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PATENTED MAY 30, 1905.

H. A. CARPENTER.

PNEUMATIC ATTACHMENT FOR RIVETING AND PLATE CLOSING MACHINES.

APPLICATION FILED APR. 9, 1898.

2 SHEETS—SHEET 1.

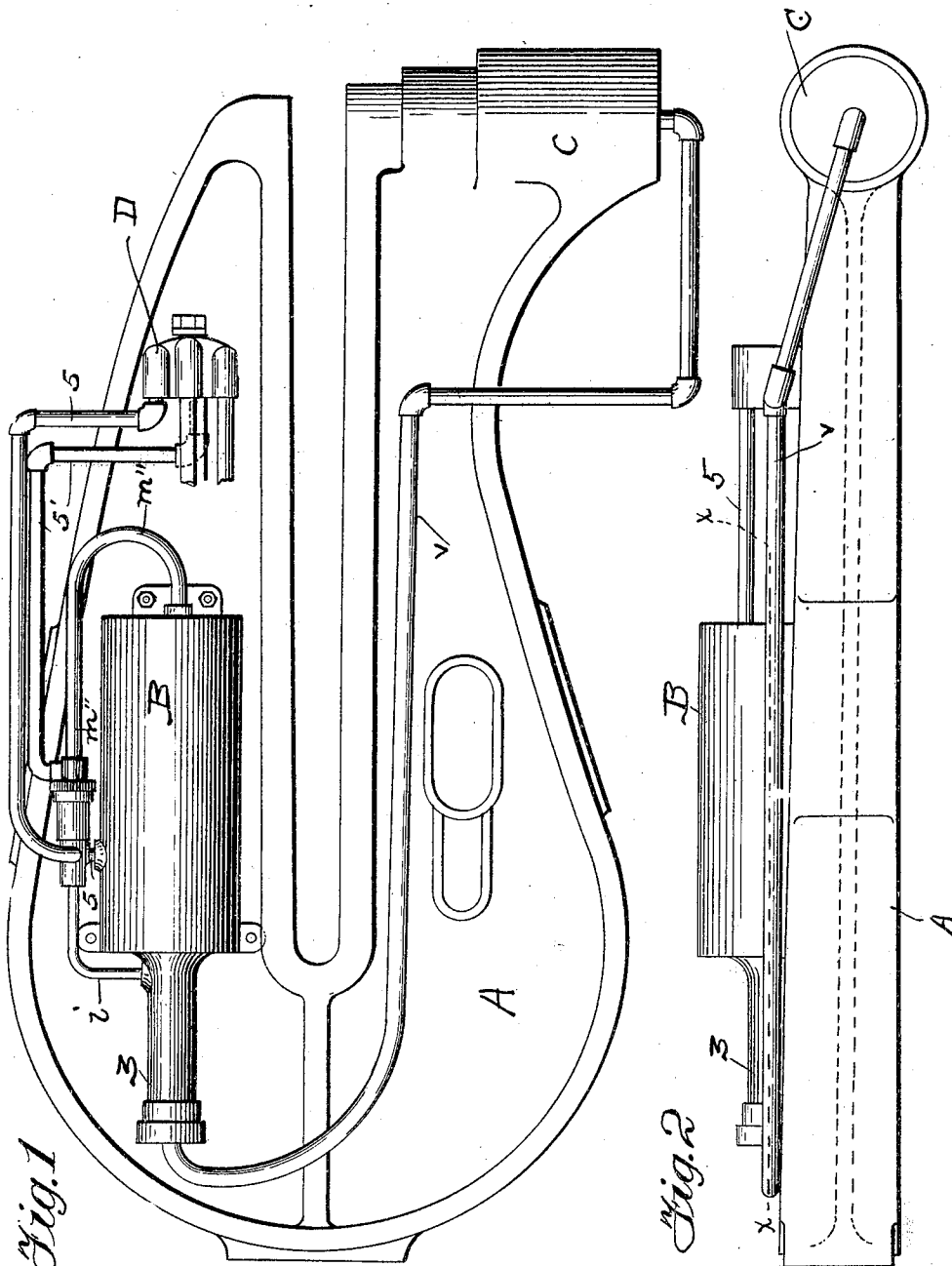


Fig. 1

Fig. 2

Witnesses:

P. A. Williams
James C. Heron.

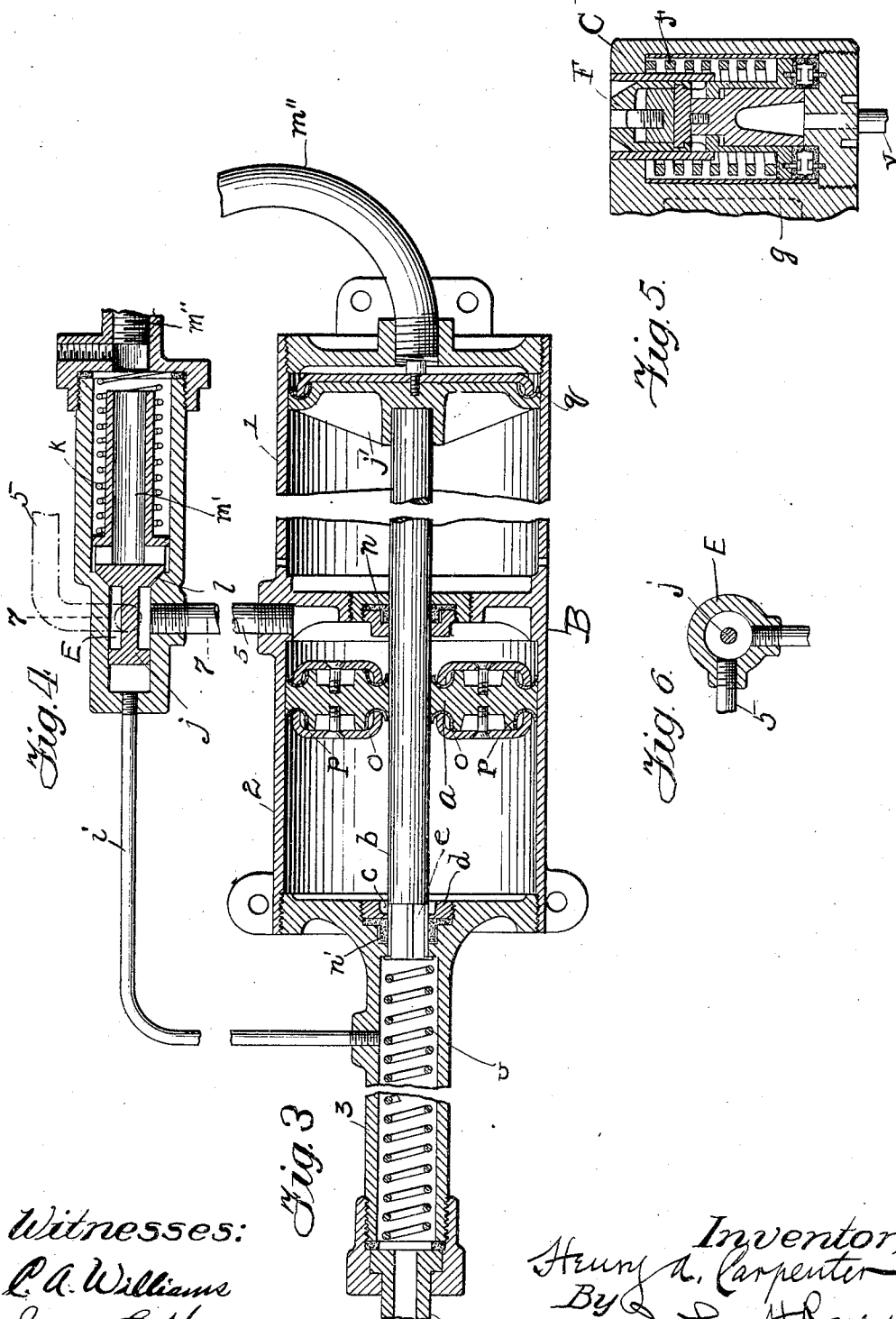
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Witnesses:
L. A. Williams
James C. Horton.

Inventor:
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UNITED STATES PATENT OFFICE.

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JERSEY, A CORPORATION OF NEW JERSEY.

PNEUMATIC ATTACHMENT FOR RIVETING AND PLATE-CLOSING MACHINES.

SPECIFICATION forming part of Letters Patent No. 791,075, dated May 30, 1905.

Application filed April 9, 1898. Serial No. 677,107.

To all whom it may concern:

Be it known that I, HENRY ALBERT CARPENTER, a citizen of the United States of America, residing at Sewickley, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pneumatic Attachments for Riveting and Plate-Closing Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in pneumatic attachments for riveting and plate-closing machines.

The object of my invention is to produce a machine in which the operation of upsetting the rivet and forming the head thereon is momentarily delayed until the pressure initially applied by the machine squares the rivet with the machine and closes the plate being operated upon, the riveting operation being performed immediately thereafter by the maximum pressure of the machine automatically applied; and to this end my invention consists in the novel construction, combination, and arrangement of parts hereinafter set forth, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 indicates a side elevation of my improved pneumatic attachment for riveting and plate-closing machines. Fig. 2 is an inverted plan view of the same. Fig. 3 is a longitudinal section of cylinder, taken on the line *xx* of Fig. 2. Fig. 4 is a longitudinal section of check-valve cylinder. Fig. 5 is a longitudinal section of hydraulic cylinder. Fig. 6 is a transverse section of the check-valve cylinder at line 7 7, Fig. 4.

Like reference characters indicate like parts wherever they occur.

Referring to said drawings, A is a frame or support of the ordinary and usual construction employed in riveting-machines, on the upper and lower members, respectively, of

which are mounted or secured the pneumatic attachment B and the hydraulic cylinder C. Said pneumatic attachment comprises the three cylinders 1, 2, and 3 and is connected to a valve or cock D, which controls the admission and exhaust of air or other element that may be employed in said cylinder. Air under pressure admitted by the pipe 5 to the rear end of cylinder 2 in rear of the piston-head or diaphragm *a*, located therein and movably mounted on the piston-rod *b*, causes said piston-head to move, compressing the liquid contained in the cylinder and forcing the same into cylinder 3 through the annular port *c*, formed in the plug *d*, around the piston-rod *b* and the groove *e*, formed in the end of said piston-rod. The liquid under pressure is forced from said cylinder 3 into the hydraulic cylinder C, connected therewith by the pipe *v*, causing the plate-closing tool F, located in said hydraulic cylinder, to advance against the plates being operated upon, thus closing the same and squaring the rivet with the machine. Immediately the movement of the plate-closing tool in the hydraulic cylinder is stopped by the plates being acted upon continued pressure in the hydraulic cylinder is supported by the large spring *f*, mounted on the riveting-plunger *g*, between a shoulder thereon and the bottom of the cylinder, which serves to prevent momentarily the advance of the riveting-tool, enabling the hydraulic pressure maintained in said cylinders C and 3 to pass through the pipe *i* and to press upon one end of the piston *j*, located in one end of the valve-chamber E, compressing the spiral spring *h*, which surrounds the tubular part *m'* of the puppet-valve and normally holds said valve closed, admitting air from the pipe 5, leading to valve D, through the valve-seat *l* into and through the tubular part *m'* of the valve, through pipe *m''* to the rear of the piston-head *j'*, which is connected to the piston-rod *b*, moving the same forward and applying the maximum pressure of the machine upon the liquid contained in the cyl-

inders 3 and C for the purpose of upsetting the rivet and forming the head thereon.

Suitable packing-rings *n* are interposed between the cylinders 1 and 2 in the partition 5 which separates the same, also rings *n'* in the partition which separates cylinders 2 and 3.

The piston-head or diaphragm *a* is provided with U-shaped packing-rings *o* and *p* for the purpose of maintaining air and water tight joints around the periphery of the same and around the piston-rod *b*. The piston-head is also provided with U-shaped packing-rings *q* for a like purpose.

The operator by a movement of the valve 15 D permits the pneumatic pressure to exhaust from cylinder 2 to pipe 5 and from cylinder 1 to pipes *m''* and 5' through an exhaust-port in the valve D to the atmosphere, the piston-head *j'* being returned to the position shown 20 in Fig. 3 by the retraction of the spring *u*, located in cylinder 3 between said piston-rod and the end of said cylinder. The retraction of the large spring mounted on the riveting-tool in the hydraulic cylinder exhausts the 25 liquid from said cylinder and cylinder 3 into cylinder 2, thus moving the piston-head to the position occupied by the same in Fig. 3. The retraction of the said large spring forcing the hydraulic pressure against the end of the piston-rod *b* would also return the piston-head *j'* 30 to its normal position; but for greater security this function is assisted by the retraction of the spring located in cylinder 3.

The mechanism illustrated in Fig. 5 is the 35 subject-matter of my copending application bearing Serial No. 677,106, and hence I make no claim therefor in the present application.

Having described my invention, what I claim, and desire to secure by Letters Patent, 40 is—

1. In a pneumatic attachment for riveting and plate-closing machines, the combination of a pneumatic cylinder, a hydraulic cylinder, a piston in the hydraulic cylinder adapted 45 to act initially on the fluid, a piston and piston-rod in the pneumatic cylinder adapted to act secondarily on the fluid, and a valve controlling the air-pressure to the pneumatic cylinder which is automatically actuated by the 50 initial compression of the fluid in the hydraulic cylinder to supply the requisite air-pressure to the pneumatic cylinder.

2. In a pneumatic attachment for riveting and plate-closing machines, the combination 55 of a pneumatic cylinder having a piston-head therein; a cylinder adapted to contain liquid having a movable piston-head or diaphragm adapted to compress said liquid; a smaller cylinder connected to or made part of the cylinder containing liquid; ports communicating 60 between the two last-mentioned cylinders and adapted to be closed by the forward movement of a piston-rod; a valve adapted to be

operated by said liquid-pressure, the said valve adapted to control the admission of air 65 to the pneumatic cylinder, substantially as described.

3. In a pneumatic attachment for riveting and plate-closing machines, the combination with a pneumatic cylinder, a main hydraulic 70 cylinder, and an auxiliary hydraulic cylinder of relatively small size, all located in longitudinal axial alinement, of a piston movable in the pneumatic cylinder, a piston-rod therefor movable in the auxiliary hydraulic cylinder 75 and adapted to cause compression of the fluid in the auxiliary cylinder, a piston in the main hydraulic cylinder which is movable independently of the piston first named, a controlling-valve adapted to admit pressure to the 80 main hydraulic cylinder initially to cause an actuation of the piston therein, and an automatically-acting valve controlling the air-pressure supply to the pneumatic cylinder which is in communication with the auxiliary 85 hydraulic cylinder, said automatic valve being adapted to be unseated by hydraulic pressure derived from the auxiliary hydraulic cylinder after the movement of the piston in the main hydraulic cylinder and to admit air-pressure 90 to the piston in the pneumatic cylinder, whereby the said piston is actuated to cause a final compression of the fluid.

4. In a pneumatic attachment for riveting and plate-closing machines, the combination 95 of a pneumatic cylinder, a main hydraulic cylinder, an auxiliary hydraulic cylinder, a piston in the pneumatic cylinder having a piston-rod adapted to work in the auxiliary hydraulic cylinder, a piston in the main hydraulic 100 cylinder which is slidable loosely on the said piston-rod, and a valve controlling the supply of air-pressure to the said first-named piston which is in fluid communication with the auxiliary hydraulic cylinder and adapted to 105 supply pressure to the piston in the pneumatic cylinder only when actuated by the hydraulic pressure incident to the initial compression of the fluid in said auxiliary cylinder.

5. In a pneumatic attachment for riveting 110 and plate-closing machines, the combination with a pneumatic cylinder, an independent main hydraulic cylinder, and an auxiliary hydraulic cylinder communicating with the main hydraulic cylinder, of a piston in the pneumatic 115 cylinder having a piston-rod passing through the main hydraulic cylinder and into the auxiliary hydraulic cylinder and provided with channels or ports in its end, a spring for retracting said piston and rod, a piston in the 120 main hydraulic cylinder which is adapted to slide loosely on the said piston-rod, and a valve controlling the supply of air-pressure to the said first-named piston which normally closes communication with the piston in the 125 pneumatic cylinder and is in fluid communi-

cation with the auxiliary hydraulic cylinder,
said valve being opened by the pressure of
the fluid after the initial compression thereof
by the hydraulic piston to supply air to the
5 pneumatic piston to give the fluid a second-
ary and final compression.

In testimony that I, HENRY ALBERT CAR-

PENTER, claim the foregoing I have hereunto
affixed my signature in the presence of two
subscribing witnesses.

HENRY ALBERT CARPENTER. [L. s.]

Witnesses:

H. J. GRAHAM,

C. A. WILLIAMS.