No. 662,675. Patented Nov. 27, 1900.

H. LEINEWEBER & G. LEININGER.

PNEUMATIC TOOL.

(Application filed Mar. 30, 1900.)

(No Model.)

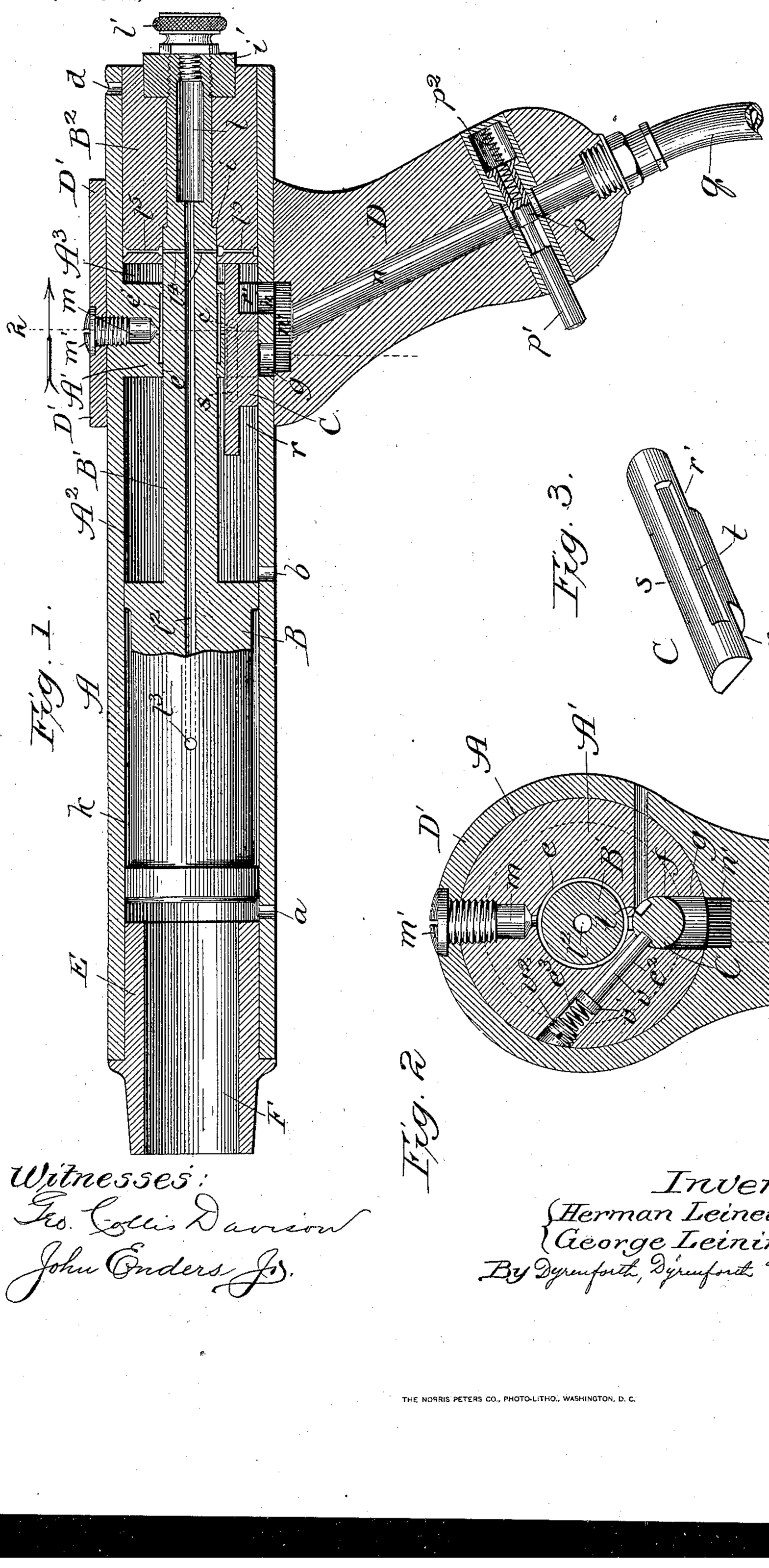

Fig. 1.

Fig. 3.

Fig. 2.

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HERMAN LEINEWEBER AND GEORGE LEININGER, OF CHICAGO, ILLINOIS.

PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 662,675, dated November 27, 1900.

Application filed March 30, 1900. Serial No. 10,789. (No model.)

To all whom it may concern:

Be it known that we, HERMAN LEINEWEBER and GEORGE LEININGER, citizens of the United States, residing at 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.

Our invention relates to improvements in pneumatically-operated tool-holding hammering implements; and our object is to provide certain improvements, more especially in the construction and operation of the slide-valve and oiling means for the moving parts to render the implement particularly simple, durable, easy running, and well adapted for its purpose.

In the drawings, Figure 1 is a longitudinal section of the implement; Fig. 2, a section taken on the irregular line 2 of Fig. 1 and viewed in the direction of the arrow, and Fig. 3 an enlarged perspective view of the slide-valve.

A is a tubular casing provided in the position shown with a rigid inner annular partition A′. In the casing in the position shown are vent-openings *a b c d*. Extending centrally through the partition A′ is a guide-opening *e* for the stem B′ of a piston or hammer B. Also extending through the partition is a guide-opening *f* for a cylindrical slide-valve C. The partition separates the interior of the shell into two chambers A^2 A^3. Extending through the shell are inlet-ports *g h*, communicating, respectively, with the chambers A^2 A^3. The piston B fits closely the inner wall of the casing, and the stem B′ fits closely through the opening *e* in the partition. On the outer end of the stem portion B′ is a second pistion B^2. It is confined on the stem between a shoulder *i* and a jam-nut *i′*, screwed upon the end of the stem. The piston A is reduced in circumference between its ends to form the annular recess *k*, and the opening *e* of the partition is enlarged between its ends to form the annular recess *e′*. In the end of the stem B′ is an oil-chamber *l*, closed at its outer end by means of a screw-plug *l′*. Extending from the chamber *l* to a point central, or nearly central, of the piston B is an oil-duct l^2, from the inner end of which branch ducts l^3 extend to the recess *k*. Branch ducts l^4 also extend from the duct l^2 to register at their outer ends with oil-ducts l^5 in the piston B^2.

D is a handle formed with a ring D′, which fits upon the casing A, as shown. In the partition portion of the shell is an oil-chamber *m*, communicating through a small port with the recess *e′*. The chamber is closed by means of a screw-plug *m′*, which passes through the ring D′ into the shell, and thus fastens these parts together. Extending through the handle is an air-supply passage *n*, terminating in a chamber *n′* over the ports *g h*. Interposed in the passage *n* is a valve *p*, having a stem *p′* extending beyond one side of the handle. The valve *p* is held normally in the position shown to close the passage *n* by means of a spring p^2, and inward pressure against the stem *p′* moves the valve to open the passage *n*. Extending to the outer end of the passage *n* is a hose *q*, which communicates with a suitable compressed-air supplier. (Not shown.)

The slide-valve C is cylindrical along its central portion and is cut away at its opposite end portions to produce the semicylindrical recesses *r r′*. The valve is provided in the positions shown with the longitudinally-extending recesses *s t*, which are of the relative lengths shown. In the partition A′ is a guide-opening e^2, enlarged toward its outer end to produce a chamber e^3. Extending through the guide-opening e^2 is a guide-pin *v*, having a head *v′* in the chamber e^3. Confined between the head *v′* and a screw-plug v^2 in the chamber e^3 is a spring v^3. The guide-pin *v* extends into the guide-groove *t* of the valve C to prevent turning of the latter, the pressure of the pin being rendered yielding by the spring v^3 to reduce friction. In the end of the casing A and rigidly secured in place is a tool-receiving tube E, which fits over and receives the handle portion of a chisel or other tool F.

Starting with the parts in the positions shown the operation will be as follows: When the valve-stem *p′* is pressed inward, compressed air enters through the passage *n* to the chamber *n′*. The valve C is in position to cover the port *g*, and the port *h* is opened by the recess *r′* of the valve. The air enters through the port *h* to the chamber A^3 and moves the piston B^2 outward until the inner

end of the piston opens the vent *d*. As the piston B^2 nears the outer limit the piston B strikes the end of the valve C and moves it to the position wherein it closes the port *h* and causes the recess *r* to uncover the port *g*. When this has occurred, air enters through the port *g* against the piston B, moving the parts back to the initial position shown, wherein the vent *d* is uncovered, and the valve C is moved by the piston B′ to close the port *g* and open the port *h*. The groove *s* in the valve C is always in communication with the vent-port *c*, and when the valve is in the position shown the chamber A^2 is in connection with the vent-port *c* through the said groove. When the valve is moved by the piston B to open the port *g* and close the port *h*, the groove *s* opens communication between the chamber A^3 and the vent-port *c*. The vents *a b d* operate to relieve the chambers A^2 A^3 of all, or nearly all, pressure above atmospheric when the pistons arrive at the ends of their traverse, while the groove *s* and port *c* operate to vent pressure from the chambers while the pistons are moving toward the valve. In each reciprocation of the pistons the piston-hammer B strikes the end of the tool F in the usual manner in tools of this kind. The recesses *k e′* materially reduce friction against the piston B and stem and afford chambers which are kept filled with lubricating-oil through the ducts described.

The reciprocation of the piston may be very rapid, and the parts being few and of a construction which renders them particularly strong the device is very durable.

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

1. In a pneumatic tool, the combination of the casing, partition separating the interior of the casing into two piston-chambers, piston-stem movable through an opening in said partition, pistons in said chambers on opposite ends of the piston-stem, air inlet and exhaust ports through the casing at the partition, and a slide-valve in the path of and actuated by the pistons, movable through a guide-opening in the partition across the said air inlet and exhaust ports and operating to open communication alternately between said chambers and the said inlet and exhaust ports, substantially as described.

2. In a pneumatic tool, the combination of the casing having the air-vents *b d*, partition separating the interior of the casing into two piston-chambers, piston-stem movable through an opening in said partition, pistons in said chambers on opposite ends of the piston-stem, air inlet and exhaust ports through the casing at the partition, and a slide-valve, in the path of and actuated by the pistons, movable through a guide-opening in the partition across the said air inlet and exhaust ports and operating to open communication alternately between said chambers and the said inlet and exhaust ports, substantially as described.

3. In a pneumatic tool, the combination of the casing A having the chambers A^2 A^3, partition A′ with guide-openings *e f*, and air inlet and exhaust ports at the partition, pistons B B^2, stem B′, slide-valve C having the end recesses *r r′*, vent-groove *s* and guide-groove *t*, and the guide-pin *v* engaging the guide-groove *t*, all constructed to operate substantially as and for the purpose set forth.

4. The combination with the casing A having the partition A′, the piston B^2, circumferentially-recessed piston B, connecting-stem B′, and the slide-valve, all constructed to operate as described, of an oiling-chamber *m* in the partition for the piston-stem, an oil-chamber *l* and oil-duct l^2 in the stem, and branch oil-ducts extending from the duct l^2 to the circumferential faces of the pistons, substantially as set forth.

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In presence of—
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