D. W. KELLOGG.
Reciprocating-Engine.

No. 205,395. Patented June 25, 1878.

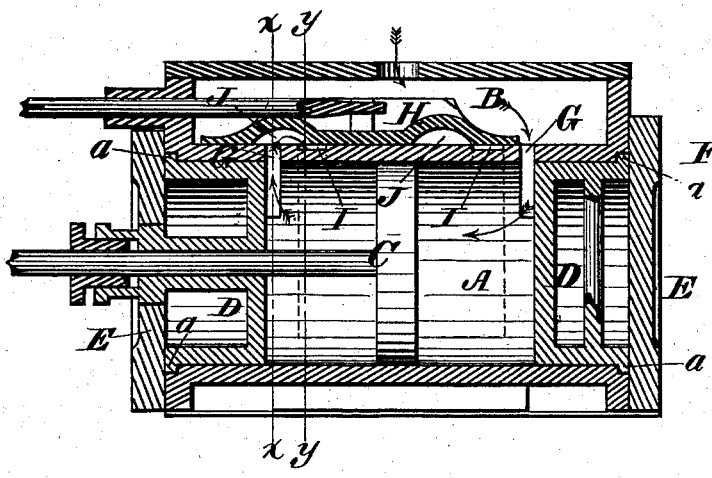


Fig. 1.

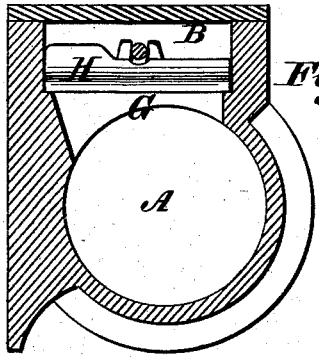


Fig. 2.

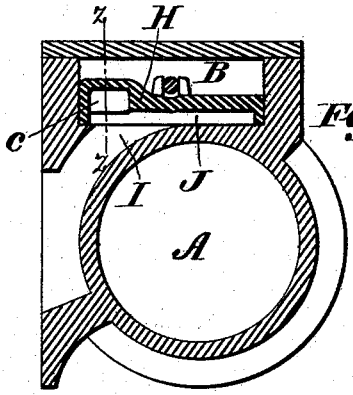


Fig. 3.

Fig. 4.

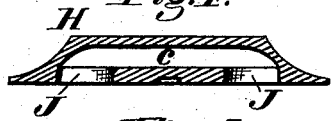
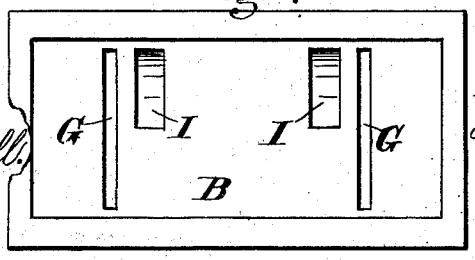


Fig. 5.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

DAN. W. KELLOGG, OF AUBURN, NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO WILLIAM A. KIRBY, OF SAME PLACE.

IMPROVEMENT IN RECIPROCATING ENGINES.

Specification forming part of Letters Patent No. **205,395**, dated June 25, 1878; application filed April 4, 1878.

To all whom it may concern:

Be it known that I, D. W. KELLOGG, of Auburn, in the county of Cayuga and State of New York, have invented certain Improvements in Slide-Valve Engines, of which the following is a specification:

The object of my invention is to avoid the waste of steam and loss of power which occur in slide-valve engines of the ordinary construction in consequence of the length and crookedness of the induction-ports and of the large area of said ports between the face of the valve and the inside of the cylinder.

As ordinarily constructed, slide-valve engines have the induction-ports made of irregular and crooked forms and of considerable length, and in consequence of such form a material loss in steam-pressure occurs between the valve-chest and the cylinder, the pressure of the steam being materially lessened by reason of its being compelled to turn the corners and angles of the ports.

Another source of material loss is due to the fact that the induction-ports, as ordinarily constructed, are of such size or capacity that they require a considerable volume of steam to fill them. This steam being discharged at each exhaust, and in no way aiding in the movement of the piston, practically is a total loss. In other words, ordinary engines at each stroke discharge as waste-steam the amount required to fill the induction-ports between the valve-face and the interior of the cylinder.

It is to overcome loss from the two above-mentioned sources that my invention is mainly designed; and to this end it consists, primarily, in so constructing the parts that straight induction-ports are used, such ports being very short in length, and communicating directly from the valve-chest to the cylinder, extending only through the thickness of the metal of the cylinder; in combining with the cylinder thus constructed a flat slide-valve, the combination of the flat valve and the peculiarly-formed induction-ports enabling me to reduce the amount of steam required to fill the ports, and consequently the amount wasted, to a point far below that of the ordinary engines.

The second feature of my invention consists in the use, in connection with the straight ports and flat valve, of wide and flat eduction-ports.

Figure 1 represents a longitudinal central section through the cylinder and valve-chest of an engine having my improvements embodied therein; Fig. 2, a cross-section of the same through the induction-port on the line *x x;* Fig. 3, a cross-section of the same on the line *y y;* Fig. 4, a longitudinal section of the slide-valve on the line *z z*, Fig. 3; Fig. 5, a top-plan view of the valve-seat and ports.

A represents the cylinder, and B the steam or valve chest, located on the top or upon one side of the same. The cylinder is extended at both ends beyond the length required for the stroke and clearance of the piston C, and is provided with hollow heads, each consisting of two parts, D E.

It will be seen that the parts D E form a hollow head or end for the cylinder, the contained air forming a non-conducting medium, preventing the loss of heat by radiation and the loss of steam by condensation.

The cylinder is provided at its ends with two straight induction-ports, G, opening directly from the interior of the cylinder into the valve-chest, the ports being, as indicated in the drawings, extremely short in depth.

The cylinder is provided, as usual, with a flat face within the valve-chest, to receive the slide-valve H, the metal forming the side of the cylinder being made as thin as possible, in order to bring the face of the slide-valve in the nearest possible proximity to the interior of the cylinder, for the purpose of rendering the ports G of the smallest possible depth and capacity, so that a small amount of steam only will be required to fill the ports.

I I represent the two eduction-ports, formed in the outside of the cylinder, between and adjacent to the ports G. As shown in the drawing, the eduction-ports are made very shallow, in order that the seat of the cylinder may be made thin for the reasons before given. The necessary capacity is obtained with the shallow ports by increasing their width in the manner shown.

By thus constructing the eduction-ports of the wide and shallow form I am enabled to provide for a free exhaust, and at the same

time to construct the cylinder with an extremely thin side, and bring the face of the valve very near the interior of the cylinder.

The valve H is made of the same general form as the well-known double D-valve, having in its face, at opposite ends, two cavities, J, to connect the respective induction-ports with the corresponding eduction-ports in the manner represented in the drawing, the steam being admitted to the cylinder past the end of the valve in the ordinary manner.

For the purpose of giving the engine an unusually free exhaust without increasing the capacity of the exhaust-ports to an objectionable extent, I connect the two recesses or cavities in the valve-face by means of the passage *c* cast in the valve, as shown in Figs. 3 and 4, so that any excess of steam in either exhaust-port may escape through the channel or passage to the opposite end of the valve, and thus through the other exhaust-port, the engine exhausting, in fact, through both exhaust-ports at the same time. The same result may be secured by connecting the two ports I by a channel in the outside of the cylinder; or, in other words, by making one wide port, I, extending the entire length of the cylinder.

By means of my improvement in the valve and ports, I find in practice that I am enabled to economize the consumption of steam, and to gain materially better results in proportion to the amount of steam consumed than can be attained in engines of the ordinary construction.

I am aware that flat slide-valves and double slide-valves are old; also, that a straight induction-port, separately considered, is old; also, that hollow cylinder-heads cast in one piece are old; and therefore I make no claim to either of said features individually.

Having thus described my invention, what I claim is—

In a steam-engine, the combination of the cylinder, provided with the short straight ports G, and the thin top wall with the wide and shallow ports I, and the flat valve H, as shown and described.

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