W. C. HEISTER.

Steam Pumping Engine.

No. 204,433. Patented June 4, 1878.

Fig. 1.

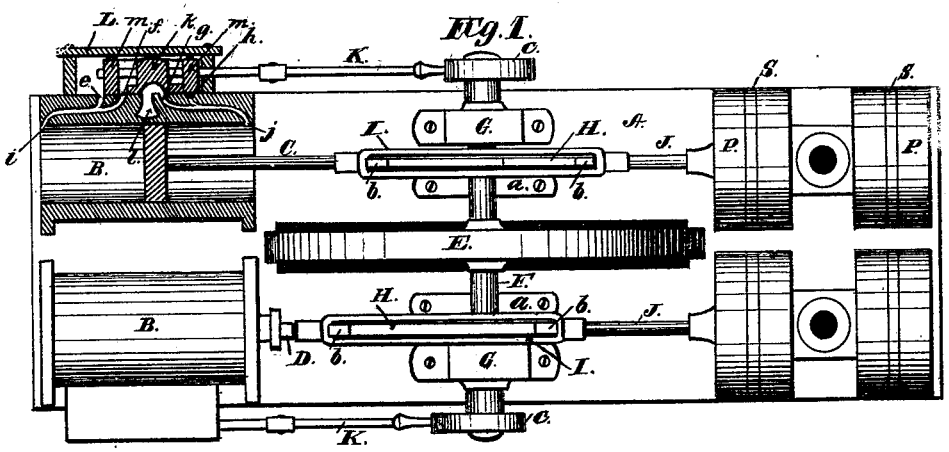


Fig. 2.

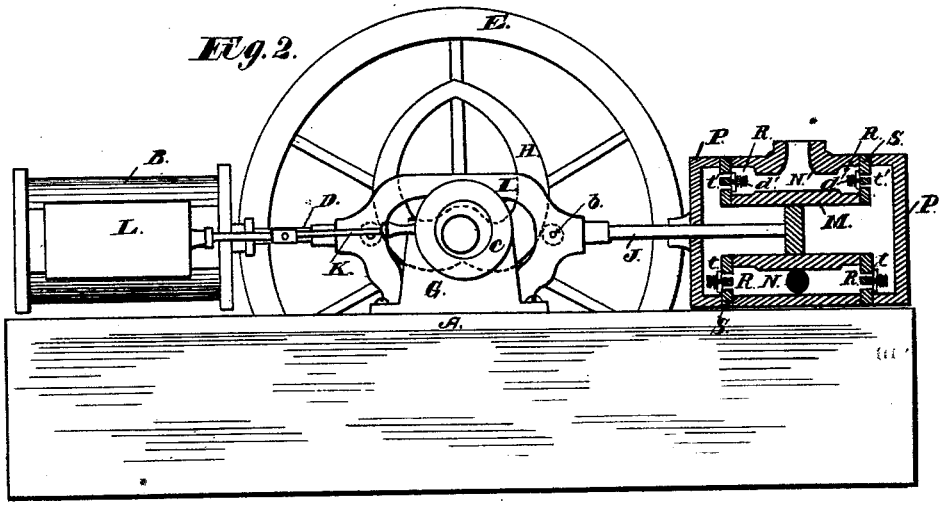


Fig. 3.

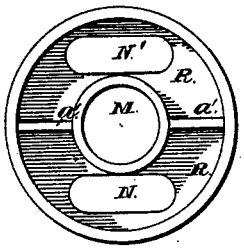
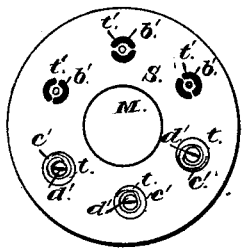


Fig. 4



Witnesses;
Chas. M. Cook
M. Chas Nolan

Inventor;
William C. Heister
by his Attys;
Cook & Ritchie

UNITED STATES PATENT OFFICE.

WILLIAM C. HEISTER, OF SPRINGFIELD, OHIO.

IMPROVEMENT IN STEAM PUMPING-ENGINES.

Specification forming part of Letters Patent No. **204,433**, dated June 4, 1878; application filed April 27, 1878.

To all whom it may concern:

Be it known that I, WILLIAM C. HEISTER, of Springfield, in the county of Clarke and State of Ohio, have invented certain new and useful Improvements in Steam Pumping-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same.

The object of my invention is to increase the efficiency, durability, and economy of double direct-acting steam pumping-engines; and my improvements consist in the construction of the steam-valve and steam-chest with double ports, for rendering the delivery and exhaust more perfect and uniform; also, in the peculiar construction of the water or pumping cylinders, all as will be herewith set forth and specifically claimed.

In the accompanying drawings, Figure 1 represents a plan view of my improved engine, with one of the steam-cylinders shown in longitudinal section. Fig. 2 is a side elevation of the same, with one of the water-cylinders shown in central section. Figs. 3 and 4 are end views of the water-cylinder, which will be referred to farther on.

Corresponding letters of reference indicate like parts in all the figures.

Upon any suitably-constructed bed or frame, A, are mounted, at one end, two parallel adjacent steam-cylinders, B, of ordinary construction, and provided with pistons and piston-rods C and D.

E is the balance-wheel, mounted upon a shaft, F, journaled in pillow-blocks G upon the bed, as shown. The axes of this shaft and of the piston-rods lie in the same plane.

Keyed on each side of the wheel E is a heart-shaped cam or eccentric, H, which cams are set quartering to each other. By means of these cams the balance-wheel is rotated through the medium of cross-heads I, of the shape indicated. These latter travel in ways *a* upon the bed, and are slotted vertically to receive the cams H, which are confined in them. The piston-rods C and D have their ends connected to each of these cross-heads, as represented. The piston-rods J of the pumping-cylinders are also connected to the opposite ends of the cross-heads, so that the latter form the means of connecting the two sets of piston-rods.

Pivoted in the slots of the cross-heads at each end, and in line with the piston-rods, are friction-rollers *b*, which, as the piston-rods vibrate, bear against the cams H and cause their rotation. The object of these rollers is to prevent the wear of the parts and to diminish friction.

The valve-rods K are operated by ordinary eccentrics, *c*, upon the shaft F, and these eccentrics are likewise set quartering.

The steam-chest L (shown in section, Fig. 1) has opening from it into the steam-cylinder two sets of ports, *e f* and *g h*, which converge and enter the cylinder at *i* and *j*.

The valve is composed of a rectangular frame, whose ends form slides *m*, that rest and travel upon the seat. This frame is adjustably fitted by set-screws upon the valve-rod, as shown. Between these outer slides, and within the frame, is the ordinary bridge-piece *k*, covering the eduction-port *l*. This piece is loose upon the valve-rod, so as to obtain lost motion, and it is shifted by each of the slides *m* alternately. By this construction and arrangement steam can be cut off at any portion of the stroke, and the expansion can be retained until the completion of the stroke, if desired.

By reference to Figs. 3 and 4, the construction of the pumping-cylinders can be clearly seen. M is the central cylinder, in which the piston driven by the rod J works. Above and below this cylinder are chambers N N′, in the former of which is the induction-port, and in the latter the eduction-port, communicating with the air-chamber.

The cylinder-heads P are recessed, as seen in section, Fig. 2; and recesses R are formed at each end of the chambers N N′, separated by flanges *a′*, as seen in Fig. 3.

S S are disks, which divide the recesses R from the recesses in the cylinder-heads P at each end. The disks have apertures coincident with the bore of the cylinder M, as seen in Fig. 4.

In each of the disks S are two sets of valves,

t t'. These valves are formed by making segmental apertures b' in the disks, which apertures are covered by rubber or other yielding disks c', which are held to their seats by spiral springs coiled upon central studs d', projecting from the disks S, as shown. The lower of these sets of valves, t, open into the recesses of the cylinder-heads P, while the upper sets open into the recesses R, which communicate with the chamber N'.

Now, as the piston vibrates in the cylinder M, water is first drawn through the valves t into the recesses of the heads P, and is then forced through the valves t' into the chamber N', and thence into the air-chamber. By this arrangement all danger of back-pressure is avoided and greater power can be exerted.

While I have described my invention in its application to a double pumping-engine, still the same devices could be applied equally as well to a single pump, the advantage in a double pump of this construction being the impossibility of halting on a dead-center.

Having thus fully described my invention, I claim—

1. The herein-described slide-valve, consisting of the loose bridge k and adjustable slides m, in combination with the induction and eduction ports, whereby the steam can be cut off automatically at any desired part of the stroke, and whereby the expansive force of the steam may be retained until the completion of the stroke, substantially as specified.

2. The herein-described pumping-cylinder, consisting of the central cylinder M, recessed heads P, valve-disks S, with their sets of valves t t', the upper seated on the inner and the lower on the outer faces of the disks S, recesses R, and chambers N N', the whole constructed and arranged in the manner and for the purpose specified.

Witness my hand this 16th day of April, A. D. 1878.

WILLIAM C. HEISTER.

Witnesses:
GEO. S. RIZER,
JOSEPH KELLEY.