C. H. HUDSON.

Steam-Pumping Engine.

No. 162,557. Patented April 27, 1875.

Fig. 1

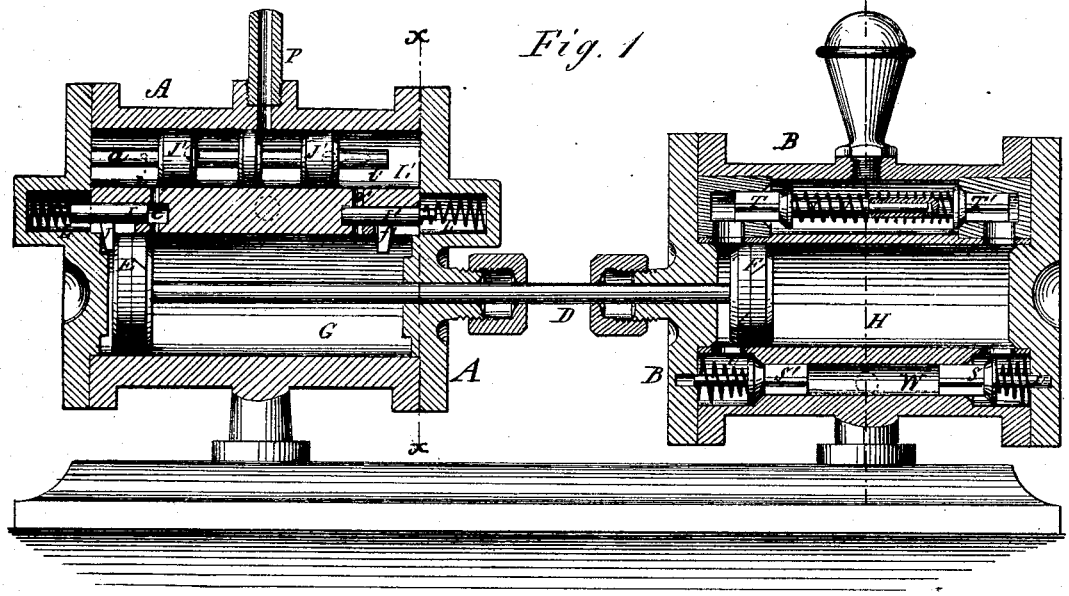


Fig. 2.

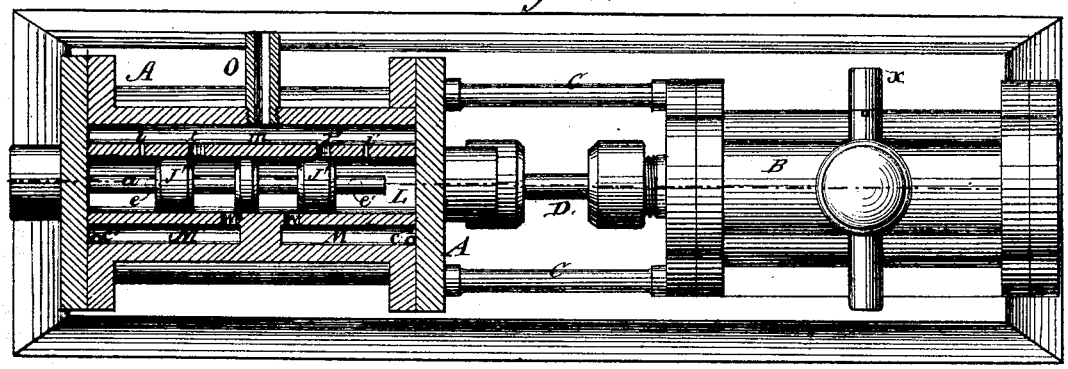


Fig. 3

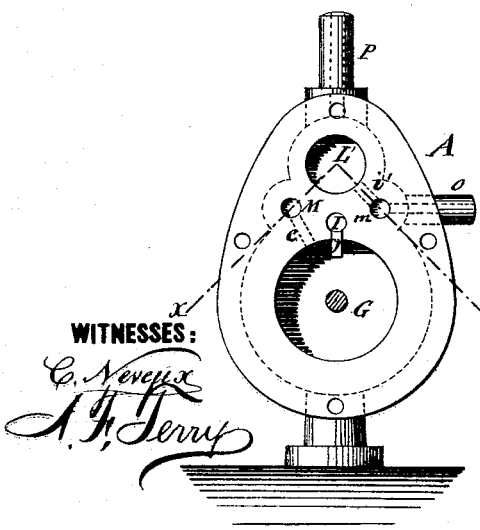
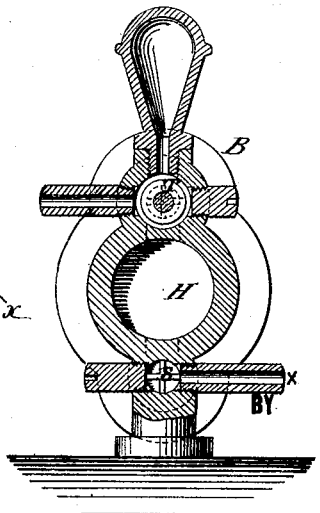


Fig. 4



WITNESSES:

C. Neveux

A. F. Terry

INVENTOR:

C. H. Hudson

BY

ATTORNEYS.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

CHARLES H. HUDSON, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN STEAM PUMPING-ENGINES.

Specification forming part of Letters Patent No. **162,557**, dated April 27, 1875; application filed January 18, 1875.

To all whom it may concern:

Be it known that I, CHARLES H. HUDSON, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Steam Pumping-Engines, of which the following is a specification:

The invention is an improvement in the class of steam pumping-engines in which the movement of the valve is effected by steam acting directly upon it. The improvement relates to a certain construction and arrangement of parts in the engine proper, and also of the eduction-valves in the pump, as hereinafter described and claimed.

Figure 1 represents a vertical longitudinal section of the steam-engine and pump. Fig. 2 is a section of the same on the line *x x* of Fig. 3. Fig. 3 is an end elevation of the engine with the head-plate removed. Fig. 4 is a vertical cross-section of the pump.

The heads of the engine A and pump B are rigidly connected by bars C, and their pistons E F by a rod, D, (which slides in suitable stuffing-boxes,) so that the pistons reciprocate together in their respective cylinders G H. Steam is admitted to the valve-chamber L′ of the engine by pipe P. The valve *d′* is composed of three disks of like diameter, keyed on a stem, *a*. When the valve is in the position shown in Figs. 1 and 2, steam passes into the space between the two right-hand disks, thence by port N into the passage M, which is parallel to the valve-chamber, (see Figs. 2 and 3,) and thence into the cylinder G by an inclined passage, *c*. As shown, piston E has reached the limit of its stroke, and has also come in contact with the tappet-arm J of a valve, I, and opened a port, *e*, leading from cylinder-space G to valve-chamber L′. The steam which has acted on the piston and filled the cylinder space is thus allowed to act on the valve J′ and move it into the alternate position necessary to cut off steam from the right-hand end of the cylinder, and admit it, by the corresponding ports N′ M′ *c′*, to the left-hand end of said cylinder, to move the piston in the reverse direction. Simultaneous with the above-described action of the steam on the valve J′, it exhausts from chamber L′ through port *i* into passage *m*, and thence by pipe O into the outer air. The port *i* being much smaller than port *e*, the pressure in the chamber L′ is always sufficient to move the valve. The regular exhaust from the cylinder G into the valve-chamber is always through the ports by which the steam entered the cylinder at the previous stroke of the piston. In other words, the induction and exhaust of the cylinder alternate through the ports N M *c*, and the corresponding ports N′ M′ *c′*. But the regular exhaust from the chamber L′ is by ports *t* or *t′* and passage *m*. As shown in Fig. 2, the regular exhaust is taking place through the ports *c′* M′ N′, between the disks of the valve J′ and through ports *t* and *m*. The valve J′ is arrested, or prevented moving too far, by means of the projecting ends of the valve-stem *a* abutting the heads of the valve-chamber. When the piston E reaches the end of its stroke in the reverse direction, the corresponding valve I′ is acted on, port *e′* opened, and the valve moved back to cut off or reverse steam, as before.

By the construction described, the valve is acted on by steam admitted to the chamber L′ from the piston-chamber G, where it has been already used to move the piston E. The exhaust always takes place, through one or the other of the passages M M′, into the valve-chamber L′, and thence into the common exhaust-passage *m* on the opposite side. The openings *t t′* between said passage *m* and the valve-chamber L′, are closed alternately by the end disks forming part of the valve J′, the thickness of the disks exceeding the diameter of the openings, and the projecting ends of the valve-stem governing the position of the valve, so that one of the disks always comes directly opposite, and thus covers, the nearest opening *t* or *t′* each time the valve is moved and comes to rest. The stem extensions are also necessary to prevent the passages *e e′* to the cylinder being shut by the valve-disks, so that steam may pass freely into the valve-chamber at the end of each piston-stroke.

Each valve I I′ is cylindrical in form, and is provided with a spiral spring, L, which is arranged in a chamber formed in the head of the engine, as shown. Thus the parts are inclosed and protected from injury, besides occupying less space than in other engines of this class. There is

likewise less loss of power by friction than in engines whose valve-stems work through the head of the cylinder. The pump B has ports at each end of chamber H. As represented, the chamber has first been filled by water entering through a reservoir-pipe, X, and flowing past valve S, while the water which filled the chamber just previous to the stroke of the piston F has been forced out past eduction-valve T. When the piston makes its next return or reverse movement, the eduction will take place through the port of valve T′ and the induction at the diagonally-opposite port of valve S′. Each valve S S′ works in a horizontal chamber, W, and has a closing spring, U, of spiral form, encircling its stem, which projects into the head of the pump. By this arrangement of valves in chamber W the supplementary chamber, requisite in pumps whose valves close by gravity, is dispensed with, and space and material are economized. The stems of valves T T′ slide one within the other, whereby they are mutually supported. They are also encircled by a spiral spring, V, to seat the valves properly.

What I claim is—

1. The three-disk valve J′, having a stem extension at each end, the separate passages M M′, through which induction and exhaust alternate, the chamber L′, and the common parallel exhaust-passage *m*, communicating with said chamber by means of openings *t t′ i i′* of different sizes, all combined and arranged as shown and described, to operate as specified.

2. The water-eduction valves T T′, having their stems extended, and one of them made tubular to receive the other, and the spring V encircling the same, as shown and described, for the purpose specified.

CHARLES H. HUDSON.

Witnesses:

F. H. TUBBS,

A. H. CROCKER.