

C. M. BROWN.  
Power Hammer.

No. 230,612.

Patented Aug. 3, 1880.

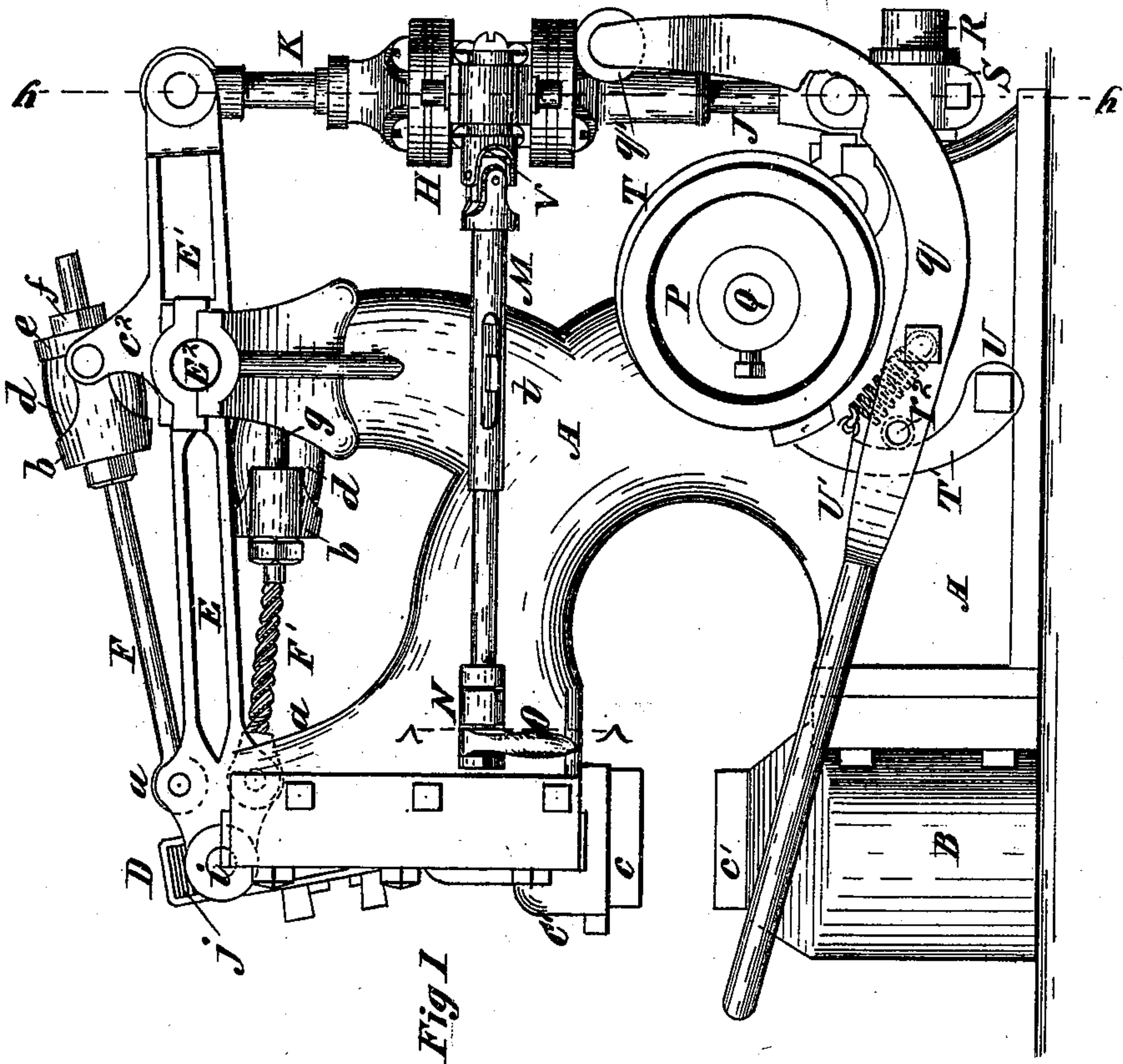


Fig 1

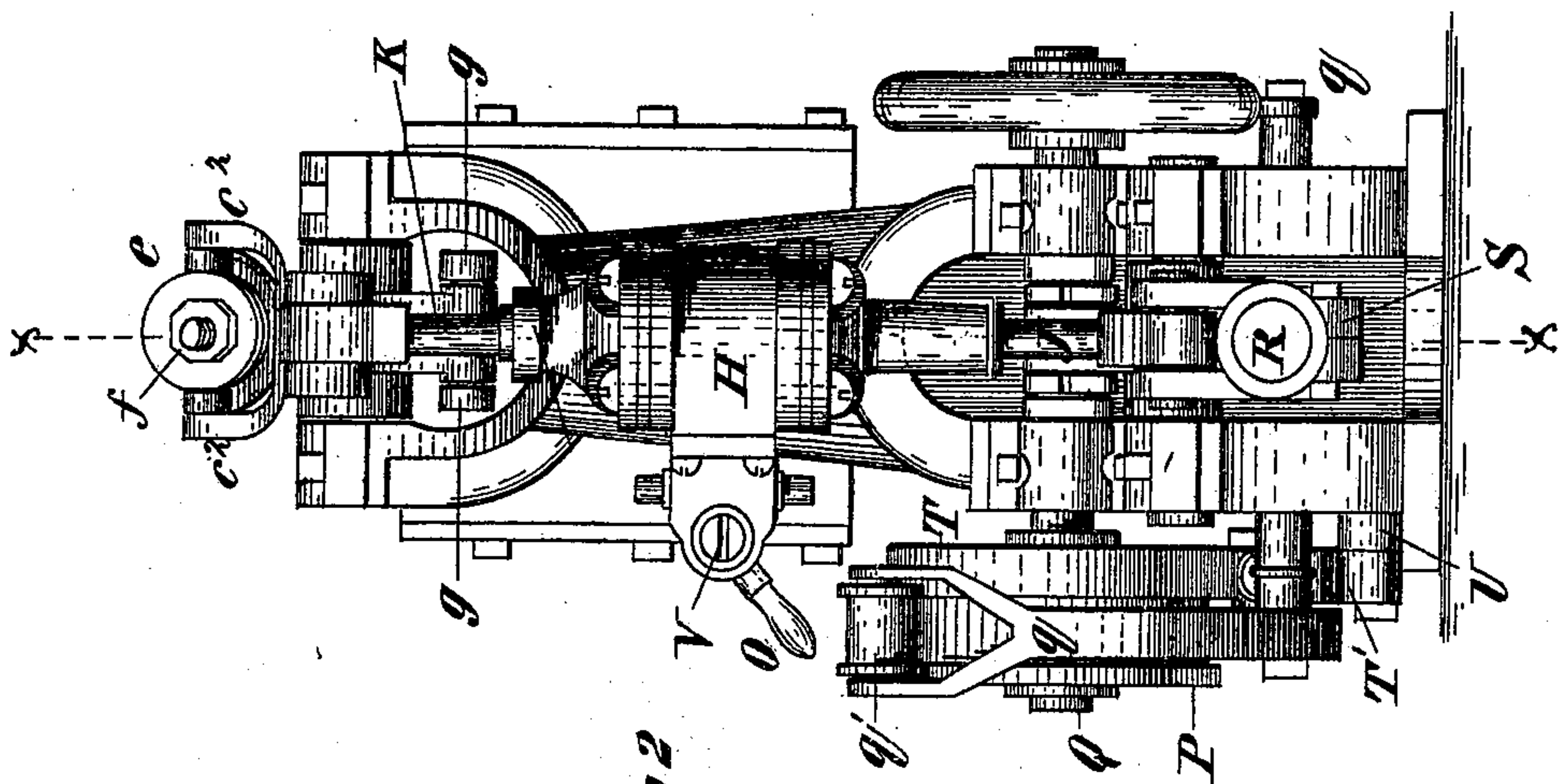


Fig 2

Witnesses

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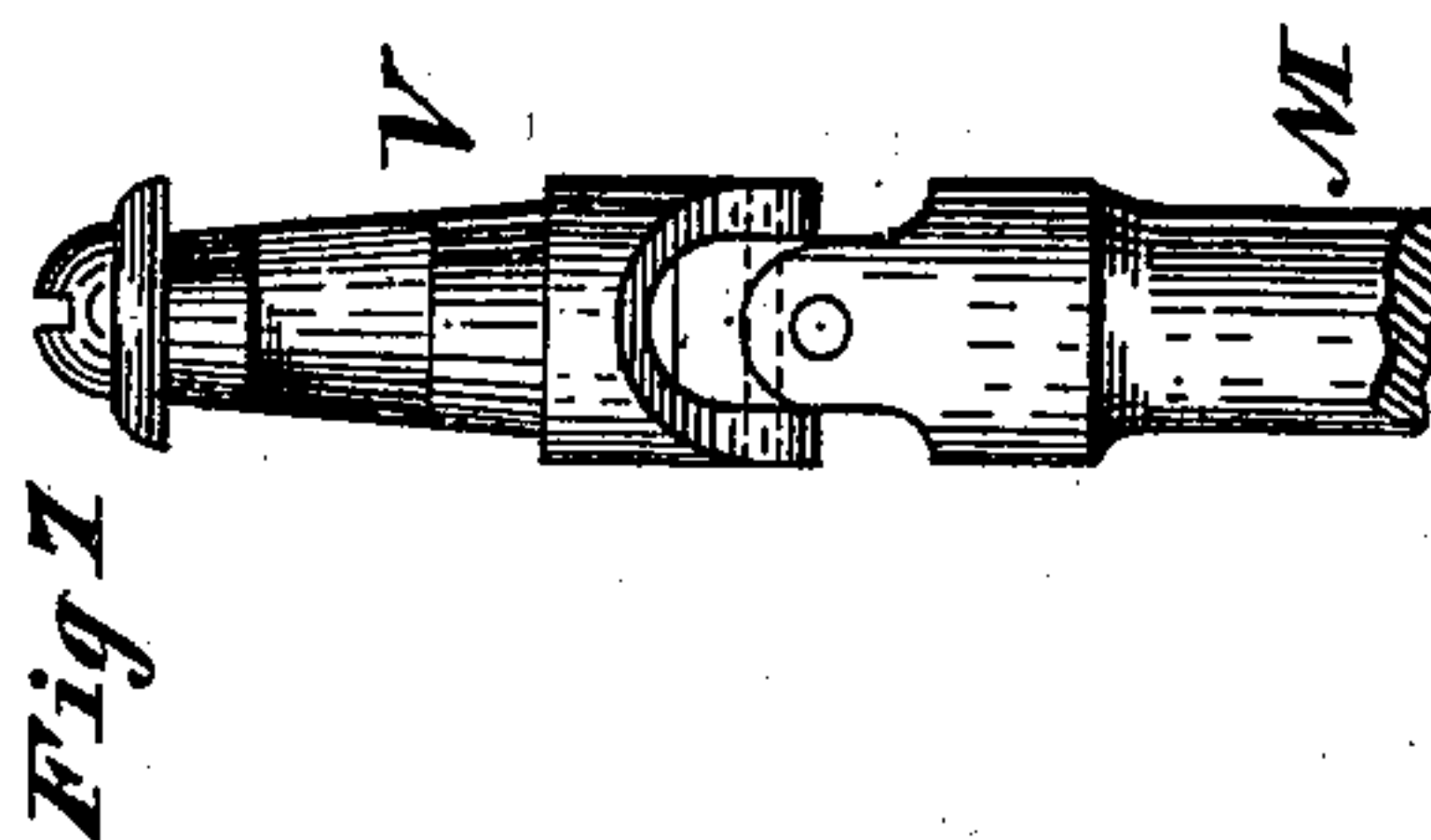
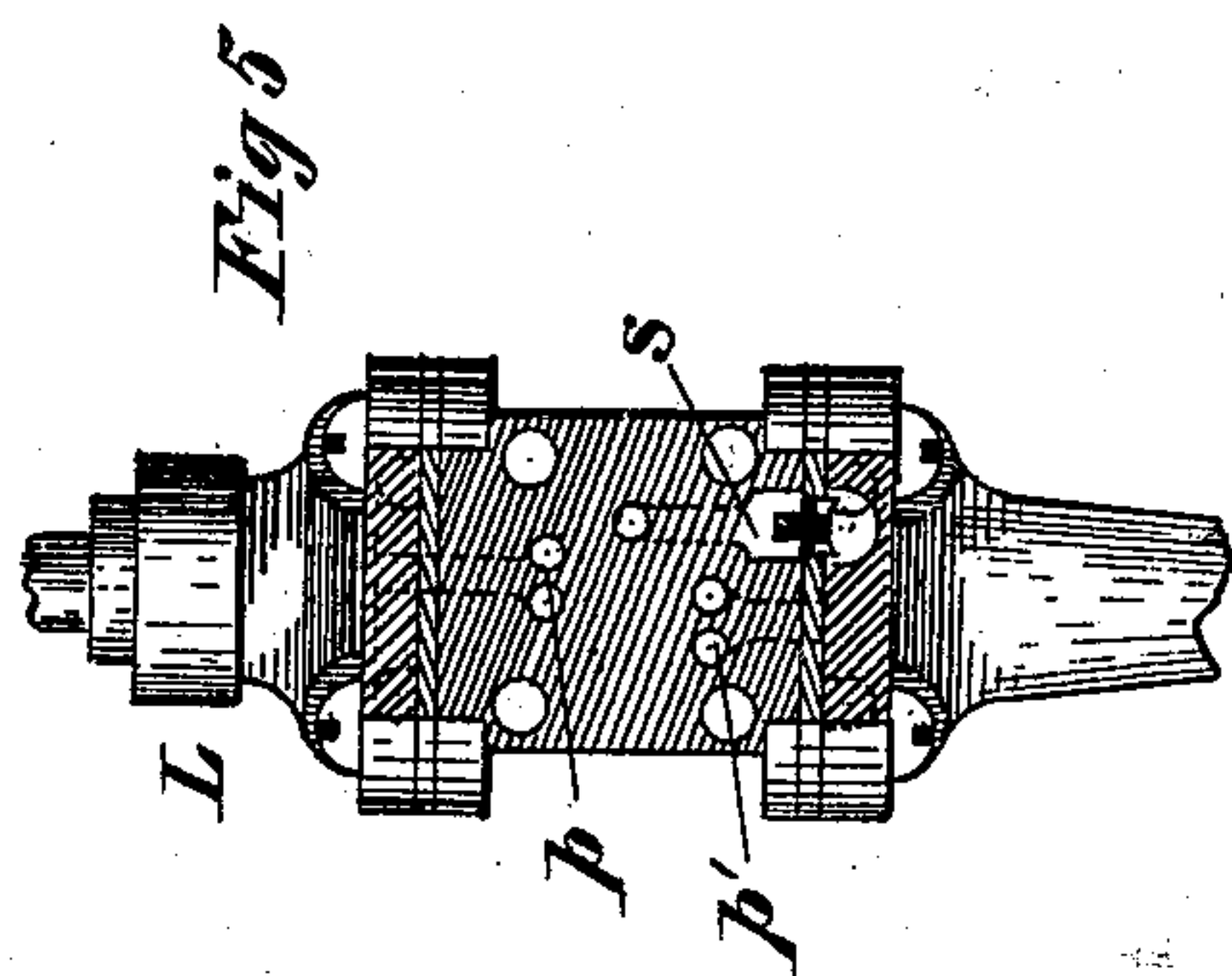
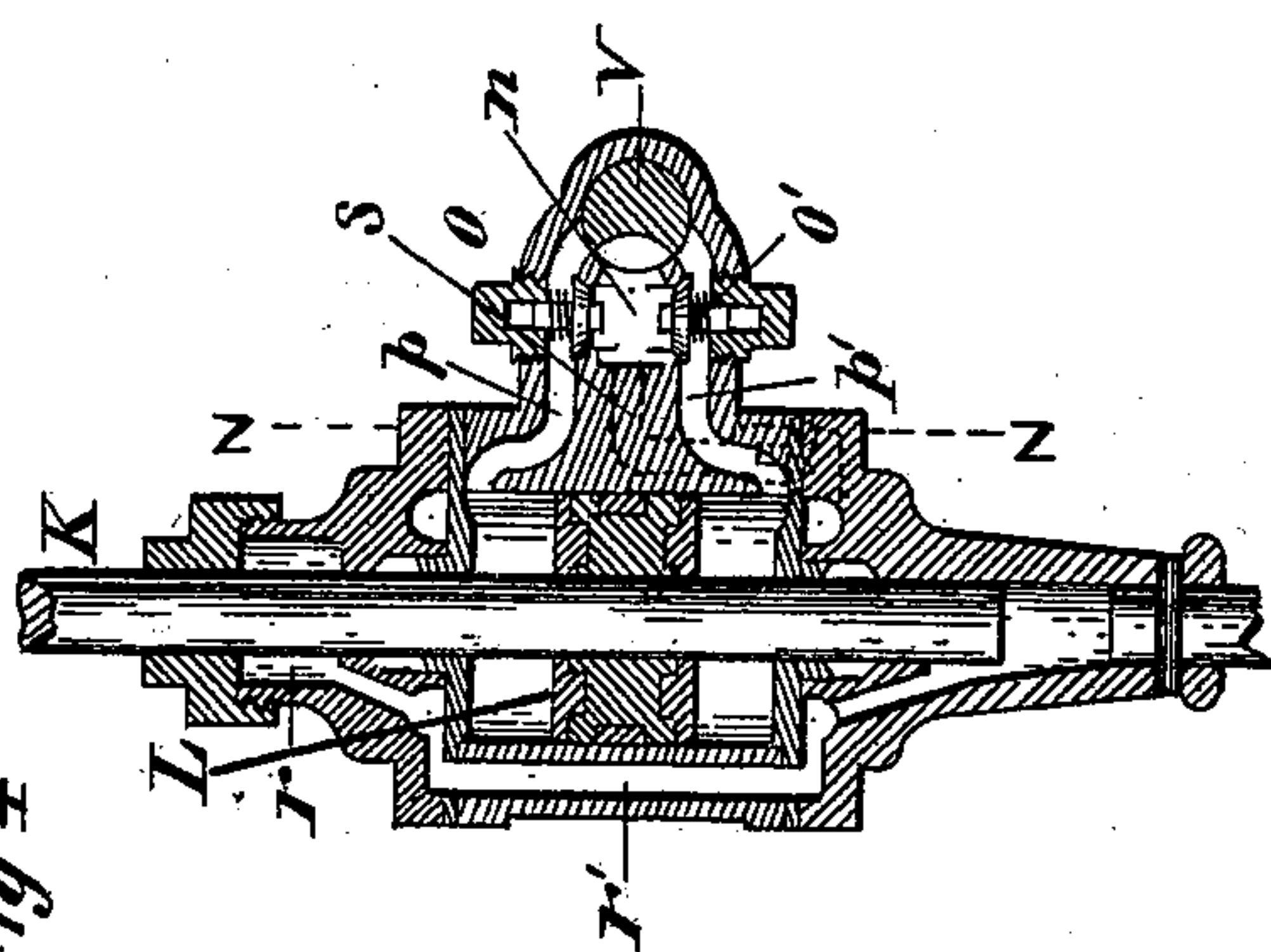
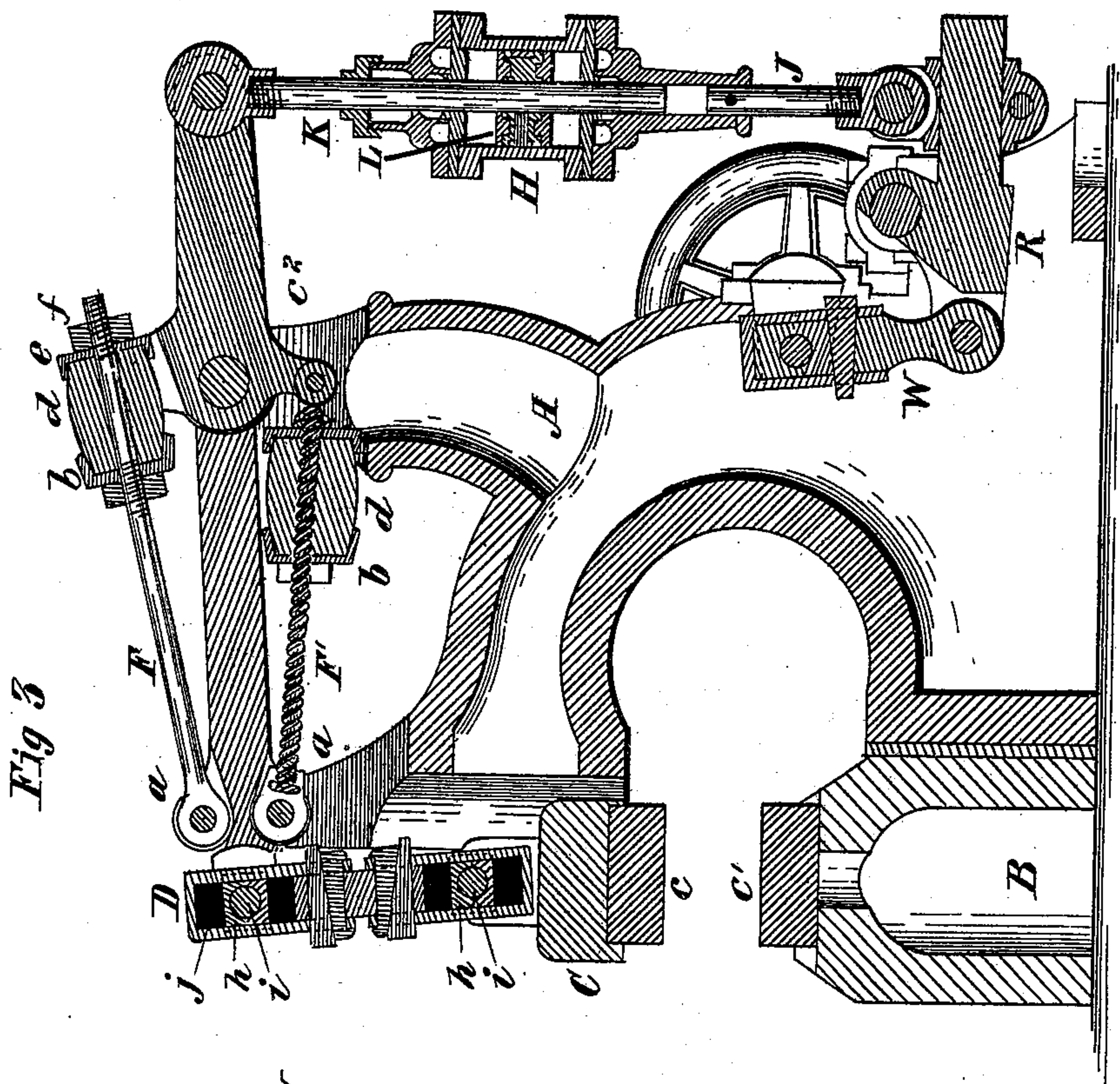
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# UNITED STATES PATENT OFFICE.

CHARLES M. BROWN, OF CHICAGO, ILLINOIS.

## POWER-HAMMER.

SPECIFICATION forming part of Letters Patent No. 230,612, dated August 3, 1880.

Application filed July 24, 1879.

*To all whom it may concern:*

Be it known that I, CHARLES M. BROWN, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Power-Hammers, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of my machine; Fig. 2, a rear elevation; Fig. 3, a longitudinal vertical section of the same, taken at the line  $x x$ , Fig. 2; Fig. 4, a vertical section taken at the line  $y y$ , Fig. 1; Fig. 5, a section taken at the line  $z z$ , Fig. 4; Fig. 6, a section taken at the line  $v v$ , Fig. 1, showing a detached section of a piece of the frame of the machine; and Fig. 7, a detached view of the end of the jointed valve-rod.

The object of my invention is to make a power-hammer in such a manner that the machine is greatly relieved from the ordinary wear and tear of such machine by relieving its several parts of their rigidity.—

My invention consists in the jointed walking-beam having truss-rods which are sustained by springs in such a manner as to make the beam flexible and elastic; and also in the jointed boxes connecting the hammer with the walking-beam, provided with springs or elastic material which relieves the machine of the jar ordinarily occasioned by the blows; also, the jointed valve-rod, which may be automatically lengthened or shortened while the machine is in motion, enabling the operator to instantly adapt the stroke of the hammer to the dimensions of the article which is being forged; also, the construction of the driving-crank and its attachments, by which the hammer is more easily raised, and by which it is driven down with increased velocity, and concentrating the force just as the blow is given; and also in the construction and combination of the various parts which constitute the brake-pulley, by which the operator is enabled to stop the machine with the hammer raised, so as to readily remove and replace the material that is being worked.

In the accompanying drawings, A represents the main frame of the machine. B is the anvil-block, made in the ordinary manner. C is the hammer-head, and  $c c'$  the dies, such as

are ordinarily attached to the hammer and anvil.

E E' constitute the two parts of the walking-beam, each of which is jointed to the shaft E<sup>2</sup>, having bearing-boxes supported by the frame A of the machine.

F F' are the adjustable truss-rods, which are jointed to the front end of the walking-beam E, as shown at  $a$ , and pass through an annular box,  $b$ , that is pivoted to projecting arms  $c^2$  on the end of the walking-beam E'.

$d$  is a rubber spring which is held in the box  $b$ , through which the adjustable truss-rods pass, and receive on their ends washers  $e$ . The tension of the spring  $d$  is regulated by adjusting the washers  $e$  by means of the screw-nuts  $f$ , that screw upon the ends of the rods F F'. These truss-rods, provided with springs attached to the jointed walking-beam, make it elastic and admit of the rapid motion, and overcome the great annoyance of the jar and the wear and tear of sudden and rapid blows.

It will be observed that the lower truss-rod has its spring cap or receptacle connected to a loose bolt which passes through the rigid arm  $c^2$  by means of two rods,  $g g$ , and instead of having a rigid truss-rod passing through the spring I use a wire rope which is hinged and made adjustable in such a manner that any tension may be given the spring. X

The flexibility of the beam is governed by the relative length of the truss-rods as compared with the arms of the walking-beam.

It will be observed that the force of the blow of the hammer is removed from the arm of the walking-beam and is sustained by the tensile strength of the truss-rods, and they, being held by springs, are largely relieved from the ordinary sudden force or shock of the blow.

The walking-beam is attached to the hammer by means of the pitman D, which is constructed the same as an ordinary pitman used in a trip-hammer to connect the hammer to the walking-beam, with the exception of the elastic slightly-yielding material, such as paper-board or rawhide, which I place above and below each box  $h$ , which carries the pin  $i$ , that connects the walking-beam and the hammer to the pitman. This elastic material  $j$  is shown at Fig. 3 of the drawings. The object of plac-



ing these boxes in this elastic or slightly-yielding material is to lessen as much as possible the concussion ordinarily caused by the stroke of the hammer on the connecting wrist-pins *i*.

5 H is a cylinder, the lower end of which is connected to the oscillating lever R by means of the rod J, as clearly shown in Fig. 3 of the drawings. The cylinder H also carries a piston-rod, K, one end of which is attached to the  
10 walking-beam, as clearly shown in Fig. 3 of the drawings.

L is the piston-head, securely attached to the piston-rod, and fits closely in the cylinder H. The piston-rod passes through the piston-head  
15 and extends into the lower part of the cylinder when the piston-head is at the upper end of the cylinder. It may be packed by means of stuffing-boxes in each end of the cylinder. The object of this cylinder and piston-connection is to raise the piston-rod in the cylinder  
20 or lower it, so as to have the hammer strike its blow high or low, according to the size of the article being hammered. This is accomplished by filling the cylinder both sides of the  
25 piston-head with any suitable fluid.

There are ports *p p'*, which lead from the ends of the cylinder to the circular valve V, and through it communicate to the chamber *n*. These ports also communicate with the chamber  
30 *n* by means of spring-valves *o o'*.

When it is desired to raise the piston-head in the cylinder, thereby causing the hammer to strike a low blow, the operator turns the valve V while the hammer is in motion, so as  
35 to communicate with the port *p* and chamber *n*. This allows the fluid to pass from the end of the cylinder above the piston-head, through the port *p*, into the chamber *n*, when its pressure will open the valve *o'* and pass through  
40 the port *p'* into the cylinder below the piston-head.

When it is desired to lower the piston-head in the cylinder to cause the hammer to strike a higher blow, the circular valve V is turned  
45 so as to connect the port *p'* with the chamber *n*, and the fluid is forced from the cylinder below the piston-head into the chamber *n*, when its pressure opens the spring-valve *o* to allow it to flow into the cylinder above the piston-head. These spring-valves prevent the fluid  
50 from passing from the ports *p* or *p'* directly into the chamber *n*, so that when the operator turns the circular valve V so as to communicate with either of these ports when the machine is in motion the fluid will be forced  
55 through that port into the chamber *n*, and out through the other port into the opposite end of the cylinder, and held there by the operation of the spring-valve, which prevents the  
60 return of the fluid.

There is a receptacle or reservoir, *r*, for the fluid in the cap on the cylinder, from which a duct or passage, *r'*, leads down below the piston-rod. There is also a duct or passage, *s*,  
65 leading up into the chamber *n*. This duct *s* is provided with a check-valve, which prevents the return of the fluid.

It will be observed that in case there is a waste of the fluid in the cylinder the fluid from the reservoir immediately passes up into the  
70 chamber *n* to keep up the supply.

The reservoir surrounds the piston-rod, and the ducts or passages leading from the reservoir to the chamber *n* pass the end of the piston-rod, so as to fully lubricate it at its bear-  
75 ings.

The valve V is connected to a jointed rod, M. This jointed rod has a bearing in the eye-bolt N, that passes through the frame of the machine, and is so connected with the frame  
80 as to rock as the end-jointed rod, that is attached to the valve, passes up and down with the cylinder H.

O is a handle rigidly attached to the jointed rod M in such a manner as to enable the operator by means of said handle to turn the rod, and thereby operate the valve V, as above described. It will be observed that this jointed rod is made in two pieces, the end of one being cylindrical and passing over the end of  
85 the other to admit of the lengthening and shortening of the connecting-rod as the cylinder H vibrates. There is a lug, *t*, rigidly attached to one part of this jointed rod, and passes through a slot in the other part, as clearly  
90 shown in Fig. 1 of the drawings, which prevents them from being turned independently of each other. It will also be observed that by this construction of the jointed rod M and its attachments the operator is enabled to operate the valve V when the machine is in motion.  
100

If preferred, the inner end of the handle O may be inserted, in any convenient manner, in the head of the eyebolt N, so as to turn vertically,  
105 and the rod M, instead of being jointed, may be a single rod extending from the valve V through an angular hole in the inner end of the handle, into which it is fitted, so as to permit the rod to play freely backward and forward, and when the handle is raised or lowered the rod is revolved, thus producing the same effect as the construction illustrated in the drawings.  
110

The power is communicated to the machine  
115 by means of the belt-wheel P upon the crank-shaft Q.

W is a connecting-rod, communicating the power from the crank-shaft to one end of the rocking lever R. This lever is provided with  
120 a sliding block, S, to which the rod J is attached to communicate the power to the walking-beam.

By sliding the block S on the rocking lever the length of the stroke of the hammer is varied.  
125

The crank-shaft is placed quite closely over the bearing of the vibrating or rocking lever, so that the velocity on the downward stroke is made greater than the upward stroke in making the blow of the hammer, which makes a more rapid and sharper stroke than if it took one-half the revolution of the crank to make the downward blow. To accomplish this the  
130



crank-shaft is placed as near over the fulcrum as possible.

T is an eccentric rim attached to the belt-wheel P. T' is a brake, pivoted to the frame of the machine at U and held against the eccentric rim by the spring U'. q is a brake-lever, carrying a roller, q', which strikes against the belt when thrown up in position by the operator. The brake T' is also removed from the eccentric rim T by means of a roller, r<sup>2</sup>, attached to the brake-lever. This brake is so arranged that it strikes the eccentric rim at its widest part when the hammer is fully raised; and the object of this special application of the brake is to enable the operator to stop the machine and hold the hammer raised. As this arrangement gives the brake a longer leverage upon the center of the wheel at this point, thus directly increasing its power, and as the wheel also, in reaching that point, has, in addition to the ordinary friction, to force back the brake in order to pass, in actual operation the combined effect is always to stop the wheel at that point. This affords a great convenience in removing and adjusting the material that is being worked.

It will be observed that, although I have spoken of a liquid as being the material to be used in the cylinder H to raise and lower the piston-head, and have suggested that oil might be used, as it would serve also as a lubricator, I do not confine myself to the use of a liquid, as air would produce substantially the same results, the purpose being to use a substance that would readily flow or pass through the ports from one end of the cylinder to the other to raise and lower the piston-head.

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

1. A jointed walking-beam composed of two sections connected by truss-rods and springs, substantially as and for the purpose set forth.

2. The combination of the walking-beam made in two parts, E E', pivoted substantially

as shown, truss-rods F F', pivoted to E, and the springs d, secured in position with fastenings that are hinged to the rigid arm, substantially as specified and shown.

3. The combination of one or more boxes, h, wrist-pins i, and the elastic packing j in the pitman connecting the hammer with the walking-beam, substantially as specified and shown.

4. The pitman H K, composed of a cylinder with its piston-rod and piston-head and ports connecting the ends of the cylinder with a common chamber, through which, by means of an automatic valve in each port and a common valve operating by hand, the fluid contents of the cylinder may, without arresting the operation of the machine, be transferred from one side of the piston-head to the other for the purpose of raising or lowering the piston-head and so lengthening or shortening the pitman, substantially as described.

5. The combination of the reservoir r and the duct or passage r' with the chamber n, provided with suitable valves for the admission of fluid or air to keep up a constant supply in the cylinder, substantially as specified and shown.

6. The combination of the cylinder H, ports p p', valve V, chamber n, and valves o o', substantially as and for the purpose specified.

7. The combination of the rod M, eyebolt N, and handle O with the reciprocating cylinder and valve V, substantially as and for the purpose set forth.

8. The combination of the eccentric rim T and brake T', for the purpose of enabling the operator to stop the machine when the hammer is raised, substantially as described.

9. The combination of the crank-lever Q, the pitman W, lever R, and pitman J, substantially as and for the purpose set forth.

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