiled spring shown.

The purpose of the dash-pot 36 and the piston extension 37 will be readily appreciated as designed to check the increasing speed of the piston at the end of its stroke in the return movement.

The main piston 25 is fitted with an intensifying-rod 30, which passes through a central stuffing-box 76 in the cylinder-head and projects slightly, as shown in Figs. 1 and 2, into the liquid-chamber 77, its end being rounded, as shown, to facilitate its entrance into the screw plug or bushing 31 in the forward movement of the main piston.

The liquid contained in the respective chambers and passages between the floating piston 61 and the head of the riveting-plunger 15 for transmitting the power of the motive pistons to the riveting-plunger may be oil or any well-known non-freezing substance and in amount to adjust the position of the floating piston 61 in its cylinder 60 to obtain a sufficient range of movement to accomplish its purpose, the supply being furnished and maintained through the openings 40, 41, and 42, fitted with screw-plugs, as shown in Fig. 1. In refilling these oil-chambers, which is occasionally necessary in the use of the machine, owing to leakage, the floating piston is adjusted to its proper normal position by means of the rod 47, Fig. 5, passed through a suitable plug-hole in the end of its cylinder, which will be readily understood.

Having now referred to all the parts used in the operation of the machine, it is not deemed necessary to describe details like the piston-packing 38 and bushings 38 employed, as such expedients are those of adoption and well understood.

The method of operation is as follows: The positive return of all the moving parts to the starting position, as shown in Fig. 1, is first effected by setting the valve 23 by means of the hand-lever 26, as illustrated, which admits the fluid-pressure from the inlet 45 through port 17, channel 18, and ports 20 into the auxiliary return-cylinders 19, which forces the main piston 25 to the front end of its cylinder, and at the same time and with the same pressure the dolly-rod 11 is forced upward by the piston 55, which enters from the channel 18 through the pipe 48 to the cylinder 9, beneath the piston 55, which also forces the confined liquid and floating piston 61 back and against the motive-fluid pressure. The increasing speed of the piston 25 during this return movement is checked near the termination of its stroke by the air-cushion in the dash-pot 36. In the opposite movement of the parts which effect the riveting the hand-lever 26 is thrown forward to a vertical position, and the valve 23 is set to open the port

17 in communication with the exhaust-port 72, which relieves the pressure from the cylinder 9 beneath the piston 55 and from the auxiliary returning-cylinders 19. The valve 23 also registers with the port 71 to open communication with the fluid-pressure supply and the main piston 25, which in its forward movement causes the rod 30 to enter the bushing 31, thus cutting off the communication between the floating piston 61 and the transmitting liquid, the piston 25 in its continued forward movement forcing the rod 30 into the confined liquid, whereby the pressure is greatly intensified and transmitted to the plunger 15 of the dolly-bar 11 and riveting-die 4, which forms the rivet-head. The valve 23 being now shifted to its first position, the return movement of the parts is effected, as heretofore explained.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A riveting-machine consisting of a yoke-frame having an anvil-die upon one arm of said frame and a power riveting mechanism upon its opposite arm, rigidly connected therewith at one extremity and at its other extremity adapted to rest upon a yielding support, substantially as and for the purpose set forth.

2. A riveting-machine composed of a yoke-frame provided with an anvil-die upon one arm; a cylinder and plunger fitted with a riveting-die upon the other arm; a liquid-chamber above said plunger communicating with a minor cylinder and piston for moving the riveting-plunger in contact with the work with a minimum volume of the motive fluid; a larger power-cylinder and piston for compressing the rivet under a maximum or intensified pressure; a series of auxiliary cylinders and pistons for returning the power-pistons and riveting-plunger after compression, and a valve for controlling the motive fluid to and from the respective cylinders through suitable ports, and means for checking the speed of the returning piston at the termination of its stroke, the whole constituting a portable self-contained structure, substantially as described.

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

JOHN A. CARLISLE.

Witnesses:

J. W. RITTER,

WILLIAM STINSON.