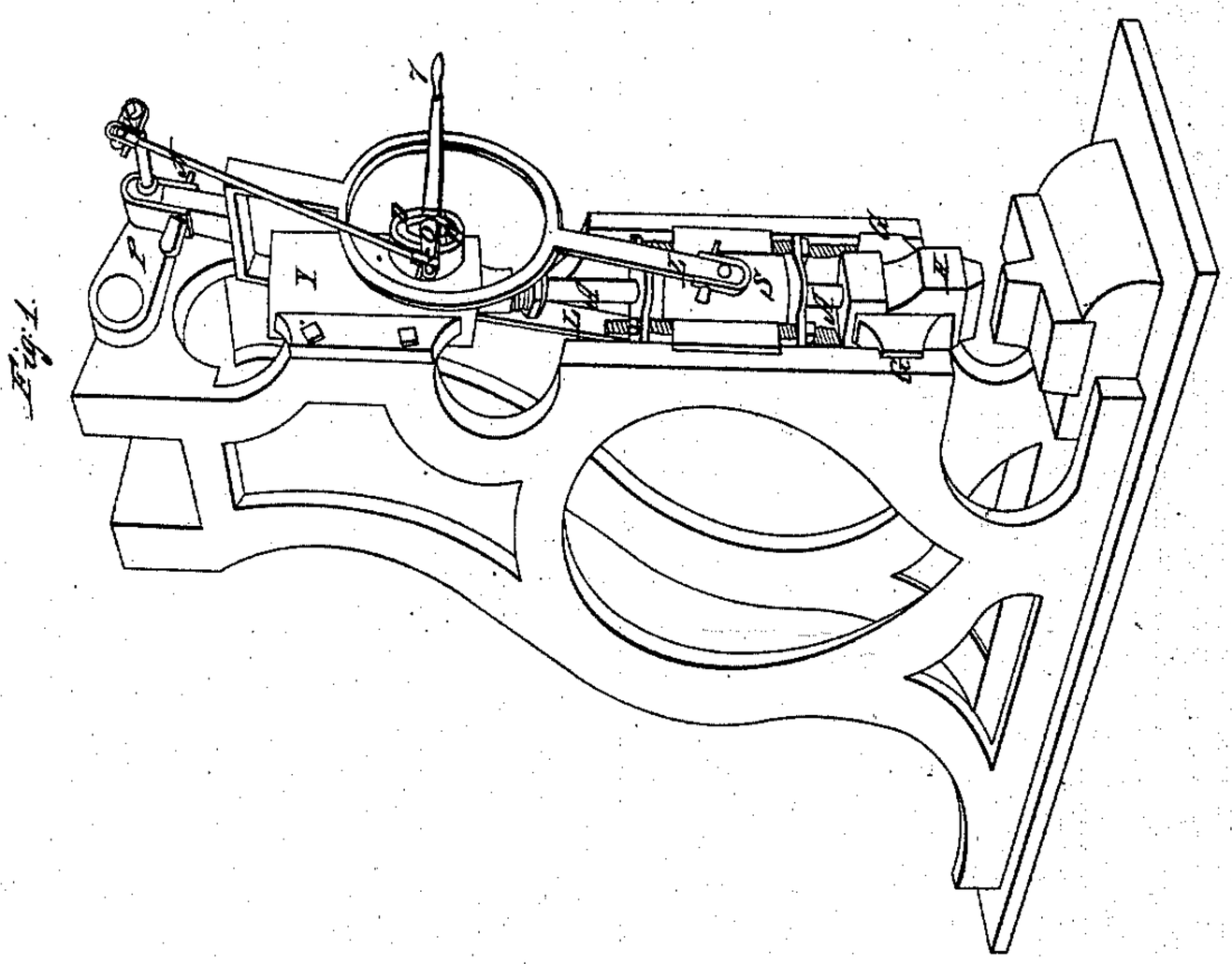
T. B. HARRISON

POWER HAMMER.

No. 68,740. Patented Sept. 10, 1867.



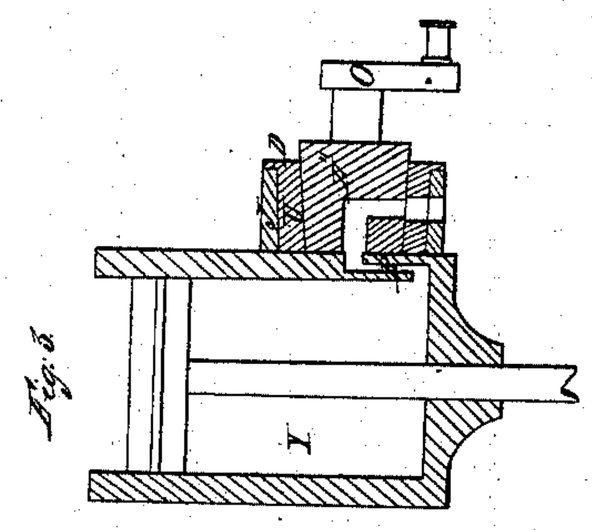


Fig. 3.

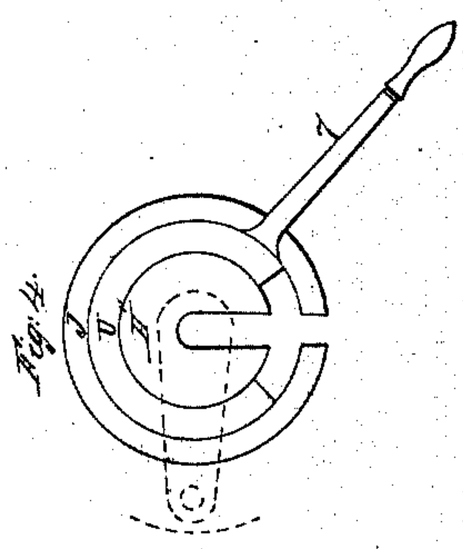


Fig. 4.

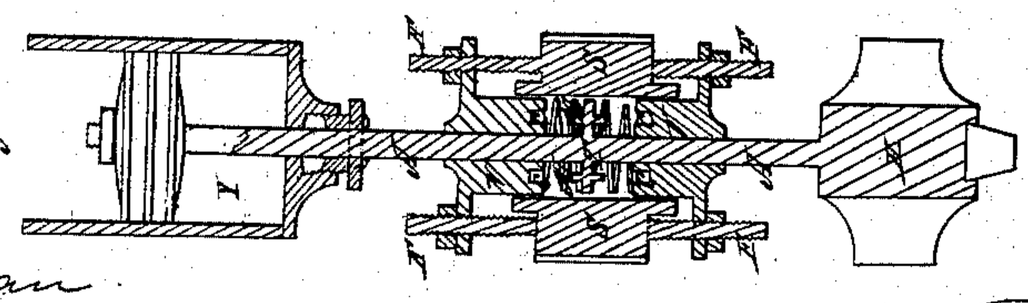


Fig. 2.

Witnesses:
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THOMAS B. HARRISON, OF MAQUOKETA, IOWA.

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IMPROVED POWER-HAMMER.

The Schedule referred to in these Letters Patent and making part of the same.

Be it known that I, THOMAS B. HARRISON, of Maquoketa, in the county of Jackson, and State of Iowa, have invented a new and useful Power-Hammer; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view, and

Figure 2 is a vertical section of the hammer, spring-box, and air-cylinder.

Figure 3 is a vertical side section of the air-cylinder, showing the cut-off valve.

Figure 4 is a front vertical section of the cut-off valve.

The construction of the machine is as follows: The hammer, marked H, in fig. 1, slides in vertical guides G G attached to the frame of the machine, and is fastened to the piston-rod A, which passes through the spring-box S and into the air-cylinder Y, and is secured to the piston or follower fitting said cylinder. On the front and back of the cylindrical portion of the spring-box S are two (2) wrists, which are attached to the two (2) arms of the forked connecting-rods L L. The other end of the rod is connected to the crank P, the wrist of which is extended to receive the small crank R. This is connected to the valve-rod N, and communicating a reciprocating motion to the arm O operating the adjustable cut off-valve W. The construction of the spring-box S is shown in section in fig. 2, and is a cylinder, having fitted to each end two cylindrical plugs or glands, V V, which are perforated to allow the piston-rod to pass through, and are secured to the spring-box S by means of the bolts F F F F. In the interior of the spring-box is a circular disk or piston, T, firmly attached to the piston-rod A, and fitting the inside diameter of the spring-box S. On the upper and lower surfaces of this piston are two annular projections, M M. In the upper and lower plugs V V are two corresponding grooves, filled with rubber, so as to form spring surfaces to receive the annular projections on the piston T, the object being to prevent injury to the two spiral steel springs which are placed above and below the piston T. The spiral springs are placed on the outside of the annular projections, on the upper and lower surfaces of the piston T. The above-mentioned annular projections are of sufficient length to engage with the rubber springs C C before the steel springs are entirely compressed The air-cylinder Y, fig. 1, is bolted fast to the frame of the machine, and is provided with an air-tight piston secured to the end of the piston-rod A. The cylinder is provided with an adjustable cut-off valve D. The construction of the cylinder is shown in section in fig. 3, together with a side vertical section of the cut-off. The air-cylinder is provided near the bottom with an opening, to allow the escape of the air from the cylinder through the air-passage B into the cut-off valve D. The cut-off valve D consists of a conical plug. This has an opening in the direction of its length, coinciding with the opening of the air-passage from the cylinder. This air-passage in the plug is bent downward at a right angle, so as to coincide with the openings in the shell U and the outer casing of the valve J, so as to permit the air to escape readily from the cylinder when the valve is as the drawings 3 and 4 represent it. The inside plug is accurately fitted to the valve-seat or shell U, in which it has an oscillating motion communicated through the arm O and valve-rod N. The shell or valve-seat U can be moved to any position by means of the lever No. 7 in figs. 3 and 4. The shell U has a mortise or opening extending through one-quarter of its circumference, as is seen in the section, fig. 4. The object of this length of mortise is to allow the inside plug H, when moved by means of the arm O, shown by the dotted lines in fig. 4, to make its entire stroke without cutting off or stopping the passage of air from the air-cylinder, when the shell is in the position indicated in fig. 4. But if the valve-seat U be turned round, by means of the lever 7 in fig. 4, the motion of the inside plug will cut off the air from the cylinder at any portion of the stroke of the piston, the amount of cut-off being determined by the relative position of the air-passage in the plug H″ and the air-way or mortise in the shell U.

The operation of the machine is as follows: When motion is communicated, by means of a pulley and belt, or otherwise, to the crank, the connecting-rod raises the spring-box. This compresses the lower spring against the plate or piston T, fig. 2, and through it lifts up the piston-rod A, lifting the hammer and forcing the piston to the top of the air-cylinder. If it is required to use the full force of the blow, the regulating lever is placed in the position indicated in the section, fig. 4, and during the descent of the piston the air is allowed to escape freely. But if the blow is required to be lighter, the regulating lever is moved upward. This causes the motion of the valve to cut off the escape of the air from the cylinder at any required portion of the stroke. The air

being condensed in the air-cylinder Y, will form an elastic air-spring, lifting upwards on the piston-rod A, thus taking a portion of the blow off the hammer. If the lever 7 in fig. 4 be turned sufficiently around, so that the mortise in the shell U will be entirely beyond the stroke of the plug H″, the air will be condensed in the air-cylinder during the entire stroke, and the hammer arrested in its descent, and will not touch the anvil face at all, thus allowing the workman to control the force of the blow at will.

The spring-box S is made sufficiently long to allow the plugs or glands V V sufficient motion in the cylinder to compensate for the difference of stroke or lift of hammer required for various thicknesses of the work to be forged. If the work is very thick the lower nuts on the bolts F F are screwed upwards, the upper nuts loosened upwards in the same proportion. The hammer will be raised, and a reverse motion to the screws will lower the hammer for light work.

I claim—

1. The cut-off valve D, consisting of the plug H, shell U, and casing J, in combination with the air-cylinder Y, arranged and operating as described.

2. The combination of the spring-box S, spiral springs, piston T, and rubber springs C C, arranged and operating as described.

3. The combination of the fixed air-cylinder Y with the piston-rod A, spring-box S, forked connecting-rod and crank P, constructed and operated substantially as described.

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Witnesses:

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