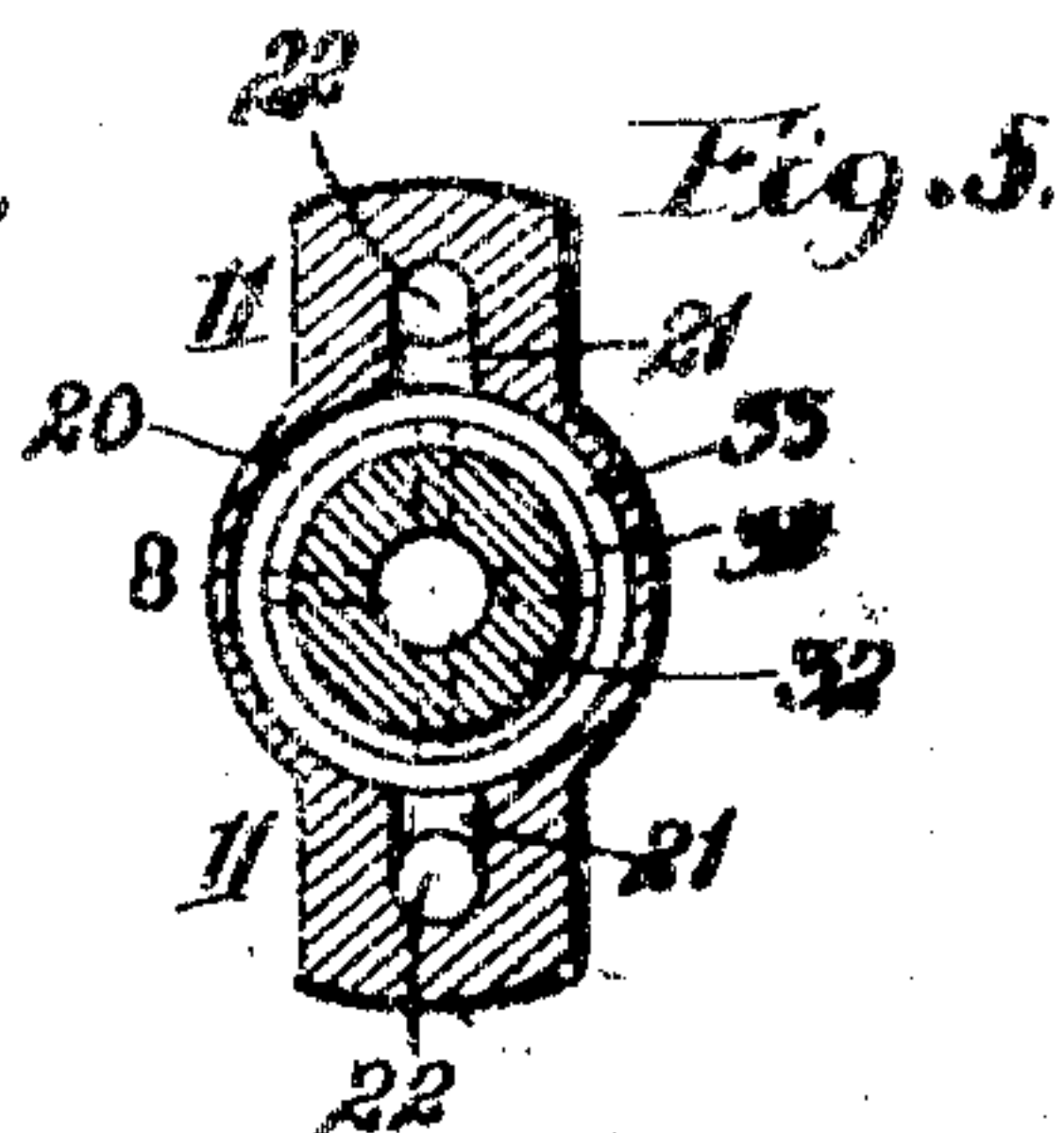
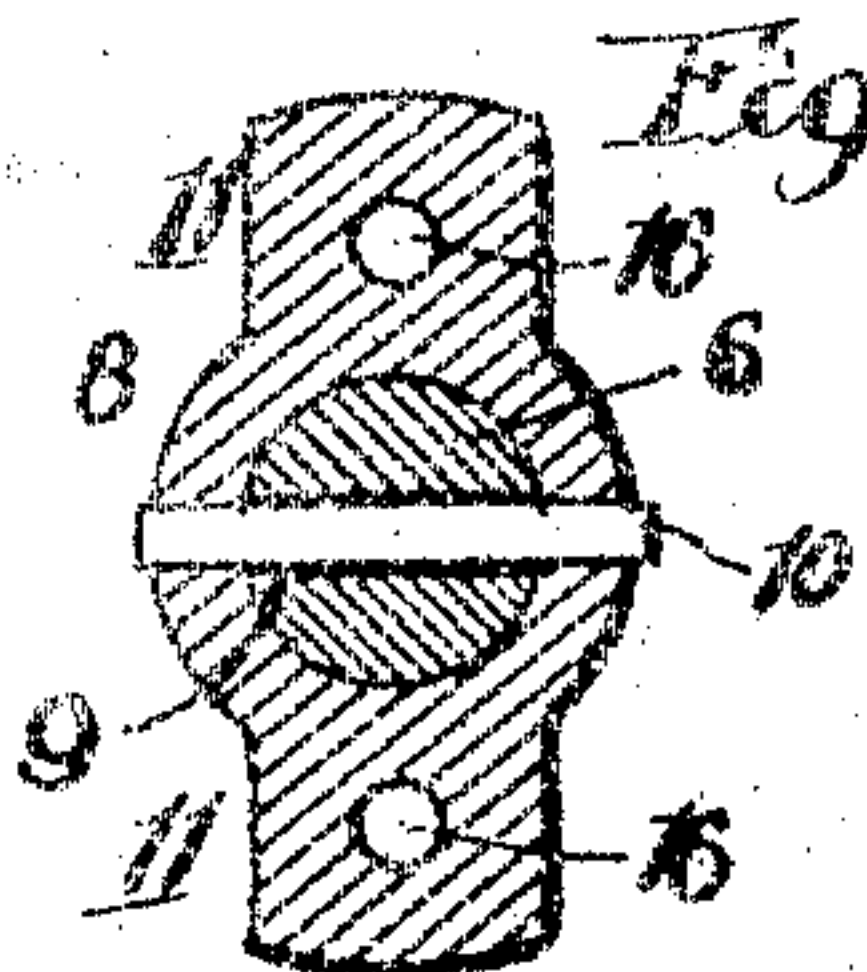
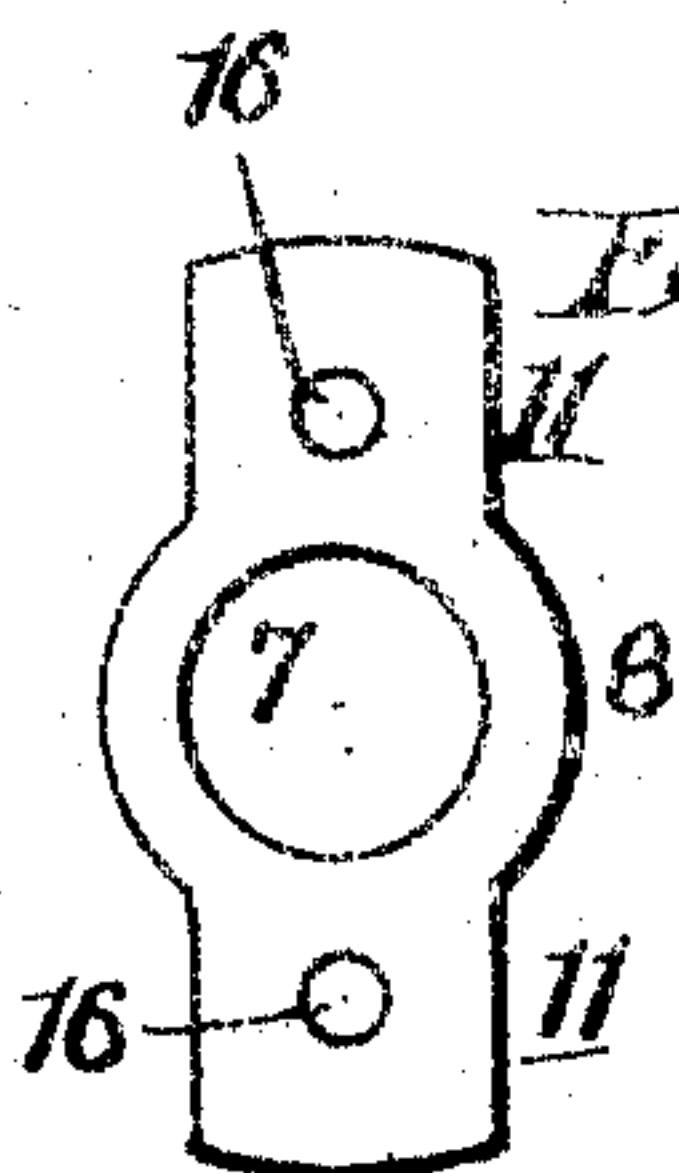
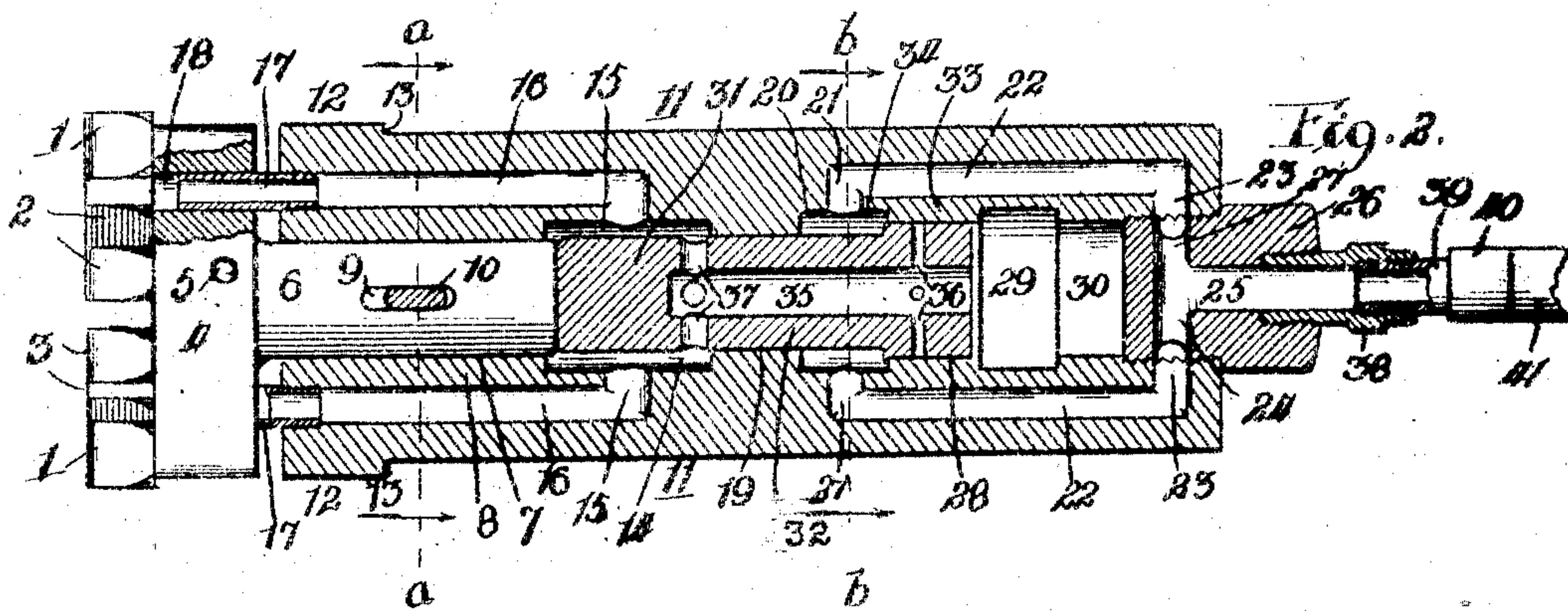
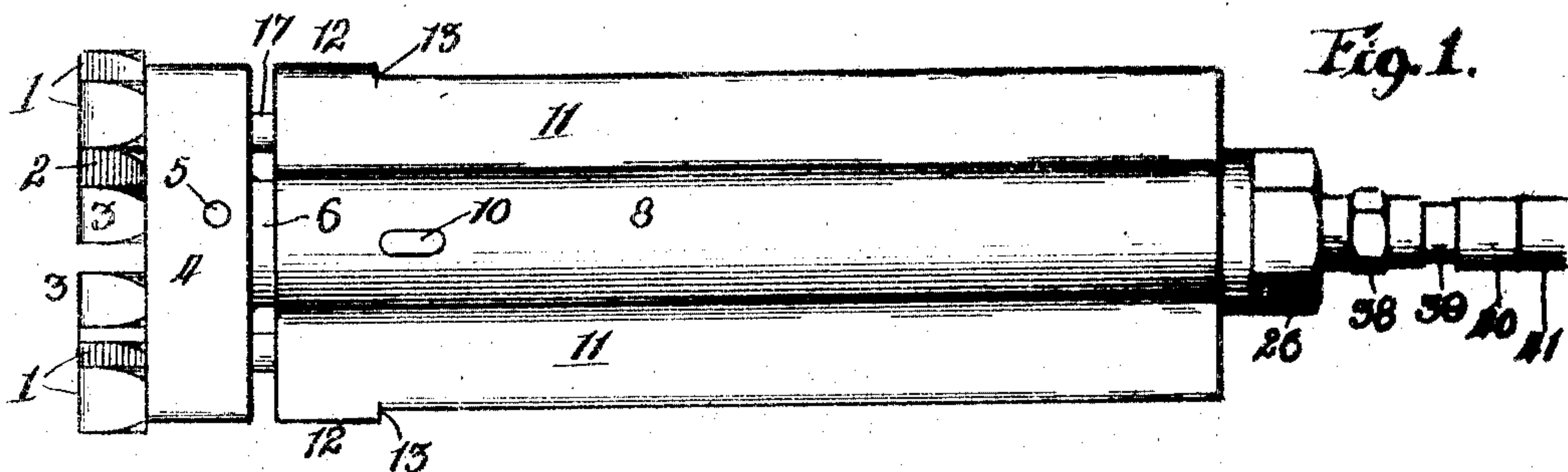


No. 873,938.

PATENTED DEC. 17, 1907.

M. HARDSOG.  
PNEUMATIC HAMMER.  
APPLICATION FILED MAR. 7, 1907.



Witnesses

Wm. P. Bond

Charles Beckman

Inventor:

Martin Hardsog  
by *[Signature]*  
Attys



# UNITED STATES PATENT OFFICE.

MARTIN HARDSOCC, OF OTTUMWA, IOWA.

## PNEUMATIC HAMMER

No. 873,938.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed March 7, 1907. Serial No. 361,052.

*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.

The present invention relates more particularly to the construction and arrangement of the frame and the head carrying the operating tool, such as the bits or cutters of a pneumatic drill.

The objects of the invention are to improve the construction of the frame of a pneumatic hammer, so as to enable air, or other medium under pressure, to act and operate the hammer and to be discharged at the bits or cutters, so as to remove dust and fine particles; to construct the frame so as to provide a barrel with a chamber for the hammer and for the shank of the tool head, and having passages for admitting air, or other medium under pressure, to reciprocate the hammer and to be discharged at the bits or cutters of the tool head; to construct a frame having a central barrel with a hammer therein, and having on opposite sides of the barrel, flanges with passages and ports for admitting compressed air, or other medium under pressure, to the chamber and discharging the air, or other medium under pressure, at the bits or cutters; to furnish the frame with a central chamber and with side passages and ports for admitting and discharging compressed air, or other medium under pressure, into and from the chamber; to furnish a frame having a central chamber with induction and eduction passages therefor, and a plug having an induction passage, in communication with the induction passages of the frame, and closing the end of the chamber, for admitting compressed air or other pressure to the chamber; to furnish a connection between the discharge or eduction passages of the frame and the tool head for discharging compressed air or other medium under pressure at the bits or cutters; to furnish passages around the barrel of the frame, for removing the dust and fine particles produced by the cutting action of the bits or cutters; and to improve generally the construction and operation of the frame and the correlated parts entering into the formation of the tool as a whole.

The invention consists in the features of

construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of the frame, showing the supply pipe for compressed air or other medium or pressure broken off, and showing a drill head with bits or cutters connected with the frame; Fig. 2 a longitudinal section of the frame shown in Fig. 1, with the drill head partly in section; Fig. 3 an end elevation of the frame; Fig. 4 a cross section on line *a— a* of Fig. 2; and Fig. 5 a cross section on line *b— b* of Fig. 2.

The drill shown has a head with a plurality of bits or cutters, but other forms of bits or cutters could be used. The arrangement shown has, at each end of the drill head, outer or end bits or cutters 1, arranged in pairs at each end of the head, with intermediate cutters 2, and intermediate cutters 3, also arranged in pairs, so that the head has eight bits or cutters. The head 4 is of a shape, as to length and width, to receive the bits or cutters, and, as shown, the head has a cross hole 5 to facilitate the removal from the head of the bit or cutter in line with the shank of the head.

The head has a shank 6 to enter the chamber 7 of the barrel 8 of the frame; and, as shown, the shank has a slot 9 through which passes a bar 10, secured in the wall of the barrel, and by which slot and bar the head has a limited end movement for operating the bits or cutters.

The frame, on two opposite sides of the barrel 8, has a flange 11, and each flange 11, at the forward end of the frame, has a projection 12 which forms a shoulder, which shoulder furnishes a rest for an encircling tube not shown. The chamber 7 terminates in a chamber 14 of a greater diameter in cross section than the chamber 7, and from this chamber, on opposite sides, a port 15 leads. Each port 15 communicates with a longitudinal passage 16, formed in each flange 11 and opening through the front end of each flange, and each passage 16, at its mouth or front end, has entered therein a tube 17, which extends into a hole 18, so as to, in effect, continue the passages 16 through the bit or cutter head, as shown in Fig. 2.

The barrel 8 has an interior circumferential wall 19, located between the chamber 14 and a chamber 20, and from the chamber 20, on each side, a port 21 leads. Each port 21 is in communication with a passage 22,



formed in each flange 11, and each passage 22, at its rear or receiving end, has a port 23 leading inwardly therefrom.

The ports 23 communicate with a cross passage 24 with which a longitudinal passage 25 communicates; and the cross passage 24 and longitudinal passage 25 are formed in a head 26, having a neck 27 with an exterior screw thread for entering the neck into the end wall of the frame and barrel, as shown in Fig. 2, so as to furnish a conduit or passage for supplying compressed air, or other medium under pressure, to the side passages 22 of the frame. The barrel has an interior circumferential wall 28, located between the chamber 20 and a chamber 29, which chamber 29 is continued as a chamber or hole 30, which receives the neck 27 of the closing plug, as shown in Fig. 2, so that the chamber of the barrel, as a whole, is closed at the outer end by the plug.

The barrel has located therein rearward of the stem 6, a hammer having a driving end or head 31, continuing as a body 32, guided and held between the circumferential wall 20, and terminating at its rear end with an enlarged portion or head 33, guided and held in the circumferential wall 28, and forming a shoulder or face 34 against which the compressed air, or other medium under pressure, admitted to the chamber 20 from the passages 22 through the ports 21, acts to recede or force back the hammer as a whole. The body, 32, of the hammer, has a central passage 35 extending longitudinally therein and opening at its rear end through the head 33, from which passage 35, lateral ports or passages 36 lead through the head 33, so that, when the hammer is receded, communication is established with the chamber 29 to admit compressed air, or other medium under pressure, to the passage 35, for the air or other medium under pressure, to act and thrust or drive forward the hammer as a whole. The passage 35, adjacent to its forward end, has leading therefrom lateral passages or ports 37 to furnish communication between the passage 35 and the chamber 14, for compressed air, or other medium under pressure, to flow from the passage 35 through the ports 15 into the passages 16 and be discharged through the tubes 17 and passages 18 at the acting end of the head around the bits or cutters.

The head or plug 26 has a screw threaded hole in line with the passage 25 which receives a tube 38, and the tube 38 has entered thereinto a coupling tube 39, on which is threaded a coupling ring 40 of a supply tube 41, leading from a source of compressed air, or other medium under pressure, so as to supply the compressed air, or other medium under pressure, to the passage 25 for the air or other medium under pressure, to enter the side passages 22 through the ports 23 and be dis-

charged into the chamber 20 through the ports 21 to act against the abutment or face 34 of the hammer and force back or recede the hammer as a whole.

The parts are assembled by inserting the tubes 17 into the front ends or mouth of the side passages 16, and entering the tubes 17 into the passages 18, and entering the stem 6 into the chamber 7 of the barrel 8, and securing the stem 6 and the head 4 with the bits or cutters thereon, against dropping out from the chamber, by passing the bar or key 10 through the wall of the barrel 8 and the slot 9 of the stem of the head. The hammer as a whole is entered into the chamber of the barrel rearward of the stem 6 of the head, and after the hammer is entered the plug or head 26 is entered into the end of the frame and the barrel, so as to close the chamber of the hammer and have the port or passage 24 in communication with the ports 23, as shown in Fig. 2. The tube 38 and the coupling tube 39 are entered into position, so as to have the coupling tube 39 receive the coupling ring 40 of the supply pipe or tube 41, completing the connection of the frame with the source of supply for the compressed air, or other medium under pressure, ready for the use or operation of the drill or tool.

In operation, the compressed air, or other medium under pressure, flows through the passage 25 into the cross passage 24 and enters the side passages 22 through the ports 23 to flow through the ports 21 into the chamber 20 and act against the abutment or face 34, to force back or recede the hammer, as a whole, into striking or driving position. The hammer, as a whole, is receded a sufficient distance to carry the end face 34 beyond the rear face of the wall 28, so that pressure can enter the chamber 29 and flow from such chamber, through the lateral passages or ports 36, into the central passage 35 and act against the front end of the passage 35 and drive forward the hammer as a whole, such action of the admitted pressure being permitted by the closing of the lateral passages or ports 37, with the passing of such passages within the circumferential wall 19, by the recession or forcing back of the hammer as a whole. The forward throw or thrust of the hammer, as a whole, causes its acting end or head 31 to contact the end of the stem 6 and drive forward the stem, and with it the head 4 and the bits or cutters carried thereby, causing the bits or cutters to act and perform the cutting operation. The forward throw or thrust of the hammer, as a whole, closes the ports or passages 36, by the wall 28, and opens the ports or passages 37, for communication between the passage 35 and the chamber 14, admitting pressure to the chamber 14, for the pressure to flow through the ports 15 and passages 16, and through the tube 17 and passages 18 to



the front of the head 4 around the cutters carried by the head. The compressed air, or other medium under pressure, discharged around at the front end of the head 4 around the cutters, has a free passage back through the openings formed by the flanges 11 around the barrel 8; and the discharge of the compressed air, or other medium under pressure, carries with it the dust and fine particles produced by the cutting operation, removing such fine dust or particles from in front of the cutter or bit head, so that the bits or cutters are not interfered with by an accumulation of dust and fine particles, because the dust and fine particles are removed, as fast as produced, by the return flow of the compressed air, or other medium under pressure, which carries with it the dust and fine particles.

The frame of the present invention, in connection with the hammer and cross head having bits or cutters, furnishes a drill by which the frame supplies the air, or other medium under pressure, to operate the hammer and discharges the compressed air or other medium under pressure at the forward side of the cross head and around the bits or cutters, so as to remove the dust and fine particles from interfering with the operation of the bits or cutters. It will thus be seen that with the frame of the present invention, means are provided for supplying compressed air, or other medium under pressure, to operate a hammer, and for allowing the compressed air or other medium under pressure, after actuating the hammer, to be discharged, so as to serve as a conductor for withdrawing dust and fine particles from around the bits or cutters, thus furnishing, in the frame itself, the requisite means for supplying compressed air, or other medium under pressure, to operate the hammer, and the requisite means for removing dust and fine particles from around the bits or cutters.

While the pneumatic hammer is shown in connection with a tool head carrying drill bits or cutters, it is to be understood that the hammer is intended for use, and can be used, with a tool head of other formation than the one shown, and for purposes other than drills, and that one flange only can have the induction and eduction passages.

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

1. In a pneumatic hammer, a frame consisting of a central barrel, and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber to receive the hammer, and each flange having a longitudinal passage at the receiving end for inducting pressure and a longitudinal passage at its discharge end for educting pressure with the passages independent of each other and in communication with the

chamber of the barrel, substantially as described.

2. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and each flange having a longitudinal passage at the receiving end for inducting pressure and a longitudinal passage at the discharge end for educting pressure, with the passages independent of each other and in communication with the chamber of the barrel, substantially as described.

3. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and the flanges each having a longitudinal induction passage and a longitudinal eduction passage for pressure, with the induction passages in communication with the chamber of the barrel for admitting pressure to operate the hammer, and with the eduction passages opening through the discharge end of the frame, substantially as described.

4. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber, divided into a plurality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for discharging pressure, a section forming a bearing for a driving hammer, a section forming an induction chamber for pressure to act and recede the hammer, and a section forming a chamber to receive pressure for acting on and driving the hammer, substantially as described.

5. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber, divided into a plurality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for discharging pressure, a section forming a bearing for a driving hammer, a section forming an induction chamber for pressure to act and recede the hammer, a section forming a chamber to receive pressure for acting on and driving the hammer, and each flange having a longitudinal induction passage for pressure in communication with the pressure induction chamber of the barrel, and a longitudinal eduction passage in communication with



the eduction chamber of the barrel, substantially as described.

6. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber, divided into a plurality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for discharging pressure, a section forming a bearing for a driving hammer, a section forming an induction chamber for pressure to act and recede the hammer, and a section forming a chamber to receive pressure for acting on and driving the hammer, and a driving hammer entered into its section of the chamber of the barrel and having on its exterior an abutment against which admitted pressure acts to recede the hammer, substantially as described.

7. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber, divided into a plurality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for discharging pressure, a section forming a bearing for a driving hammer, a section forming an induction chamber for pressure to act and recede the hammer, a section forming a chamber to receive pressure for acting on and driving the hammer, and a driving hammer entered into its section of the chamber of the barrel and having on its exterior an abutment against which admitted pressure acts to recede the hammer, and having also a central passage in its body with lateral passages adjacent to each end thereof for admitting pressure into and discharging pressure from the central passage in operating the driving hammer, substantially as described.

8. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, each flange having a longitudinal induction and a longitudinal eduction passage for pressure, both passages in communication with the chamber of the barrel, the barrel having a central chamber, divided into a plurality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for discharging pressure, a section forming a bearing for a driving hammer, a section forming an induction chamber for pressure to act and recede the hammer, a section forming a chamber to receive pressure for acting on and driving the hammer, a driving hammer entered into its section of the chamber of the barrel and having on its exterior an abutment against which admitted pressure acts

to recede the hammer, having also a central passage in its body with lateral passages adjacent to each end thereof for admitting pressure into and discharging pressure from the central passage in operating the driving hammer, and a closing plug for the rear end of the frame and chamber of the hammer, the plug having a longitudinal and a cross passage in its body for admitting pressure to the induction passage of each flange, substantially as described.

9. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel each flange having a longitudinal induction and a longitudinal eduction passage for pressure, with both passages in communication with the chamber of the barrel, the barrel having a central chamber, divided into a plurality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for discharging pressure, a section forming a bearing for a driving hammer, a section forming an induction chamber for pressure to act and recede the hammer, a section forming a chamber to receive pressure for acting on and driving the hammer, a driving hammer entered into its section of the chamber of the barrel and having on its exterior an abutment against which admitted pressure acts to recede the hammer, and a tool head having passages through its body in communication with the eduction passages of the flanges for discharging pressure in advance of the head, substantially as described.

10. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel with the flanges extending the length of the barrel, each flange having a longitudinal induction and a longitudinal eduction passage for pressure, both passages in communication with the chamber of the barrel, the barrel having a central chamber, divided into a plurality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for discharging pressure, a section forming a bearing for a driving hammer, a section forming an induction chamber for pressure to act and recede the hammer, a section forming a chamber to receive pressure for acting on and driving the hammer, a driving hammer entered into its section of the chamber of the barrel and having on its exterior an abutment against which admitted pressure acts to recede the hammer, a tool head having passages through its body and tubes connecting each passage of the tool head with an induction passage of a flange for discharging pressure in advance of the tool head, substantially as described.

11. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior



rior flanges on the side of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber to receive the hammer, and one flange having a longitudinal passage for inducting pressure and a longitudinal passage discharging at the front end of the flange for educting pressure, with the passages independent of each other and each in communication with the chamber of the barrel, substantially as described.

12. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on the side of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and the flange having a longitudinal passage, for inducting pressure and a longitudinal passage for educting pressure each passage independent of the other and each passage in communication with the chamber of the barrel and the eduction passage discharging at the front end of the flange, substantially as described.

13. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on the side of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and one flange having a longitudinal induction passage and a longitudinal eduction passage for pressure, each passage independent of the other and both passages in communication with the chamber of the barrel and the eduction passage discharging at the front end of the flange, a driven stem entered into the chamber of the barrel, and a driving hammer in the chamber of the barrel and actuated by pressure admitted through the induction passage of the flange, substantially as described.

14. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on the side of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and one flange having a longitudinal induction passage and a longitudinal eduction passage for pressure, each passage independent of the other and both passages in communication with the chamber of the barrel and the eduction passage discharging at the front end of the flange, a driven stem entered into the chamber of the barrel, a driving hammer in the chamber of the barrel and actuated by pressure admitted through the induction passage of the flange, the driving hammer having on its exterior an abutment against which the admitted pressure acts to recede the hammer, and having also a

central passage in its body with lateral passages adjacent to the end thereof for admitting pressure into and discharging pressure from the central passage in operating the driving hammer, substantially as described.

15. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on the side of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and one flange having a longitudinal induction passage and a longitudinal eduction passage for pressure, both in communication with the chamber of the barrel and the eduction passage discharging at the front end of the flange, a driven stem entered into the chamber of the barrel, a driving hammer in the chamber of the barrel and actuated by pressure admitted through the induction passage of the flange, the driving hammer having on its exterior an abutment against which the admitted pressure acts to recede the hammer, and having also a central passage in its body with lateral passages adjacent to the end thereof for admitting pressure into and discharging pressure from the central passage in operating the driving hammer, and a closing plug for the rear end of the frame and chamber of the hammer, the plug having a longitudinal and cross passage in its body for admitting pressure to the induction passage of the flange, substantially as described.

16. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on the side of the barrel with the flanges extending the length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and one flange having a longitudinal induction passage and a longitudinal eduction passage for pressure each passage independent of the other and both passages in communication with the chamber of the barrel and the eduction passage discharging at the front end of the flange, a driven stem entered into the chamber of the barrel, a driving hammer in the chamber of the barrel and actuated by pressure admitted through the induction passage of the flange, the driving hammer having on its exterior an abutment against which the admitted pressure acts to recede the hammer, and having also a central passage in its body with lateral passages adjacent to the ends thereof for admitting pressure into and discharging pressure from the central passage in operating the driving hammer, a closing plug for the rear end of the frame and chamber of the hammer, the plug having a longitudinal and cross passage in its body for admitting pressure to the induction passage of the flange, and a



tool head connected with the stem and having a passage through its body in communication with the eduction passage at the front end of the flange for discharging pressure in advance of the head, substantially as described.

17. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on the side of the barrel with the flanges extending the full length of the barrel, the barrel having a central chamber divided into sections, one section to receive a driven stem and another section to receive the driving hammer, and one flange having a longitudinal induction passage and a longitudinal eduction passage for pressure, each passage independent of the other and both passages in communication with the chamber of the barrel and the eduction passage discharging at the front end of the flange, a driven stem entered into the chamber of the barrel, a driving hammer in the chamber of the barrel and actuated by pressure admitted through the

induction passage of the flange, the driving hammer having on its exterior an abutment against which the admitted pressure acts to recede the hammer, and having also a central passage in its body with lateral passages adjacent to the end thereof for admitting pressure into and discharging pressure from the central passage in operating the driving hammer, a closing plug for the rear end of the frame and chamber of the hammer, the plug having a longitudinal and cross passage in its body for admitting pressure to the induction passage of the flange, a tool head connected with the stem and having a passage through its body, and a tube connecting the passage of the tool head with the eduction passage at the front end of the flange for discharging pressure in advance of the tool head, substantially as described.

MARTIN HARDSOOG.

Witnesses:

JOSEPH KEARNS,  
HELEN LOTSPEICK.