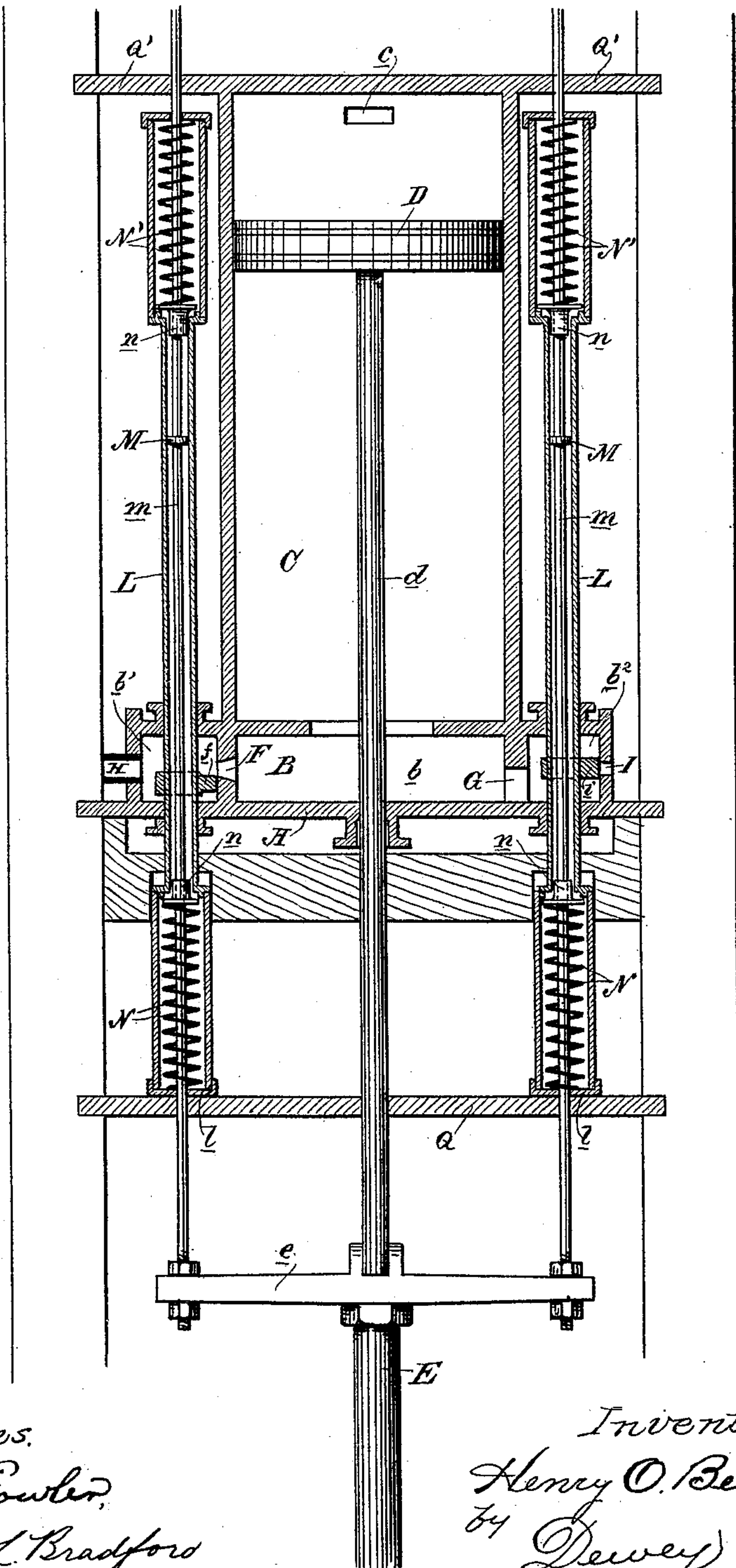


(No Model.)

H. O. BEATTY.  
STEAM MOTOR FOR PUMPS.

No. 424,045.

Patented Mar. 25, 1890.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

HENRY O. BEATTY, OF SACRAMENTO, CALIFORNIA.

## STEAM-MOTOR FOR PUMPS.

SPECIFICATION forming part of Letters Patent No. 424,045, dated March 25, 1890.

Application filed October 16, 1889. Serial No. 327,250. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY O. BEATTY, a citizen of the United States, residing at Sacramento, Sacramento county, State of California, have invented an Improvement in Steam-Motors for Pumps; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of steam-actuating motors or engines exemplified by Letters Patent of the United States, No. 408,400, issued to me August 6, 1889; and my invention consists in the hereinafter-described improvements in the construction of that motor.

The object of these improvements is to simplify the construction of the motor.

Referring to the accompanying drawings for a more complete explanation of my invention, the figure is a vertical section of my steam-motor.

A is a bed-plate, upon which is mounted and bolted firmly a steam-chest B, from the center of which rises the vertical main cylinder C, the lower end of which is in open communication with the central portion of the steam-chest. Within the cylinder C is the piston D, the rod *d* of which extends downwardly through the steam-chest and through the bed-plate in a suitable stuffing-box, and has its lower end connected with the plunger-rod E of the pump. (Not necessary herein to show.)

The steam-chest B is a three-compartment one, the central compartment being designated by *b*, the steam-inlet compartment by *b'*, and the steam-exit compartment by *b<sup>2</sup>*. The inlet-compartment *b'* communicates with the central compartment by an inlet-port F, and said central compartment communicates with the exit-compartment *b<sup>2</sup>* through an opening G.

H is the steam-inlet pipe for admitting the steam to the compartment *b'*, and I is an exit-port through which the steam is exhausted from the exhaust-compartment *b<sup>2</sup>*. In the top of the cylinder C is an air-relief port *c*.

L are vertical tubular valve-rods, which extend downwardly in suitable stuffing-boxes—one through the inlet-compartment *b'* of the steam-chest and the other through the exit-compartment *b<sup>2</sup>* of said steam-chest. Secured

to the side of the valve-rod L which passes through the inlet-compartment *b'* is a valve *f* for controlling the inlet-port F, and secured to the side of the valve rod L which passes down through the exit-compartment *b<sup>2</sup>* is a valve *i*, which controls the exit-port I from said compartment.

Within the tubular valve-rods L are fitted collars M, the stems *m* of which pass down through the tubular valve-rods and are connected at their lower ends with a cross-head *e* of the pump plunger-rod E.

Within the lower ends of the tubular valve-rods L are mounted spiral springs N, which encircle the stems *m*. The lower ends of these spiral springs rest on caps *l*, screwed on the lower ends of the valve-rods, said caps being perforated to permit the free passage of the stems *m*.

As far as heretofore explained, the mechanism is precisely the same as that described in my patent heretofore mentioned. In that patent I showed supplementary cylinders on each side of the top of the main cylinder, and communicating by ports with said cylinder, and within these supplementary cylinders were pistons, the rods of which were connected with and were adapted to operate the tubular valve-rods L, so that the rod on one side should close the inlet-port, while the rod on the other side should open the exit-port.

In my present improvement I dispense wholly with the supplementary cylinders and their pistons. Instead of this I carry up the tubular valve-rods L on each side to and immediately under a top stop-bar Q', which corresponds with the bottom stop-bar Q, against which the lower ends of the valve-rods are adapted to come in contact to limit their stroke. Within the upper ends of the valve-rods L, I seat springs N', corresponding to the springs N in their lower ends, and I run up the stems *m* of the collars M through said springs and through the upper ends of the valve-rods and through the upper stop-bar Q', so that said stems play freely up and down.

The operation of the improved motor is as follows: Steam is admitted through the pipe H into the inlet-compartment *b'* of the steam-chest, and thence passing through the open port F into the central compartment *b* of said



chest passes upwardly into the main cylinder C and under the piston D therein. The piston is thereby raised on its upward stroke, thus lifting the pump-plunger, the cross-head 5 *e* of which also lifts the stems *m* in the tubular valve-rods L. When the piston D reaches nearly to the limit of the upward stroke, the collars M in the tubular valve-rods L come in contact with the springs N' in the upper 10 ends of the valve-rods, and thereby raise said rods to the top stop-bar Q', which operation has the effect of closing the inlet-port F by means of the valve *f* and opening the exit-port I by means of the valve *i*. The steam immediately exhausts through the port I from the 15 main cylinder, and the weight of all the parts of the pump-plunger and its rod and the column of water causes the downward movement of the piston D, and also the downward movement of the collars M in the tubular valve-rods. When the bottom of the stroke has 20 been nearly reached, the collars M come in contact with the top of the springs N and force the valve-rods down on the lower stop-bar Q, thereby again opening port F and closing port I.

It is obvious that though the collars M might come in direct contact with the ends of the valve-rods L, thereby effecting their vertical 30 movement without the interposition of the springs, said springs serve the more complete purpose of allowing the piston D and the stems *m* to continue to the limits of their stroke without jar or danger of breakage, as 35 would be the tendency if these parts were suddenly arrested by the positive limit to the movement of the valve-rods.

In this kind of motor it is impossible to accurately regulate the incoming steam so as 40 to arrest the motion of the piston at precisely the same point, and therefore it is best to provide for a variation in the limits of the stems *m* without affecting the limits of the valve-rods L, which have a stated movement, 45 while the stems pass on up or down, being cushioned by the springs N and N'.

As the collars M are small, I prefer to regulate their contact with the springs by the interposition of flanged washers *n*, fitted around 50 the stems *m* and bearing on the ends of the springs, and against these washers the collars come in contact.

As it would be inconvenient to have large valve-rods passing through the steam-chest, 55 I prefer to make their center portions small and their ends enlarged, so as to receive springs of the proper size.

The advantages gained by dispensing with the supplementary cylinders and their pis- 60 tons, which formed a feature of my patent above referred to, and substituting therefor

the springs N', may be briefly stated as follows: economy in the manufacture; less necessity for nicety of workmanship, it requiring less skill to properly adjust springs N' 65 than to get the supplementary cylinders and piston-rods into proper alignment; avoiding the difficulty in keeping them in alignment; avoiding the difficulty due to the condensing of the steam when first turned into the supplementary cylinders, which results in their failure to operate the valves, and thereby requiring the valves to be worked by hand to let the main piston down; the supplementary cylinders being liable to fail in operating the 75 valves, either on account of being cold or for want of true alignment, the steam carries the main piston above the air-relief port *c*, and if the pressure be greater than necessary to run the motor at proper speed the impetus 80 will carry the main piston into contact with the cylinder head or cap and work injury. On the contrary, the spiral springs N' never fail to properly operate the valves. The steam escapes at port I before the main piston passes 85 air-relief port *c*, and from the moment the lower valve is opened the upward momentum of the piston is checked by gravity by the spiral springs and by the compressed air between the piston and cylinder-head. With 90 these checks I have found by experience with the use of springs N' that the main piston never strikes the cylinder-head.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is— 95

In a steam-motor for pumps, the combination of a main cylinder, a piston mounted therein and having its rod connected with the pump-plunger, a steam-inlet port and a steam- 100 exit port at the lower end of the cylinder and communicating therewith, vertically-movable tubular valve-rods passing down through the steam-chest, fixed stop-bars above and below said rods for limiting their movement, valves 105 carried by the rods for controlling the inlet and exit ports of the steam-chest, movable stems passing completely through the tubular valve-rods and connected at their lower ends with the pump-plunger, fixed collars 110 upon the stems, and the springs N and N' within the lower and upper ends of the tubular valve-rods, with which the collars of the movable stems come in contact to operate the valve-rods and their valves, substantially as 115 described.

In witness whereof I have hereunto set my hand.

HENRY O. BEATTY.

Witnesses:

S. H. NOURSE,

H. C. LEE.