G. Doyle,

Steam-Engine Valve-Gear.

No. 61,175. Patented Jan. 15, 1867.

Fig 1.

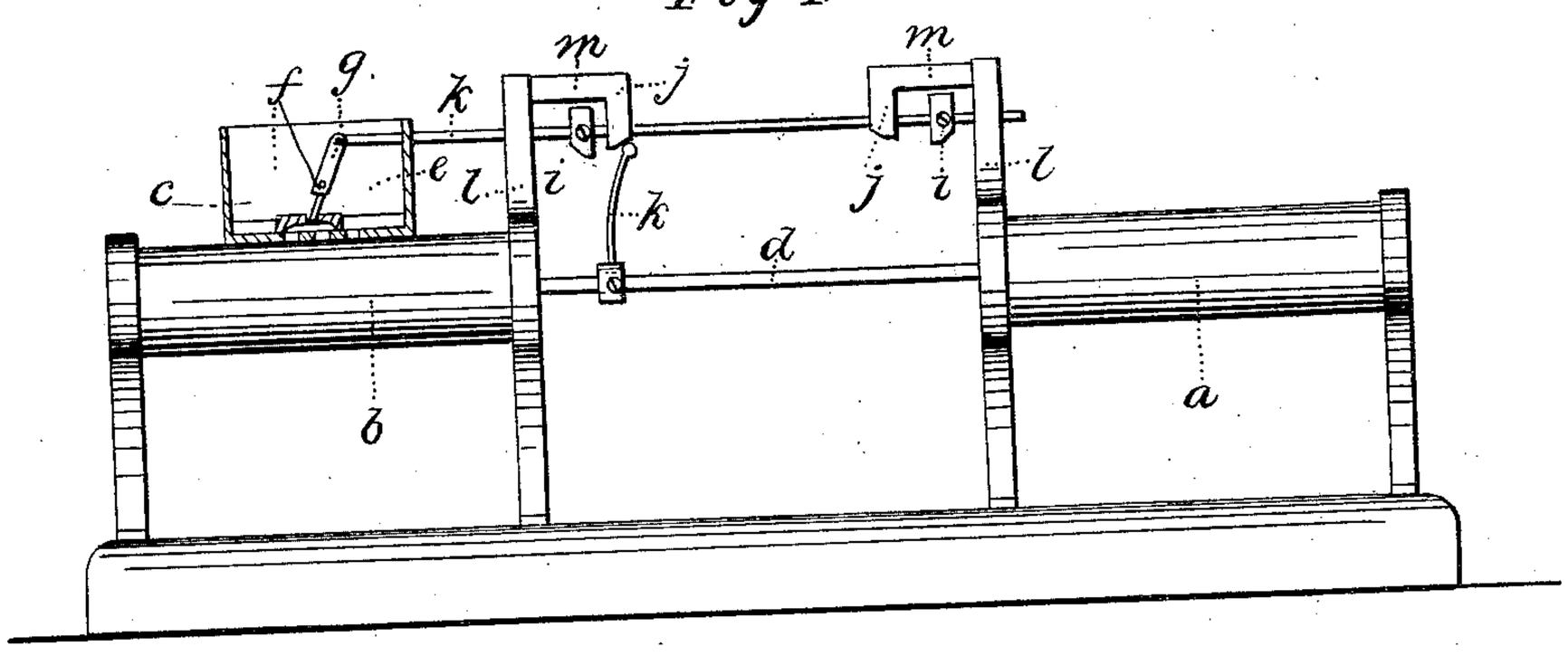
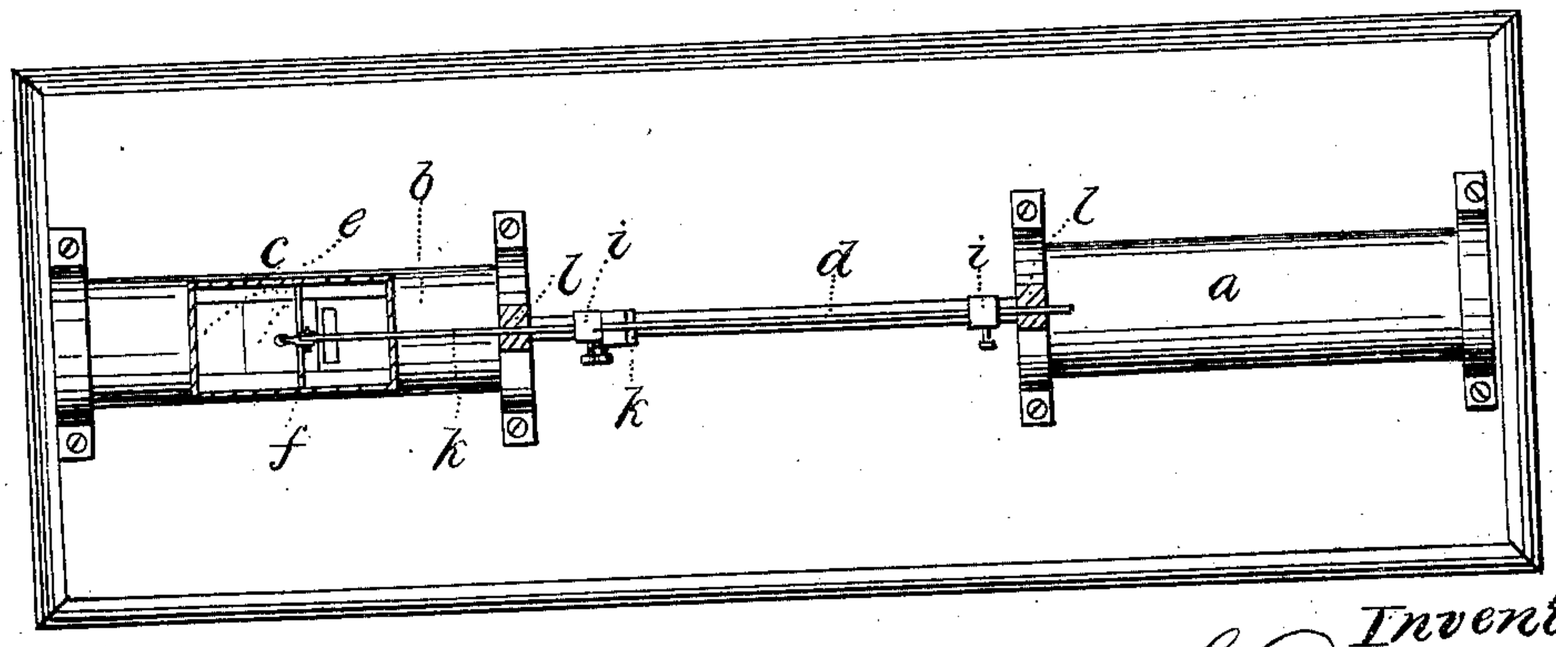


Fig. 2.



Witnesses.
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GEORGE DOYLE, OF WORCESTER, MASSACHUSETTS.

Letters Patent No. 61,175, *dated January* 15, 1867.

IMPROVEMENT IN STEAM PUMP VALVE-GEAR.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that I, GEORGE DOYLE, of Worcester, in the county of Worcester, and State of Massachusetts, have invented a new and useful Improvement in Steam Pumps; and I 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, in which—

Figure 1 is a side view of the steam and pump cylinders and of some other parts of a steam pump, the steam chest being shown in section.

Figure 2 is a plan or top view partly in section.

The object of this invention is to improve and simplify the means of operating the steam valve in pumps of this description. The devices for changing the valve have been for the most part of such a character and mode of operation as to subject the valve to the liability of being arrested in its movement midway between the steam induction ports or openings, instead of being moved far enough to close one of the ports entirely. When the valve is thus arrested, steam is admitted into the cylinder on both sides of the piston, and the engine consequently stops. This invention is designed to prevent such accidents or occurrences, and to insure the proper and full movement of the valve in each direction, so as fully to open and close the induction ports at each part of its reciprocation. In order to effect this result, I employ the movement of the piston in gathering power, sufficient, when the piston approaches the end of its stroke in each direction, to effect the necessary change in the position of the valve, through the agency of a spring whose free end, when it is released strikes lugs fixed on the valve-stem and moves the valve the proper distance.

In the example of my invention here shown, *a* is the pump cylinder; *b* the steam cylinder; *c* the steam chest; and *d* the piston-rod. The valve is seen at *e*, and is connected in any suitable way to a lever, *g*, which, vibrates on a rod or shaft, *f*, that is extended across the steam chest. The valve-stem *h* extends between the space intermediate the cylinders and a little way over the pump cylinder, being supported by standards, *l l*, that rise from the inner end of each cylinder, through which standards they are free to slide. *i i* are lugs fixed adjustably by means of set-screws upon the valve-stem near to the inner end of each cylinder respectively, and between those ends are dogs, *j j*, which in this example consist of the lower parts of right-angled arms, *m m*, that extend toward each other from the top of the standards *l l* and over the valve-stem, their vertical parts being slotted or perforated to allow the valve-stem to go through them. Their lower parts *j j* are below the level of the valve-stem. On the piston-rod *d*, about midway of its length between the cylinders, or about midway of the part which moves between them, I adjust, by means of a collar and set-screw, a spring-arm, *k*, which rises high enough to engage the lugs *i* during the movements of the piston-rod, and also to come in contact with the dogs *j*. When the piston-rod is moving towards the left, the spring-arm *k* is carried along until its top strikes against the left-hand dog *j*, which, being rigid, causes the top of the arm to be bent backwards and downwards, while it is passing beneath the dog, when the arm is suddenly released and is allowed to strike against the adjacent lug *i*, thereby moving the valve-stem and shifting the valve. The force with which it strikes the lug depends on the tension put upon the spring; the strength or stiffness of which, and the position of the dogs, being determined or adjusted with regard to the power required to move the valve the necessary distance at the completion of each stroke of the piston. The like action of the spring-arm takes place when it is moved past the right-hand dog *j*, at which time it strikes the lug *i* on that end of the valve-stem, and moves the valve in the opposite direction. Instead of going under dogs *j j*, separated by an interval, as here shown, the spring-arm may be made to go under a projection which is continued from the point occupied by one dog to that occupied by the other. By means of this invention the stroke or movement of a piston is made use of to provide or gather up a force sufficient to effect the opening and closing of the ports, so that, although the lugs may receive their impulse from the springs at the times when the piston is completing its stroke in each direction, yet the valve is operated with certainty and promptness, and is moved the required distance to fully open and close the ports in proper order. Any form of spring may be used that will effect the throw or change of the valve, and a spiral spring may be used by causing such a spring to be compressed by a tappet or arm from the piston-rod, and to be suddenly released when the time comes to change the valve.

What I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of the spring *h*, the dogs *j j*, and the lugs *i i*, on the valve-stem, substantially as and for the purpose specified.

2. I also claim the arrangement of the dogs *j j* for putting tension on the spring by restraining it during the stroke or part of the stroke of the piston, substantially as and for the purpose specified.

The above specification of my invention signed by me this 19th day of April, 1866.

GEORGE DOYLE.

Witnesses:

WM. F. MCNAMARA,

ALEX. F. ROBERTS.