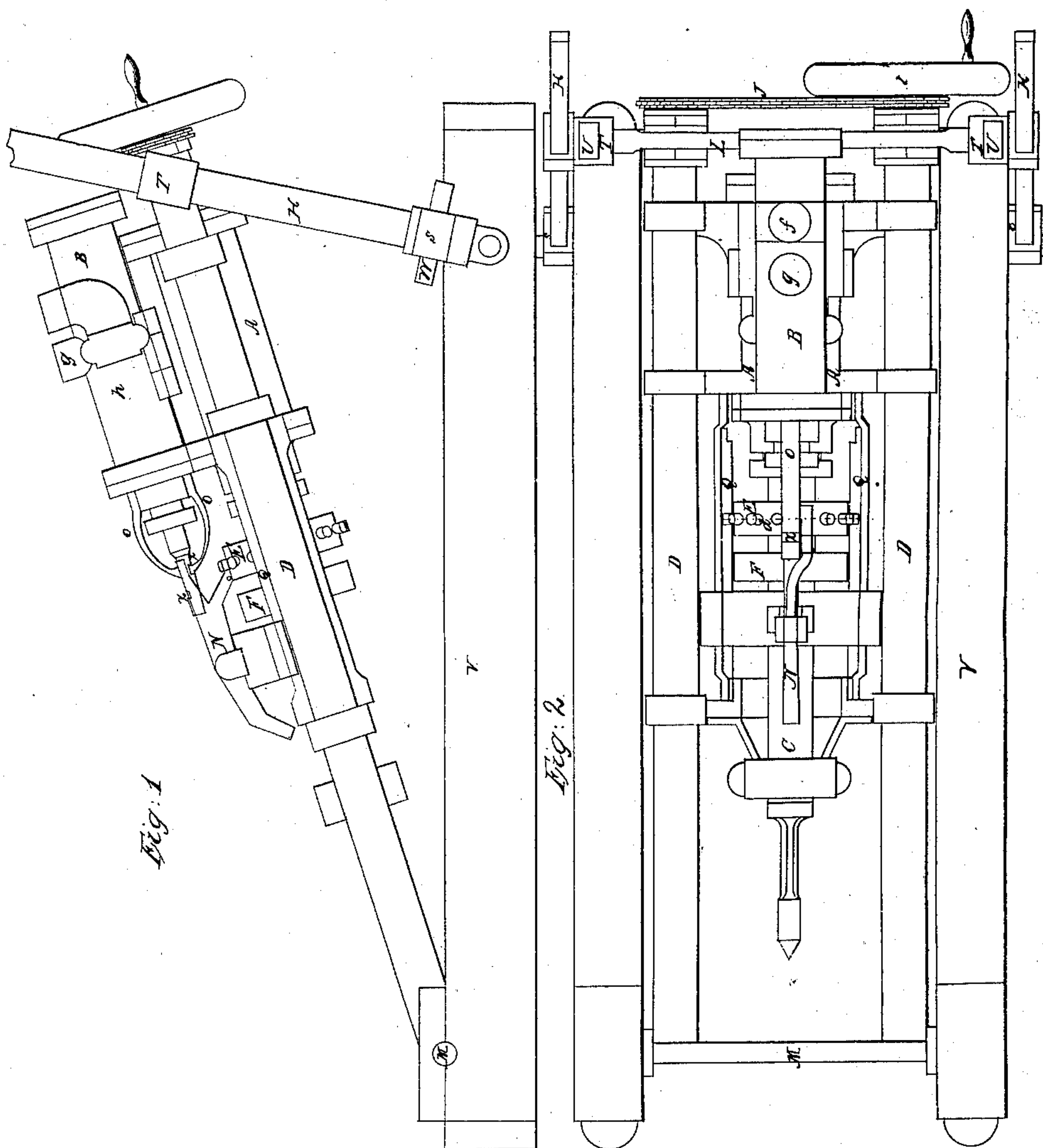


No. 20,423.

PATENTED JUNE 1, 1858.

H. GOULDING.  
STEAM VALVE.

3 SHEETS—SHEET 1.

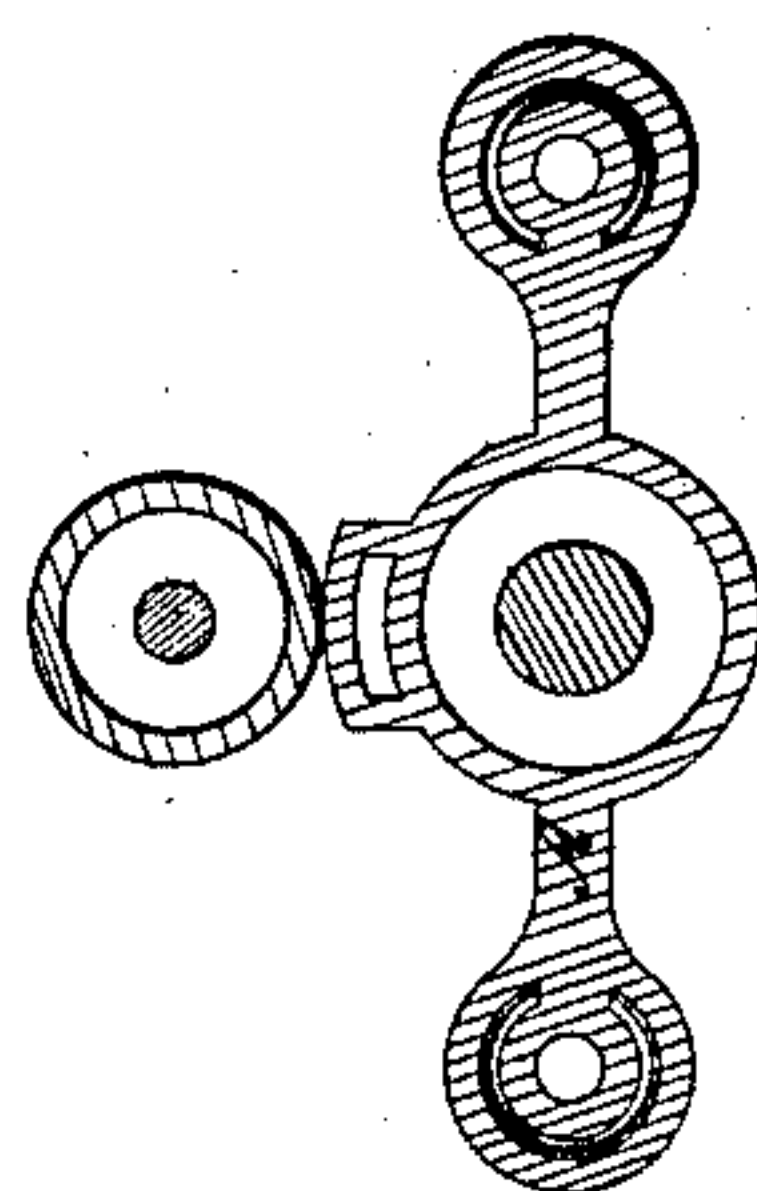
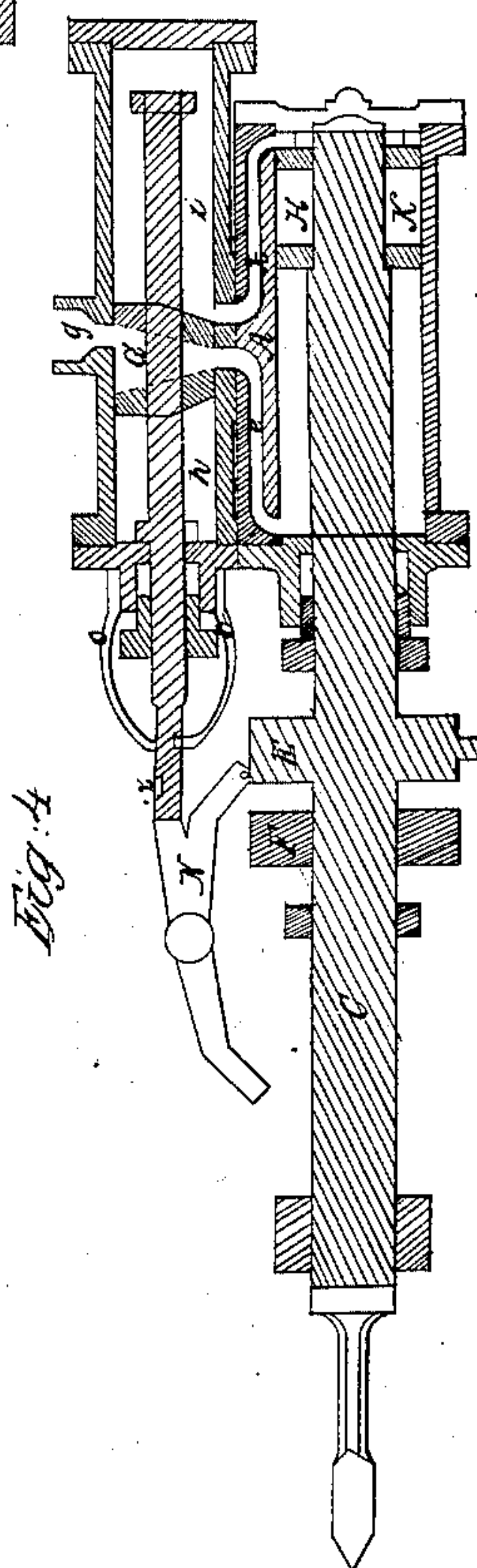
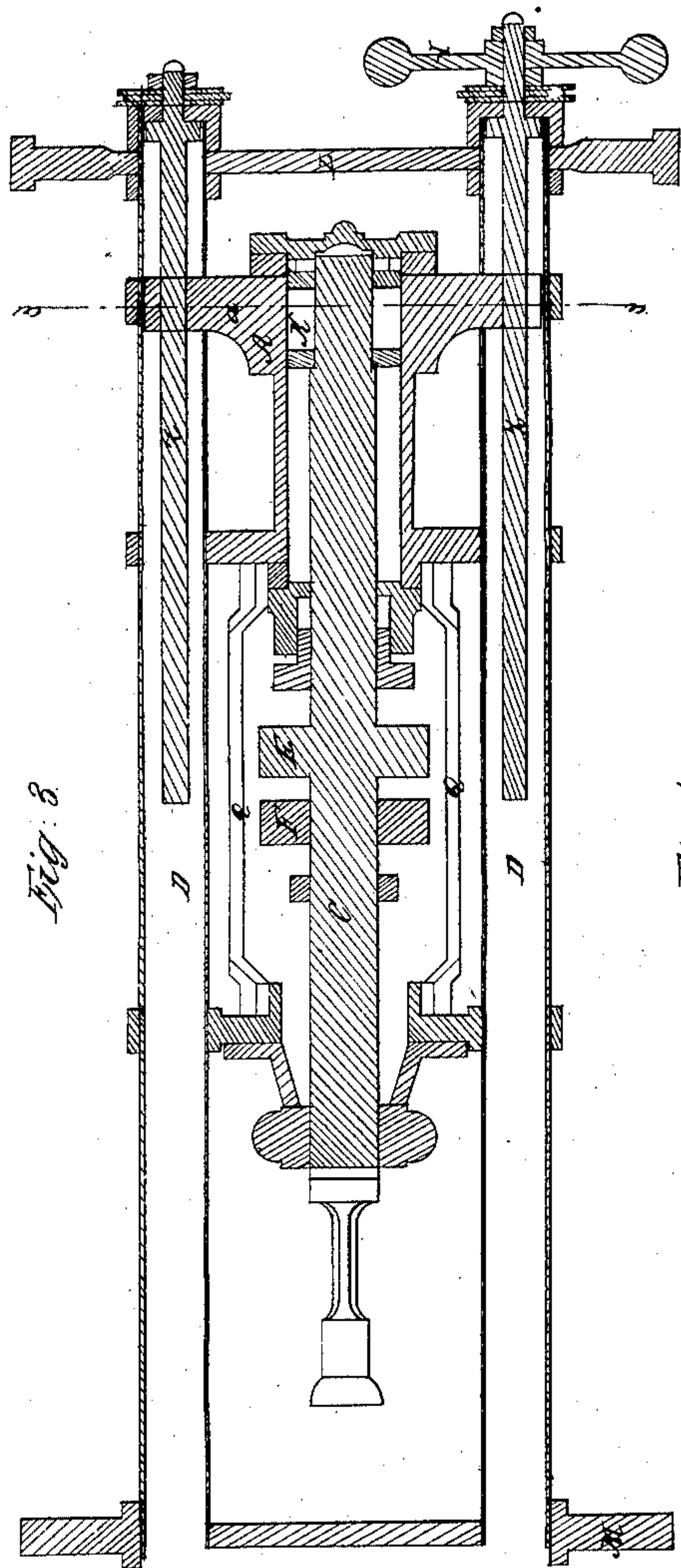


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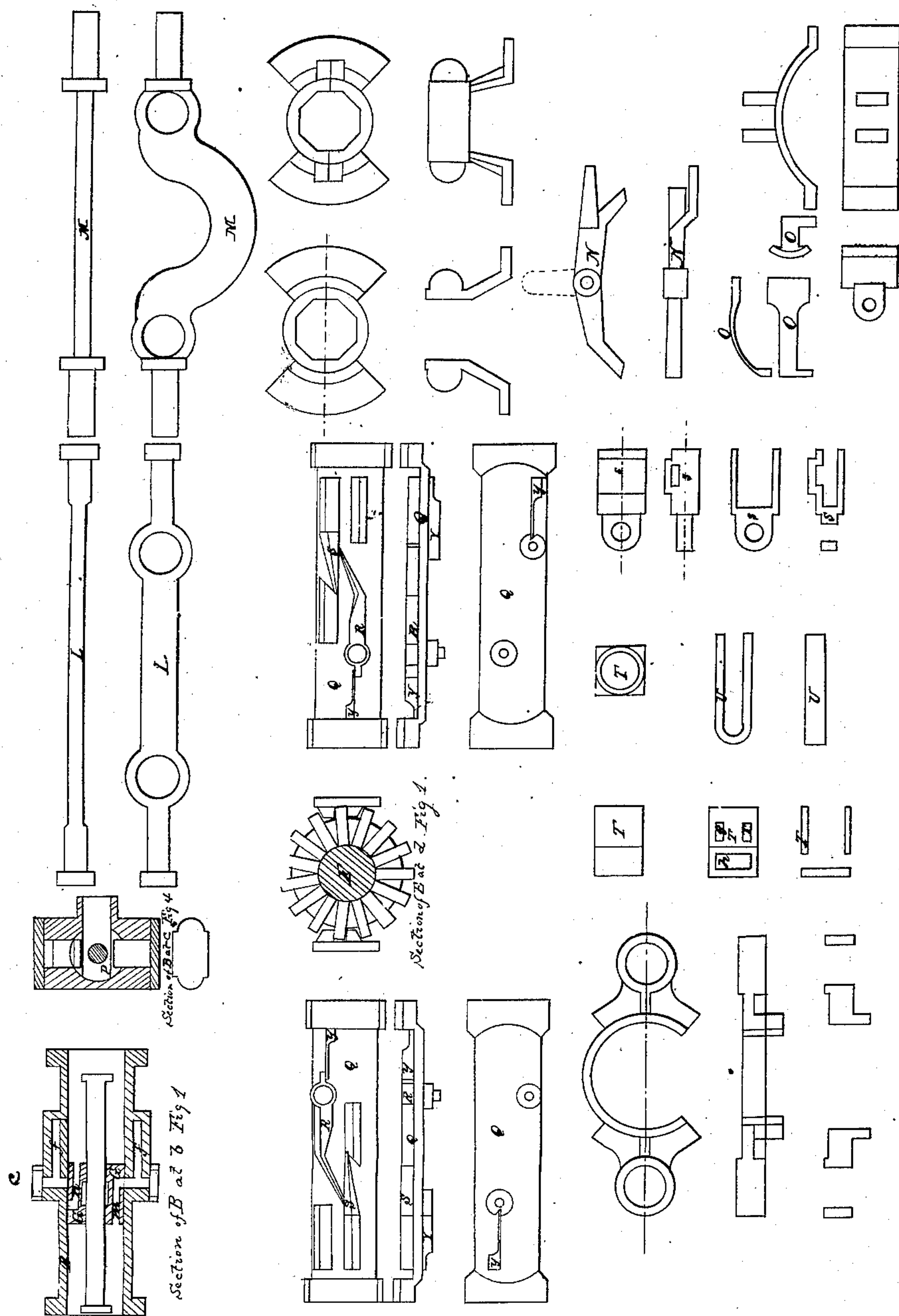
3 SHEETS—SHEET 2



Section of Fig. 3 at a.

H. GOULDING.  
STEAM VALVE.

3 SHEETS—SHEET 3.





# UNITED STATES PATENT OFFICE.

HENRY GOULDING, OF SAN FRANCISCO, CALIFORNIA.

## STEAM-VALVE.

Specification of Letters Patent No. 20,423, dated June 1, 1858.

*To all whom it may concern:*

Be it known that I, HENRY GOULDING, of the city and county of San Francisco and State of California, have invented a new and useful Machine for the Purpose of Drilling, Cutting, and Crushing Rock; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a side elevation. Fig. 2 is a ground plan. Fig. 3 is a section of side elevation. Fig. 4 is a section of ground plan. Fig. 5 shows the various new and novel parts in side elevation, ground plan or section, like letters referring to like parts in all the figures.

The main object aimed at in this machine is to cause a direct and effective blow to be imparted by the drill cutter or stamper without the sudden shock or jar being transmitted to the machine.

The great obstacle to the introduction in competition of hand labor of any rock drilling machine before invented is its great bulk if connected to a steam boiler and if not the great inconvenience of adapting any power to it, and even after it has been set in operation none that I have seen yet struck the rock without a corresponding blow being felt on the machine which must necessarily cause too great a loss by wear and tear of parts to be successfully used.

The great advantages of my machine are smallness, which allows of it being carried by two men and placed; its adjustment to any angle or position required; also the means that I employ to transmit power allows of the utmost simplicity of parts insuring its durability as well as avoiding the necessity of moving the prime motor at every different hole to be bored.

I connect my drill cutter or stamper directly to the piston rod, thereby using effectively all the power applied and that in the most direct manner, as the piston and rod are entirely free and unconnected to any part of the machine except in guides, which prevents the shock or jar of the blow to be felt on the machine, which object is also assisted by the cut off valve G, which serves to work expansively and presents to the piston directly the blow is given and at the rebound, the full pressure, which as the air

that was driving it forward had been expanded to three times its former volume, allows of the easy and smooth reversion so peculiar to the machine.

The motor and action of the valve gear is as follows: On the upward stroke the valve G is changed before the piston K gets to the end of the stroke so as to present to the piston the full pressure of the air or steam used and as that use in driving the piston has been expanded to three times its volume the reversion is rapid and smooth. On the other end the piston is allowed to travel with full force and unimpeded until the drill cutter or stamper strikes the rock. Then by the accelerated force of the loose collar D the valve is changed, thereby catching the piston on the rebound.

In referring to Figs. 1 and 2 it will be seen that the cylinder A with all its working parts is fed forward to the work by the handwheel I, which turns the two feed screws Z Z, which are connected together by the chain J, which screws for their better security from accident are inclosed in the hollow slides D. It will also be seen that the slides together with all attached are firmly attached to the axle M, which is fitted to a bearing box in the wooden frame V, which allows of the drill's being used in a greater variety of positions than it could be were it hung in the center and allowed to swing around, as were it hung so, it could not be used to drill a horizontal hole any lower than the common center, as also it would be top heavy and require more bracing than my plan. Therefore I consider this as one important point toward its practicability. It is held at any required angle by the supporting rods H H, which are held against the collars on the axle L by means of the double keys U U being driven into the slots *q*, *r*, in the clasps P, as shown in the drawings, which allows of a quick and easy method of readjustment and at the same time is light and firm, much more than any arrangement of hanging in the center can be. The lower ends of the supporting rods H H are held in the sockets *s*, *s* by means of the keys W W, which allows of their speedy removal in case of accident or of changing for longer or shorter as may be required.

By reference to the drawing it will be seen that there is a large collar E welded to the piston rod C which serves as a crosshead to



guide and steady the drill as the blow is given, by means of the pins that are firmly inserted, as shown more fully in Fig. 5, where the collar is shown in section through the center of pins, as also in Fig. 5 are shown the slides Q Q, each shown in front and back elevation, side view and section through the center, showing the position of the pins when the piston is traveling toward the rock. The front and back elevations also show the clicks R, S which give the pins the directions. The pins in traveling up the inclines presented by the clicks R, R press against the clicks S S which arise with pressure and allow the collar to rotate, yet as soon as the pins have passed them they are forced back into place by means of the springs y, y, and present a plain, straight guide for the forward stroke.

The operation of the valve is as follows: The drawings Figs. 3 and 4 show the piston K at its extreme backward stroke, the opening *h*, is open into the back reservoir *i*, which has on the upward stroke been filled with air at the pressure in the conducting pipe (*f*). Its tendency is to expand, which acting against the piston K stops its backward motion, and propels it forward with its rod C and whatever may be attached to it. The position of the piston valve G is such that the opening *e*, of the forward end of the cylinder A has free communication through the valve G to the exhaust pipe *g*, and the front reservoir *h*, is in direct communication with the supply pipe *f*, by the opening *m*, in the piston valve G. Consequently the reservoir *h*, will be filled on or before the completion of the forward stroke and were the piston valve G left free to move it would move backward as soon as the pressure became greater in the reservoir *h* being filled than in the reservoir (*i*) being expanded. To prevent the valve from moving before the piston K is ready to reverse the valve G is retained by the spring *o* falling into the notches X in the valve rod. When the piston K shall have completed its forward stroke, which is determined by its striking the drill against the rock, the loose collar F by its own accelerated force trips the rocking lever N, which trips the spring *o*, relieving

the valve G, which by the pressure in reservoir *h* exceeding that in the reservoir *i* the valve G moves backward, thereby changing the direction of the piston, by using the contents of the reservoir *h*, and exhausting the back end of cylinder A and refilling the reservoir *i*, and the valve G is being retained in its position until the completion of the backward stroke by the spring *o*.

The rocking lever N is worked as follows: On the backward stroke the fast collar E comes in contact with the inclined end and raises it to permit the collar to pass, yet in rising it shifts the valve G either by direct communication or by tripping the spring *o* and allowing the valve G to move by direct pressure, as shown in the drawing. On the downward stroke the lever N being in such a position that the accelerated force of the loose collar F after the piston has given the blow sends it forward on the piston rod C and by that means trips the lever N and changes the valve. The great advantage of having the loose collar work the valve by its accelerated force instead of the fast collar, as is the case in the backward stroke, is that I should get the reversion of the air at and in connection with the blow, which would necessarily in a measure if not wholly spoil the effect of the blow, and in whatever measure it affected the blow it would receive the blow on the front end of the cylinder. So by the loose collar I get a full and unincumbered blow on the rock and save the wear and tear on the machine that would incur by any other arrangement and the valve is reversed so that the pressure takes the piston K on the rebound, thereby obviating all shock or jar on the machine at that time, as the mass of iron in the piston rod and drill get the change of direction by the rock upon which it strikes.

What I claim and wish to secure by Letters Patent is—

The loose collar on the piston rod for the purpose of changing the valve after the blow is given.

HENRY GOULDING.

Witnesses:

JOHN HOYT,  
E. V. JOICE.