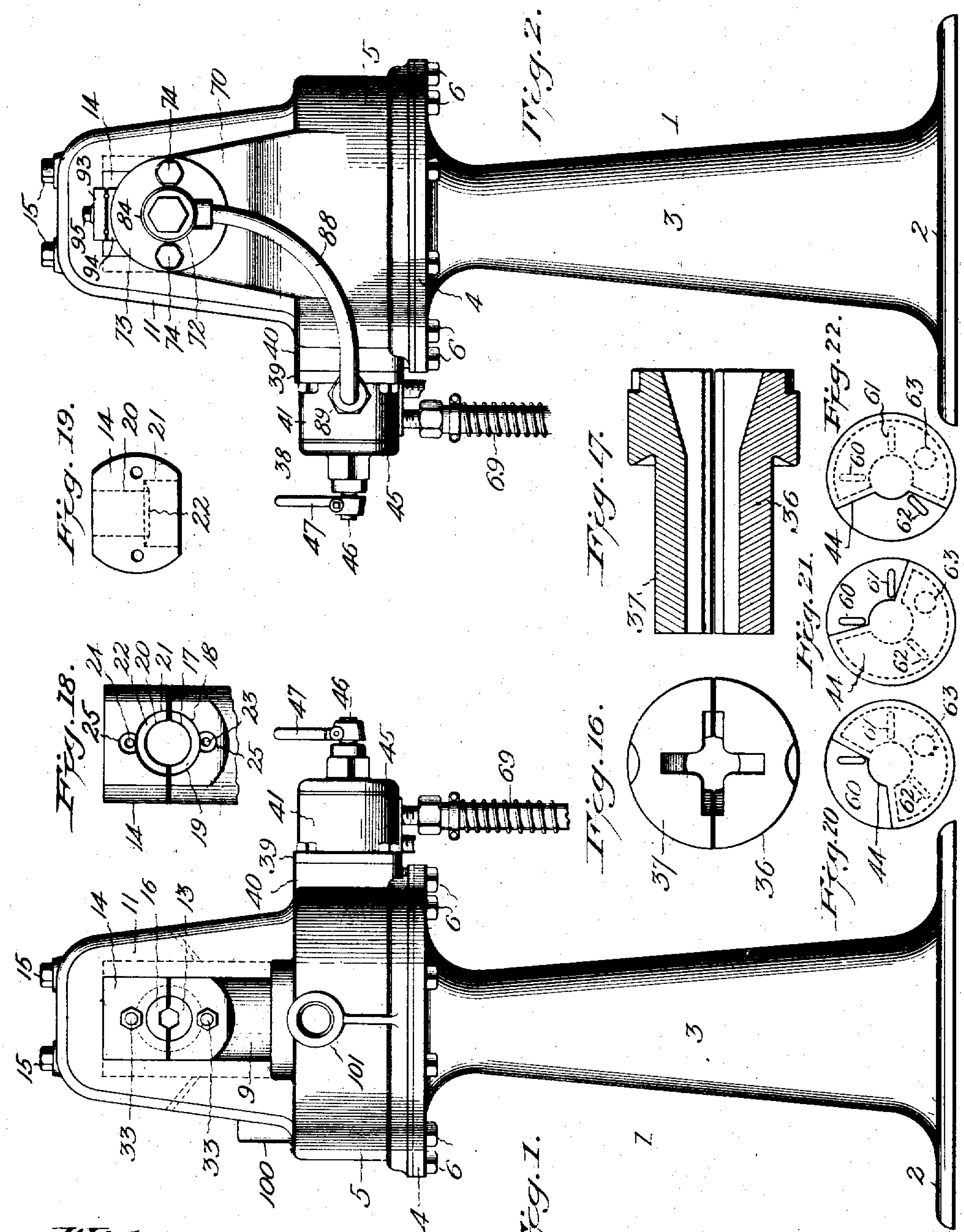
J. G. LEYNER.

FLUID OPERATED DRILL SHARPENER.

APPLICATION FILED JUNE 8, 1907.

917,777. **Patented Apr. 13, 1909.**

3 SHEETS—SHEET 1.



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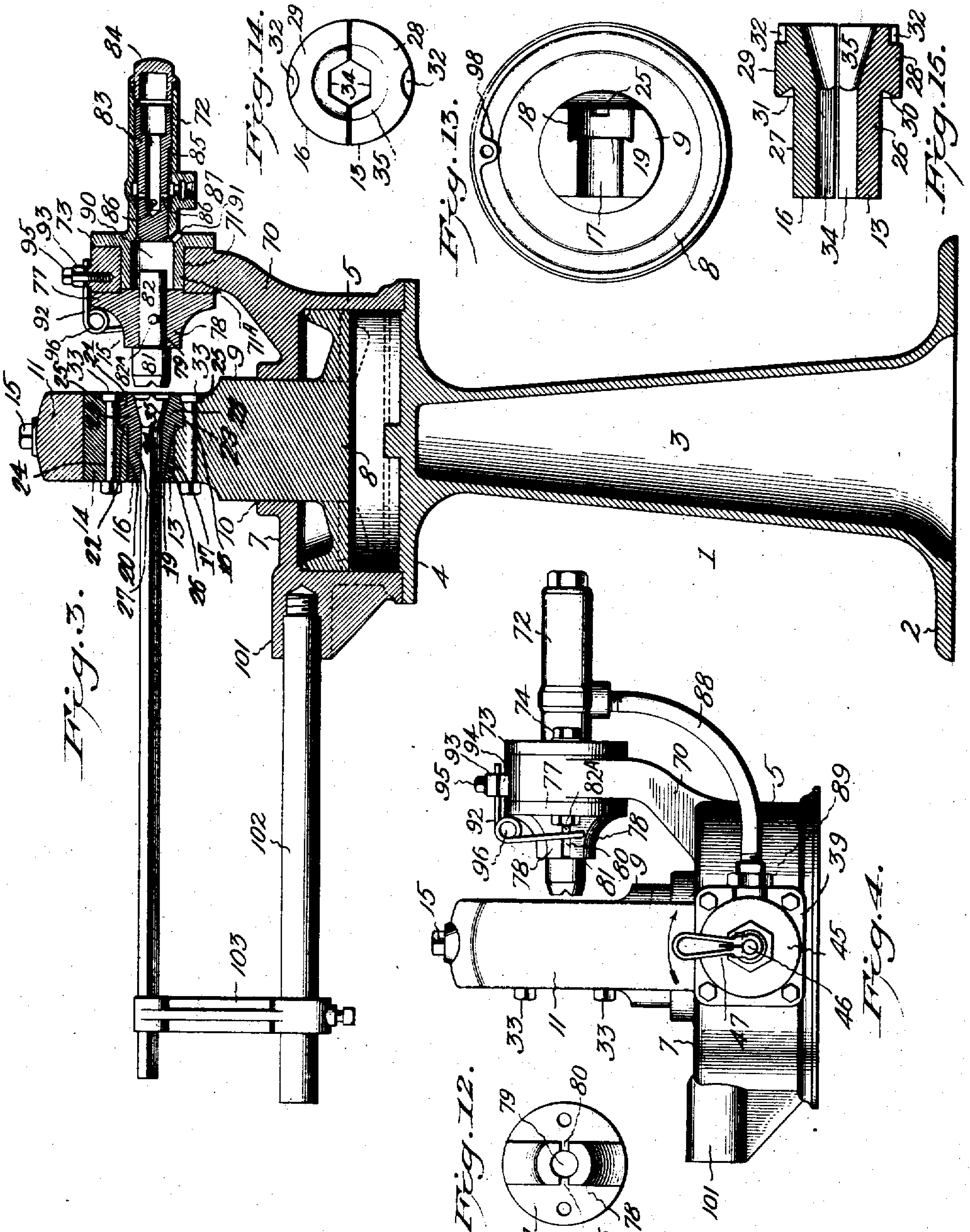

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Fig. 5.

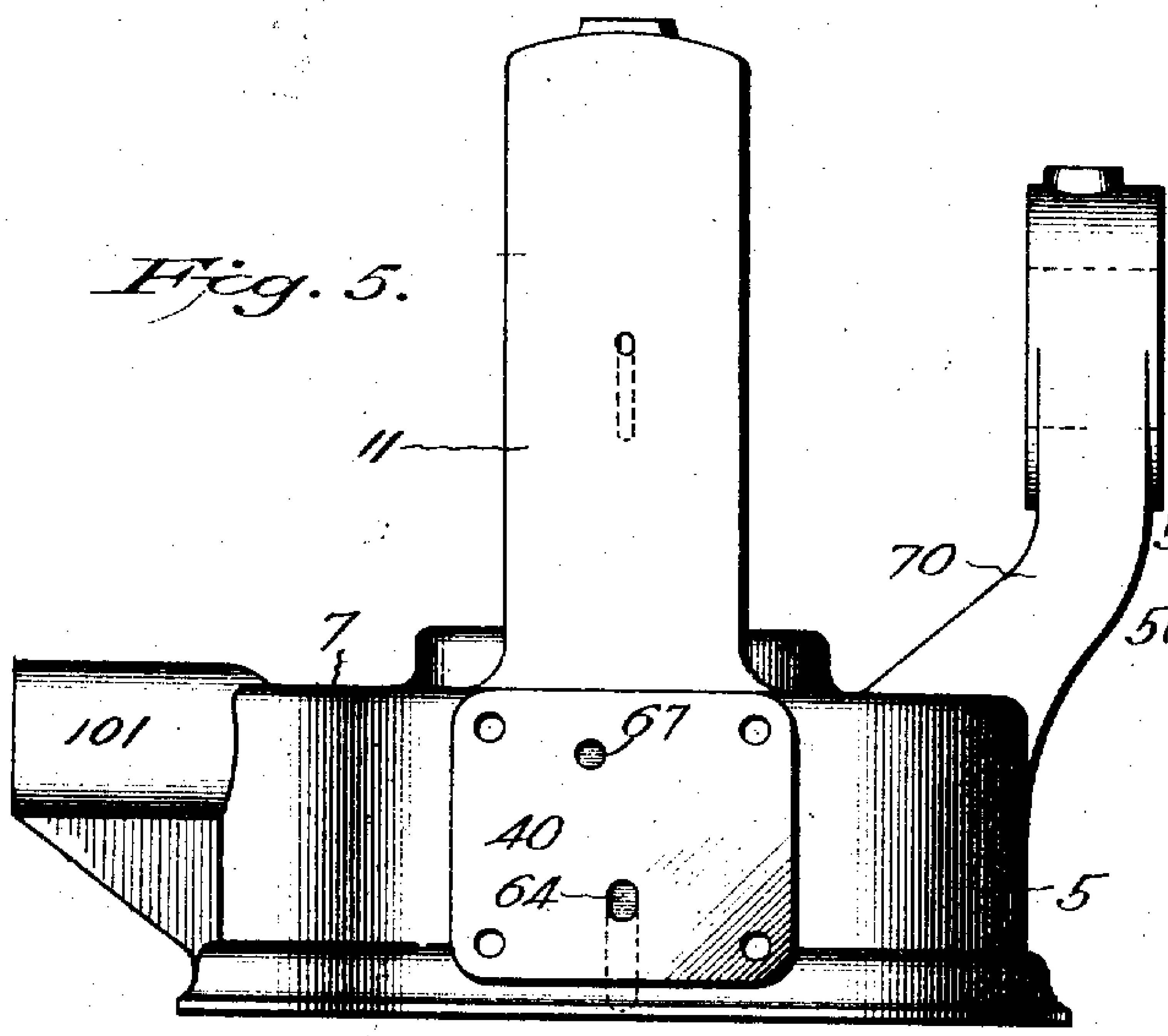


Fig. 8.

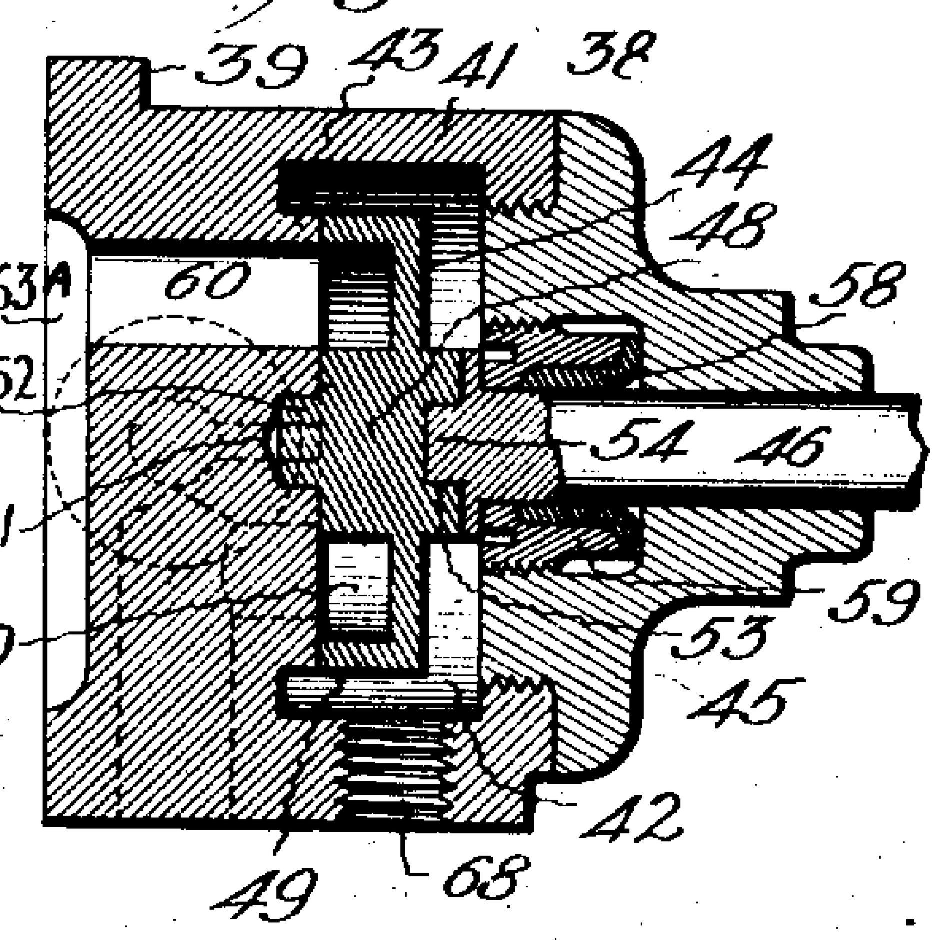


Fig. 11.

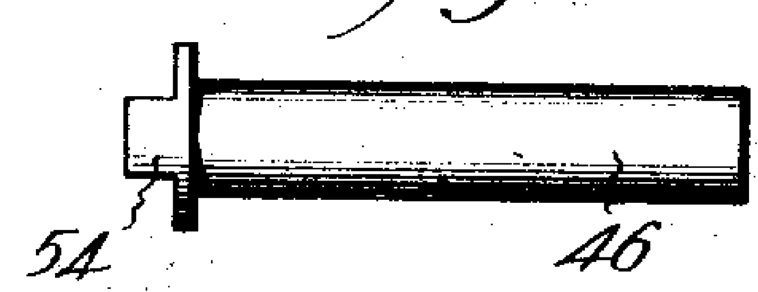


Fig. 7.

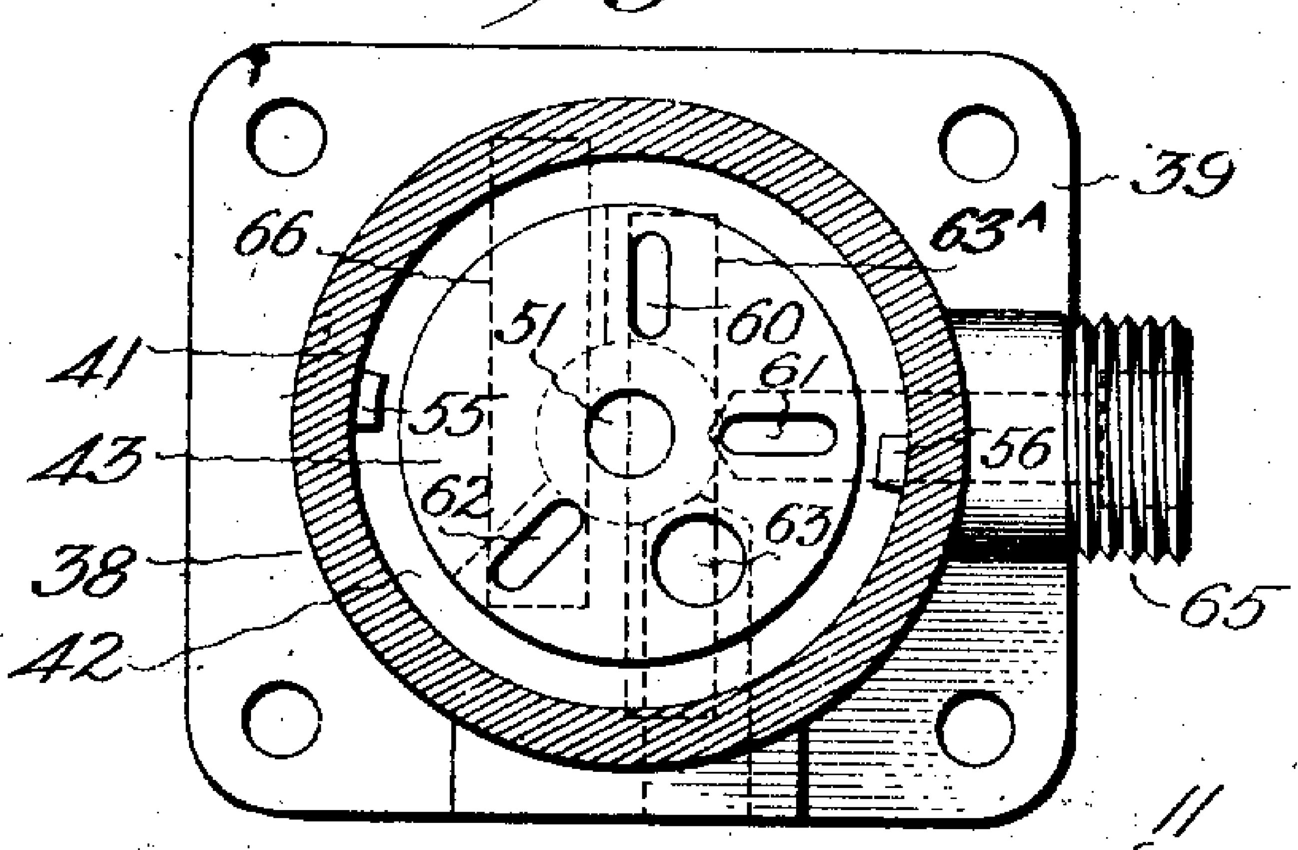


Fig. 9.

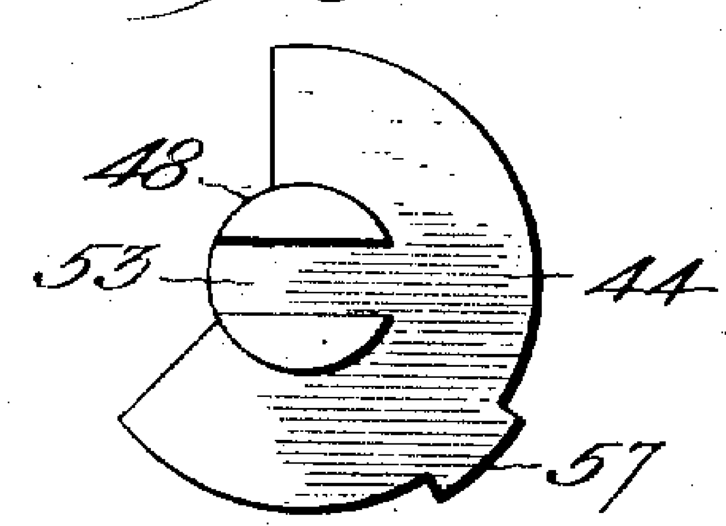


Fig. 10.

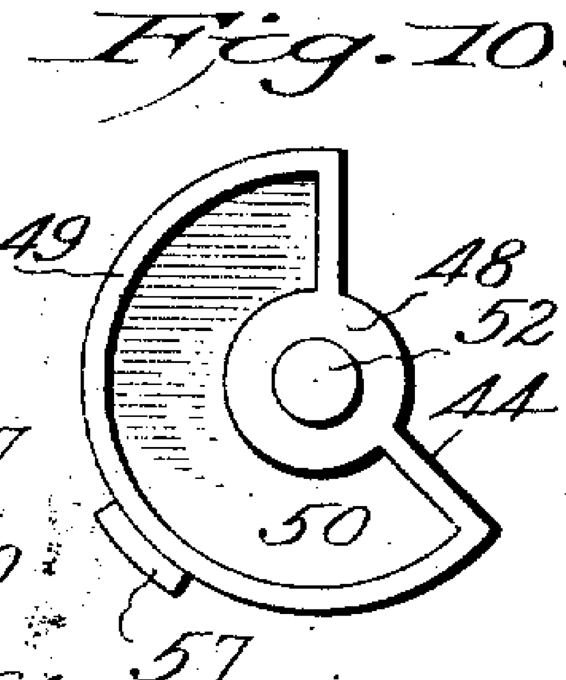
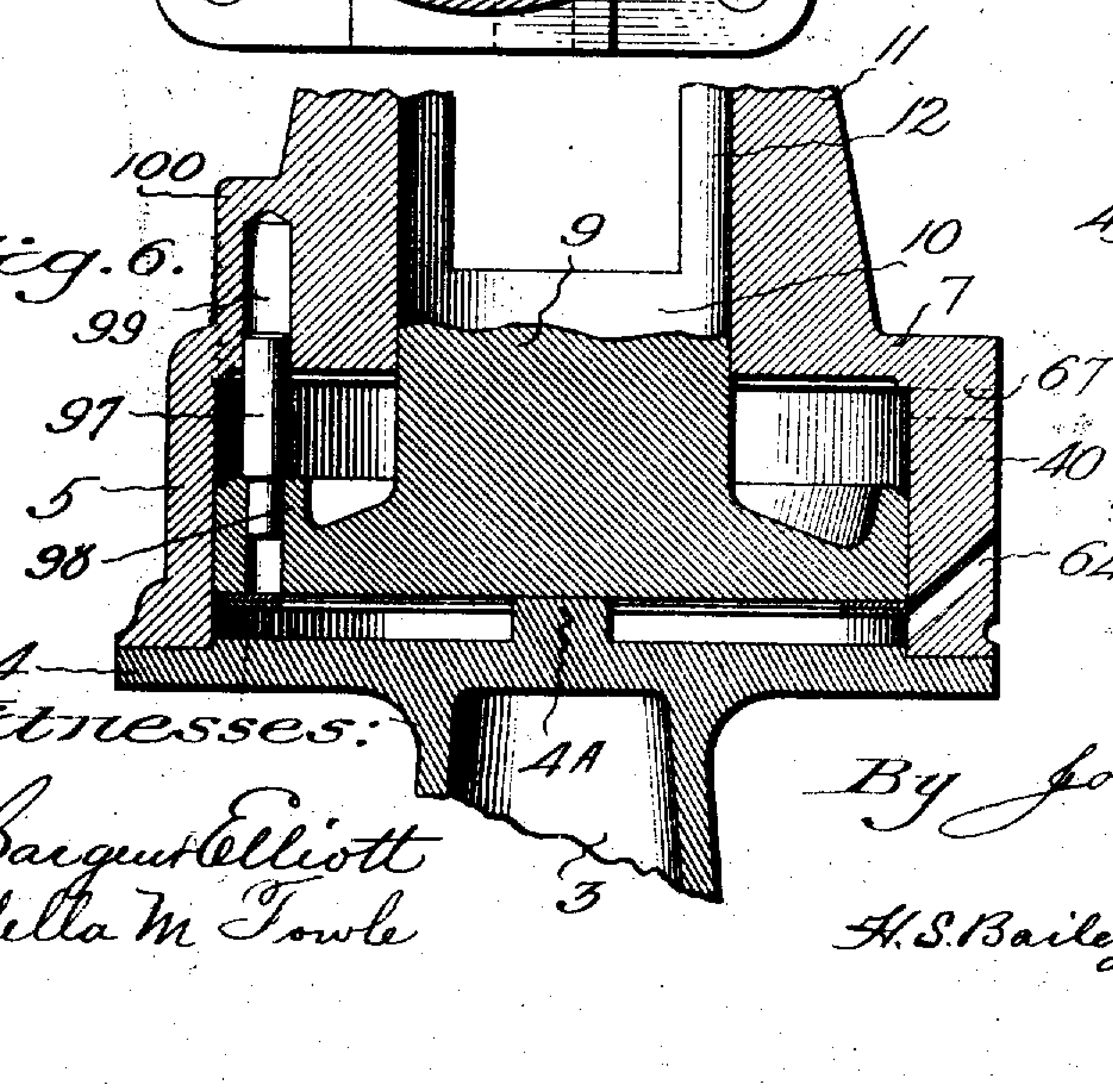


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN GEORGE LEYNER, OF DENVER, COLORADO.

FLUID-OPERATED DRILL-SHARPENER.

No. 917,777. Specification of Letters Patent. Patented April 13, 1909.

Application filed June 8, 1907. Serial No. 377,985.

To all whom it may concern:

Be it known that I, JOHN GEORGE LEYNER, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented new and useful Fluid-Operated Drill-Sharpeners, of which the following is a specification.

My invention relates to a fluid controlled drill sharpener, and the objects of my invention are: First, to provide a fluid or pneumatically controlled drill gripping and holding and drill sharpening machine. Second, to provide a fluid or pneumatically controlled vise for gripping and holding a drill. Third, to provide a fluid or pneumatically controlled drill sharpener in which one of the jaws of the drill holding vise is controlled by fluid pressure to grip, hold, and release a drill. Fourth, to provide a fluid or pneumatically controlled piston operated drill holding vise and a hammer piston driven reciprocating dolly for sharpening a drill. Fifth, to provide a fluid controlled piston operated drill holding vise, and a reciprocating hammer piston operated dolly controlled by a manually operated throttle valve. Sixth, to provide a drill sharpener having a fixed jaw and a movable jaw, said movable jaw being actuated to move to and from the fixed jaw, and to grip and hold a drill by fluid pressure, preferably compressed air, and to provide a reciprocal movement drill striking dolly adapted to be driven on its drill sharpening strokes by a hammer piston, and to be moved on its inoperative strokes by a resilient device, and adapted to reciprocate independent of the reciprocal strokes of said hammer piston, and to provide a manually operated throttle valve arranged to control and actuate, by a continuous movement, said movable jaw of said vise and said hammer piston substantially simultaneously, but to actuate said vise in time enough before the hammer piston is started to enable said jaw to grip and hold a drill bit in operative striking relation to said dolly. And seventh, to provide a simple, durable, accurate rock cutting lip forming die holding and dolly striking compressed air or other fluid controlled and operated drill-bit sharpener for the rock cutting drill bits of rock drilling engines. I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a front elevation of the improved drill sharpener. Fig. 2, is a rear elevation of the same. Fig. 3, is a central vertical, sectional view thereof, showing a drill clamped in position for sharpening. Fig. 4, is a side elevation of the drill holder and sharpener detached from its supporting standard. Fig. 5, is a slightly enlarged view similar to Fig. 4, the drill sharpener being omitted, and the valve casing being removed to show the ports which admit the actuating fluid into the cylinder above and below the piston. Fig. 6, is a central vertical, sectional view through a portion of the machine, at right angles to the line of section shown in Fig. 3, the piston being at the limit of its downward movement, and means being shown for preventing axial movement of the said piston. Fig. 7, is a transverse vertical sectional view through the valve casing, showing the ports in said casing for admitting the actuating fluid to the lower and upper ends of the cylinder, and to the sharpener, the exhaust port also being shown, the casing being detached from the side of the cylinder. Fig. 8, is a vertical sectional view, taken through the axial center of the valve casing, showing the valve and its stem and the ports for admitting actuating fluid to the under side of the piston. Fig. 9, is a front elevation of the fluid controlling valve. Fig. 10, is a rear elevation of the same. Fig. 11, is a side view of the valve stem. Fig. 12, is a front view of the dolly holder and guide. Fig. 13, is a plan view of the piston, the drill holding die which is secured in the upper end of its stem being removed. Fig. 14, is a front elevation of a pair of drill holding dies, of a form adapted for holding a hexagonal drill. Fig. 15, is a longitudinal sectional view through Fig. 14. Fig. 16, is a front view of a pair of drill holding dies designed for drills cruciform in cross section. Fig. 17, is a longitudinal sectional view thereof. Fig. 18, is a face view of the plug or block to which the upper drill holding die is secured. Fig. 19 is a top plan view thereof. And Figs. 20, 21, and 22 are diagrammatic views illustrating the three positions of the fluid controlling valve.

Similar characters of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1, designates the supporting stand of my fluid controlled drill sharpener. This stand comprises a floor or foundation base 2, a hollow vertical column or standard 3, and a top or table portion 4, all of which are preferably made of circular form. Upon this supporting stand, I place the drill sharpener and holder, which comprises a cylinder 5, which sets on and is secured to the table portion of the stand by any suitable means, but preferably by bolts or cap screws 6. This cylinder is open at its bottom, the table portion forming its lower cylinder head, and it is closed at its upper end by an integral head 7. This cylinder is provided with an axial bore or piston chamber, in which a piston 8 is reciprocally mounted, and which is provided with a short piston-rod or stem 9, that extends through an aperture 10, formed in the upper head of the cylinder.

A vertically projecting standard 11, is formed on the top of the cylinder, having a central bore 12, which forms a continuation of the aperture 10, in the upper cylinder head 7. The thickness of this standard is less than the diameter of the piston stem, hence its bore 12 is formed in diametrically opposite sides of the standard, while the piston stem projects laterally through the opposite faces of the standard as shown. The upper end of the piston stem, however, is reduced in width to correspond to the thickness of the standard, and in this upper end is formed a recess, in which is secured a drill holding die 13. The bore or guideway 12, extends a suitable distance above the end of the piston stem, and in its upper end is secured a block 14, by bolts 15, which pass down through the top of the standard into threaded holes in the block, and the block has a recess in its under side, in which is secured a die 16, which is a counterpart of the die 13. The recess in the end of the piston stem, in which the die 13 is secured, comprises two abutting semi-circular recesses of different diameters. The recess 17 of smaller diameter, extends practically through two-thirds of the thickness of the end of the piston stem, and terminates at the beginning of the recess 18, of larger diameter, which recess extends to the opposite face of the end of the stem. The shoulder 19, at the juncture of the two recesses, is under-cut as shown in Fig. 3. The block 14, has recesses 20, and 21, and an under-cut shoulder 22, exactly corresponding respectively to the recesses 17 and 18, and the under-cut shoulder 19, in the end of the piston stem, and when the stem and block are adjacent to each other, as shown in Fig. 18, their respective recesses form a circular hole or bore of two diameters. Bolt holes 23 and 24 are formed respectively through the end of the valve stem, and the block 14, and ends of these holes adjacent to the larger semi-circular recesses of the said stem and block, are counter-bored as shown at 25, the counter-bores cutting through the said recesses 18 and 21 for a purpose to be presently explained.

The dies 13 and 16, are formed with semi-circular members 26 and 27 respectively, which lie within the semi-circular recesses 17 and 20; and also with members 28 and 29 respectively, which lie within the recesses 18 and 21. They are also formed with under-cut shoulders 30 and 31 respectively, which dove-tail upon the shoulders 19 and 22, of the stem and block. The larger ends of the dies are formed with semi-circular recesses 32, which coincide with the bolt hole counterbores 25, and when the dies are placed in position, as shown in Fig. 3, and bolts 33 are passed through the holes in the stem and block, their heads will lie partially in the counterbores 25 and in the recesses 32, in the ends of the dies, and when nuts are screwed upon the ends of these bolts, they will cause the under-cut shoulders of the dies to engage or lock one upon the other, so that the said dies will be securely held in their recesses.

The two dies have each a half hexagon shaped recess 34, formed in them, and when the dies are placed together these recesses will register and form a complete axial hexagonal bore. The two half parts of the die are further provided with conical recesses 35, which are concentric with the hexagonal bore, and which converge from the front end of the die into the hexagonal bore, as clearly shown in Fig. 15. This hexagonal bore in the die is made large enough to grip the standard size hexagon tool steel used, which is generally seven-eighths inch steel, but if any other size tool steel is used a set of dies are made for it, and in case round tool steel is used the dies should have a round gripping aperture through them, and this axial gripping aperture in the die is made a trifle smaller than the diameter of the tool steel, so that the jaws will grip it firmly.

In Figs. 16 and 17, I have illustrated a pair of dies 36 and 37, which are adapted to hold a drill steel that is cruciform in cross section; in all other respects these dies are the same as those shown in Figs. 14 and 15. The cylinder is provided with a valve chest 38, which comprises a flange portion 39, that is bolted or is otherwise secured to a base portion formed on the side of the cylinder, and a cylindrical portion 41 formed on the flange portion. This cylindrical portion 41, is formed with a valve chamber 42, that extends into it from its front side, in which a valve seat 43 is formed, and a disk valve 44 is placed in the chamber and seated against the valve seat 43. The entrance to the valve chest is threaded, and a cover 45 is threaded to it and is provided with a hexagonal wrench receiving portion by which the cover may be screwed into it. An axial aperture is formed through the cover, and a valve stem 46 extends into and through the cap and is coupled to the valve, and to its outer end a handle 47 is secured.

The valve 44 consists of a hub 48, formed with a flange or disk, which comprises substantially two-thirds of a complete circle, a segment of about 135 degrees being omitted. An inwardly projecting rim 49 is formed around the circumferential edge of the valve, which also extends radially to the hub from the two points where the circumferential edge terminates, and when the rim lies against the valve seat, as shown in Fig. 8, a chamber or port 50, is formed between the valve and its seat, the purpose of which will be fully explained hereinafter. The valve seat is formed with an axial bearing hole 51, and the adjacent face of the valve hub 48, is formed with a circular lug or stud 52, which projects into the hole 51, and supports and centers the valve relatively to its seat. The opposite face of the hub is formed with a groove 53, which receives a rectangular head 54, formed on a circular flange upon the inner end of the valve stem, by which the disk is rotated when the stem is turned.

Diametrically opposite stop lugs 55 and 56 are formed on the wall of the valve chamber, and a tail or projection 57 is formed at a suitable point on the circumferential edge of the valve, which is designed to engage these stop lugs to limit the movement of the valve in each direction, as will more fully appear.

A threaded axial counterbore is formed in the inner face of the cap 45, which receives a cupped packing washer 58, which surrounds the stem 46, and a cupped packing nut 59 is screwed into the counterbore over the washer 58. The flange on the end of the valve stem lies between the nut 59 and the face of the valve hub, and prevents the head 54 from becoming detached from the groove 53 in the valve hub.

The valve seat 43, is formed with inlet ports 60, 61, and 62, and with an exhaust port 63. The port 60 extends horizontally through the valve chest and communicates with a vertical port 63^A in the inner face of the valve chest, which extends down adjacent to the bottom of the chest and communicates with a port 64, which extends through the side of the cylinder 5, below the piston 8. The port 61 extends through a threaded nipple 65, on the side of the valve chest, and connects with the cylinder of a pneumatic hammer, as will appear later, and the port 62 extends through the valve chest and communicates with a vertical port 66, in the inner face of the chest, which communicates with a port 67 which extends through the cylinder 5, at a point above the piston 8. The exhaust port opens out through the end wall of the valve chest as shown in Figs. 7 and 8, and an inlet port 68 is formed through the side of the valve chest, which port is threaded to receive a nipple, which is connected by a hose 69 with a source of fluid under pressure.

When the machine is not operating, the valve stands in the position shown by dotted lines, Fig. 7, and as illustrated in Fig. 9, in which position all the ports are closed, and in communication with the valve port 50, and the vertical terminal edge of the valve will be parallel with the port 60, while the other terminal edge will be parallel with the port 62. These terminal edges stand at an angle of about 60 degrees to each other, thereby forming a gap or recess in the valve whereby the ports are uncovered and communicate with valve chest, as the valve is turned.

With the valve in the position shown in Fig. 9, the piston 8 is at the lower end of the cylinder 5, and consequently the drill holding die 13 is at the limit of its movement below the upper die 16. To operate the machine, a drill is placed in the die 13, and the valve is moved to the position shown in Fig. 20, when the operating fluid will be admitted to the under side of the piston, which will be forced up, and the drill will be clamped between the two dies. A further movement of the valve to the position shown in Fig. 21, will uncover the port 61, and admit the operating fluid to the cylinder of the dolly operating piston hammer, which will be operated to sharpen the drill, and by reversing the valve to the position shown in Fig. 22, the fluid beneath the piston will exhaust through the valve port 50 and exhaust port 63, and the port 62 will be uncovered and fluid admitted above the piston 8, which will be moved down and the drill released, as will all be more fully explained hereinafter.

The rear end of the cylinder is provided with an integral vertical standard 70, which is provided with a circular aperture 71, in alinement with the axial center of the drill gripping dies when they are in the position shown in Fig. 1. Within the aperture 71, I insert the hub portion of a hammer piston cylinder 72. The cylinder is formed with a circular flange 73, at one end, from which the hub projects, and the hub is inserted from the rear side of the standard, and the flange is bolted to the standard by bolts 74, which extend through and beyond the other side of the standard. I also secure to the opposite side of the standard, which is the front side, a dolly guide and support 75. This guide comprises a flange 77, which is bolted to the standard by the bolts 74, and a projecting head 78, provided with an axial bore 79, that is positioned in alinement with the dies and the hammer piston cylinder. Diametrically opposite slots 80 extend in a horizontal plane from the forward end of the head to the flange 77, and a drill lip forming punch or dolly 81, is reciprocally mounted in the bore 79. This dolly comprises a shank portion 82, which is fitted snugly but reciprocally in the bore of the cylindrical hub and a lip cutting head portion of greater diameter. The shank is made long enough to extend through the aperture in the support into the hammer cylinder and into the path of a hammer-piston 83, reciprocally mounted in the cylinder 72. The lipped end or head portion of the dolly is round and the dollies are formed with heads of varying diameters to meet the requirements of the drills being sharpened. The cutting lips of the dolly are arranged radially upon the face of its head, which is made at right angles to the axial center of the dolly, and these lips extend from the center of the dolly's head to its periphery; consequently, they will form a circumferential row of radially arranged rock cutting lips on the end of a drill. I preferably employ a full triangular or inverted V-shaped rock cutting lip on the dolly, and form the dolly with preferably four five or six of these lips. My invention, however, contemplates the use of dollies having any desired number or shape of rock cutting lips, arranged in any desired manner and with the head of the dolly of any desired form, and adapted to form a rock cutting end on or to resharpen solid or hollow drill steel or drill bits.

The pneumatic hammer piston cylinder is provided with a removable rear cylinder head 84, which is preferably threaded to the cylinder and is provided with a wrench receiving nut. The hammer piston is made in two diameters and the cylinder's bore is consequently made in two diameters. The larger diameter of the hammer piston forms about one-third of the length of its smaller diameter portion, and a square shoulder 85 is formed at the junction of the larger and smaller portions of the piston. An axial aperture is formed in the rear end of the hammer piston, which extends into it from its rear end to near its front end, and a circumferential row of port holes 86, is formed radially through the shell to intersect the inner terminal end of this axial aperture. I preferably use but four of these radial port holes and preferably place each pair of them at diametrically opposite centers to each other through the shell and each pair at a slight distance to one side of the other pair.

The cylinder is arranged to reciprocally support the piston, and an air inlet port 87 is formed in it, to which is connected one end of a pipe 88, which connects at its other end with the fluid supply port 61, of the valve chest 41, the pipe being connected to the nipple 65 by a union 89. The forwardly projecting hub portion 71^A of the cylinder 72, is provided with an axial chamber 90, which is made a little larger than the diameter of the striking end of the hammer piston or the rear end of the shank of the dolly. The shank of the dolly extends into this chamber, and the striking end of the hammer piston also extends into it on the forward stroke of its reciprocal movement and strikes the shank end of the dolly, as will be understood by reference to Fig. 3.

In Fig. 3, the hammer piston is in position to receive the actuating fluid to start it forward. The fluid enters through the port 87, and passes into the bore of the hammer piston, through the ports 86, and drives the piston forward against the dolly, and as the ports 86 pass within the chamber 90, the fluid exhausts into said chamber and out through an exhaust port 91. The fluid then exerts a pressure upon the shoulder 85 of the hammer piston, and drives it rearward again.

The dolly is reciprocally mounted in its supporting head independently of the hammer piston, and is arranged in the reciprocal path of the hammer piston, and is adapted to be struck by said piston on each forward stroke and driven against the opposing end of the drill bit. It is necessary, however, that the dolly be held normally within the reciprocal striking path of the hammer piston, and that after being struck and driven against a drill bit, it should be instantly returned independently of the rearward movement of the hammer piston, as it is essential that the rearward movement of the dolly be free and independent of the reciprocal movement of the hammer piston, and yet at the same time be as positive and quick and have a resilient variable throw within the limits of its full reciprocal stroke, so that if the burying of its lip into the soft hot steel of a drill bit should make it slightly slower in its return stroke than the hammer piston, it would still make the greater portion of its return stroke before the hammer piston again struck it, but normally it should make its full return stroke slightly quicker than the hammer piston makes its backward stroke and be in position to receive the full force of the hammer piston's forward stroke.

There are a number of ways by which the dolly could be automatically returned independently of the hammer piston after being struck by it, and the invention contemplates any means by which this feature may be accomplished, but I preferably carry out this feature of my invention in the following manner: Through the shank of the dolly is passed a steel pin 82^A, which extends through and beyond the opposite sides of the said shank far enough to form trunnions which are arranged to extend through and beyond the slots 80 in the head. These trunnions are engaged by the free ends of a pair of springs 92, the opposite ends of which may be secured in any desired manner to the standard 70, but which I preferably secure by removably clamping them between a plate 93 and the top of a boss 94 formed on the standard 70, by a cap screw 95, a coil 96 being formed intermediate of the ends of the springs and arranged under contractive tension which they are arranged to exert to hold the shoulder formed at the junction of the head and shank portions of the dolly normally against the end of its support and the inner end of its shank in the striking path of the hammer piston.

The trunnions of the shank of the dolly, reciprocating in the radial slots of the cylinder, act as feather keys, and hold the dolly against rotative movement. The peripheral surface of the lips of the dolly and the adjacent periphery of the head of the dolly, converge the same angle that is given to the conical entrance of the dies, so that should the hammer piston and the dolly be operated when a drill bit is not placed in jaws in striking relation to the dolly or be operated when a drill bit is not in the jaws, the beveled peripheral surface of the head of the dolly will strike in the beveled tapering entrance to the die, which will receive the spent blows of the dolly without injuring the lips of the dolly.

In order to prevent the piston 8, from turning axially in the cylinder 5, a pin 97, having a reduced lower end, is driven into a hole in a boss 98, formed on the upper edge of the piston until the shoulder formed at the junction of the two diameters of the pin rests upon the top of the boss. The projecting end of this pin extends into a guide hole 99, which extends through the top of the cylinder and into an enlargement 100, formed on the standard 11. The pin 97, which is partially within the hole when the piston is down, will pass up into the hole, as the piston rises, and thus prevent it from turning within the cylinder.

Upon the forward portion of the cylinder 5, is formed a hub 101, having a threaded axial hole, in which one end of a bar or tube 102 is screwed. This bar extends forward parallel with the direction in which the drill bit extends, when clamped, and upon it is slidably mounted one end of a drill supporting arm 103, which is provided with a set screw to secure the said arm at any desired point of the length of the bar 102.

The opposite end of the arm is provided with a V-shaped recess, which is arranged in axial alinement with the axial center of the upper half die 16, and is arranged and adapted to support the rear ends of the drill bits so that they will rest in horizontal alinement with the center of the dies when gripped by said dies.

The rock cutting drill bits to be resharpened or the drill steel in drill lengths upon which it is desired to form rock cutting lips, are heated in a forge to a suitable degree of heat, and each drill bit or drill steel is inserted in the dies and gripped and held there by the pneumatic pressure of the upwardly moving piston, and the rock cutting lips are formed on it by the reciprocating dolly, which is operated by the reciprocating piston 83, mounted in the cylinder 72.

The operation of my pneumatic drill sharpener is as follows: A supply of compressed air under the desired pressure is led from a source of supply to the air inlet aperture and port 68, through the pipe or hose 69, a fragment of which is shown in Figs. 1 and 2. The handle 47 is then moved in the direction of the arrow—Fig. 4— to turn the valve 44 to the position shown in Fig. 20, when the actuating fluid will pass through ports 60, 63, and 64, to the lower end of the cylinder 5, below the piston 8, which will thereby be raised to the position shown in Fig. 3. A drill bit or a bar of drill steel, the point of which is to be resharpened, or on which a new rock cutting point is to be formed, is previously placed in the lower half die 13, so that its end to be sharpened is just about even with the front end of the die, and the piston rises quickly and clamps the said drill bit against the half die of the block 14. In practice, I preferably use a pressure of about 80 pounds per square inch, but less pressure will hold the drill bits satisfactorily. This pressure is so great that the half dies will make indentations into a cold bar of tool drill steel. This position of the valve allows the drill steel to be clamped between the dies 13 and 16, before the actuating fluid is admitted to the cylinder of the piston hammer. The handle is then pushed in the same direction, until the tail 57, of the valve, engages the stop 55, when, not only the port 60 but the port 61 also will be opened, and the actuating fluid will pass through port 61, pipe 88, and inlet 87, to the hammer piston cylinder 83, and accomplishes the reciprocation of the hammer piston to strike the dolly, in the following manner:

The piston hammer being in the position shown in Fig. 3, the actuating fluid, which is preferably air, on entering the cylinder passes into the bore of the piston hammer through the ports 86, and drives the hammer forward against the dolly, which is there by driven against and into the hot end of the drill, upsetting it so that it fills the bell-shaped entrance to the die and forces its lips into it and forms a set of circumferentially and radially arranged V-shaped rock cutting lips on said drill similar in every respect to its own lips. The very rapid reciprocative movement of the hammer piston causes the dolly to strike with great rapidity against the drill bit, and the springs 92 draw the dolly back after it strikes each blow; thus the dolly automatically assumes its normal position after each blow independently of the air controlled reciprocating movement of the hammer piston. At each forward stroke of the hammer piston, the air exhausts through the ports 86, into the chamber 90, and thence to the atmosphere through the port 91, at which instant, the pressure being removed from the rear end of the valve, the air acts upon the shoulder 85, to throw the hammer rearward and the operation is repeated.

When the drill has been properly sharpened, and it is desired to stop the piston hammer and remove the said drill, the handle 47 is reversed and moved until the tail 57 on the valve 44 contacts with the stop 56, when the valve will be in the position shown in Fig. 22, and the air beneath the piston 8 will exhaust through ports 64, 63, and 60, into the valve port 50, and thence through the port 63 to the atmosphere. At the same instant, air will be admitted above the cylinder through ports 62, 66, and 67, and the piston will be forced down until it is stopped by a supporting lug 4^a, upon the piston head 4, which insures an open space between the said head and the piston, to permit the entrance of air.

My invention contemplates broadly an air controlled vise for holding a drill bit, and a reciprocating blow striking dolly actuated by an air controlled hammer piston, and means for actuating the dolly on its inactive strokes in such a manner that it will have a resilient compensating movement independent of the air controlled movements of the piston hammer.

While I have illustrated and described the preferred construction and arrangement of my pneumatic drill sharpener, I do not wish to be limited to the precise construction and arrangement shown and described, as many changes might be made without departing from the spirit of my invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent is:

1. In a drill sharpener, the combination of a supporting base, a cylinder arranged to form the upper part of said base, and provided at its top with a fixed vertical standard, a block fixed in the top of said standard, a removable drill-bit clamping die in said block, a reciprocating piston in said cylinder having a vertically projecting stem, a die in the end of said stem in line with the fixed die of said standard, a valve chest on said cylinder, a system of fluid inlet and exhaust ports extending from said valve chest to said piston, and a manually operated valve in said valve chest arranged to control said ports to operate said piston to grip and hold a drill-bit.

2. In a drill sharpener, the combination with a supporting base, a cylinder provided with a drill supporting arm, a yoke-shaped standard on said cylinder, a die at the upper end of said standard, a fluid controlled piston reciprocally mounted in said cylinder having a vertical stem, and a die in the end of the stem, said dies being formed with a combined drill-bit shank gripping portion and a conical diverging tapering portion adapted to form an enlarged tapering head portion on drill-bits, an arm on said cylinder, a hammer piston and cylinder mounted on said arm, a drill sharpening dolly reciprocally mounted to project into said cylinder in the reciprocal path of said piston, and arranged to face the conical end portion of said drill bit gripping dies, a valve chest on the cylinder, a system of fluid ports extending from said valve chest to said cylinder and dolly operating hammer piston-cylinder, and a manually operated valve in said valve chest arranged to control the ports leading to said cylinders.

3. In a drill sharpener, the combination of a supporting base, a cylinder mounted on said base, a drill holding vise supported by said cylinder, a piston in said cylinder forming a part of and arranged to control said vise to hold a drill, a hammer piston cylinder supported upon said first cylinder, a dolly reciprocally mounted in a support adjoining said hammer piston cylinder, means connected with said cylinder and including a hammer piston in said cylinder for driving said dolly forward, a valve chest secured to said vise operating cylinder, a valve seat in said valve chest provided with fluid ports which lead from said valve seat to said cylinders, a disk valve seated in said valve chest against said valve seat, an expansive fluid inlet and exhaust port in said valve chest, and means including a handle for manually operating said valve to control the ports of said cylinders and thereby operate said drill gripping vise to hold a drill, and said hammer piston and dolly to sharpen a drill.

4. In a fluid controlled drill sharpener, the combination with a supporting base, a cylinder secured upon said base, a piston in said cylinder having a vertical sleeve, a bracket on said cylinder, a hammer piston cylinder supported upon one side of said bracket, a support secured to the opposite side of the bracket, a dolly reciprocally mounted in said support in alinement with said hammer piston cylinder, means including a hammer piston in said cylinder for driving said dolly forward, a valve chest on the first cylinder, a valve seat in said chest, a system of fluid inlet and exhaust ports leading into and from said valve chest and from said valve seat to said cylinders and from said cylinders to the atmosphere, a disk valve in said valve chest seated against said valve seat, an axial valve stem extending through and beyond said valve chest and secured at its inner end to said valve disk to rotate the same within said chest on said valve seat, a handle on the outer end of said valve stem, said fluid ports being arranged in progressive order in said valve seat and concentric to the center, a recess being formed in said valve whereby

said ports are uncovered as they register with the recess, and an exhaust port in the under side of said disk valve, registering with said ports in operative order.

5. In a fluid controlled drill sharpener, the combination with a supporting base, a cylinder having a piston operated drill holding vise, mounted on said base, a valve chest on said cylinder, and a manually operated valve disk in said chest, a system of fluid inlets and exhausts in said valve chest leading to said cylinder, of a pneumatic hammer cylinder and hammer piston supported on said first cylinder, a dolly reciprocally mounted in said cylinder in operative drill sharpening relation to said vise, and a fluid conveying tube connected at one end to said valve chest and at its opposite end to said hammer piston cylinder, and arranged to admit air to said hammer piston to drive said dolly on its drill sharpening strokes.

6. In a fluid controlled drill sharpener, the combination of the supporting base, of a cylinder mounted thereon, a piston in said cylinder, a drill holding vice operated by said piston to grip and hold a drill, a dolly operatively supported in drill sharpening relation to said vise, with the valve chest provided with a circular valve seat, a disk-shaped valve pivotally mounted in said valve chest, and seated against said valve seat, there being a recess in the periphery of said valve disk, an exhaust port in said valve disk, and an operative system of fluid inlet and exhaust ports arranged concentric with the axis of said disk valve and its exhaust port, said recess permitting said ports to be opened as the valve is rotated, and means including a manually operated handle for rotating said disk valve to open and close said ports to admit actuating fluid to said cylinders and pistons.

7. In a drill sharpener of the character described, the combination with a standard, of a cylinder mounted thereon; a piston in said cylinder, and means for preventing axial rotation of said piston; a standard on said cylinder, having a die at its upper end; a stem on the piston, and a die on the end of said stem in alinement with the first die; a cylinder having a hammer piston; a dolly in the path of said piston; a valve chest on the first mentioned cylinder; a seat formed in said chest having ports leading to said cylinder, and to the atmosphere; a valve in said chest on said seat adapted to open said ports successively when the valve is turned, and means for limiting the rotation of the valve in each direction.

8. In a drill sharpener, of the character described, the combination with a main cylinder and a piston therein, having a vertical stem; a die in the upper end of the stem; a yoke-shaped standard on the cylinder, and a die in said standard in line with said piston's die; with a bracket at the rear of said standard, having an axial bore; a support secured to one side of the bracket, having an axial bore in line with the bore of the bracket, a dolly reciprocally mounted in said support, an operative hammer piston cylinder supported by said bracket, a hammer piston reciprocally mounted in said cylinder and arranged to strike said dolly on its forward stroke; a valve chest on the main cylinder, having ports leading to the upper and lower end of the main cylinder and to the atmosphere; a pipe connecting one of said main cylinder's ports with said hammer piston's cylinder; a valve for opening the ports of both cylinders successively; and means for operating and for limiting the movement of said valve.

9. In a fluid controlled drill sharpener, the combination of a pair of drill-bit clamping jaws comprising a fixed and movable jaw, said movable jaw being slidably mounted in a supporting frame, means for moving said movable jaw, a half die on each jaw, each half die being provided with a funnel shaped drill upsetting and sharpening recess, a beveled shoulder in each jaw, a beveled shoulder on each half die registering against the beveled shoulder of each jaw, and a bolt extending through each jaw and arranged to clamp each half die's beveled shoulder to the beveled shoulder of each jaw.

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

JOHN GEORGE LEYNER.

Witnesses:
E. T. STEVENSON,
ROBT. J. HILL.