C. J. SMITH.

ROCK DRILL SHARPENING AND SHAPING MACHINE.

APPLICATION FILED FEB. 8, 1907.

919,969. **Patented Apr. 27, 1909.**

4 SHEETS—SHEET 1.

Fig. 1.

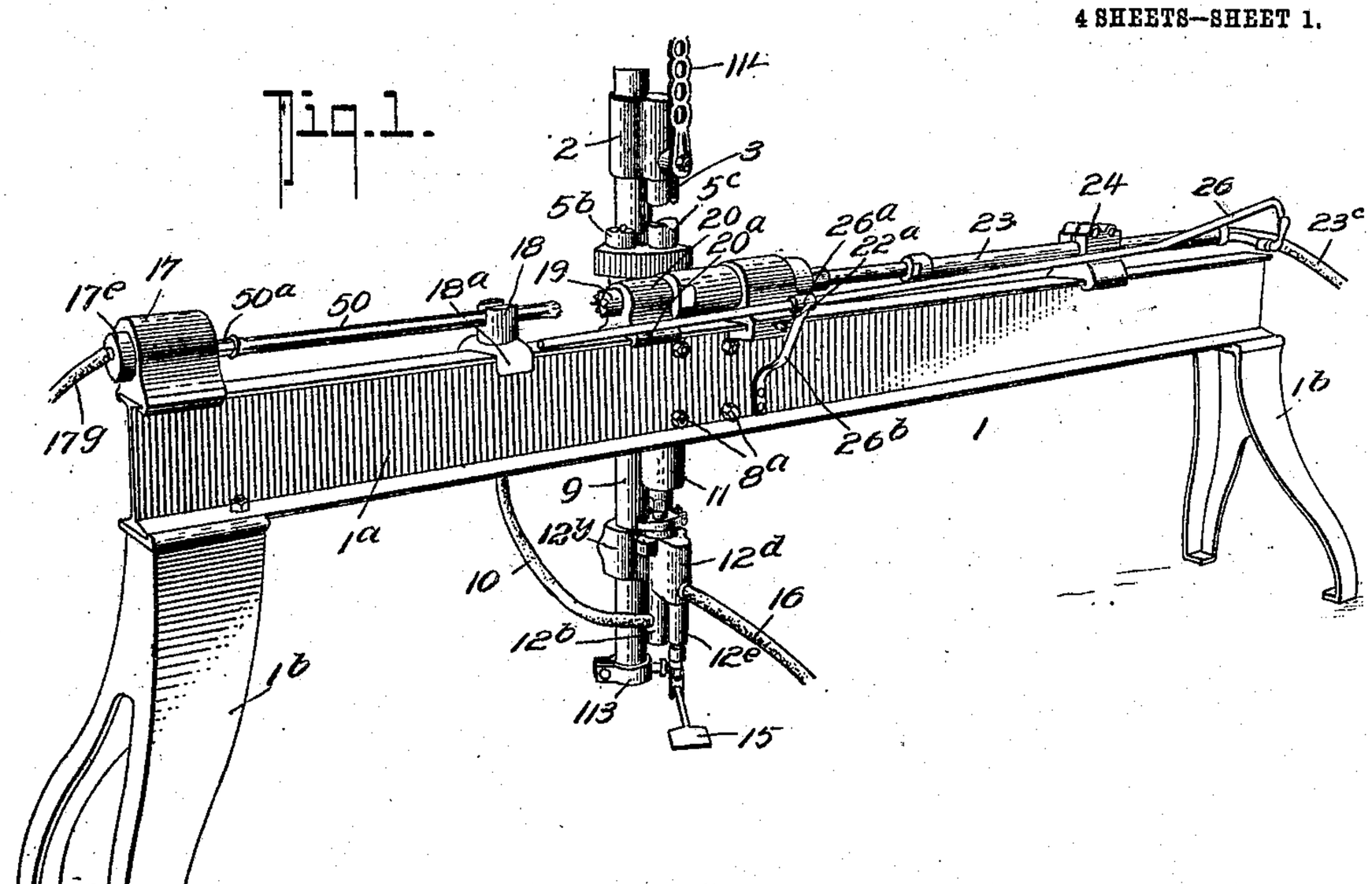
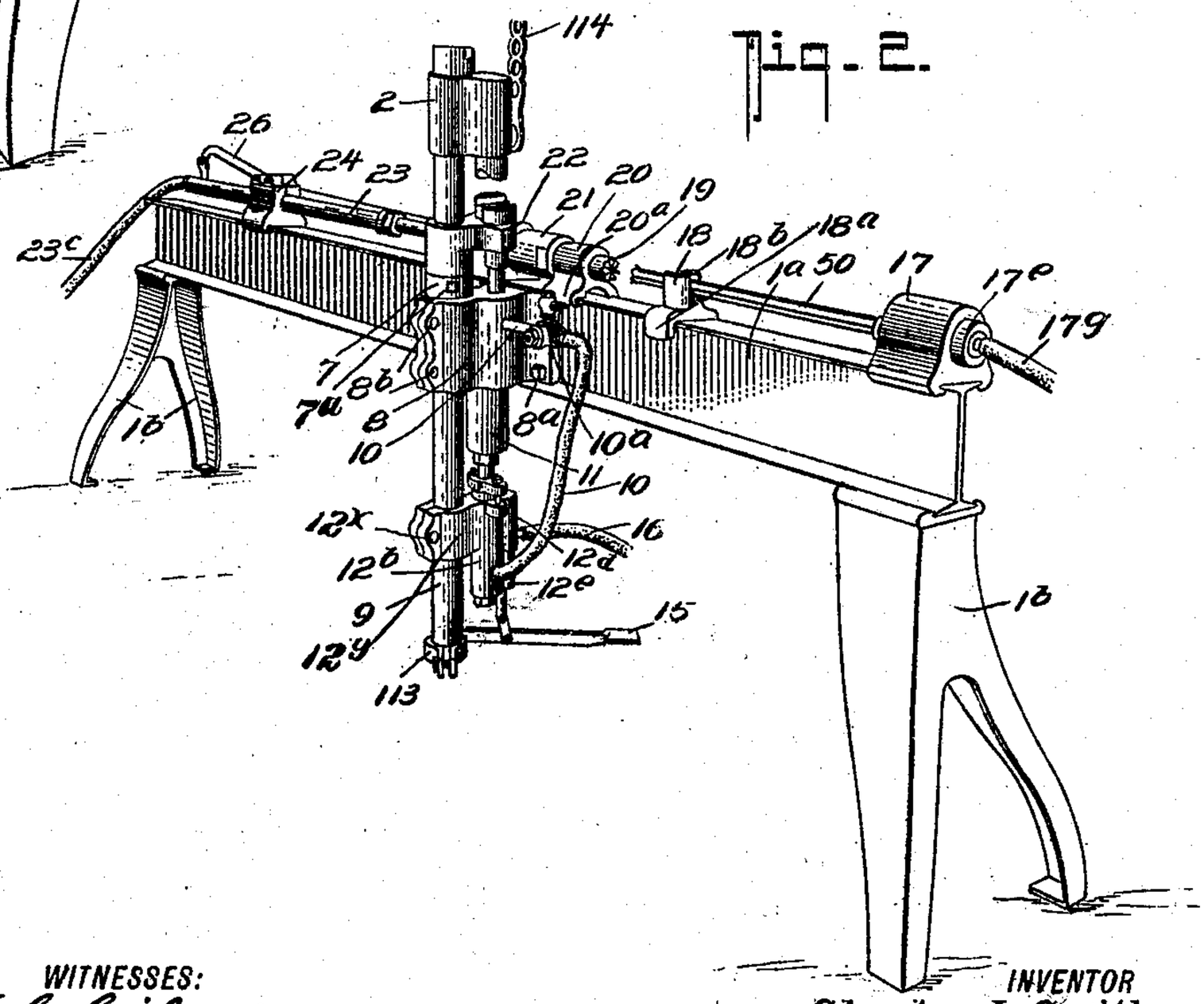


Fig. 2.



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4 SHEETS—SHEET 2.

Fig. 3.

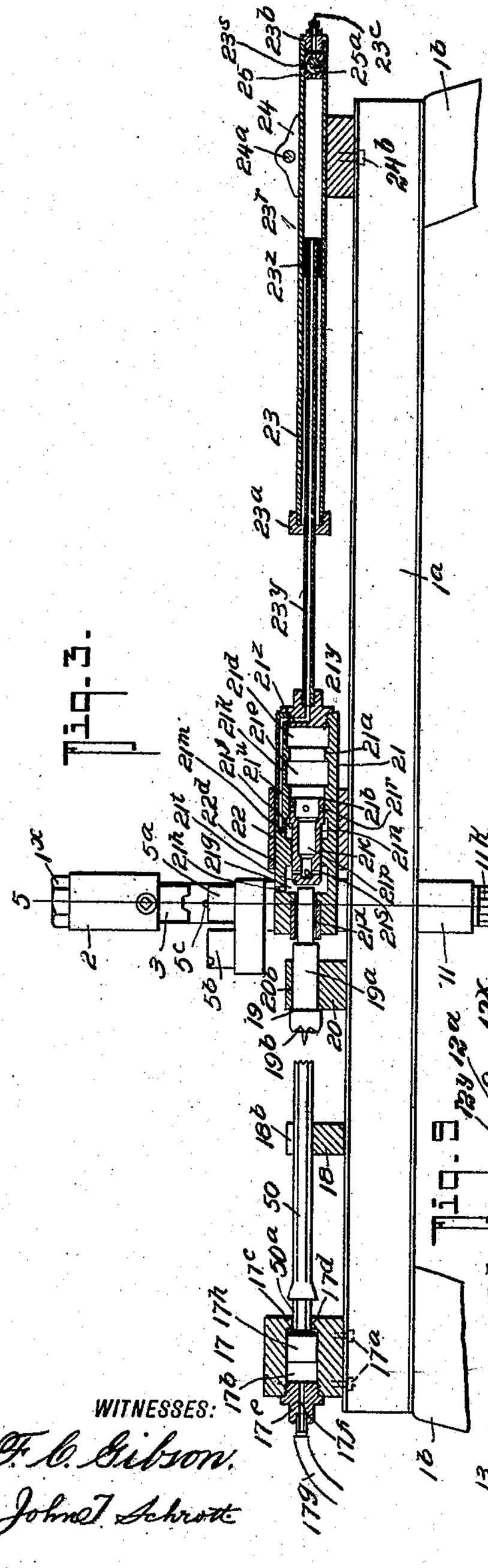

Fig. 4.

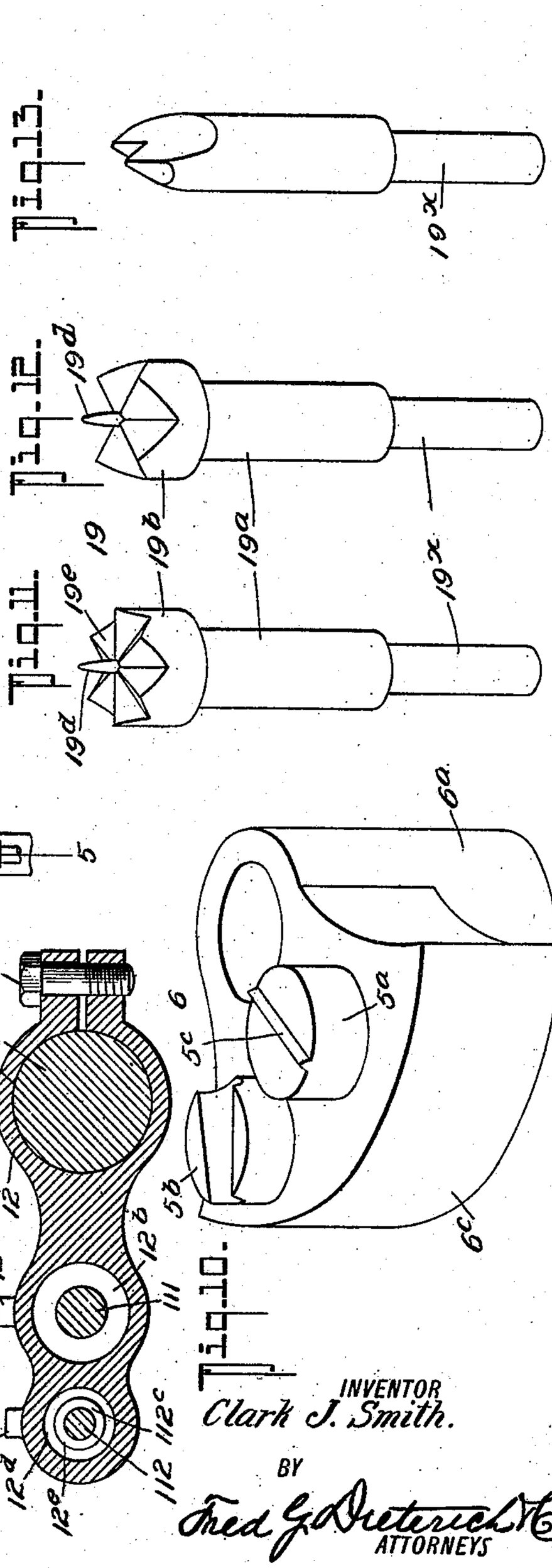

Fig. 12.

Fig. 13.

Fig. 10.

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4 SHEETS—SHEET 3.

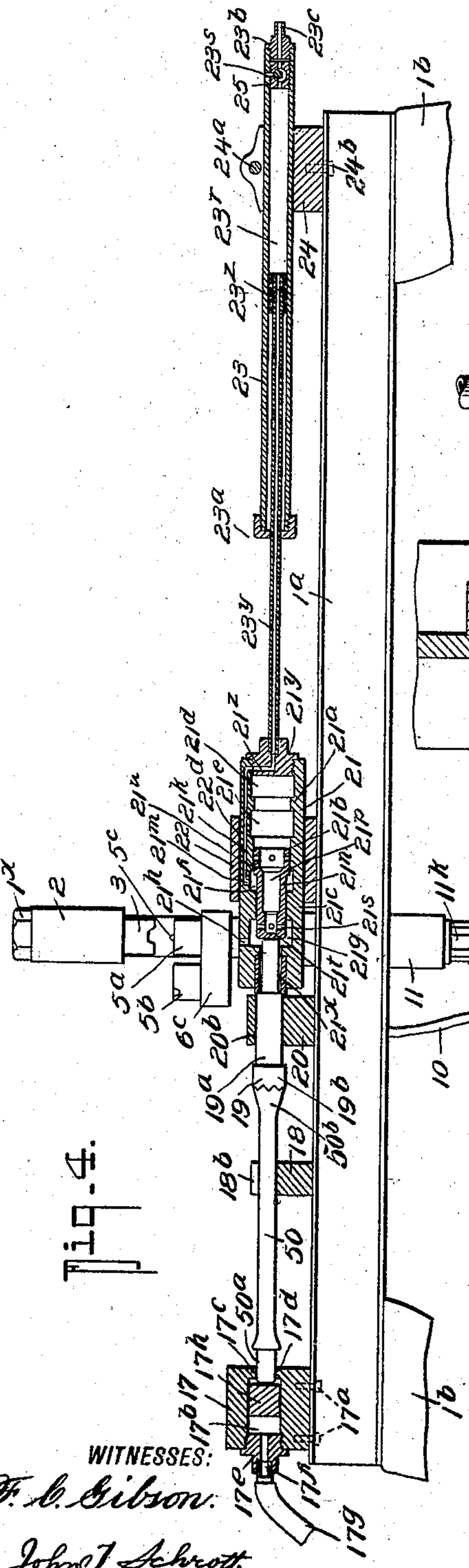

Fig. 4.

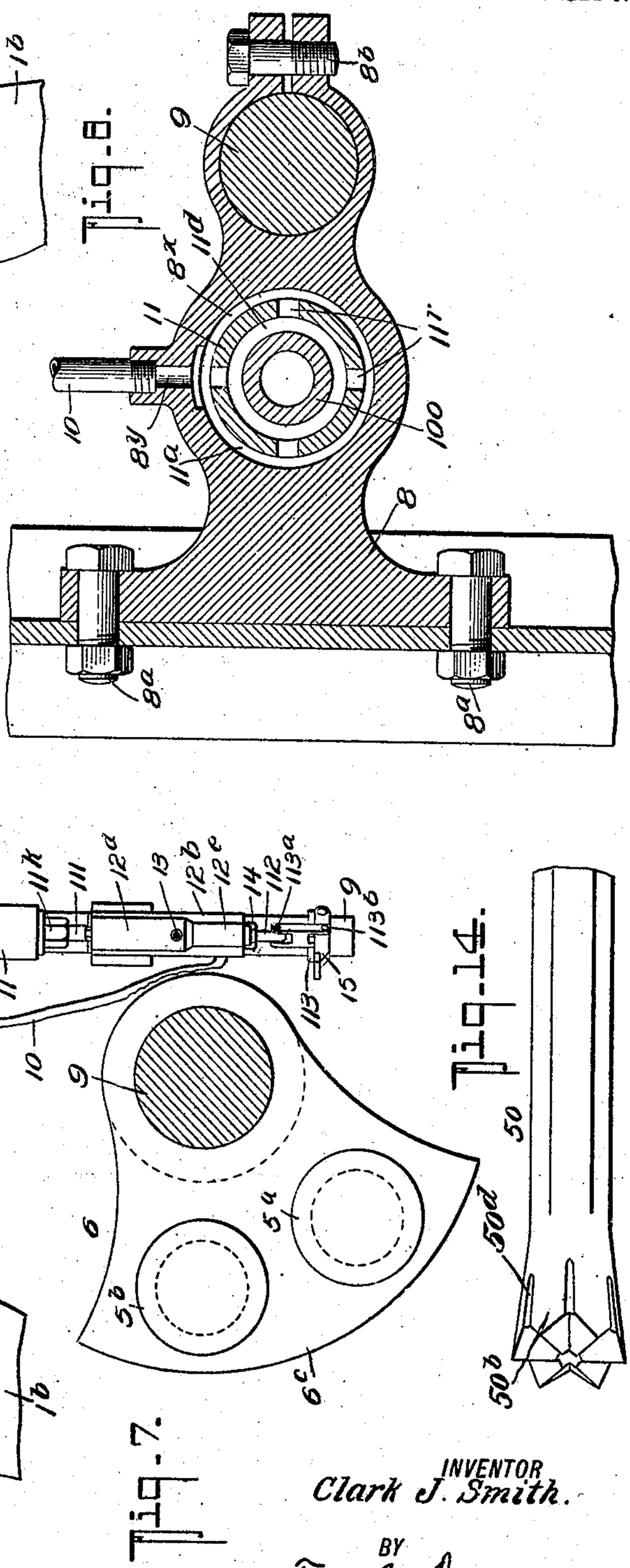

Fig. 8.

Fig. 14.

Fig. 7.

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4 SHEETS—SHEET 4.

Fig. 5.

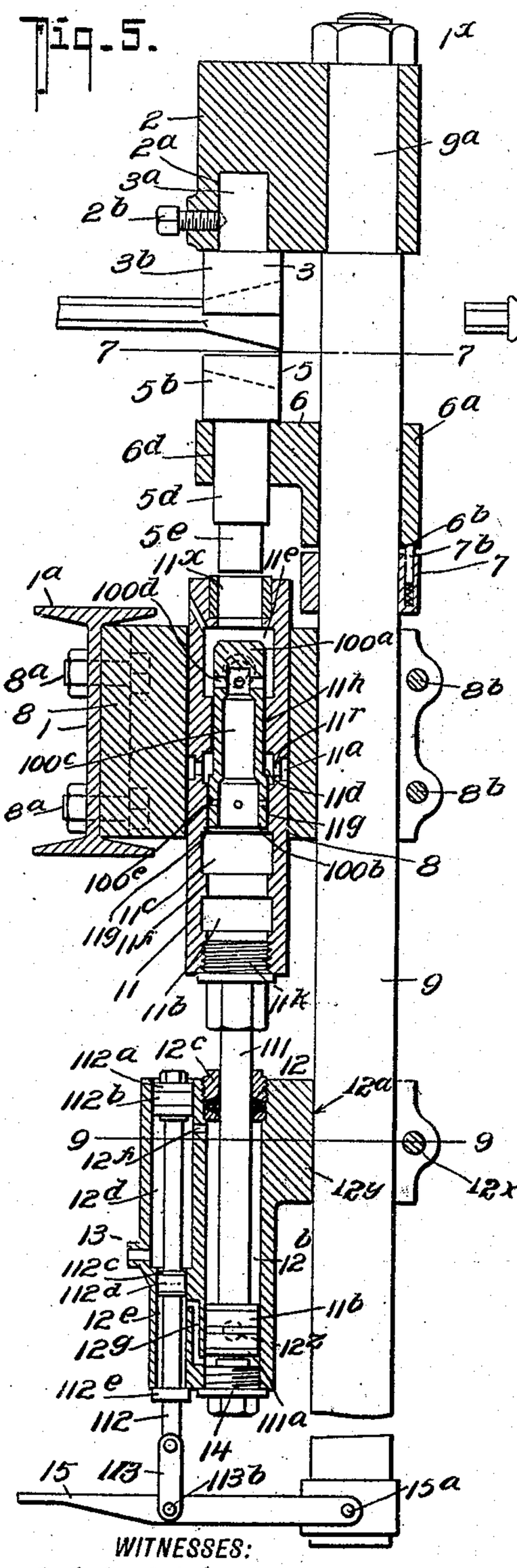
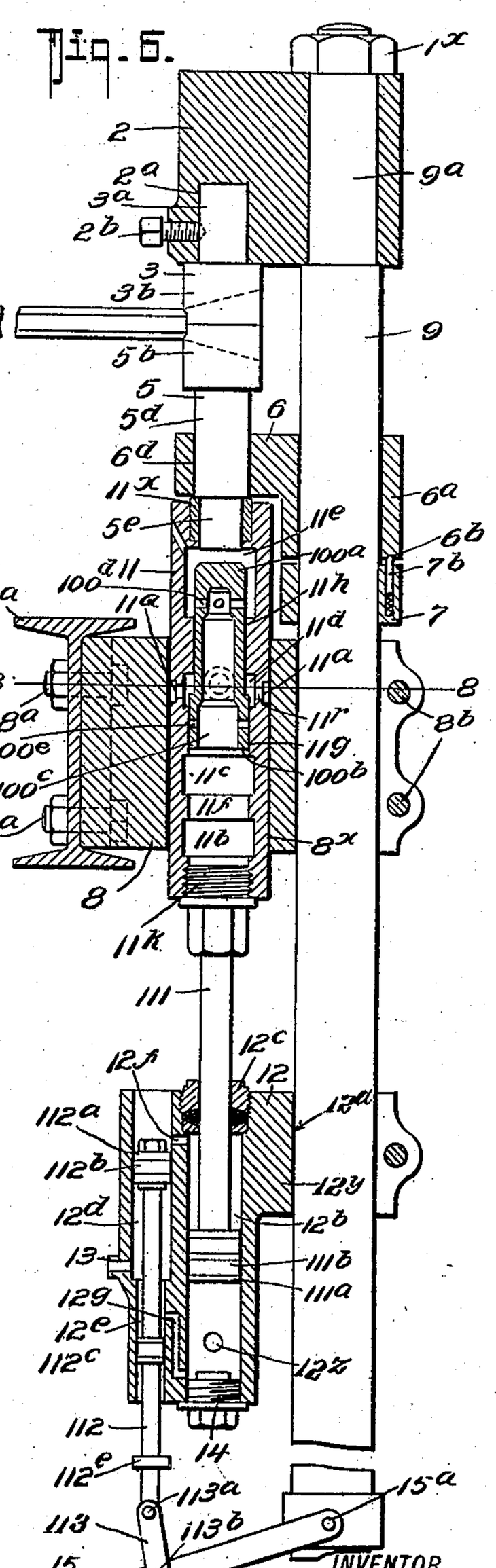


Fig. 6.



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UNITED STATES PATENT OFFICE.

CLARK J. SMITH, OF OTTUMWA, IOWA, ASSIGNOR TO HARDSOCG WONDER DRILL CO., INCORPORATED, OF OTTUMWA, IOWA.

ROCK-DRILL SHARPENING AND SHAPING MACHINE.

No. 919,969. Specification of Letters Patent. Patented April 27, 1909.

Application filed February 8, 1907. Serial No. 356,481.

To all whom it may concern:

Be it known that I, CLARK J. SMITH, residing at Ottumwa, in the county of Wapello and State of Iowa, have invented certain new and useful Improvements in Rock-Drill Sharpening and Shaping Machines, of which the following is a specification.

My invention relates to certain new and useful improvements in means for sharpening, forming and shaping rock drill bits, and it more particularly has for its object to provide a machine of this character of a very simple and effective construction, composed of a minimum number of parts and in which the parts are so arranged and designed as to be capable of ready control by the operator and will be automatic in their operation.

Generically my invention comprises a suitable supporting bed upon which is mounted the shaping and slot cutting devices and the sharpening devices proper.

The shaping and slot cutting mechanism in its generic nature comprises a supporting frame secured to the bed frame in which a supporting column is held, the upper end of this column carrying a fixed die and a pair of shiftable dies and at the lower end the controlling valve and feeding mechanism are supported. The controlling valve and feeding mechanism are coöperatively connected with a pneumatic hammer that is adjustably held in the column supporting frame and coöperates with the shiftable dies.

The sharpening mechanism proper consists of a drill supporting means including a pneumatic bumper or holder to coöperate with the drill and also includes a dolly holder and hammering engine to coöperate with the dolly for sharpening the drill end, the pneumatic hammer including means coöperatively connected therewith whereby the same can be controlled and automatically fed up to the work.

In its more subordinate nature my invention includes certain novel construction, combination and arrangement of parts all of which will be first described in detail, and then be specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which:

Figure 1, is a perspective view of my invention looking at the same from the front of the machine. Fig. 2, is a similar view looking at the invention from the rear of the machine. Fig. 3, is a central, vertical longitudinal section of the invention showing the position of the parts just prior to bringing the dolly in engagement with the bit. Fig. 4, is a similar view showing the position of the parts as the dolly is engaging the bit to sharpen the same and the piston of the hammer being in its dolly engaging position. Fig. 5, is a vertical, cross section on the line 5—5 of Fig. 3, showing the position of the parts when the shaping dies are separated. Fig. 6, is a similar view showing the position of the parts when the shaping dies are operating on the drill bit to bring the same into proper gage. Fig. 7, is a cross section on the line 7—7 of Fig. 5. Fig. 8, is a cross section on the line 8—8 of Fig. 6. Fig. 9, is a cross section on the line 9—9 of Fig. 5. Fig. 10, is a detail perspective view of the shiftable die holder and its dies. Figs. 11, 12, and 13, are perspective views of various forms of dollies which may be used in my machine. Fig. 14, is a detail perspective view of the end of a drill bit formed by my machine.

Referring now to the accompanying drawings in which like letters and numerals of reference indicate like parts in all of the figures 1 designates the bed frame of the machine which comprises the bed 1^a which may be in the nature of an ordinary I-beam to which are bolted the standards or legs 1^b, as shown.

To one end of the I-beam 1^a a drill holder 17 is secured by bolts 17^a or otherwise, and the drill holder 17 is bored out at 17^b to form a hollow chamber which is closed at one end by the web 17^c that is apertured as at 17^d to receive the end 50^a of the drill bit 50. The chamber 17^b is closed at its other end by a threaded plug 17^e which has a passage 17^f communicating with the air feed pipe 17^g as shown Held within the chamber 17^b is a buffer block 17^h that is held against the end 50^a of the drill bit 50 by pneumatic pressure within the chamber 17^b between the buffer block 17^h and the plug 17^e in a manner more fully explained later. Slidably mounted on the I-beam 1^a is a drill carriage 18 which has flanges 18^a to fit over the I-beam and which is provided with a drill receiving pocket 18^b, as shown, whereby the drill may be held in the pocket 18^b in such a manner as to be readily removable.

22 designates the hammer support which is fixed to the I-beam 1^a by set screws 22^a,

if desired, and the hammer support is provided with a longitudinal aperture to receive the hammer casing 21, the hammer casing and hammer will be more fully described hereafter.

20 designates a dolly support which is slidably mounted on the I-beam 1^a in a manner similar to the drill support 18 and the dolly support 20 has flanges 20^a to cooperate with the I-beam 1^a and has a dolly receiving aperture 20^b in which the dolly 19 is held, the dolly 19 having a shank 19^a and a head 19^b which is provided with the cutting points or teeth 19^c, as shown, and the center 19^d for use whenever a hollow drill bit is being operated upon. The shank 19^a is of two diameters one of which 19^x is such as to fit into the chuck 21^x of the hammer casing.

The pneumatic hammer in my present invention is of the reciprocating type and consists of the casing 21 which has a central bore provided with annular flanges 21^a, 21^b, 21^c to separate the bore into a series of chambers 21^d, 21^e, 21^f and 21^g respectively, the chamber 21^g being adjacent the chuck end of the casing and communicating with the atmosphere through exhaust ports 21^h, as shown. The end of the casing 21 opposite the chuck 21^x is closed by a screw plug 21^y having a bore 21^z that meshes with a passage 21^k in the hammer casing, the passage 21^k communicating with the chamber 21^f through ports 21^m as shown.

The passage between the chambers 21^f and 21^g formed by the web 21^c is of less diameter than that between the chamber 21^d, 21^e and 21^f to properly coöperate with the reciprocating hammer piston 21^n which has a central bore 21^p and radial apertures 21^r and 21^s at opposite ends. The hammer piston 21^n is provided with a hammer head 21^t and an enlarged butt end 21^u for the usual purposes. The screw plug 21^y receives a piston rod 23^y that passes through a cap 23^a on the feed piston casing 23 and the piston rod 23^y projects into the casing 23 and carries a suitably packed piston head 23^z, as shown. The casing 23 is held in the support 24 by a set screw 24^a the support 24 being in turn fixedly secured to the I-beam by screw bolts 24^b or in any other desired manner. The other end of the feed piston casing 23 is closed by a screw plug 23^b having a passage through which the working agent is passed from the working agent feed supply pipe 23^c, the working agent passing through a three-way valve 25 before it comes in contact with the piston 23^x. The three-way valve 25 has ports 25^a that permit passage of the working agent from the supply pipe 23^c into the piston casing 23 to force the piston 23^z outward and the ports of the valve 25 are also so arranged that when the valve is in another position the working agent within the chamber 23^r of the piston casing 23 will be exhausted to atmosphere through a port 23^s, but when the valve 25 is in a third position the exhaust port 23^s as well as the working agent fed to the chamber 23^r is cut off rendering the feeding of the pneumatic hammer to the work inoperative.

The shaping and slot cutting mechanism which forms a part of my present invention, comprises a supporting frame 8 which is secured to the bed plate 1^a by bolts 8^a, as shown, and which carries a supporting rod or column 9 that is adjustably held in the supporting frame 8 by clamping bolts 8^b, as indicated in Figs. 5, 6 and 8. The upper end of the column 9 is reduced as at 9^a and terminates in a shorter portion to receive a securing nut 1^x which holds the upper die holder on the reduced part 9^a of the column 9. The upper die holder 2 is socketed at 2^a to receive the upper die 3 which is held in position by a set screw 2^b, as shown, and the upper die 3 has a shank 3^a and the head 3^b, the under surface of which is shaped to properly form the drill bit end.

7 designates a collar secured to the column 9 by a set screw 7^a so as to support the lower die holder 6 which has a hub portion 6^a apertured to receive the column 9, and the lower holder 6 is rotatable on the column 9 and held in its various positions by a spring latch 7^b carried by the collar 7 which enters depressions 6^b in the hub portions 6^a of the die holder 6. The die holder 6 comprises a die carrying arm 6^c having a pair of die receiving pockets 6^d to respectively receive the shaping die 5, and the slot cutting die 5^a, as shown, the shaping die 5 having a head 5^b whose upper face is shaped to correspond with that of the die head 3^b to properly shape the drill end, while the die 5^a has its head provided with a groove forming prismatic member 5^c which forms the side grooves in the drill head as will be hereinafter more fully explained, each of the dies 5 and 5^a having shanks 5^d which in turn have reduced ends 5^e to be received in the chuck 11^x of the hammer casing 11. The hammer casing 11 is longitudinally slidable in the aperture 8^x in the frame member 8 and is provided with an outer annular groove 11^a having radial ports 11^r that communicate with an internal bore or chamber of the casing. The internal bore or chamber of the casing 11 is divided into a plurality of sets of compartments, 11^b, 11^c, 11^d, and 11^e respectively by annular flanges 11^f, 11^g and 11^h, as shown.

Reciprocably mounted within the casing 11 is a hammer 100 which comprises the head 100^a and the butt 100^b and the internal chamber 100^c. The hammer 100 is provided with radial apertures 100^d adjacent the head 100^a and corresponding apertures 100^e in the butt 100^b.

8^y designates a port communicating with the bore 8^x near the top thereof in communication with which port the air supply pipe 10 is connected and in this pipe 10 a cut-off valve 10^a may be placed, if desired.

The lower end of the casing 11 is closed by a screw plug 11^k to which connects a piston rod 111 that projects through a gland 12^c into a piston chamber 12^b forming a part of a bracket 12 which is secured to the rod or column 9 by a hub 12^y that is apertured at 12^a to permit passage of the rod 9, and the hub 12^y is secured to the rod 9 by screw bolts 12^x, as shown. The piston rod 111 carries a piston 111^a at its end which is provided with suitable packing devices 111^b, the lower end of the piston cylinder 12^b being closed by a screw plug 14, as shown. The bracket member 12 includes a supplemental piston cylinder or chamber portion of two diameters, 12^d, the larger, and 12^e the smaller diameter, and within the chambers 12^d and 12^e a treadle operated valve piston rod 112 operates and the rod 112 at its upper end carries a piston 112^a provided with suitable packing devices 112^d and also carries a supplemental piston 112^c provided with suitable packing devices 112^d, as shown. The piston 112^a operates in the larger bore 12^d while that 112^d operates in the bore 12^e, a collar 112^e secured to the piston rod 112 serving to limit the upward movement thereof. The valve piston 112 is pivotally secured to a treadle 15 that is pivotally mounted at 15^a to the column 9, by a link 113 that is pivotally mounted at 113^a to the valve piston rod 112 and is pivotally connected at 113^b to the treadle 15. The chambers 12^b and 12^d are in communication with one another near their upper ends by ports 12^f while the chamber 12^e communicates with the chamber 12^b through port 12^g that is in communication with the chamber 12^e near the top thereof and in communication with the chamber 12^b at the bottom thereof.

The air supply pipe 10 which is connected with the port 8^y at one end, has its other end connected with a port 12^z that communicates with the interior of the chamber 12^b near the bottom thereof for a purpose presently to be made clear. The main air supply pipe 16 which communicates with the source of working agent supply is connected with the port 13 that is in communication with the chamber 12^d near its lower end so that the working agent supply can enter directly into the chamber 12^d at all times.

114 designates a gage member that is secured to the upper die holder 2 so that the drill may be gaged from time to time in order to enable the operator to form a drill of the desired size. The gage 114 consists of a flat member having a series of bores of different diameters. The drill may be gaged by simply passing it through either one or the other of the apertures, depending upon the size drill which it is desired to make.

In order to have all parts of the apparatus under control of the operator while standing in one position, the three-way valve 25 hereinbefore referred to is operated through a rod 26 that passes through a bearing 26^a on the end of a bracket 26^b secured to the bed plate 1^a of the machine, the end of the rod 26 being adjacent the drill support 18 so that while the operator manipulates the treadle 15 with one foot and grasps the drill with his left hand he may control the valve 25 with his right hand by grasping the rod 26 and shifting the same as may be desired.

So far as described, the manner in which my invention operates will be best explained as follows:—After the drill 50 has had its end 50^a inserted into the holder 17 with its end 50^b ready to be operated upon by the dolly 19, and after the drill 50 has been laid in the holder 18, the operator opens the three-way valve to admit the working agent into the chamber 23^r of the feed piston mechanism and forces the hammer casing 21 and consequently the dolly 19 forward until the dolly 19 is in contact with the end 50^b of the bit 50. As the feeding takes place the working agent will pass through the aperture in the piston rod 23^y and through the passage 21^k into the interior of the casing 21 and thus operating the hammer piston 21^n, to force the dolly 19 to form the teeth on the end of the bit 50, and at the same time upset the same as at 50^c to bring it into proper shape. After the drill has been sharpened and upset by the action of the dolly 19, the same is removed from the holders 18 and 17 and placed between the dies 3 and 5, and brought down to the proper gage, it being understood that the drill bit 50 can be removed from the dies 3 and 5 from time to time and passed through the gage 114 so that the exact diameter of the butt end may be brought to the desired size. After the bit end 50^b has been formed into the desired gage it may be returned to the sharpening mechanism and the sharpening action completed, it being understood that in practice it may be desired to transfer the drill 50 from the action of the sharpening apparatus to that of the gaging apparatus from time to time back and forth until the drill is both sharpened and gaged to the desired degree. When it is desired to supply the drill bit 50 with clearance grooves 50^d, then the die holders 6 are swung on the column 9 to bring the die 5^a into play, the die 5^a having the required member 5^c to form clearance grooves 50^d on the drill bit between the teeth as occasion may require and in a manner well understood by those skilled in the art.

In operating the shaping and gaging mechanism, the operator places his foot upon the treadle 15 to draw down the valve piston rod 112 to close the port 12^f by the piston

112[a] and open up communication between the chamber 12[d] through the chamber 12[e] to the port 12[g] so that the working agent can enter the chamber 12[b] ahead of the piston 111[b] and force the piston rod 111 upward, carrying with it the hammer casing 11 and feeding the same and in turn the die 5[a] or 5, as the case may be, toward the die 3 to properly act upon the drill bit, it being understood that as soon as the casing 11 has been moved up sufficiently to permit the annular groove 11[a] coming in alinement with the port 8[y], the working agent from the chamber 12[b] will pass out through the port 12[z], via the pipe 10 to the port 8[y] and enter the annular groove 11[a] from whence it will pass through the annular ports into the interior of the hammer casing 11 and act upon the piston 100 in a manner well understood by reference to the drawings, thus causing piston 100 to reciprocate, and impact upon the shank 5[e] of the lower dies 5[a] or 5[b], respectively.

In the practical application of my invention, I desire it understood, that while I have shown a six-point bit, I do not limit myself to the sharpening of bits having six points, since my machine can be used with sharpening dies having the ordinary chisel point, or any number of points; the dolly which does the sharpening may have the same number of points as the bit shown in Fig. 12, or it may have a less number of points as shown in Figs. 13 and 14, and a bit may be sharpened with a dolly having the same number or a less number of points as will be readily understood by those skilled in the art to which the invention appertains. In the shaping and truing operation of my apparatus, the points of the bit may be also rounded if desired.

From the foregoing description taken in connection with the accompanying drawings it is thought the complete construction, operation and numerous advantages of my invention will be readily understood by those skilled in the art to which it appertains.

What I claim is:—

1. In an apparatus of the class described, a column or support, a relatively fixed die holder carried by said column, a die carried by said die holder, a second die holder adjustably mounted on the column, a plurality of dies carried by said second die holder, combined with means continuously tending to move all of said last named dies toward the relatively fixed die while simultaneously impacting the movable die.

2. In an apparatus of the class described, a relatively fixed die and a relatively movable die, an impacting engine for receiving said relatively movable die, a support for said impacting engine, said support having a working agent inlet port and said impacting engine having a working agent inlet port, means for moving the impacting engine and the movable die toward the fixed die to bring the feed port of the engine in alinement with the feed port of its support to operate the impacting engine, substantially as shown and described.

3. In an apparatus of the class described, a relatively fixed and a relatively movable die, an impacting engine coöperating with the movable die, a support for the impacting engine through which the impacting engine is movable, said support having a working agent inlet port, said impacting engine having a working agent inlet port to coöperate with the inlet port of its support at times, means for normally holding the impacting engine with its port out of register with that of its support, and means for bringing the impacting engine with its port in register with the port of its support to operate the impacting engine and feed the movable die toward the fixed die.

4. In an apparatus of the class described, a fixed and a movable die, an impacting engine for receiving the movable die, a support having an aperture in which said impacting engine is endwise movable, said impacting engine having a working agent inlet port, said engine support having a working agent inlet port adapted to register with that of the impacting engine at times, a piston carried by the impacting engine, a piston casing coöperating with said piston and having a piston controlled port, in communication with the port of the engine support, and means for admitting working agent in said piston casing to normally hold the impacting engine with its port out of register with that of its support, and means for admitting working agent in said piston casing to force the impacting engine in one direction to bring its inlet port in register with that of its support, substantially as shown and described.

5. In an apparatus of the class described, an impacting engine combined with a feeding mechanism therefor, said feeding mechanism comprising a support having a main piston chamber having an outlet port, a piston rod carried by the impacting engine, a piston on said piston rod operable within said main piston chamber, said support having a supplemental chamber, a valve stem held in said supplemental chamber, pistons carried by said valve stem, piston controlled ports between said supplemental piston chamber and said main piston chamber, and manually controlled means for shifting said valve stem to open up communication between the supplemental piston chamber and said main piston chamber at either side of said impacting engine carried piston, a support for said impacting engine having a working agent inlet port in communication with the working agent outlet port of the

feeding mechanism support, said impacting engine having a working agent inlet support adapted to be brought into register with the inlet port of its support when the engine is moved in one direction, a relatively fixed die holder and a relatively movable die coöperatively arranged with said impacting engine, substantially as shown and described.

6. In an apparatus of the class described, a relatively fixed die, an adjustably supported relatively movable die holder, a pair of dies carried thereby, an impacting and feeding engine coöperating with said relatively movable dies, means whereby said relatively movable die holder may be moved to bring either of its dies in alinement with the impacting engine, as desired, substantially as shown and described.

7. In a rock drill shaping machine, a fixed and a movable die, a main support, an impacting engine, an impacting engine support secured to said main support and apertured to permit passage of the impacting engine, means for feeding the impacting engine toward the movable die and toward the fixed die and simultaneously admitting working agent to the impacting engine to operate the same.

8. In a rock drill shaping machine, a fixed and a movable die, a main support, an impacting engine, an impacting engine support secured to said main support and apertured to permit passage of the impacting engine, means for feeding the impacting engine toward the movable die and toward the fixed die and simultaneously admitting working agent to the impacting engine to operate the same, said moving means comprising a piston and rod carried by the impacting engine, manually controlled valve devices for admitting working agent to said piston to force the impacting engine longitudinally.

9. In a mechanism of the class described, the combination with the shaping dies and the support therefor, of an impacting engine, a support in which said impacting engine is longitudinally movable, said support and said impacting engine having coöperative ports, means for admitting working agent to the port of the support, together with pneumatic means for moving the impacting engine longitudinally toward or from the dies with its port into or out of register with the port of the support.

10. In a mechanism of the class described, the combination with the shaping dies and the support therefor, of an impacting engine, a support in which said impacting engine is longitudinally movable, said support and said impacting engine having coöperative ports, means for admitting working agent to the port of the support, together with pneumatic means for moving the impacting engine longitudinally toward or from the dies with its port into or out of register with the port of the support, and manually operated means for controlling the action of the pneumatic moving means.

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Witnesses:
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