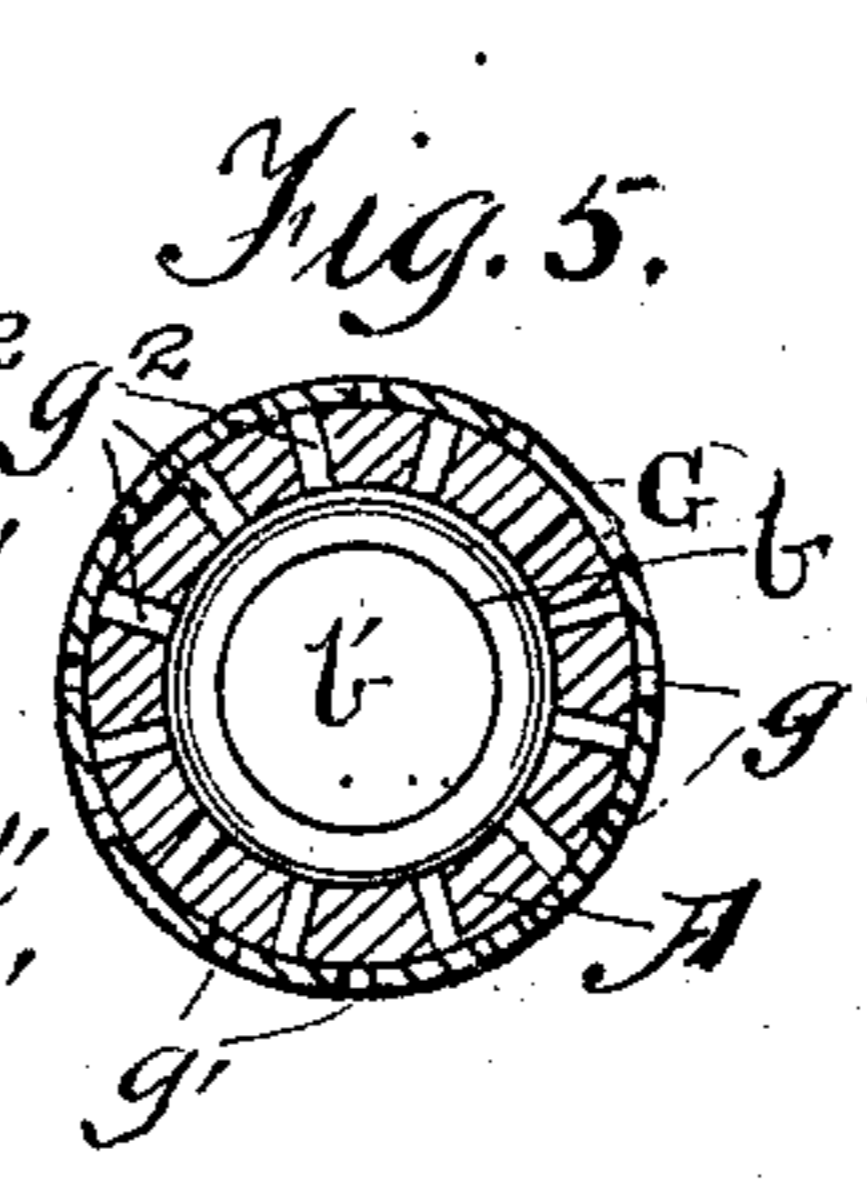
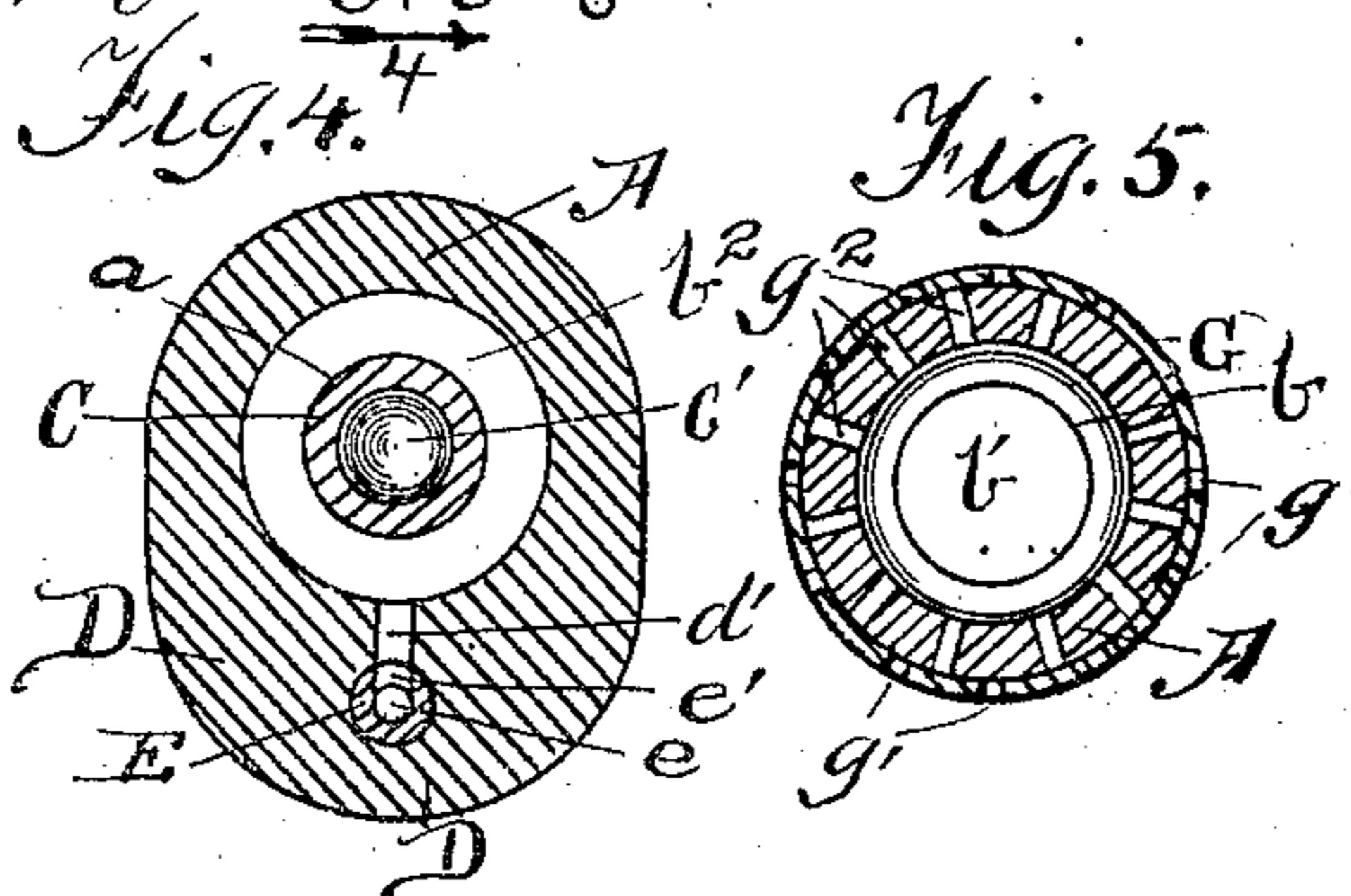
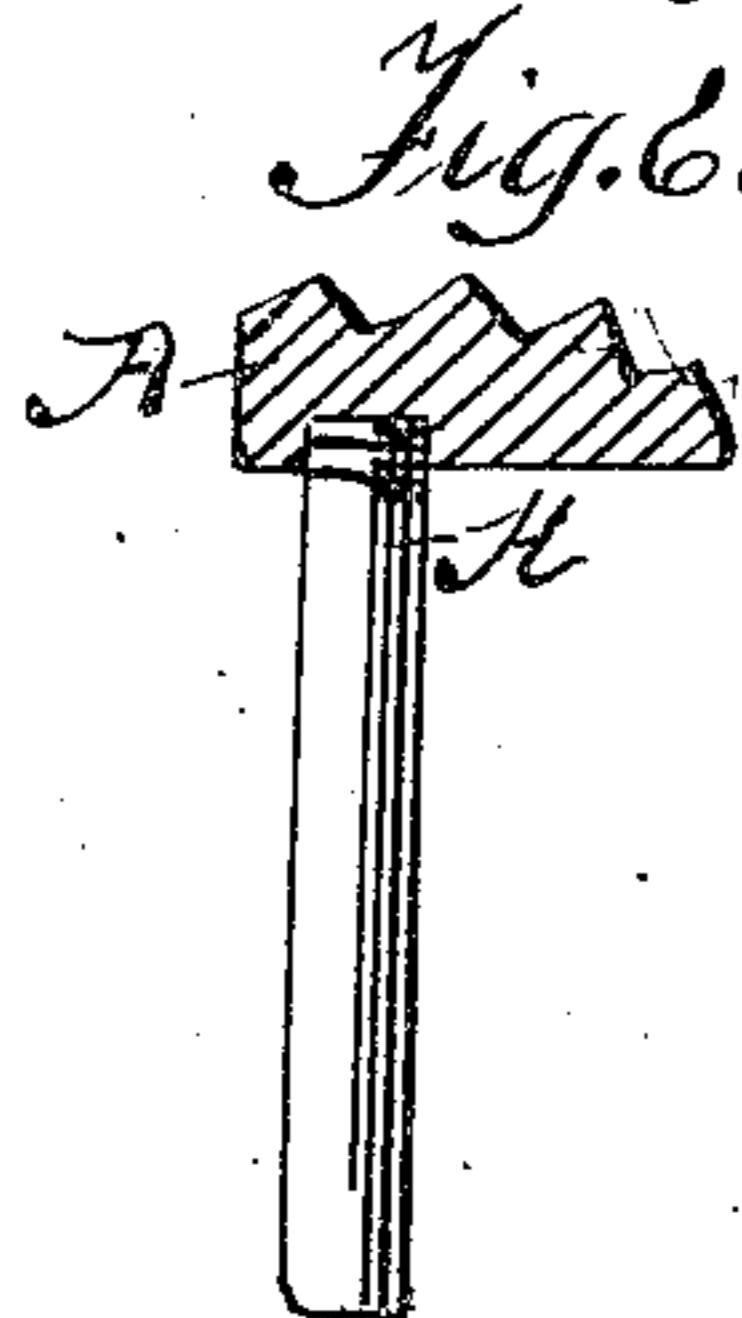
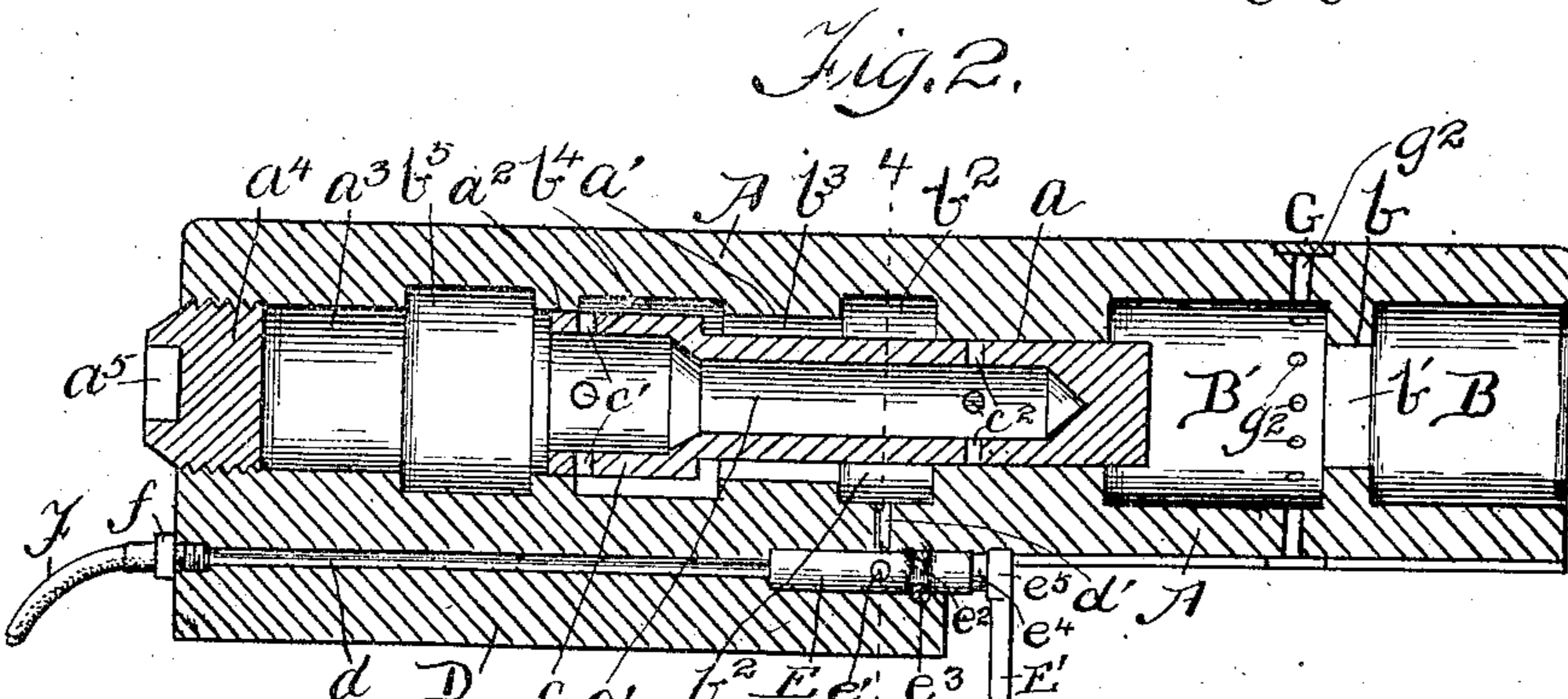
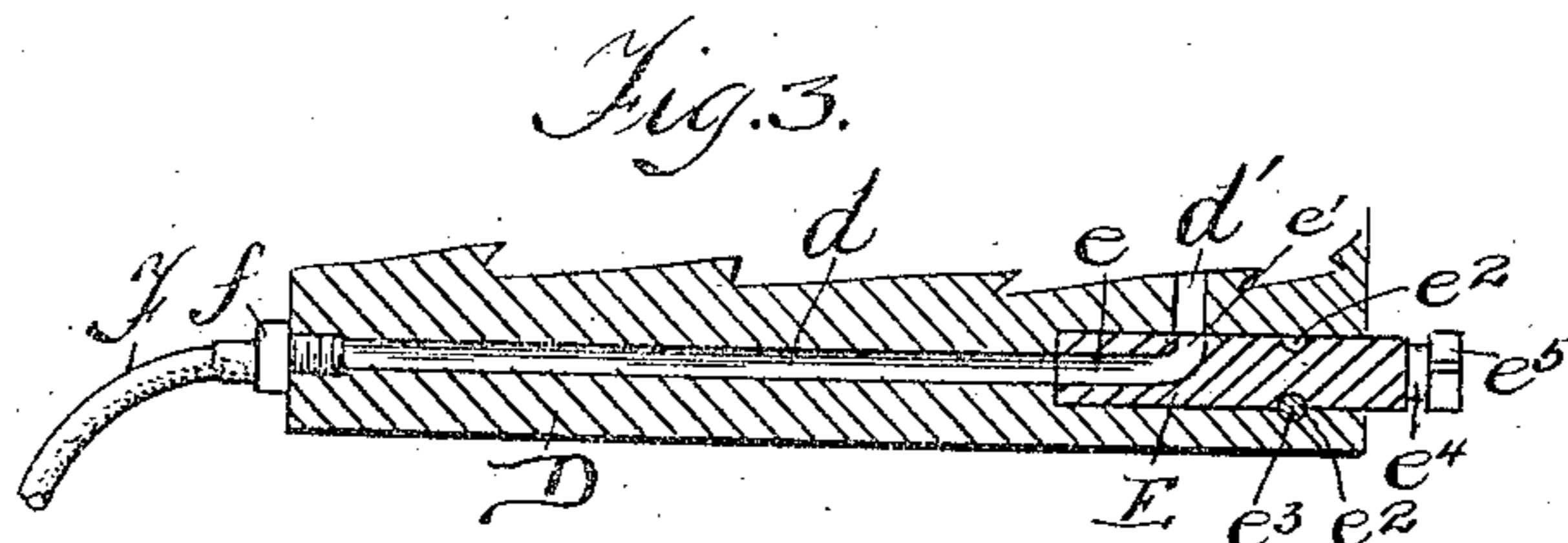
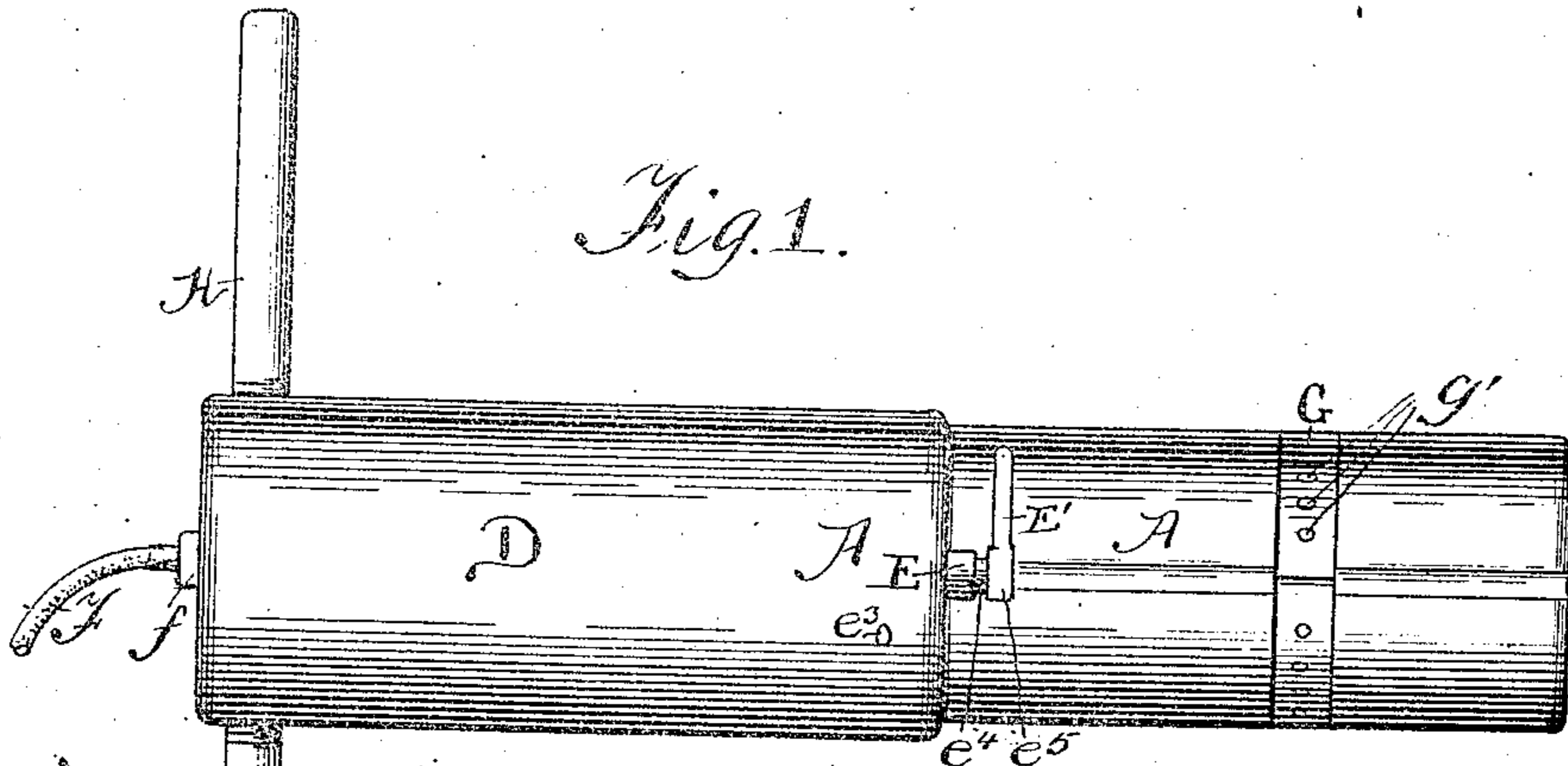


No. 819,425.

PATENTED MAY 1, 1906.

M. HARDSOEG.  
PNEUMATIC HAMMER.  
APPLICATION FILED JULY 29, 1904.



Witnesses:  
Wm. P. Bond  
Walter Banning

Inventor:  
Martin Hardsocg  
By Danning & Danning  
Attys.

# UNITED STATES PATENT OFFICE.

MARTIN HARDSOCC, OF OTTUMWA, IOWA.

## PNEUMATIC HAMMER.

No. 819,425.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed July 29, 1904. Serial No. 218,634.

*To all whom it may concern:*

Be it known that I, MARTIN HARDSOCC, a citizen of the United States, residing at Ottumwa, in the county of Wapello, and State of Iowa, have invented certain new and useful Improvements in Pneumatic Hammers, of which the following is a specification.

This invention relates more particularly to pneumatic hammers designed or intended for use with drills or drilling-tools; but the improvement can be used with hammers for other purposes than drilling and with other tools than drills.

The objects of the invention are to give the operator a more perfect and reliable control of the fluid-pressure to the frame or cylinder in actuating the hammer; to enable the operator to control the position of the cylinder or frame with one hand and control the admission of the fluid with the other hand, thus enabling both hands to be utilized independent of each other in operating the hammer; to enable the exhaust to be discharged through the body of the frame or cylinder or the discharge to be shut off, as may be desired, and to improve generally the several elements which enter into the construction and operation of the pneumatic hammer as a whole.

The invention consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawings, Figure 1 is a top or plan view of the pneumatic hammer of the invention. Fig. 2 is a horizontal section on line 2 of Fig. 1 looking in the direction of the arrow; Fig. 3, a detail in section showing the controlling-valve for the pressure turned to admit pressure to the interior of the frame or cylinder, Fig. 2 showing the controlling-valve in position to shut off the admission of pressure to the main frame or cylinder; Fig. 4, a cross-section on line 4 of Fig. 2 looking in the direction of the arrow with the handle removed; Fig. 5, a cross-section on line 5 of Fig. 2 looking in the direction of the arrow; and Fig. 6 a detail showing the manner of securing the handle to the main frame or cylinder.

The main frame or cylinder A can be made of steel or other suitable metal and preferably circular in cross-section and of a length and interior diameter to suit the requirements of the hammer. The forward or inner end of the main frame or cylinder A has therein a socket or hole B to receive the chuck or head for the drill or tool, and at the rear of the

socket or chamber B is a chamber B' for the movements of the hammer, the chambers B and B' having between them a wall or flange b integral with the frame or cylinder A and having therein a hole b' for the passage of the acting end of the hammer to strike the chuck holding the drill or other tool. At the outer terminus of the chamber B' is a ledge or flange a, forming a guide or support for the body of the hammer, and adjacent to the ledge or flange a in the face of the main frame or cylinder A is a circumferential chamber or channel b<sup>2</sup>, leading from which is a circumferential passage b<sup>3</sup> in a ledge or flange a', forming a guide for the head of the hammer, and this passage b<sup>3</sup> communicates with a circumferential chamber or channel b<sup>4</sup>, surrounding the head of the hammer when in normal position. At the outer terminus of the channel or chamber b<sup>4</sup> on the interior of the main frame or cylinder A is a wall or flange a<sup>2</sup>, having therein a hole which receives the head of the hammer when in normal position, and adjacent to this wall or flange a<sup>2</sup> in the interior of the main frame or cylinder A is a chamber b<sup>5</sup>, leading from which to the outer end of the main frame or cylinder A is a passage a<sup>3</sup>, closed by a plug a<sup>4</sup>, which plug, as shown, has therein a recess a<sup>5</sup> for the end of a wrench or other tool by means of which the plug can be inserted and withdrawn from the passage a<sup>3</sup> to close such passage or open the same to permit the insertion and withdrawal of the hammer.

The hammer can be of any suitable construction adapted to operate in the main frame or cylinder A. The hammer shown has a tubular body C, with a head or enlarged portion c at its outer end, and this hammer is of the type having an interior chamber C', into which pressure enters to drive the hammer forward, the pressure entering through ports or holes c' in the head or enlargement c when the hammer is in normal position and at rest and the pressure discharging through the ports or holes c<sup>2</sup> when the hammer has been projected for the ports or holes c<sup>2</sup> to pass the end face of the ledge or wall a, the driving pressure escaping into the chamber B' when the ports or holes c<sup>2</sup> are unclosed.

The main frame or cylinder A has formed therewith or suitably secured thereto a barrel D, having therein a longitudinal passage d for admitting pressure to the interior of the main frame or cylinder A for actuating the hammer. The forward or inner end of the

barrel D has an enlarged hole or end passage in axial alinement with the passage  $d$ , in which is located a tubular valve or plug E, having therein a passage  $e$  in alinement with the passage  $d$ , and leading out from the passage  $e$ , through the wall of the tubular plug or valve, is a port  $e'$ , which can be brought into communication with or carried out of communication with a passage  $d'$  in the wall of the main frame or cylinder A, which is in communication with the chamber  $b^2$ , so that when communication is established between the port  $e'$  and the passage  $d'$  pressure can flow through the passage  $d$ , passage  $e$ , port  $e'$ , and passage  $d'$  into the chamber  $b^2$  to operate and drive the hammer forward in the usual manner. The body of the tubular plug or valve E has in its exterior a circumferential groove  $e^2$ , which is engaged by a pin  $e^3$ , driven through the wall of the barrel D and serving to hold the tubular plug or valve E against endwise movement and allowing such plug or valve to be axially turned in its chamber to bring its port into and out of communication with the passage  $d'$  for supplying pressure to and shutting off pressure from the chamber of the main frame or cylinder. The forward end of the tubular plug or valve E extends beyond the end of the barrel D, and this end  $e^4$  has secured thereto a socket  $e^5$  of a handle or finger-piece E', by means of which the plug or valve E can be axially turned as required to admit pressure to or shut off pressure from the chamber of the main frame or cylinder. The handle or finger-piece E' can be operated by one hand of the user of the hammer, and it is preferred that the handle or finger-piece E' be so set that when it is in a horizontal or turned-down position on either side the port  $e'$  will be out of communication with the passage  $d'$ , and with the handle or finger-piece the vertical port  $e'$  will be in communication with the passage  $d'$  to admit pressure to the chamber of the main frame or cylinder. This arrangement enables the operator or user by the position of the handle or finger-piece to determine whether pressure is on or off from the hammer; but it will be understood that the handle or finger-piece E' can be otherwise set so long as its position is known when putting on or cutting off the pressure-supply. The rear end of the barrel D has entered therein one section of a coupling  $f$ , the other section of which is attached to a hose F or other conducting means leading from a source of fluid-pressure supply, such as compressed air, for supplying the fluid-pressure to the main frame or cylinder to operate the hammer therein.

The pressure for driving the hammer forward which escapes through the ports or holes  $c^2$  in the chamber B' can be allowed to escape from the chamber through the hole  $b'$  when the hammer is withdrawn, in which case the pressure would escape around the

tool that is being operated. The arrangement shown provides also for escaping the pressure direct from the chamber B' or shutting off such escape of the pressure. The device for attaining this end consists of a split band G, located in a circumferential recess or groove  $g$  in the exterior of the main frame or cylinder. This band is provided with a plurality of holes  $g'$ , which can be brought into alinement with a corresponding number of holes  $g^2$  in the wall of the main frame or cylinder, so that when a hole  $g'$  is in alinement with a hole  $g^2$  the pressure is free to escape through the holes to the exterior of the main frame or cylinder. The turning of the band G in its recess or groove to carry the holes  $g'$  away from the holes  $g^2$  will in such case cause the pressure discharged into the chamber B' not to escape therefrom through the holes  $g'$  and  $g^2$ , but to escape in a forward direction through the hole  $b'$  and pass out at the front end of the main frame or cylinder or out of the tool or instrument used. It will thus be seen that by means of this perforated band G the pressure can be allowed to escape forward or to escape laterally through the wall of the main frame or cylinder, it only being necessary to turn the band and close communication through the holes  $g'$  and  $g^2$  to forwardly escape the air and to turn the band to open communication between the holes  $g'$  and  $g^2$  to laterally escape the air.

The rear or outer end of the main frame or cylinder has secured thereto a handle by means of which the operator or user can guide and direct the main frame or cylinder as required. The handle H shown is in two parts, each part having a thread at one end which enters a threaded hole in the wall of the main frame or cylinder and when entered secures the section or part of the handle to the main frame or cylinder. This arrangement enables the handle to be on opposite sides of the main frame or cylinder or, if so desired for any purpose, one part or section of the handle can be unscrewed and removed, leaving a handle, which is operative for the purpose of holding and guiding the hammer as a whole. This construction of a detachable handle enables the hammer to be used in places where if the handle projected on both sides it would be impossible or inconvenient to use the hammer, as with one part of the handle removed the other part serves as a means to hold the hammer in position without interference from a part of a handle projecting from the opposite side.

In use the operator holds the hammer as a whole by the handle H, leaving the other hand free to manipulate the valve controlling the supply of pressure. The turning of the handle or finger-piece E' into position to open communication between the port  $e'$  and

passage  $d'$  allows fluid-pressure to enter the chamber  $b^2$  for operating the hammer, and such admission of pressure will continue as long as the operator holds the valve E in its communicating position for the port  $e'$  and passage  $d'$ . The cutting off of the supply of pressure is attained by the user or operator turning the finger-piece to a lateral or horizontal position, and when the finger-piece is in this position the user or operator knows that the supply is cut off; but of course the cut off of the supply might be indicated with the handle or finger-piece H in a vertical or outstanding position, and the fact of having the supply on could be indicated by having the handle or finger-piece in a flat or lateral position so long as the user or operator understood in which position the supply was on and the supply was off. The valve E is under perfect control of the hand of the operator, and the location of this controlling-valve is convenient, as its position is such as to enable the hand of the operator to readily and quickly operate the lever or finger-piece of the valve without any inconvenience or trouble from the main frame or cylinder or otherwise. The user or operator can by adjusting the band G either direct a discharge of pressure forwardly or laterally, according as to whether the ports or holes  $g'$  and  $g^2$  are in line or out of line, thus enabling the discharge of the pressure to be controlled by the user or operator by simply changing the position of the band so as to bring the holes  $g'$  and  $g^2$  into or out of alinement. The detachable parts or sections of the handle furnish a means by which the main frame or cylinder can be supported on two sides or held only on one side, thus enabling the hammer to be used in places where a handle projecting on both sides would be inconvenient for use.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a pneumatic hammer, the combination of a main cylinder provided with a pressure-passage leading to its interior, a barrel on the main frame or cylinder forming a shoulder at its forward end, and provided on its interior with a longitudinally-extending pressure-passage, a valve-plug outwardly projecting from the forward end of the barrel, a handle for operating the valve, and a reciprocating hammer within the main frame or cylinder adapted to be operated by the pressure admitted by the valve, substantially as described.

2. In a pneumatic hammer, the combination of a main frame or cylinder and forming a shoulder in combination therewith, and provided on its interior with a pressure-supply passage adapted to communicate with a pressure-supply passage leading to the interior of the main frame or cylinder, a valve-plug entered through the shoulder or abutment, and provided with a bore communicat-

ing with the longitudinally-extending passage, and further provided with an opening adapted to communicate with the passage leading to the interior of the cylinder, a handle on the forward end of the valve-plug for turning the same, and a hammer within the main frame or cylinder adapted to be reciprocated by the pressure admitted through the valve-plug, substantially as described.

3. In a pneumatic hammer, the combination of a main frame or cylinder and forming a shoulder in combination therewith, and provided on its interior with a longitudinally-extending pressure-supply passage adapted to communicate with a pressure-supply passage leading to the interior of the main frame or cylinder, a valve-plug entered through the shoulder or abutment, and provided with a bore communicating with the longitudinally-extending passage, and further provided with an opening adapted to communicate with a passage leading to the interior of the cylinder, a handle on the forward end of the valve-plug for turning the same, a hammer within the main frame or cylinder adapted to be reciprocated by the pressure admitted through the valve-plug, and handles outwardly projecting from the main frame or cylinder near the rear end thereof, substantially as described.

4. In a pneumatic hammer, the combination of a main frame or cylinder, having a transversely-extending passage leading to its interior, and having on one side a thickened portion or barrel forming a shoulder or abutment in combination with the main frame or cylinder, said bore having therein a longitudinally-extending pressure-passage enlarged at its forward end to form a valve-socket, a valve-plug entered into the enlarged portion and forwardly projecting from the shoulder or abutment, and provided on its interior with a longitudinally-extending bore communicating with the longitudinally-extending passage, and further provided with a transversely-extending port adapted to communicate with the transversely-extending passage leading to the interior of the frame or cylinder, and provided on its exterior with a circular curve or recess, a pin passing through the barrel and projecting into the recess to retain the valve-plug in place, a handle at the forward end of the valve-plug for turning same, and a hammer within the main frame or cylinder adapted to be reciprocated by the pressure admitted to the main frame or cylinder, substantially as described.

5. In a pneumatic hammer, the combination of a main frame or cylinder, having a transversely-extending passage leading to its interior, and having on one side a thickened portion or barrel forming a shoulder or abutment in combination with the main frame or cylinder, said bore having therein a longitu-

dinally-extending pressure-passage enlarged at its forward end to form a valve-socket, a valve-plug entered into the enlarged portion and forwardly projecting from the shoulder or abutment, and provided on its interior with a longitudinally-extending bore communicating with the longitudinally-extending passage, and further provided with a transversely-extending port adapted to communicate with the transversely-extending passage leading to the interior of the frame or cylinder, and provided on its exterior with a circular curve or recess, a pin passing through

the barrel and projecting into the recess to retain the valve-plug in place, a handle at the forward end of the valve-plug for turning same, and a hammer within the main frame or cylinder adapted to be reciprocated by the pressure admitted to the main frame or cylinder, and handles outwardly projecting on opposite sides of the main frame or cylinder near its rear end, substantially as described.

MARTIN HARDSOOG.

Witnesses:

EMMET A. WORK,  
BEN M. WORK.