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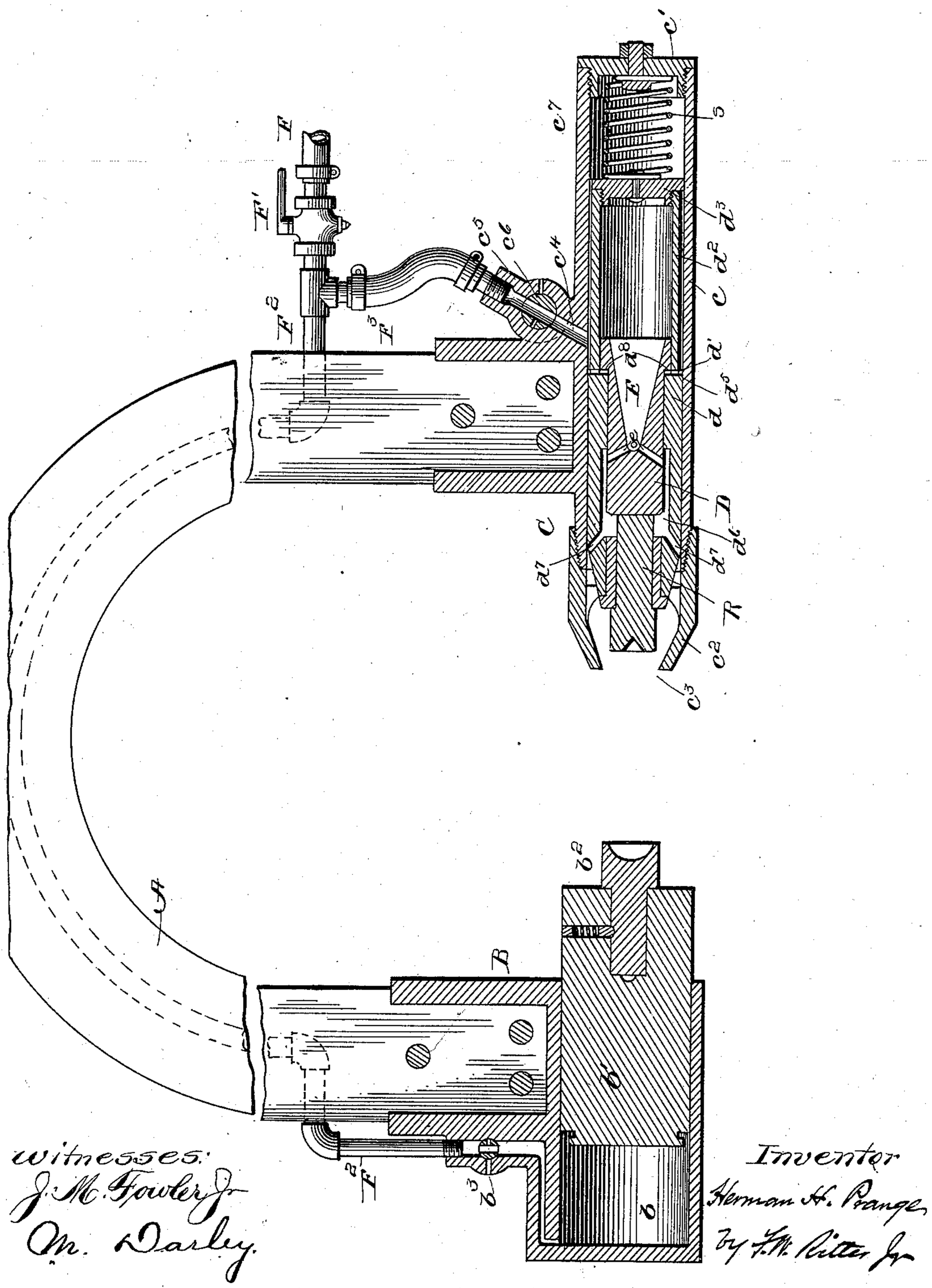
H. H. PRANGE.

PNEUMATIC RIVETER.

(Application filed Feb. 19, 1900.)

(No Model.)



Witnesses:
J. M. Fowler Jr.
M. Darley.

Inventor
Herman H. Prange
by F. H. Ritter Jr.
Attorney

UNITED STATES PATENT OFFICE.

HERMAN H. PRANGE, OF AKRON, OHIO, ASSIGNOR TO THE JOHNSON, PARFITT TOOL COMPANY, OF SPRINGFIELD, ILLINOIS.

PNEUMATIC RIVETER.

SPECIFICATION forming part of Letters Patent No. 657,449, dated September 4, 1900.

Application filed February 19, 1900. Serial No. 5,774. (No model.)

To all whom it may concern:

Be it known that I, HERMAN H. PRANGE, a citizen of the United States, residing at Akron, in the county of Summit, State of Ohio, have invented certain new and useful Improvements in Pneumatic Riveters; and I hereby declare the following to be a full, clear, and exact description of the same, such as will enable others to make and use my invention.

In the drawing forming a part of this specification and illustrating my invention is shown a suitable yoke or support, parts being broken away, and sectional views of a pneumatic hammer and a pneumatic "hold-on" supported by or attached to the opposite arms of the yoke.

Like symbols refer to like parts wherever they occur.

The object of my invention is to so combine a plate-closer with a pneumatic riveter as to obtain a constant length of stroke of the riveting-hammer, whereby closer joints and more uniform rivets are obtained as a result of the operation of the machine.

To this end my invention, generally stated, embraces the combination, in a riveting-machine, of a fixed hammer-casing, and a pneumatic-hammer cylinder longitudinally movable in said fixed casing, the fixed casing having a plate-closer which projects beyond the working or advanced position of the longitudinally-movable hammer-cylinder, whereby the hammer-cylinder is allowed a gradual advance, and the length of the stroke of the riveting-hammer remains constant.

I will now proceed to describe my invention more fully, making reference to the drawing for that purpose.

In the drawing, A indicates a yoke or other suitable support, to one arm of which is secured a pneumatic hold-on B and to the other and in line with the hold-on a pneumatic riveter or hammer C. The pneumatic hold-on may consist of the usual cylinder b, provided with a piston or ram b', in the outer end of which is secured the snap or die b^2, which constitutes the anvil and is shaped to receive the head of the rivet and support the rivet and plates under the blows of the riveting-hammer. The ram-cylinder b is provided with an induction-port and supply-pipe and with a suitable throttle-valve b^3.

F indicates the supply-pipe of the motive fluid provided with a suitable throttle-valve F′ and divided into branches F^2 and F^3, leading, respectively, to the hold-on B and the hammer C, each of said branches having its own throttle-valve b^3 and c^6.

c indicates the fixed outer casing for the support of the pneumatic-hammer cylinder d, which is longitudinally movable therein, said casing c closed at one end by a cap or closure c' and at the other or open end extended, preferably by a detachable sleeve, beyond the normal travel of the hammer-cylinder, as at c^2, to constitute a plate-closer, which may be slotted, as at c^3, to per permit of the operator inspecting the work during the operation of the machine. This outer fixed cylinder c is provided with an induction-port c^4 and inlet or pressure pipe c^5, provided with a suitable throttle-valve c^6 for controlling the admission of the motive fluid to the hammer-cylinder.

d indicates the hammer-cylinder, longitudinally movable in the outer or fixed casing c, said hammer-cylinder d being reduced in diameter to form an annular shoulder d' and chamber d^2 for the reception of the motive fluid, the annular chamber d^2 having communication with the chamber c^7 of casing c, so that the motive fluid shall exert its pressure on the end of the hammer-cylinder d to hold it up to the work and cause its gradual advance as the rivet is formed. The rear end of the hammer-cylinder d is closed by a cap d^3, and, if desired, a retracting-spring s may be interposed between the outer or fixed casing and the hammer-cylinder to retract the hammer-cylinder when the fluid-pressure is removed. The forward end of the hammer-cylinder is provided with a central bore for the reception of the riveting-die R, which is movable therein and is struck by the piston or hammer D. The hammer-cylinder d is provided with ports d^5, whereby the hammer-cylinder communicates with the surrounding pressure-chamber d^2, while in the forward

part of the hammer-cylinder is the annular exhaust-chamber d^6, provided with exhaust-ports d^7.

D indicates the piston (or hammer) of the hammer-cylinder, provided on its exterior with an annular shoulder d^8 and having a central passage E, from which extend the ports or passages e e, which are alternately inlet and exhaust ports, according to the position of the piston or hammer D.

The construction of the devices being substantially of the character hereinbefore set forth, their operation will be as follows: A properly-heated rivet having been inserted in the rivet-holes of the plates to be united, said plates are placed against the plate-closer c^2, with the rivet projecting into the plate-closer in line with the riveting-die R, the hammer-cylinder d being at such time withdrawn or at the extent of its backward movement. The throttle-valves F′ and b^3 are then opened and the motive fluid is admitted to the cylinder b of hold-on B, which projects the ram b' and forces the die b^2 against the head of the rivet, thus holding the plates to be riveted in firm contact with the plate-closer c^2 on the end of fixed casing c of the hammer-cylinder. When this has been done, the operator turns the throttle-valve c^6 to admit the motive fluid to the fixed casing and hammer-cylinder. The motive fluid passes through induction-port c^4, first into the annular chamber d^2, surrounding the hammer-cylinder d, and forces said hammer-cylinder forward until the riveting-die (or header) R bears upon the rivet, after which the motive fluid passes by the ports d^5 into the hammer-cylinder forward of the annular shoulder d^8 of hammer D, thence forcing the hammer back until the passages e e register with the induction-ports d^5, and next through ports or passages e e into the interior E of the piston or hammer D, whereupon the hammer is projected forward and delivers its blow on riveting die or header R. The forward movement of the piston or hammer D closes ports e e as to the induction-ports d^5 of the hammer-cylinder and opens them as to the exhaust-chamber d^6 and exhaust-ports d^7, whereupon the piston or hammer D is withdrawn (or given its reverse movement) by the pressure of the motive fluid from ports d^5 on the annular shoulder d^8 of the piston or hammer. When the piston or hammer D has reached substantially the limit of its inward movement, the ports or passages e e are again brought in register with the induction-ports d^5 d^5, and the forward stroke of the hammer follows, as hereinbefore pointed out. The above-noted operation of the hammer continues until such time as the motive fluid is cut off, and the continued pressure of the motive fluid in the annular chamber d^2 and in the chamber c^7 upon the end of cylinder d causes the gradual advance of the hammer-cylinder and riveting-die R, as the rivet-head is formed while the stroke of the piston or hammer D remains constant.

It will be noted that by the arrangement of the motive-fluid pipes and throttle-valves hereinbefore pointed out in combination with the hold-on and hammer one operator is enabled to first advance the hold-on and subsequently advance the hammer and control its operation, and it will also be noted that by combining a plate-closer with a fixed casing and a hammer longitudinally movable in the casing the travel and force of blow of the hammer can be rendered constant and uniform and not variable, as in previous constructions.

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

1. The combination with a suitable supporting-casing, of a pneumatic hammer longitudinally movable in the casing, means for the admission of motive fluid to the casing and hammer, a plate-closer mounted on the casing, and means for holding the rivet and plates up to the plate-closer, substantially as and for the purposes specified.

2. The combination with a suitable support, of a hold-on, a fixed casing, a pneumatic hammer longitudinally movable in the fixed casing, means for the admission of motive fluid to the hold-on and to the fixed casing and the pneumatic hammer, and a plate-closer mounted on the fixed casing, substantially as and for the purposes specified.

3. The combination with a suitable support, of a hold-on, a casing, a pneumatic hammer longitudinally movable in the casing, and a valved motive-fluid-supply pipe having branches leading to the hold-on and to the casing the one leading to the casing having an independent throttle-valve, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 13th day of February, 1900.

HERMAN H. PRANGE.

Witnesses:
CARRIE M. KOLP,
R. M. WANAMAKER.