No. 778,319. PATENTED DEC. 27, 1904.

H. LEINEWEBER.

PNEUMATIC TOOL.

APPLICATION FILED MAR. 19, 1904.

2 SHEETS—SHEET 1.

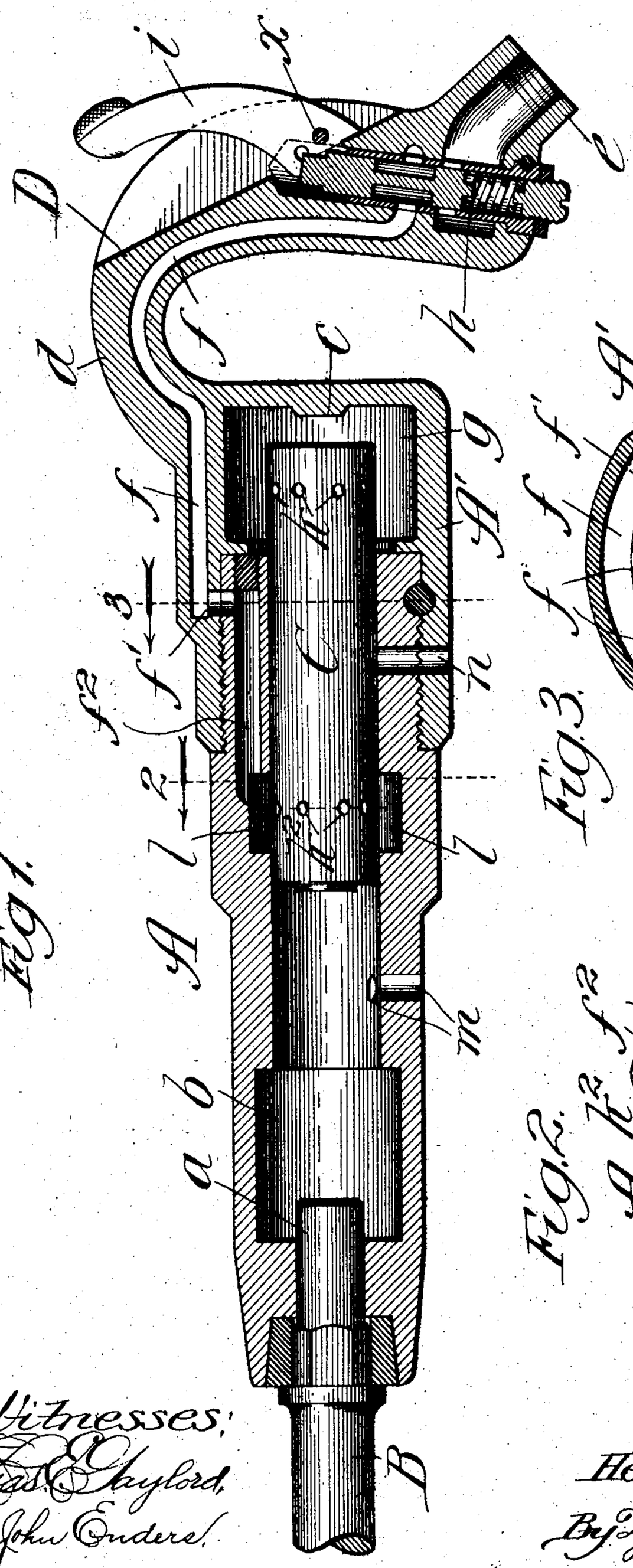

Fig. 1.

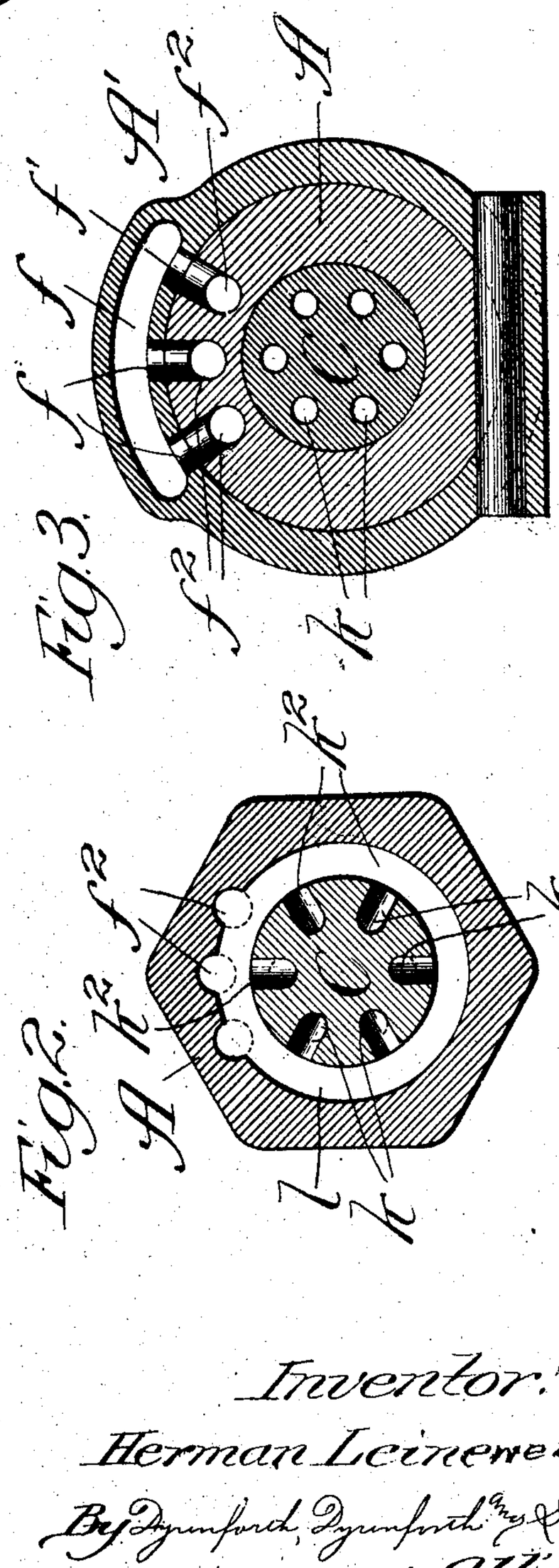

Fig. 3.

Fig. 2.

Witnesses:
Chas. E. Taylord.
John Enders.

Inventor:
Herman Leineweber
By Dyrenforth, Dyrenforth & Lee,
Attys.

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2 SHEETS—SHEET 2.

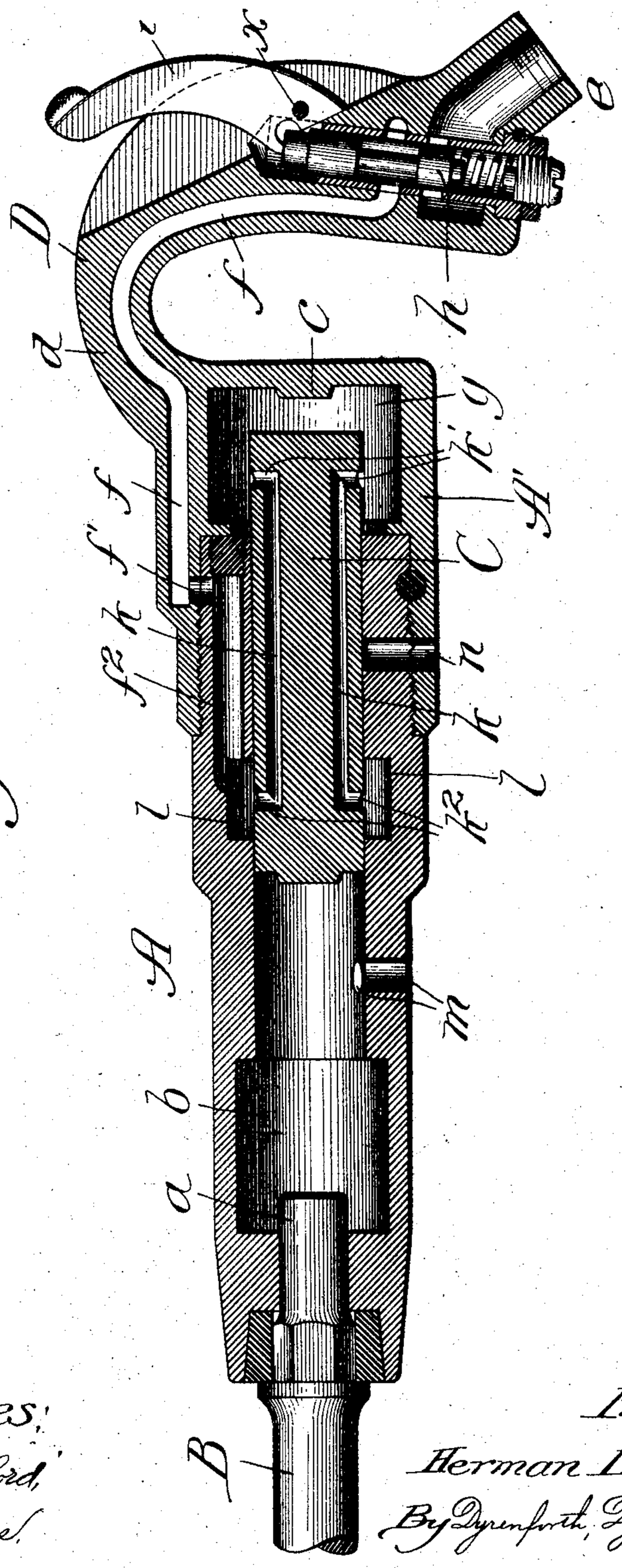

FIG. 4.

Witnesses:
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No. 778,319. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

HERMAN LEINEWEBER, OF SOUTH CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO WILLIAM F. BEHRENS, OF CHICAGO, ILLINOIS.

PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 778,319, dated December 27, 1904.

Application filed March 19, 1904. Serial No. 199,028.

To all whom it may concern:

Be it known that I, HERMAN LEINEWEBER, a citizen of the United States, residing at South Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pneumatic Tools, of which the following is a specification.

My invention relates to an improvement in the class of pneumatic hammers in which a piston confined in a casing is actuated by air-pressure to reciprocate against a tool to drive it—such as a riveting-tool, a chisel, or the like—in the end of the casing.

The object of my invention is to provide a valveless pneumatic tool in the class referred to of simple construction, rendering it comparatively cheap to manufacture, durable, and reliable in operation.

Referring to the accompanying drawings, Figure 1 shows my improved pneumatic tool by a view in longitudinal sectional elevation. Fig. 2 is a section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow; Fig. 3, a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow; and Fig. 4 a view like that presented by Fig. 1, but showing the piston in longitudinal section.

A is the casing, of general cylindrical shape, having a desired tool B, (shown broken,) and which may be a riveting-tool, a chisel, or the like, seated in its distal end, with its stem *a* projecting into an enlargement forming an air-chamber *b* in the casing. On the opposite end of the casing is screwed or otherwise fastened a hollow head A′, closed at its outer end, which is provided centrally on its inner side with a boss *c*, insuring exposure to the driving air-pressure of the respective end of the reciprocating piston C, hereinafter described, whenever the latter bears against it, as when the tool is held in upright position, the head having formed with it a neck *d*, terminating in a handle D to a nipple *e*, on which is fastened the flexible tubing (not shown) for conducting air-pressure from any suitable source to the implement. An air-passage *f* extends in the handle D through the neck *d* and lengthwise in the wall of the head A′ beyond the plane of an enlargement forming an air-chamber *g* in the head-section of the casing. In the handle is interposed between the nipple *e* and the adjacent end of the passage *f* a spring-pressed valve *h*, normally tending to close communication between the nipple and passage and controllable by a thumb-lever *i*, fulcrumed at *x*, for operating the valve to open it and admit the pressure for working the tool. The piston C is confined in the casing to reciprocate between the boss *c* and the end of the tool-stem *a*. It is closed at both ends and contains a desired number (one or more) of longitudinal ducts *k*, each terminating at its opposite ends, respectively, in lateral openings *k′* and *k²* in the piston near its ends. The passage *f* leads to a series of ports *f′*, extending transversely through the casing, these ports communicating with branches *f²* of the passage *f*, extending lengthwise in the wall of the casing, and these branches terminate at an annular enlargement forming the pressure-feeding chamber *l* in the casing between the chambers *b* and *g* therein. Exhaust-ports are provided in the casing at *m* and *n*.

The operation is as follows, with the parts in the relative positions in which they are shown in the drawings: On pressing the lever *i* to open the valve *h* air-pressure flows through the passage *f*, openings *f′*, and branches *f²* into the feeding-chamber *l*, whence it enters the piston-openings *k²* and passes through the piston-ducts *k*, discharging therefrom at the openings *k′* into the chamber *g*, wherein it acts against the end of the piston therein and drives the latter against the stem *a*. At the end of that (the forward) stroke of the piston the openings *k′* therein are within the chamber *l*, thereby leaving the chamber *g* open through the piston-way to the exhaust-port *n*, through which the pressure from that chamber escapes. This position of the piston brings the openings *k′* into the chamber *l*, (constantly, while the valve *h* is held open, supplied with air-pressure from the branches *f²*, which are in open communication through the ports *f′* with the passage *f*,) and pressure from that chamber enters the openings *k′*, passes through

the piston-ducts k, and discharges from the latter at the piston-openings k^2 into the chamber b, wherein it acts against the respective end of the piston to produce its back stroke, in making which it uncovers the exhaust-port m, permitting the pressure in the chamber b to escape therefrom, and at the end of which the piston-openings k^2 are again in the feeding-chamber l to admit therefrom through those openings and the ducts k and openings k', then in the chamber g, air-pressure into the latter for effecting the forward or driving stroke of the piston. In this manner the piston is reciprocated with great rapidity to act against the tool B.

It will be noticed that the chamber g is larger than the chamber b. The purpose of this difference is to cause the air-pressure force for the forward piston-stroke to be greater than that for producing the back stroke and to reduce to the minimum the recoil in the chamber g.

The gist of my invention consists in providing the intermediate pressure-feeding chamber in communication with a pressure-supply passage and the piston containing one or more air-ducts opening alternately into the feeding-chamber at the ends of the successive piston-strokes with exhaust-equipped end chambers, into which the driving-pressure enters alternately from the feeding-chamber through the piston. Hence I do not limit my invention to the details of construction and combinations of parts shown and described, since they may be variously modified without departure from the invention.

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

1. In a pneumatic tool having a casing carrying at one end the tool and at its opposite end a handle, the combination with the casing of a valve-controlled air-pressure-supply passage, end chambers and an intermediate feeding-chamber for the air-pressure in the casing, said feeding-chamber communicating with said passage, a piston reciprocably confined in the casing, having one or more ducts each terminating at its ends in lateral openings in the piston, whereby at the end of each piston-stroke the opening or openings register with said feeding-chamber, and exhaust-ports in the casing for said end chambers.

2. In a pneumatic tool having a casing carrying at one end the tool and at its opposite end a handle, the combination with the casing of a valve-controlled air-pressure-supply passage, end chambers and an intermediate feeding-chamber for the air-pressure in the casing, said feeding-chamber communicating with said passage, an exhaust-port adjacent to each end chamber, and a piston reciprocably confined in the casing, having closed ends and a plurality of longitudinal ducts within it each terminating at its ends in lateral openings in the piston, near its ends, said openings near the respective piston ends registering alternately with said feeding-chamber at the ends of the successive piston-strokes.

3. In a pneumatic tool having a casing carrying at one end the tool and at its opposite end a handle, the combination with the casing of a valve-controlled air-pressure-supply passage terminating in the casing-wall and having branches communicating therewith, end chambers in the casing and an intermediate pressure-feeding chamber therein to which said branches discharge, an exhaust-port adjacent to each end chamber, and a piston reciprocably confined in the casing, having closed ends and containing a plurality of longitudinal ducts each terminating at its ends in openings in the piston near its ends, said openings near the respective piston ends registering alternately with said feeding-chamber at the ends of the successive piston-strokes.

4. In a pneumatic tool the combination of a casing carrying at one end the tool and provided on its opposite end with a head having formed with it a neck and a handle, pressure-chambers in the casing near its opposite ends each provided with an exhaust-port and an intermediate pressure-feeding chamber therein, a passage for the air-pressure leading through said handle and neck and terminating in the wall of said head, branches extending in the casing-wall from said passage and discharging into said feeding-chamber, a spring-pressed valve in said passage in the handle provided with an operating-lever, and a piston reciprocably confined in the casing, having closed ends and containing longitudinal ducts each terminating at its ends in openings in the piston near its ends, said openings near the respective piston ends registering alternately with said feeding-chamber at the ends of the successive piston-strokes.

5. In a pneumatic tool, the combination with the casing containing a pressure-chamber in each end portion, and an air-pressure-supply passage, of a piston reciprocably confined in the casing, having closed ends with one or more ducts extending lengthwise within it and each terminating at its opposite ends in lateral openings in the piston, whereby the air-pressure for driving the piston may be introduced through it to act against its respective ends.

HERMAN LEINEWEBER.

In presence of—
F. M. WIRTZ,
WALTER N. WINBERG.