

King & Mulock,

Reciprocating Engine.

No. 112,151.

Patented Feb. 28. 1871.

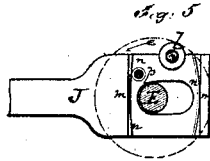
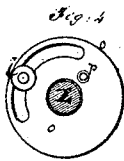
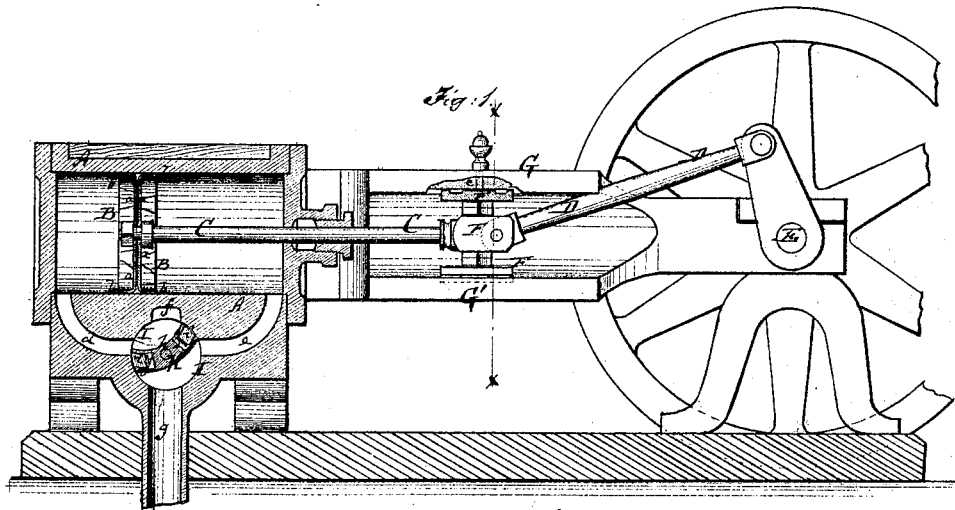


Fig. 2

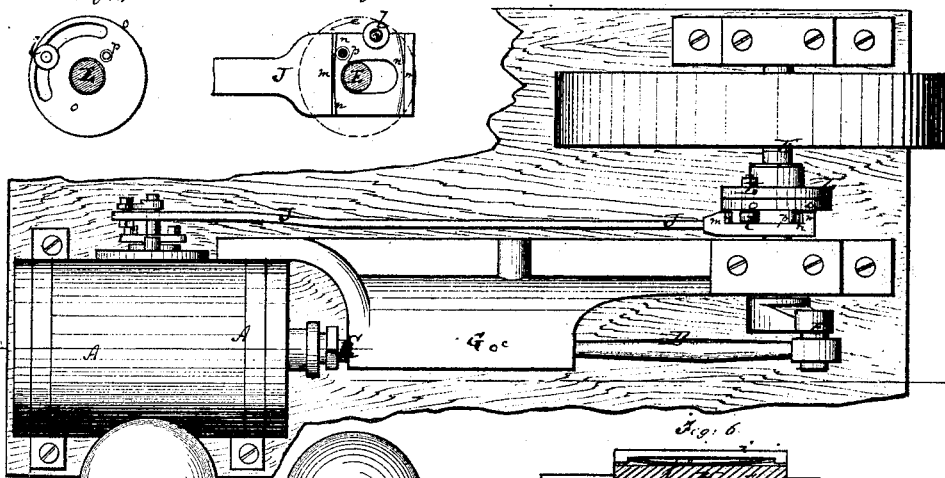


Fig. 6

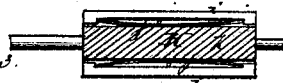
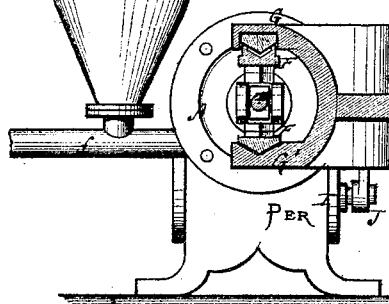


Fig. 3



Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY JAMES KING AND DANIEL CHARLES MULOCK, OF MIDDLETOWN,
NEW YORK.

IMPROVEMENT IN STEAM AND WATER ENGINES.

Specification forming part of Letters Patent No. **112,151**, dated February 28, 1871.

To all whom it may concern:

Be it known that we, HENRY JAMES KING and DANIEL CHARLES MULOCK, of Middletown, in the county of Orange and State of New York, have invented a new and Improved Steam and Water Engine; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

Figure 1 represents a vertical longitudinal section of our improved steam and water engine. Fig. 2 is a plan or top view of the same. Fig. 3 is a vertical transverse section of the same, taken on the plane of the line *x x*, Fig. 1. Fig. 4 is a detail face view of the cut-off disk. Fig. 5 is a detail side view of the valve-rod and cam for operating the same. Fig. 6 is a detail longitudinal section of the valve.

Similar letters of reference indicate corresponding parts.

This invention relates to several improvements in the construction of the valve-gear and other working mechanism of steam and water engines.

The invention consists in a novel construction of valve, cut-off, piston, cross-head, and valve-gear, all arranged with an object of simplifying the construction of the machinery and avoiding friction, as hereinafter more fully described. The cross-head is so shaped, in connection with the guides between which it works, that both its edges can be properly lubricated. The cut-off can be adjusted at will to use the steam expansively or not.

A in the drawing represents the cylinder of our improved engine. B is the piston; C, the piston-rod; D, the connecting-rod; and E the crank-shaft to be turned.

The cylinder is of a suitable construction, and is set up in a horizontal or other suitable position.

The piston B is constructed of two metal plates, *a a*, which are riveted or screwed together. Each of these plates has an outward-bent rim, *b*, which, previous to being bent at right angles to the body of the plate, is nicked or cut. When bent, the several sections of the rim *b* will overlap each other and produce

an outward pressure, by which the piston will always be kept tight in the cylinder.

The piston-rod C is, at its outer end, secured to the cross-head F, which works between two fixed guides, G G'. The upper edge of the cross-head is made hollow, while its lower edge is convex, as shown in Fig. 3. The guides are shaped to correspond with the edges of the cross-head. Thus the lower edge of the cross-head is V-shaped, and the contiguous surface of the guide G' hollow to fit it. Oil or other lubricating material can thus be held in the grooved guide G'. The upper edge of the cross-head is grooved to correspond with the contiguous V-shaped face of the guide G.

Lubricating matter can be securely held in the grooved upper edge of the cross-head, and thus both edges of the same are oiled and will move without friction. Through an opening, *c*, in the top guide, G, the upper edge of the cross-head can be supplied with lubricating matter.

H is the valve for regulating the supply of steam or water to the cylinder. This valve is fitted transversely, under the cylinder A, into a cylindrical valve-chamber, I, which is provided for its reception. It is hung at the ends, and connected by a crank and slotted rod, J, with an eccentric-pin on the crank-shaft E, so that it (the valve) will be oscillated by the rotation of the crank-shaft. The valve H is curved, but narrow, as shown. Its ends are to regulate the admission of steam to the ports *d e* of the cylinder A.

Steam or water enters the chamber I at the top through a suitable supply-pipe, *f*, and is then admitted into one of the ports, *d* in the drawing, while at the same time the other port is in communication with the exhaust *g* for discharging the spent water or steam. The next motion of the valve will reverse the action of the piston by letting new steam into *e* and exhausting through *d*. While the steam is to be used expansively the valve must be in such a position as to close against the inlet of steam, while the exhaust is left open, both the ports *d e*. The valve is constructed of an inner main piece or core, *h*, and of two adjustable edge pieces, *i i*. The latter are, by means of springs *j j*, which are shown in Fig. 6,

pressed against the sides of the chamber I, and a steam-tight fit is thereby produced. The upper face of the valve is concave and the lower convex; or the valve may be made angular, if desired. By this form the valve can be made to open one port entirely for the exhaust, and at the same time to but partly open the port for the admission of steam; thereby the operation will be considerably facilitated. Steam can, through apertures near the edges of the valves, be admitted against the inner faces of the pieces *i*, for the purpose of holding them tight against the sides of the valve-chamber. The valve is set by means of the rod J, which, at its outer slotted end, embraces the crank-shaft E, as indicated in Fig. 5, and which receives motion by an eccentric-pin, *l*, from a disk, L, that is mounted upon said shaft. The pin *l*, which carries a friction-roller, works against two vertical edges, *m*, formed on the rod J by a groove. These edges are made elastic by springs *n* placed against them, so that thereby the motion of the valve becomes gentle and even.

o is another disk, fitted around the shaft E in front of the disk L, and provided with a projecting pin, *p*. The pin *l* projects through a curved slot of the plate *o*, as in Fig. 4, allowing the latter to be adjusted on the shaft E so as to bring the pins *p l* any suitable distance apart. The pin is set closer to the center of the shaft E than the pin *l*, and does, therefore, not move the rod J as far as the pin *l*. In striking the edge *m* the pin *p* moves the valve far enough to close both ports *d e* against

the access of steam while the exhaust is still open, and allows, therefore, the steam to be used expansively. When the pin *l* strikes the rod J it revolves the valve.

By adjusting the disk *o* the effect of its pin *p* can be regulated at will. It is evident that by changing the position of the pin *l* on the shaft the engine may be reversed.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The piston composed of two plates, *a a*, which are provided with outward-bent cut edges, as set forth.

2. The cross-head F, grooved on the upper and convex on the lower edge, combined with guides G G', convex on the upper and grooved on the lower edge, as described, for the purpose of enabling both edges to be oiled.

3. The concavo-convex sides *i i* and concavo-convex core *h*, combined with intermediate springs *j j*, arranged as described, to form a double-acting valve.

4. The rod J, for operating the valve H, when provided with the springs *n*, for receiving the motion from the actuating pin or pins, as set forth.

5. The cut-off pin *p*, secured to an adjustable disk, *o*, and combined with the pin *l* and rod J, as set forth.

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