

No. 707,920.

Patented Aug. 26, 1902.

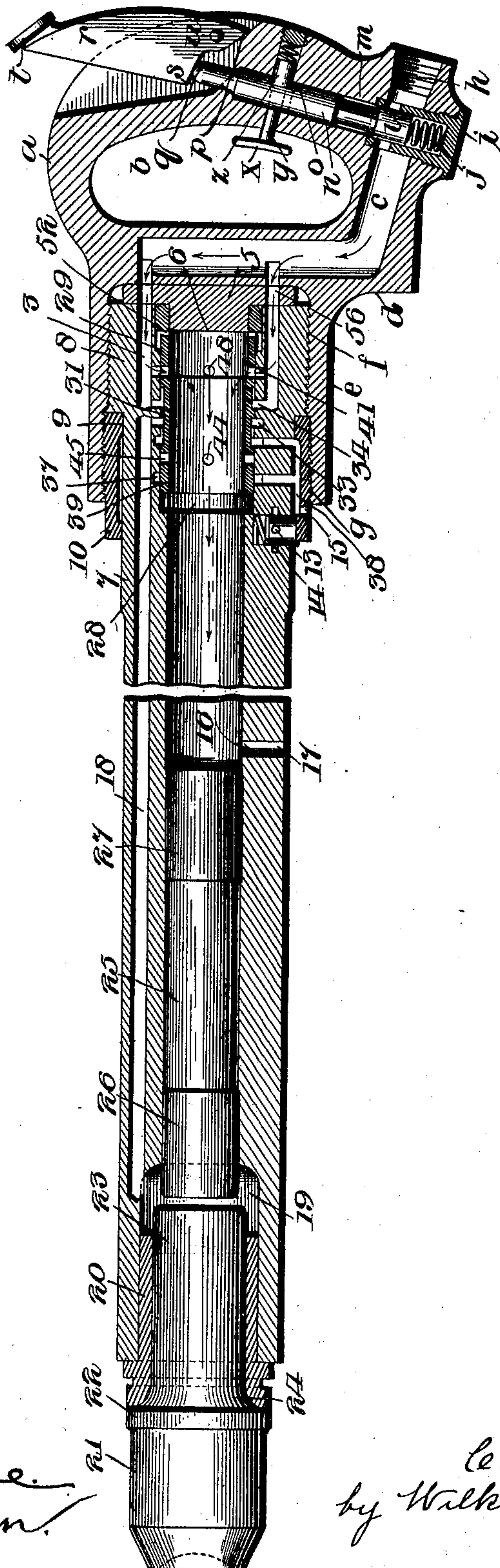
C. H. HAESELER.  
PNEUMATIC HAMMER.

(Application filed June 20, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



Witnesses  
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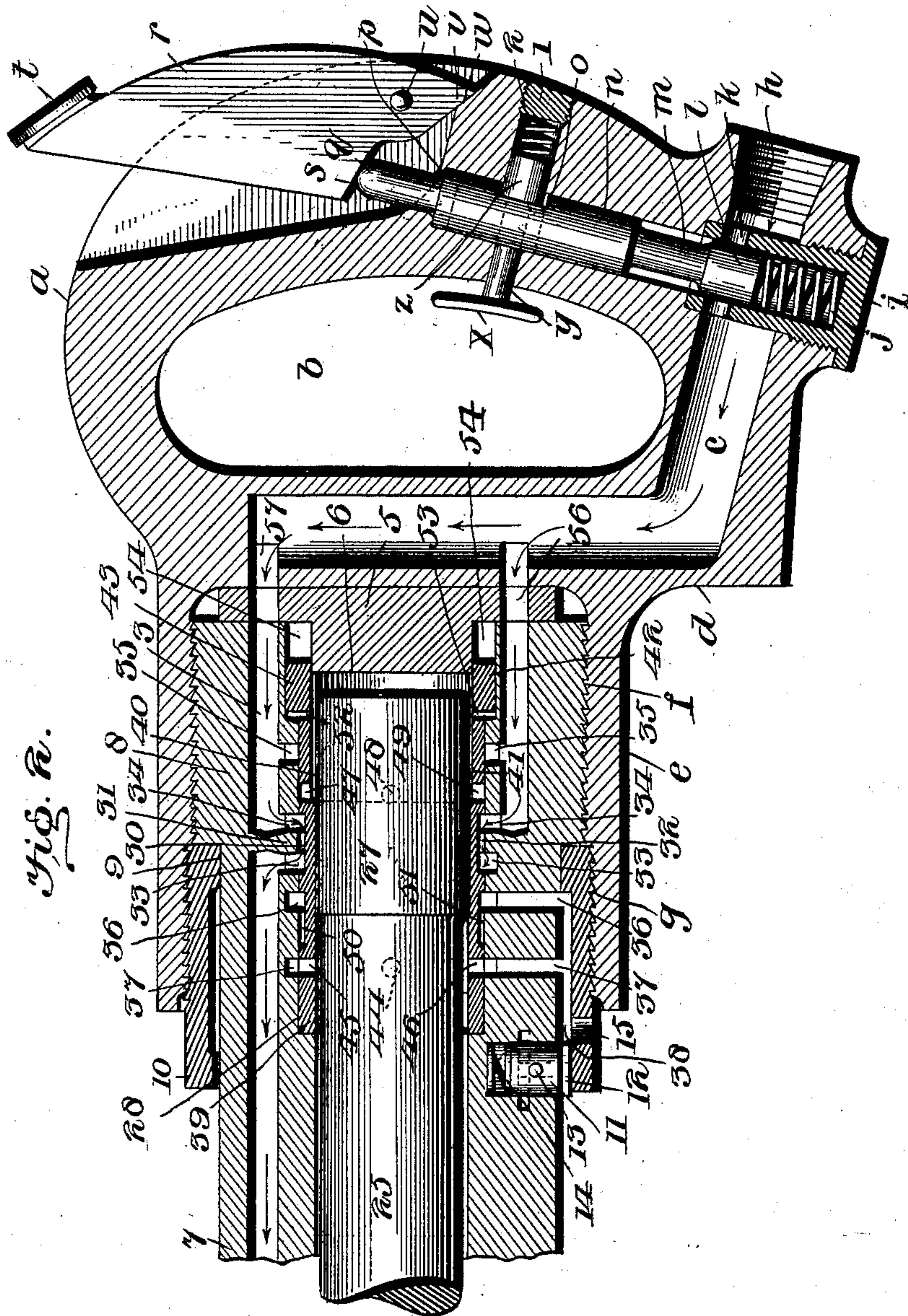
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Witnesses

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# UNITED STATES PATENT OFFICE.

CHARLES H. HAESELER, OF PHILADELPHIA, PENNSYLVANIA.

## PNEUMATIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 707,920, dated August 26, 1902.

Application filed June 20, 1901. Serial No. 65,342. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES H. HAESELER, 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 Pneumatic Hammers; and I do hereby 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.

My invention relates to improvements in pneumatic hammers; and it consists in the constructions and combinations of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal section of my improved hammer, the piston and rivet-set being shown in side elevation. Fig. 2 is an enlarged sectional view of the rear part of the hammer, showing especially the valves and air-passages.

*a* represents the handle, provided with a portion *b* to receive the fingers.

*c* is the passage for the motor fluid, preferably compressed air, which enters at the lower portion of the handle and passes upward nearly to the top thereof. The handle is reduced, as shown at *d*, leaving a cylindrical portion *e*, provided with an internal right-handed screw-thread *f* and an internal left-handed screw-thread *g* of slightly-larger diameter than the screw-thread *f*.

*h* represents the screw-thread, by means of which a hose may be attached to the handle.

*i* is a screw-threaded cylinder let into the lower part of the handle and crossing the passage *c*. In the lower part of the cylinder is located the spring *j*, and a port *k* passes through said cylinder to allow the motor fluid to flow into the passage *c* when the passage *k* is unobstructed. In this cylinder *i* works a piston provided with a head *l*, a reduced portion *m*, and a cylindrical portion *n*, cut away at *o*. The upper part of the portion *n* is reduced, forming a shoulder *p*, which prevents the piston from being thrown out of the handle by the spring *j*. The outer end of the piston is rounded, as shown at *q*.

*r* represents a lever for operating the piston, thereby admitting fluid to the passage

*c*. It is provided with a thumb-piece *t* and an inclined portion *s*, adapted to engage with the end *q* of the piston. This lever is mounted on the pivot *u* and moves back and forth in a slot in the handle. The lower part of the lever is provided with a projection *v*, adapted to rest against the inclined portion *w* of the handle when the hammer is not in use. This construction also serves as a stop to prevent the piston from being thrown out of the handle.

*x* is a finger-piece projecting into the finger-space *b* and mounted on a stem *y*, which is enlarged, as shown at *z*. This enlarged portion is adapted to fit in the cut-away portion *o* of the piston and normally engages with this portion, being driven therein by the spring 2, resting against the screw-nut 1, which is let into the handle.

3 and 4 represent passages in the cylinder which connect with the passage *c*.

5 represents an end block provided with an enlarged portion 6, which block is interposed between the cylinder 7 and handle *a* and against which piston 25 may strike, if necessary, in its rearward movement. This block may be of resilient material, if desired.

The cylinder 7 is provided with an enlarged portion 8, having a right-handed screw-thread on the outside to engage the screw-thread *f* in the handle. Just in front of these screw-threads the cylinder has a reduced portion, (shown at 9,) forming a shoulder, and an annular nut 10, having a left-handed screw-thread, which engages with the screw-thread *g* of the handle *a*, abuts against this shoulder, and, together with the screw-threads already described, firmly fastens the handle and cylinder together. The nut 10 is provided with internal teeth, with which the teeth 12 on the dog 11 engage to prevent the nut from turning. This dog works in a cylindrical groove cut in the cylinder 7, and a spring 14 normally holds the dog in contact with the nut. This dog is provided with two pins 13, and when it is desired to disengage the dog from the nut the dog is pushed up in the cylinder and turned ninety degrees, in which position the pins engage in the circular groove cut in the cylinder and hold the dog out of contact with the nut. The nut 10 has



a hole 15 in it to allow the escape of the air or motor fluid at certain times.

The cylinder 7 is provided with an internal bore 16, an escape-opening 17, and a long passage 18 for conducting air to the front of the piston to force it rearward after a blow has been struck. This bore is enlarged near the front end, as at 19, and in this enlargement a sleeve 20 is fitted, being retained therein by friction, or it may be screw-threaded into said cylinder, if desired. 21 represents the rivet-set, provided with a collar 22, a stem 23, and a curved portion 24, which engages the outer end of the sleeve 20. 25 represents the movable piston, provided with heads 26 and 27. At the rear nearest the handle the bore 16 is enlarged, as shown at 28, for the reception of the sliding cylindrical valve, and the rear end is still further enlarged, as shown, forming an enlarged space 29, located in front of an enlarged portion of said valve. 30 represents a ring on said cylinder, which is so arranged with reference to the cylindrical valve as to leave a circular passage 31 32 between said ring and said valve. A circular groove about three times as wide as the ring 30 is cut in the cylindrical valve 39 for a purpose hereinafter to be explained. Passages 56 and 57 connect with the passage *c* and with the spaces between the ring 30 and the cylindrical valve 39. Two circular grooves 33 and 34 are cut in the cylinder, and these two grooves, together with the passages 31 and 32, connect the passages 56 and 57 with the passage 18. Circular grooves 35, 36, and 37 are also cut in the cylinder. Between the circular nut 10 and the cylinder 7 is a passage 38, which connects with the grooves 36 and 37. The rear end of the valve 39 is cut away slightly on the inside, leaving the passages 40 and 41. The rear end of this valve is enlarged, forming the circular abutment 42 and 43, which works in the enlarged portion 29 of the cylinder. 44, 45, and 46 represent a series of holes in the valve which register with the circular groove 37 when the valve is in its forward position, as shown in Fig. 2. 47, 48, and 49 represent another series of holes which register with the circular groove 35 when the valve is in the other position, as shown in Fig. 1.

50 and 51 represent a circular groove on the outside of the valve just long enough to connect the groove 36 with the groove 33 when the valve is in the position shown in Fig. 1.

52 and 53 represent another series of holes in the valve 39, adapted to deliver air to the space 29 when in the position shown in Fig. 2.

54 represents a circular annular space behind the valve when the latter is in its forward position. In assembling the various parts this valve is placed in the position shown in Fig. 1, the enlarged portion of the valve filling the annular space 54 behind the valve, a partial vacuum being formed when the valve is shifted forward. When the re-

turn stroke of the piston is nearly completed, air is forced into the openings in front of the enlarged portion of the valve, opening into the annular chamber 29, which will restore the valve to its former position, as will hereinafter more fully appear.

The operation is as follows: When it is desired to use the hammer, the rivet-set 21 is placed against the rivet, the stem *y* is pushed back by the finger-piece *x*, releasing the valve in the handle, and the lever *t* is pressed down by the thumb. This opens the passage for the compressed air or other motor fluid to enter the passage *c*, whence it flows through the passages 56 and 57, through the circular groove 35 and holes 47, 48, and 49, (the valve being in the position shown in Fig. 1,) and forces the piston toward the rivet-set, which it strikes with a sharp blow. Just before the piston strikes the rivet-set the port 17 is uncovered, and the air-pressure behind the piston is thereby suddenly diminished. The inertia of the piston, however, causes it to strike the rivet-set with a sudden blow. The jar immediately shifts the valve from the position shown in Fig. 1 to the position shown in Fig. 2. In this latter position the holes 47, 48, and 49 are closed, cutting off the supply of air to the bore 16 behind the piston. The air from the passage *c* then flows around under the ring 30 into the passage 18, where it gets in front of the piston 25 and forces the same back, the air in the bore 16 being then exhausted through the holes 44, 45, and 46 into the groove 37, the passage 38, and out through the hole 15. As soon as the piston in its rearward movement passes the holes 44, 45, and 46 it of course stops this exhaust through the hole 15, and the air behind the piston is then compressed. The compressed air working up through the holes 52 and 53 into the enlarged portion 29 of the cylinder drives the cylindrical valve back into the position shown in Fig. 1, after which the compressed air in the enlargement 19 and passage 18 is exhausted through the groove 33, passages 50 51, and groove 36 into the groove 38 and out through the hole 15. This cycle of operations is then repeated indefinitely and will keep on automatically until the supply of air is cut off from the passage *c*.

Of course it is obvious that various other forms of tools may be used instead of the rivet-set 21. It is also obvious that various changes in the details may be made without departing from the spirit of my invention, and I wish it to be distinctly understood that I do not limit myself to the exact details shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a pneumatic hammer, the combination of a handle provided with a cylindrical portion having an internal screw-thread and a larger portion having an internal screw-



thread of the opposite pitch, with a cylinder having a screw-threaded end adapted to engage the smaller screw-thread in the handle, and a nut adapted to engage the larger screw-thread in the handle.

2. In a pneumatic hammer, the combination of a handle provided with a cylindrical portion having an internal right-handed screw-thread and a larger internal left-handed screw-thread, of a cylinder having an enlarged end provided with a right-handed screw-thread and a circular nut having a left-handed screw-thread adapted to engage with the left-handed screw-threads in the handle.

3. In a pneumatic hammer, the combination of a handle provided with a cylindrical portion having internal right-handed screw-threads and a larger portion having internal left-handed screw-threads, with a cylinder having an enlarged end forming a shoulder, said end being provided with right-handed screw-threads, and a circular nut surrounding said cylinder and provided with left-handed threads, said nut screwing into the left-handed screw-threads on said handle and abutting against the shoulder on said cylinder, and means for preventing the rotation of said nut.

4. In a pneumatic hammer, the combination of a handle, a cylinder screwed therein, a circular nut screwed into said handle to prevent disengagement of said cylinder and said handle, said nut being provided with internal teeth at one end, and means engaging said teeth to prevent the rotation of said nut.

5. In a pneumatic hammer, the combination of a handle, a cylinder and a circular nut holding said handle and cylinder together, said nut being provided with internal teeth at one end, and a toothed dog located in a slot in said cylinder and engaging said nut.

6. In a pneumatic hammer, the combination of a handle, a cylinder and a circular nut holding said handle and cylinder together, said nut being provided with internal teeth at one end, with a spring-operated toothed dog located in a slot in said cylinder and engaging said nut.

7. In a pneumatic hammer, the combination of a handle provided with a cylindrical portion having an internal screw-thread, a cylinder screwed therein, a circular nut engaging said handle and said cylinder, said nut being provided with internal teeth at one end with a toothed dog located in a slot in said cylinder and engaging said nut, and a spring for normally holding said dog and said nut in engagement, said dog being provided with pins.

8. In a pneumatic hammer, the combination of a handle, a cylinder provided with a shoulder and screw-threaded into said handle and a circular nut confining said handle and said cylinder together, said nut being provided with internal teeth at one end, with a toothed dog adapted to normally engage

said nut and prevent its rotation, and means whereby said dog may be held out of contact with said nut.

9. In a pneumatic hammer, the combination of a handle, a cylinder and a nut confining said handle and cylinder together, said nut being provided with internal teeth at one end, and said cylinder being provided with a cylindrical slot, a larger circular slot, and smaller vertical slots, with a toothed dog provided with pins located in said cylindrical slot, and a spring engaging said dog and tending to force it into engagement with said nut.

10. In a pneumatic hammer, the combination of a cylinder and a sliding valve therefor, said valve being moved in one direction by the jar of the hammer when it is operated, and in the other direction by the compression of the air in said cylinder consequent upon the return stroke of the piston.

11. In a pneumatic hammer, the combination of a cylinder, a sliding cylindrical valve located at one end of said cylinder, said valve being provided with ports and a piston, the ports being so arranged that the valve is moved in one direction by the jar of the hammer in its operation, and in the opposite direction by the compression of the air incident to the return stroke of the piston.

12. In a pneumatic hammer, the combination of a cylinder open at both ends, a tool closing one end of said cylinder and a handle closing the other end, the bore of said cylinder having an enlargement at one end, a sliding cylindrical valve located in said enlargement and a piston in said cylinder, the parts being so arranged that the valve is slid in one direction by the impact of said piston upon said tool, and whereby the valve is slid in the other direction by the return stroke of the piston.

13. In a pneumatic hammer, the combination of a cylinder the bore thereof having an enlargement at one end, said cylinder being provided with air-passages, a sliding cylindrical valve provided with ports located in said enlargement and a piston in said cylinder, the air-passages, ports and cut-away portions of said valve and cylinder being so arranged that the valve is moved in one direction by the jar of the hammer as it is operated, and moved in the other direction by the compression of the air incident to the return stroke of the piston.

14. In a pneumatic hammer, the combination of a cylinder, a piston therein and means for supplying a motor fluid thereto to move said piston back and forth, including a sliding cylindrical valve provided with ports located in said cylinder, said cylinder being provided with an opening running from the bore thereof to the outer air and located near one end thereof, whereby the pressure of the motor fluid upon the piston will be considerably diminished just before the piston strikes the tool.



15. In a pneumatic hammer, the combination of a cylinder provided with air-passages and a stepped cylindrical bore, a piston in said cylinder and a sliding stepped cylindrical valve located in one end of said cylinder, said valve being provided with air openings and ports, and the parts being so arranged that the valve is moved in one direction by the impact when the hammer is in operation, and is moved in the other direction by the compression of the air in the bore of the said cylinder caused by the return stroke of said piston.

16. In a pneumatic hammer, the combination of a handle, a cylinder secured thereto, a piston and a valve located in said cylinder, of an air-passage in said handle, a valve normally closing said air-passage, and means for positively locking said valve in said closed position.

17. In a pneumatic hammer, the combination of a handle provided with an air-passage, a cylinder secured to said handle provided with air-passages, a piston in said cylinder, a heavy cylindrical valve provided with air-ports in said cylinder, a valve for cutting off the air in the air-passage of said handle, means for positively locking said valve in its closed position, and means for releasing said valve from its locked position.

18. In a pneumatic hammer, the combination of a handle provided with an air-passage, a cylinder provided with air-passages secured to said handle, a valve provided with air-ports located in said cylinder, a piston in said cylinder, a valve normally closing the air-passage in said handle, means for positively locking said valve in its closed position, and means operable by the hand of the workman for releasing and operating said valve.

19. In a pneumatic hammer, the combination of a handle provided with an air-passage, a cylinder provided with air-passages, a valve provided with air-ports in said cylinder, a piston in said cylinder, a tool mounted at one end of said cylinder, a valve controlling the air-passage in said handle, and means for normally holding said valve positively locked.

20. In a pneumatic hammer, the combination of a handle provided with an air-passage, a cylinder, a valve and piston therein, a tool at one end of said cylinder, a valve for normally closing the air-passage in said handle, means for positively locking said valve in its closed position, and means operable by the workman for releasing and opening said valve.

21. In a pneumatic hammer, the combination of a handle provided with an air-passage, a cylinder provided with air-passages secured to said handle, a valve provided with air-ports located in said cylinder, a piston in said cylinder, a valve for normally closing the valve-passage in said handle, means for normally holding said valve locked in its closed

position, and a pivoted lever for operating said valve.

22. In a pneumatic hammer, the combination of a handle provided with an air-passage, a cylinder provided with air-passages secured in said handle, a nut securing said cylinder and said handle together, a valve provided with air-ports located in said cylinder, a piston in said cylinder, a valve normally closing the air-passage in said handle, means for positively locking said valve in its closed position and means operable by the workman for opening said valve.

23. In a pneumatic hammer, the combination of a cylinder provided with air-passages, a piston in said cylinder, a tool, and a valve for regulating the action of the motor fluid, said cylinder being provided near the front end with an exit opening or port, whereby the pressure behind the piston is considerably diminished just before said piston strikes said tool.

24. In a pneumatic hammer, the combination of a cylinder provided with a screw-threaded head and with air-passages, a piston in said cylinder, a handle screwed upon said cylinder, a tool, and a valve for regulating the action of a motor fluid, said cylinder being provided near the front end with an exit opening or port, whereby the pressure behind the piston is considerably diminished just before it strikes said tool.

25. In a pneumatic hammer, the combination of a handle secured to said cylinder, said handle being provided with an inlet air-passage, a sliding stepped valve and a piston in said cylinder, a valve for controlling the passage of the air in the air-passage in said handle, means for normally holding said valve locked, and means for unlocking and opening said valve.

26. In a pneumatic hammer, the combination of a cylinder having a bore enlarged at each end, a tool in one end of said cylinder and a valve in the other end of said cylinder, said cylinder and valve being provided with air-passages, a piston in said cylinder, a handle provided with an air-passage, a valve for opening and closing the air-passage in said handle, and means for securing said handle and cylinder together.

27. In a pneumatic hammer, the combination of a cylinder provided with a bore enlarged at both ends with air-passages and an exit-opening near one end, a tool located in one end of said cylinder, a cylindrical valve provided with air-ports and located in the other end of said cylinder, a piston in said cylinder, and means for admitting air to said cylinder, and for cutting it off as desired.

28. In a pneumatic hammer, the combination of a cylinder having a bore enlarged at each end, a sleeve in one end of said cylinder and a cylindrical valve in the other end of said cylinder, said cylinder and valve be-



ing provided with air passages and ports, a piston in said cylinder, a tool in said sleeve, a handle provided with an air-passage, and a valve for normally closing the air-passage in said handle.

29. In a pneumatic hammer, the combination of a cylinder having an enlargement at each end, a tool in one end of said cylinder, a sliding cylindrical valve provided with air ports and passages located in the other end of said cylinder, said cylinder being provided with air-ports and vent-openings and one of said passages being nearly the whole length of said cylinder, a handle secured upon said cylinder and provided with an air-passage, a valve for governing said air-passage, means for normally holding said valve locked, and means for unlocking and opening said valve.

30. In a pneumatic hammer, the combination of a cylinder provided with an enlarged screw-threaded end, a screw-threaded handle engaging said end, a circular nut screwed into said handle and serving to aid in holding said handle and cylinder together, a washer provided with a projecting portion of the same size as the main bore of the piston, said cylinder being provided with a bore enlarged at each end, and a sliding cylindrical valve located in the enlargement at one end of said cylinder, part of said valve surrounding the extension of said washer.

31. In a pneumatic hammer, the combination of a handle provided with an air-passage, a cylinder provided with air-passages secured thereto, a circular nut surrounding said cylinder and screwed into said handle, said cylinder having a bore enlarged at each end, a stepped cylindrical valve provided with air ports and passages located in one end of said cylinder, and a piston in said cylinder.

32. In a pneumatic hammer, the combination of a cylinder provided with a sleeve at one end, a tool in said sleeve, a piston in said cylinder, a valve in one end of said cylinder, said cylinder-valve being provided with air ports and passages, a handle secured to said cylinder and provided with an air-passage, a valve for controlling said air-passage, means for normally holding said valve locked, and means for unlocking and opening said valve.

33. In a pneumatic hammer, the combination with a cylinder and a tool, a piston and a valve in said cylinder, of a handle provided with an air-passage secured to said cylinder, a perforated cylindrical screw-threaded plug passing through said air-passage, a valve working in said plug, means for normally holding said valve locked, means for unlocking said valve, and a pivoted lever for moving said valve after it has been unlocked.

34. In a pneumatic hammer, the combination of a cylinder, a tool, a piston and a valve in said cylinder with a handle secured to said cylinder and provided with an air-passage, a perforated cylindrical screw-threaded plug passing through said air-passage, a valve

adapted to reciprocate in said plug, a spring in said plug engaging one end of said valve, said valve being provided with a cut-away portion, means engaging said cut-away portion for normally holding said valve locked, means for unlocking said valve, and a lever pivoted in said handle for operating said valve.

35. In a pneumatic hammer, the combination with a cylinder and a tool, a piston and a valve located in said cylinder, of a handle provided with an air-passage secured to said cylinder, said handle being also provided with a valve-passage and a plunger-passage, a perforated cylindrical screw-plug crossing the air-passage in said handle, a valve provided with a cut-away portion adapted to reciprocate in said valve-passage and plug, a plunger adapted to engage said cut-away portion to normally lock said valve, a stem and finger-piece secured to said plunger, and a pivoted lever for operating said valve.

36. In a pneumatic hammer, the combination of a cylinder and a tool, a piston and a valve located in said cylinder with a handle secured to said cylinder and provided with an air-passage, a valve-passage and a plunger-passage, a perforated cylindrical screw-plug crossing said air-passage, a spring in said plug, a valve provided with a cut-away portion adapted to reciprocate in said valve-passage and plug, a plunger adapted to engage the cut-away portion in said valve, a spring acting to force said plunger into said cut-away portion, a finger-piece and stem connected to said plunger, and a lever pivoted in said handle and engaging one end of said valve.

37. In a pneumatic hammer, the combination of a cylinder provided with air-passages and with a bore having enlargements at each end, a tool located in one of said enlargements, a piston located in said cylinder and a sliding cylindrical valve provided with air-ports located in the other end of said cylinder, a handle screwed upon said cylinder, a nut for securing said handle and said cylinder together, said handle being provided with an air-passage, a valve-passage, a plunger-passage and a slot, a cylindrical perforated screw-threaded plug crossing said air-passage, a valve provided with a cut-away portion adapted to be reciprocated in said plug and said valve-passage, a spring engaging one end of said plug, a plunger operating in said plunger-passage, a finger-piece and stem connected to said plunger, a spring engaging one end of said plunger, and an operating-lever pivoted in said slot.

38. In a pneumatic hammer, the combination of a cylinder, a tool, piston and valve in said cylinder with a handle secured to said cylinder, a circular nut surrounding said cylinder and screwed into said handle, means for preventing the rotation of said nut the handle being provided with an air-passage, a valve-passage, a plunger-passage and a slot,



a perforated cylindrical screw-threaded plug crossing said air-passage, a spring in said plug, a valve provided with a cut-away portion, a spring-operated plunger adapted to engage the cut-away portion in said valve, and a lever pivoted in said slot and engaging one end of said valve.

39. In a pneumatic hammer, the combination of a cylinder having a bore enlarged at each end, a tool in one end of said cylinder and a sliding cylindrical valve in the other end of said cylinder, a piston in said cylinder, said valve and cylinder being provided with air ports and passages and said cylinder having an enlarged screw-threaded end with a handle screwed upon said cylinder, a nut surrounding said cylinder and screwed into said handle, said nut having teeth at one end, a toothed dog engaging said teeth, said handle being provided with an air-passage, a valve-passage, a plunger-passage and a slot, a perforated cylindrical screw-threaded plug in said air-passage, a spring in said plug, a valve having a cut-away portion, a spring-operated plunger for engaging the cut-away portion of said valve, a stem and finger-piece secured to said plunger, and a lever pivoted in the slot in said handle.

40. In a pneumatic hammer, the combination of a cylinder having a bore enlarged at each end, a tool in one end of said cylinder and a cylindrical valve in the other end of said cylinder, a piston in said cylinder, said cylinder and valve being provided with air ports and passages, and said cylinder being provided with enlarged screw-threaded ends with a handle screwed to said cylinder, a circular nut having teeth at one end screwed into said handle, a toothed dog located in the slot in said cylinder, and a spring adapted to force said dog into engagement with the teeth on said nut, said handle being provided with an air-passage.

41. In a pneumatic hammer, the combination of a cylinder, a piston, a valve, a handle screwed upon said cylinder, a nut screwed into said handle, said nut being provided with teeth at one end, a dog provided with teeth and with pins located in a slot in said cylinder, a spring engaging said dog, said handle being provided with an air-passage, a valve-passage, a plunger-passage and a slot, a screw-threaded perforated plug crossing said air-passage, a spring in said plug, a valve provided with a cut-away portion, a plunger adapted to engage said portion, a spring engaging one end of said plunger, a finger-piece and stem attached to said plunger, and a lever pivoted in the slot in said handle.

42. In a pneumatic hammer, the combination of a cylinder having an enlargement on each end, a tool in one end of said cylinder, a stepped cylindrical valve in the other end of said cylinder, a piston in said cylinder, said cylinder and valve being provided with air ports and passages, and said cylinder be-

ing provided with an enlarged screw-threaded end, a handle screwed upon said cylinder, a circular nut screwed into said handle and provided with teeth at one end, a dog provided with teeth and pins located in a slot in said cylinder, and a spring engaging said dog, said handle being provided with an air-passage.

43. In a pneumatic hammer, the combination of a cylinder provided with an internal bore having enlargements at each end, a tool in one end of said cylinder, a sliding cylindrical valve in the other end of said cylinder, a piston in said cylinder, said cylinder and valve being provided with air ports and passages, and a handle secured to said cylinder, said handle being provided with an air-passage.

44. In a pneumatic hammer, the combination of a cylinder open at both ends and having a bore enlarged at each end, a tool in one end of said cylinder, a sliding cylindrical valve in the other end of said cylinder, a piston in said cylinder, a washer closing one end of said cylinder, a handle encircling said washer at one end of said cylinder, a nut screwed into said handle, means for preventing the rotation of said nut, said handle being provided with an air-passage, a valve-passage, a plunger-passage and a slot, a perforated cylindrical screw-threaded plug located in said air-passage, a spring in said plug, a valve having a cut-away portion, a spring-operated plunger adapted to engage said cut-away portion, a finger-piece and stem secured to said plunger, and a valve pivoted in said slot.

45. In a pneumatic hammer, the combination of a cylinder open at each end and provided with an internal bore enlarged at each end, a tool in one end of said cylinder, a sliding cylindrical valve in the other end of said cylinder, a piston in said cylinder, a washer closing one end of said cylinder, a handle secured to said cylinder, a nut screwed into said handle, and means for preventing the rotation of said nut, said handle being provided with an air-passage.

46. In a pneumatic hammer, the combination of a cylinder open at each end and provided with a cylindrical bore enlarged at each end, a tool in one end of said cylinder, a sliding cylindrical valve in the other end of said cylinder, said valve and cylinder being provided with air ports and passages, and said cylinder being provided with an enlarged screw-threaded head, of a perforated washer closing one end of said cylinder, a handle screwed over said washer upon the enlarged end of said cylinder, a nut screwed into said handle, and means for preventing the rotation of said nut, said handle being provided with an air-passage.

47. In a pneumatic hammer, the combination of a cylinder open at both ends and having a central bore enlarged at both ends, a



shell in one end of said cylinder, a sliding  
cylindrical valve in the other end of said cyl-  
inder, a passage in said cylinder, said cylin-  
der and valve being provided with air pas-  
sages and ports and said cylinder being also  
5 provided with an enlarged screw-threaded  
end, a handle screwed upon said cylinder, a  
nut screwed into said handle and having  
teeth at one end, a toothed dog engaging said  
10 nut, a spring engaging said dog, a perforated

washer between said handle and said cylin-  
der, said handle being provided with an air-  
passage, and a valve.

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

CHARLES H. HAESELER.

Witnesses:

GLENN B. HARRIS,

T. W. WATSON.