No. 789,916. PATENTED MAY 16, 1905.

A. E. JOHNSON.

HAMMER DRILL.

APPLICATION FILED NOV. 5, 1904.

2 SHEETS—SHEET 1.

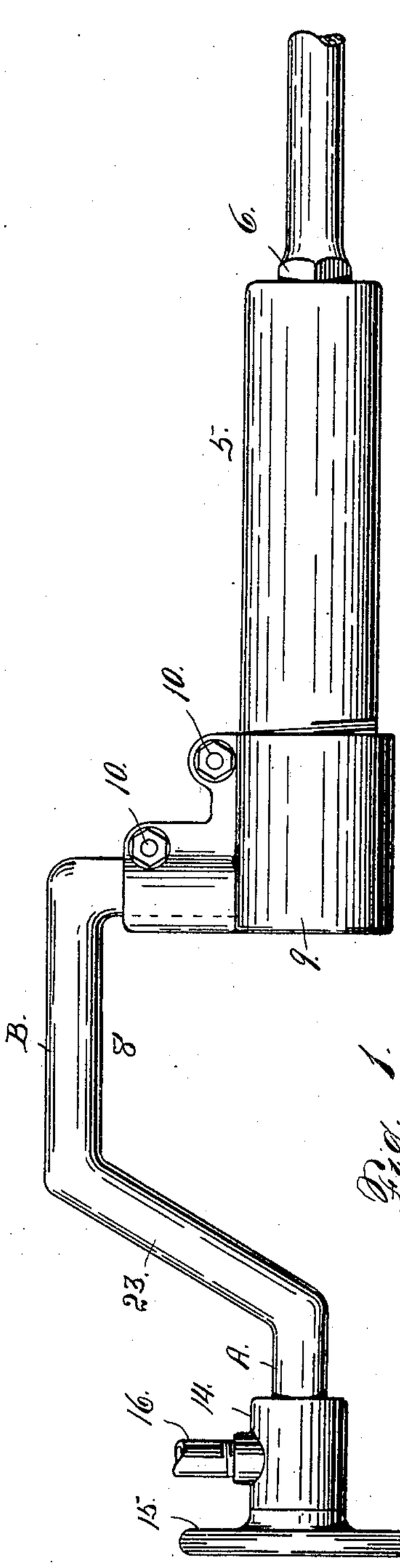

Fig. 1.

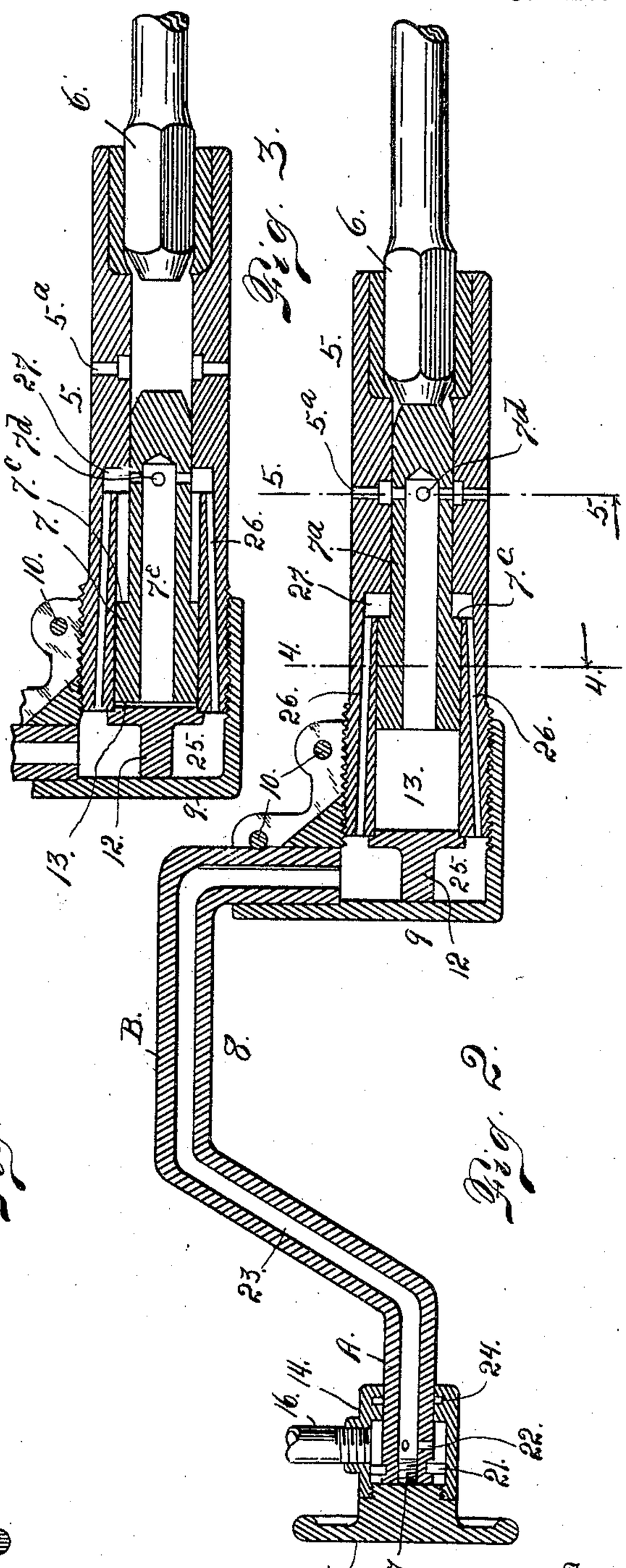

Fig. 3.

Fig. 2.

Witnesses

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2 SHEETS—SHEET 2.

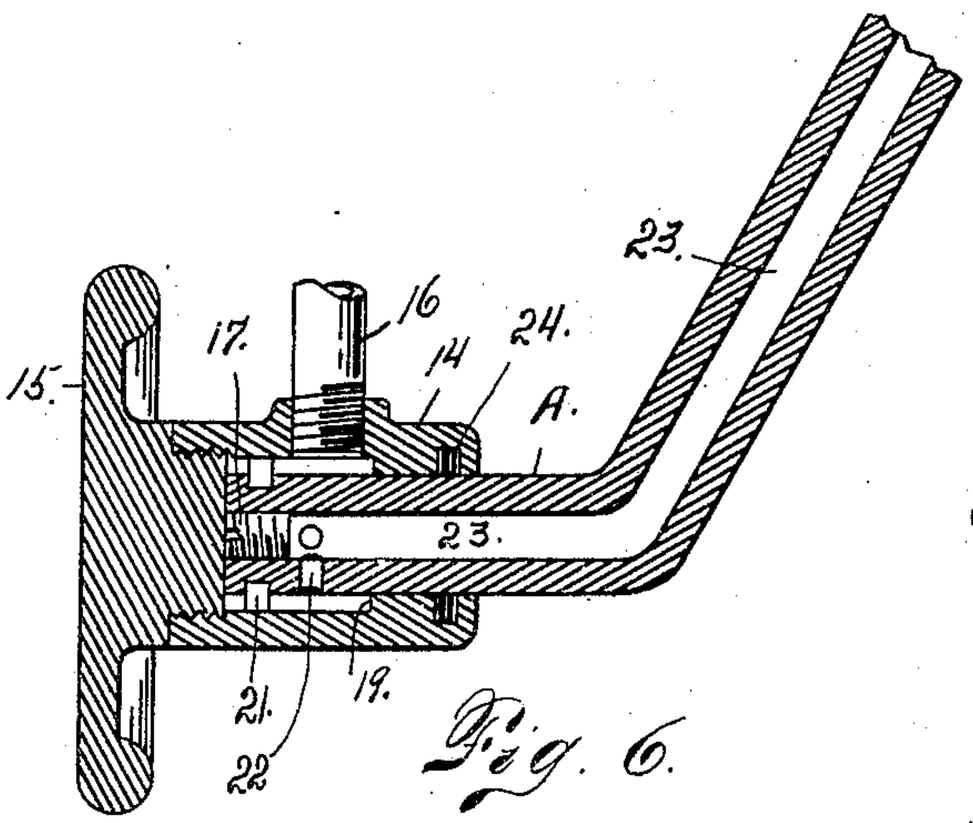

Fig. 6.

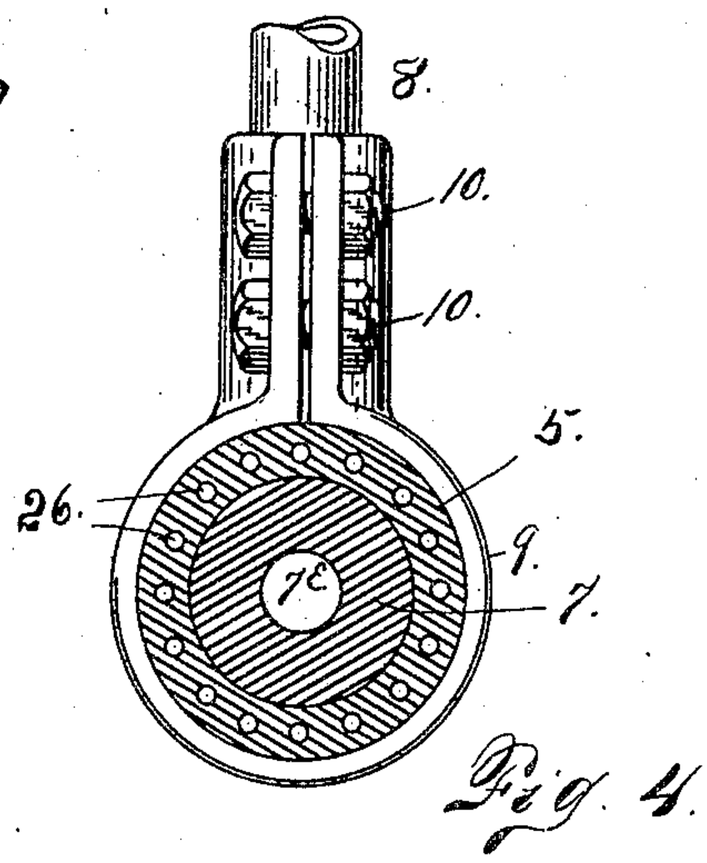

Fig. 4.

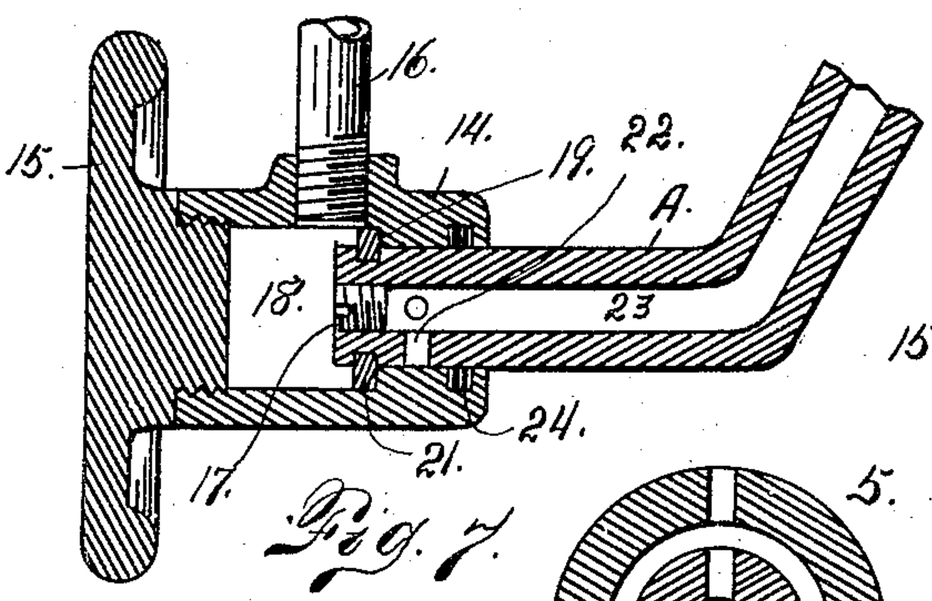

Fig. 7.

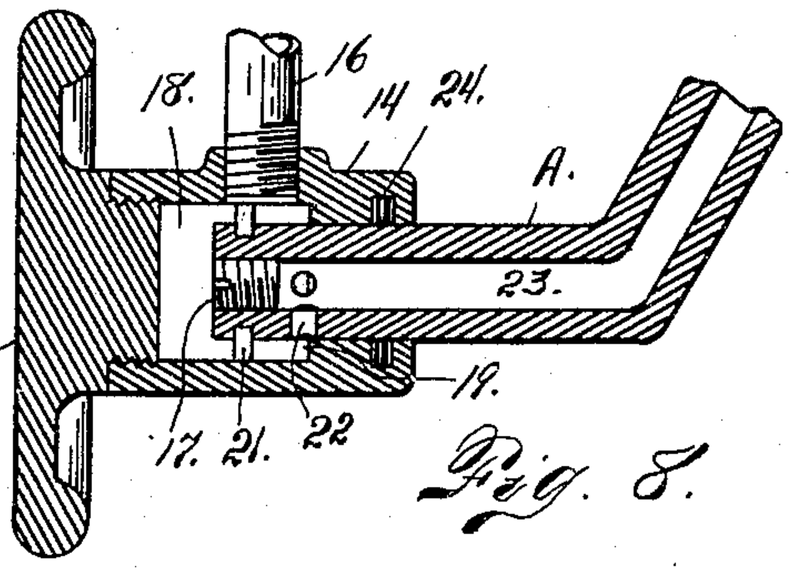

Fig. 8.

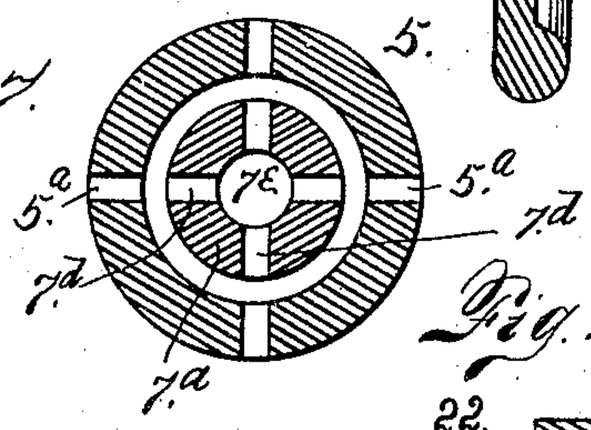

Fig. 5.

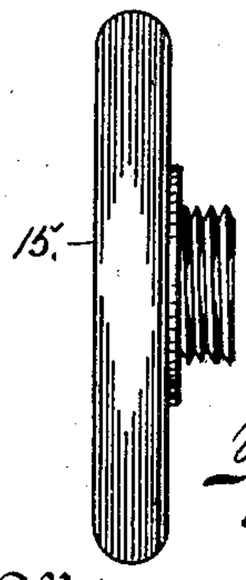

Fig. 9

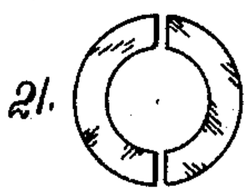

Fig. 11.

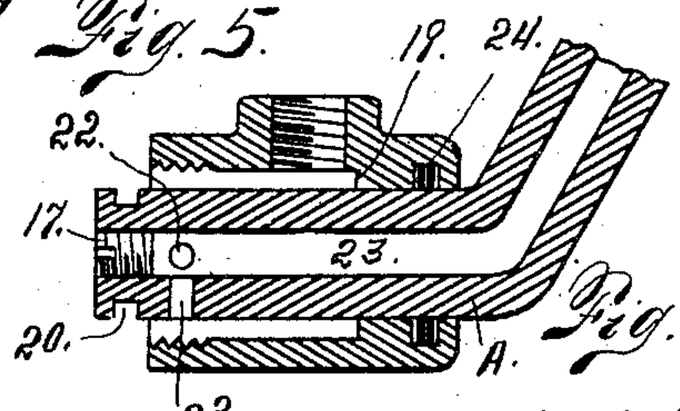

Fig. 10.

Witnesses

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No. 789,916. Patented May 16, 1905.

UNITED STATES PATENT OFFICE.

ALFRED E. JOHNSON, OF DENVER, COLORADO.

HAMMER-DRILL.

SPECIFICATION forming part of Letters Patent No. 789,916, dated May 16, 1905.

Application filed November 5, 1904. Serial No. 231,538.

To all whom it may concern:

Be it known that I, ALFRED E. JOHNSON, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Hammer-Drills; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in hammer-drills or drills in which the reciprocating part or hammer is not directly connected with the drill-bit or tool, the said part being actuated by air or other suitable operating fluid.

My improvement is adapted more especially for use in connection with drills of the lighter class which are held in position and manipulated by hand as distinguished from those which are mounted upon a stationary column.

An important feature of my invention consists of a hollow crank secured at one extremity to the body of the tool, while its other extremity is journaled in an abutment against which the user presses with his body while one hand engages the hollow crank for the purpose of rotating the tool. The operating fluid is delivered to the tool through a conduit connected with the abutment and passes thence to the hollow crank and therethrough to the hammer-chamber of the tool. The construction is such that the abutment is acted on by an air-cushion when the device is in use, assuming that air is employed. The amount of fluid allowed to pass the tool is controlled by the pressure of the user upon the abutment, since the latter is slidable on the hollow crank, which is journaled in the abutment.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of a tool equipped with my improvements. Fig. 2 is a longitudinal section of the same. Fig. 3 is a fragmentary section similar to Fig. 2, but showing the hammer in a different position. Figs. 4 and 5 are cross-sections taken on the lines 4 4 and 5 5, respectively, of Fig. 2 on a larger scale. Fig. 6 is an enlarged sectional view of the abutment and the rear extremity of the hollow crank. Fig. 7 is a similar view showing the parts in a different relative position. Fig. 8 is another view showing the parts in still another position. Fig. 9 is a detail view of the detachable abutment or part against which the user presses when the device is in use. Fig. 10 is a detail view of the rear extremity of the hollow crank and the sleeve in which it is journaled, the abutment being removed. Fig. 11 is a detail view of a sectional washer employed to limit the rear movement of the abutment and the sleeve with which it is connected.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the body of the drill, 6 the tool or drill-bit connected therewith, and 7 the hammer or reciprocating part mounted in the chamber of the cylindrical body part 5.

Suitably connected with the rear extremity of the cylinder 5 is the hollow crank 8. As shown in the drawings, the forward extremity of this crank is connected with the cylinder by a clamping-coupling 9, partially split on one side, the split parts being connected by bolts 10. It must be understood, however, that I do not limit the invention to the employment of this construction of coupling, since it is evident that the coupling may be formed integral with the body of the crank. As shown in the drawings, the rear extremity of the cylinder is screwed into the coupling, its rear extremity engaging a stop 12, located in the air-chamber 25, the said stop closing the rear extremity of the hammer-chamber 13. The rear extremity A of the hollow crank has its center in line with the longitudinal center or axis of the body of the tool, while its part B occupies a position at any desired distance from said center, according to the

desired leverage. The part A is journaled in a sleeve 14, into the rear extremity of which is screwed an abutment 15. The rear extremity of the crank is slidable in the sleeve to the extent illustrated in Figs. 6 and 7, Fig. 6 showing the extremity of the crank at its rearward limit, while Fig. 7 shows it at its forward limit, of movement. Threaded in this sleeve is a conduit 16, through which the fluid, as air, passes to the sleeve. The rear extremity of the longitudinal opening of the hollow crank is closed by a screw-plug 17. The chamber 18 of the sleeve is somewhat larger in diameter than the portion of the hollow crank which enters the sleeve, and at the forward extremity of this chamber is formed a shoulder 19. The rear end of the crank is provided with a circumferential groove 20, in which is located a two-part washer 21, the latter being sufficiently loose to allow the operating fluid to pass forward of it and enter ports 22 of the sleeve, whereby the fluid passes to the central opening 23 of the hollow crank. This washer 21 engages the shoulder 19 to prevent the sleeve from escaping or slipping over the rear end of the crank, but permits the fluid to pass freely around it or between its parts, as heretofore stated.

In assembling the parts the crank and sleeve are made to assume the relative position shown in Fig. 10, after which the sectional washer is dropped into the circumferential groove 20. The sleeve is then moved rearwardly and the abutment 15 screwed into the position which limits the rearward movement of the crank. Forward of the shoulder 19 the sleeve is provided with a packing-washer 24, forming an air-tight joint between the sleeve and crank forward of the said shoulder.

From the foregoing description the use and operation of my improved device will be readily understood. Assuming that the parts are in the position shown in Fig. 2, if air is introduced to the chamber 18 of the sleeve through the conduit 16 this air will pass through the longitudinal passage 23 of the crank 8 to the chamber 25 of the casing 5 and thence through passages 26 of the cylinder 5 to a small chamber 27, surrounding the reduced part 7^a of the hammer. This air acting on the circumferential shoulder 7^c of the hammer will throw the same to its backward limit of movement, since the air in the chamber 13 will exhaust through ports 7^d of the hammer and ports 5^a of the casing. As soon as the hammer reaches its backward limit of movement or the position shown in Fig. 3 the air will enter the ports 7^d of the hammer and pass thence through the passage 7^e to the rear extremity of the hammer and drive the latter to the forward position or that shown in Fig. 2. As nothing is claimed on the special construction of hammer and drill-casing, the said mechanism will not be described more in detail. In Fig. 2 the sleeve and crank 8 are shown in position whereby the ports 22 are wide open and the abutment 15 in direct contact with the rear extremity of the crank. The position which the device will generally occupy in use is that shown in Fig. 8, in which case the air-pressure will be in the chamber 18 between the abutment and the rear extremity of the crank, forming a cushion which will largely relieve the operator from the effects of the vibrations incident to the operation of the machine. This is an important feature in a device of this class, since the hammer-strokes are very rapid. As heretofore explained, the operator will press with his body against the abutment 15, while one hand will grasp the part B of the crank and turn the instrument as desired in the operation of the machine, whereby the point of the drill-bit will change its relative position in the hole, and thus prevent its inner extremity from striking in the same place continually. In other words, this hand rotation of the tool takes the place of the automatic rotary movement usually employed in drills and entirely does away with the complexity incident to an attachment of this kind, being therefore particularly advantageous in machines of light weight and intended to be handled by the operator, as heretofore explained.

In Fig. 7 the operating fluid is entirely cut off from the hollow crank; but the fluid-pressure in the chamber 18 cannot force the abutment off the rear extremity of the crank, owing to the engagement of the washer 9 with the shoulder of the sleeve. When the ports 22 are forward of this shoulder, the fluid is cut off from the crank, as the latter fits closely in the forward end of the sleeve.

Having thus described my invention, what I claim is—

1. In a hammer-drill, the combination with the body of the instrument and a relatively stationary abutment, of a hollow crank journaled in the abutment at one extremity and connected with the body of the device at the other extremity, and suitable means for introducing operating fluid to the said crank at its abutment extremity.

2. In a device of the class described, the combination with the drill-body, of a hollow crank and an abutment in which the rear extremity of the crank is journaled, its forward extremity being rigidly connected with the drill-body for rotating purposes, the abutment being provided with a forwardly-extending sleeve having a chamber into which the rear extremity of the crank protrudes, the rear extremity of the crank being provided with a port connecting said chamber with the longitudinal passage of the hollow crank, and suitable means for connecting the chamber of the sleeve with a source of operating fluid.

3. The combination with the drill-body, of

a hollow crank connected therewith at its forward extremity, to deliver operating fluid thereto, an abutment in which the rear extremity of the hollow crank is journaled, the said abutment having a forwardly-extending sleeve provided with a chamber, the rear extremity of the crank having ports connecting the said chamber with the longitudinal passage of the crank, the sleeve having a shoulder at the forward extremity of its chamber, and the rear extremity of the crank being provided with a circumferential recess, and a two-part packing-washer engaging said recess and projecting beyond the crank and forming a stop adapted to engage the shoulder of the sleeve to prevent the latter from being removed from the crank.

4. In a hammer-drill, the combination with the body of the instrument, of an abutment, a hollow crank connecting the body of the tool with the abutment, the crank being revolubly connected with the abutment, the rear extremity of the crank being also slidable in the abutment to control the supply of operating fluid to the hollow crank.

5. In a hammer-drill, the combination with the body of the instrument, of an abutment, a hollow crank having its forward extremity rigidly connected with the body and its rear extremity slidable in the abutment for the purpose of regulating the admission of operating fluid to the hollow crank, the crank being revoluble in the abutment to permit rotation of the tool, and the abutment being provided with a chamber adapted to form a fluid-cushion between its rear extremity and the crank.

6. The combination with the body of the drill, of a hollow crank rigidly connected therewith, and an abutment provided with a chamber into which the rear extremity of the crank protrudes and with which the longitudinal opening in the crank communicates, the rear extremity of the crank being slidable and revoluble in the abutment which is constructed to regulate the admission of the operating fluid as the rear extremity of the crank slides therein, and at the same time forming an air-cushion between the crank and the rear extremity of the abutment.

7. The combination with the drill-body, of an abutment, a rigid fluid-conduit rigidly connected with the drill-body at one extremity, the abutment being provided with a chamber into which the other extremity of the conduit protrudes and with which it is slidably connected, and means for introducing the fluid to the chamber of the abutment, the latter being constructed to form a fluid-cushion between the abutment and the conduit and to control the passage of fluid to the conduit by virtue of the sliding connection.

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

ALFRED E. JOHNSON.

Witnesses:
A. J. O'BRIEN,
DENA NELSON.