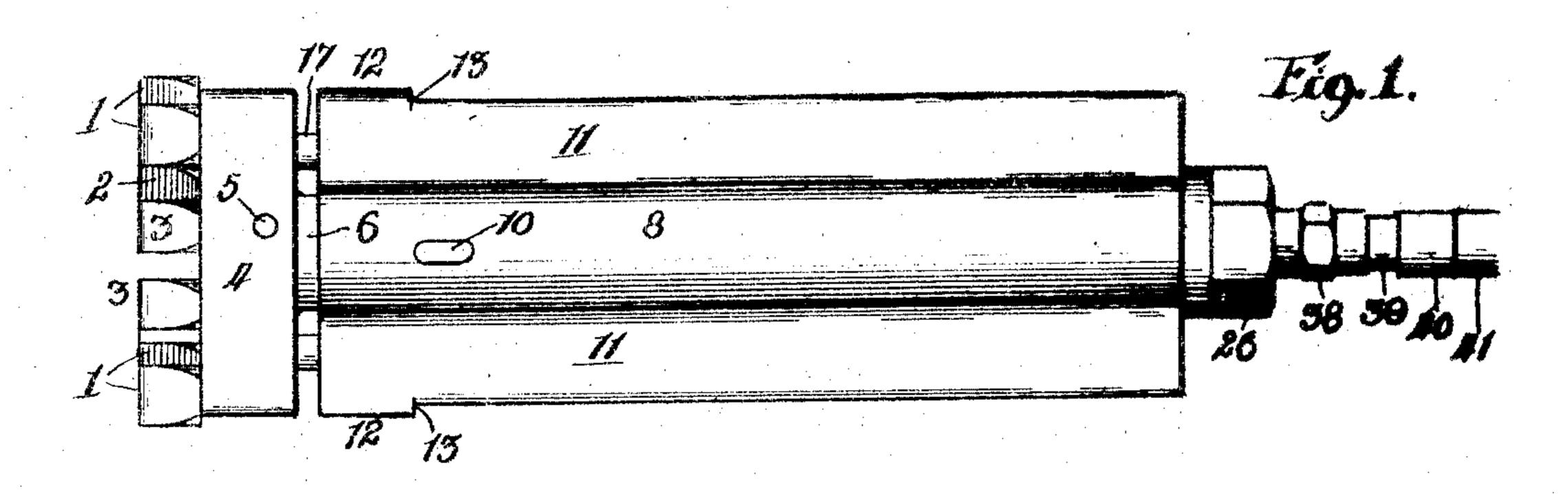
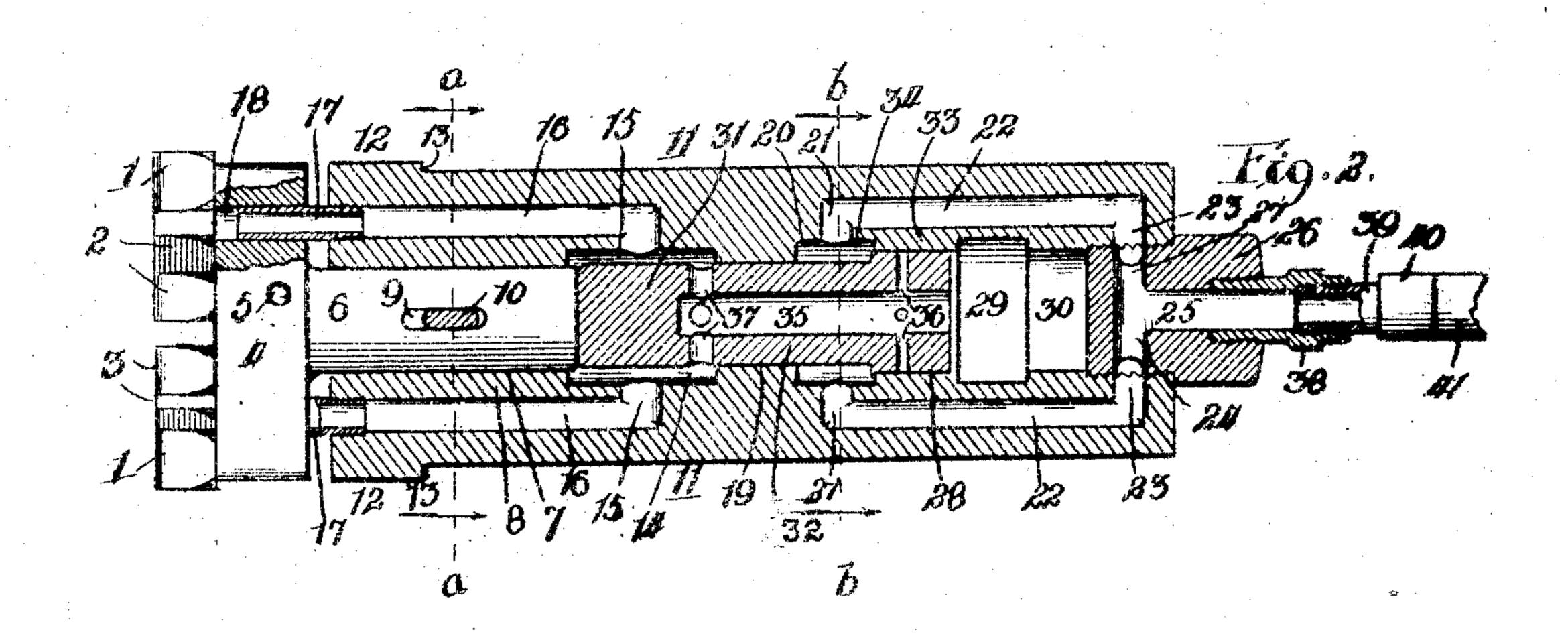
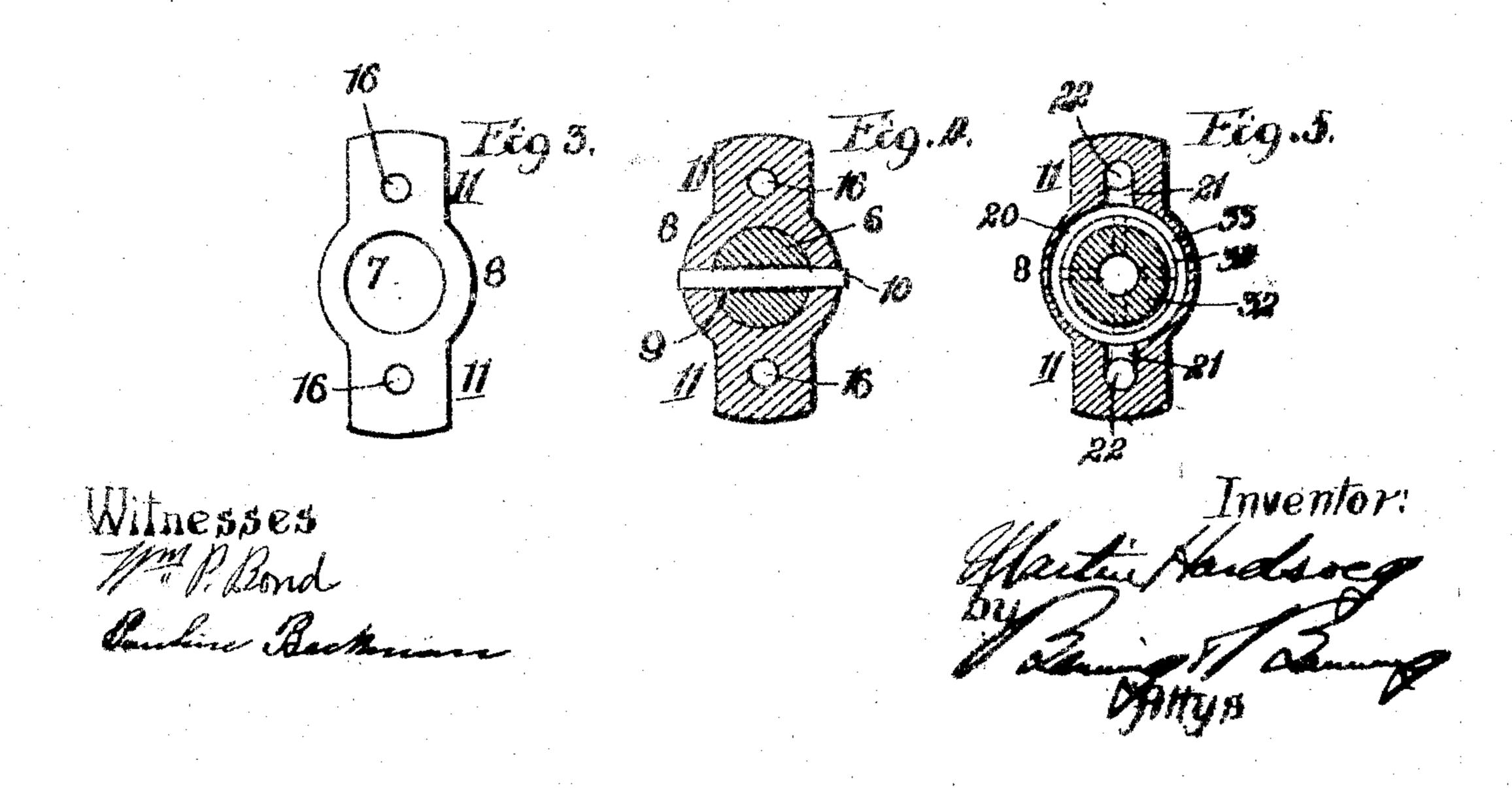
M. HARDSOCG. PNEUMATIC HAMMER. APPLICATION FILED MAR. 7, 1907.







UNITED STATES PATENT OFFICE.

MARTIN HARDSOCG, OF OTTUMWA, IOWA.

PNEUMATIC HAMMER

No. 873,938.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed March 7, 1907. Serial No. 381,052.

To all whom it may concern:

Be it known that I, MARTIN HARDSOCG, a citizen of the United States, residing at Ottumwa, in the county of Wapello and State 5 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 arrange-10 ment 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 15 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 20 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 25 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 30 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 dis-35 charging 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, 40 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 me-

the correlated parts entering into the formation of the tool as a whole.

dium under pressure at the bits or cutters;

to furnish passages around the barrel of the

frame, for removing the dust and fine par-

bits or cutters; and to improve generally the

construction and operation of the frame and

50 ticles produced by the cutting action of the

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 60 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 65 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 70 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 75 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 80 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 85 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, 90 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 sec- 95 tion 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, 100 and each passage 16, at its mouth or front end, has entered thereinto 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 The invention consists in the features of is in communication with a passage 22, 110 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 5 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 to 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 15 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 20 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. 25 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 com-30 pressed 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 pas-35 sage 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, communica-40 tion 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 45 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 50 pressure, to flew 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 re-

ceives 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, 60 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 pas-

65 sages 22 through the ports 23 ami 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 70 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 75 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 80 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 24.85 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 90 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 95 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 100 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 beyould the rear face of the wall 28, so that 105 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, 1 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 ham- 115 mer 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 t and drive forward the stem, and with it the head 4 and the bits or cutters car- 120 ried 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, 125 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 130

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 5 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 proto duced 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, be-15 cause 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.

20 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 25 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 30 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 com-35 pressed 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 40 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 nown 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 50 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:

55 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 60 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

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 70 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 75 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 cham- 80 ber 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 85 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 90 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 95 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 100 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 105 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 110 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 115 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 120 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 125 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 longitudi-65 each other and in communication with the | nal eduction passage in communication with 130 the eduction chamber of the barrel, substan-

tially as described.

6. In a pneumatic hammer, a frame consisting of a central barrel and straight exte-5 rior 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, to 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 form-15 ing 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 abûtmeist against which admitted pres-20 sure acts to recede the hammer, substantially as described.

7. In a phélimatic hammer, a frame consisting of a central barrel and straight exterior flanges on opposite sides of the barrel 25 with the flanges extending the length of the barrel, the barrel having a central chamber, divided into a phirality of sections, providing a section forming a bearing for a driven stem, a section forming an eduction chamber for 30 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 35 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 hummer, and having also a cen-40 tral 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 in-50 duction 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 55 forming a bearing for a driven stem, a section forming an education chamber for discharging pressure, a section forming a bearing for a driving frammer, a section forming an induction chamber for pressure to act and 60 recede the hammer, a section forming a chamber to receive pressure for acting on and driving the hummer, a driving hammer entered into its section of the chamber of the barrel and having on its exterior an abut-65 ment agnifist which admitted pressure acts | sisting of a central barrel and straight exte- 130

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 ham- 70 mer, 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 75 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 80 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 85 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 90 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 95 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 100 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 105 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 110 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 pressuré, a section somming a bearing for a driv- 115 ing hammer, a section ferming 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 120 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 125 the tool head with an induction passage of a flange for discharging pressure in advance of

the tool head, substantially as described. 14. In a preumatic hammer, a frame con-

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 longi-'5 tudinal passage fer 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 10 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 15 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 20 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 25 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 30 barrel having acentral 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 35 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 40 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.

15 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 50 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 55 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 60 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

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. 70

15. In a pneumatic hammer, a frame consisting of a central barrel and straight exterior flanges on the side of the harrel with the flanges extending the length of the barrel, the barrel having a central chamber divided 75 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 com- 80 munication 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 ac- 85 tuated 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 90 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 95 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 105 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 110 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 115 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 120 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 125 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 65 acts to recede the hammer, and having also a | the induction passage of the flange, and a 130

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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 5 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 10 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 longitu-15 dinal 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 20 the front end of the flange, a driven stem entered into the chamber of the barrel, a driv- Witnesses: ing hammer in the chamber of the barrel and actuated by pressure admitted through the Helen Lotspeick. Ad the figure for the figure in the state of the state of the figure in the figure in

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induction passage of the flange, the driving hammer having on its exterior an abutment 25 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 30 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 induc- 35 tion 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 40 discharging pressure in advance of the tool head, substantially as described.

MARTIN HARDSOCG.