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C. A. CONDE.

Improvement in Valves for Steam-Engines.

No. 129,532. Patented July 16, 1872.

Fig. 1

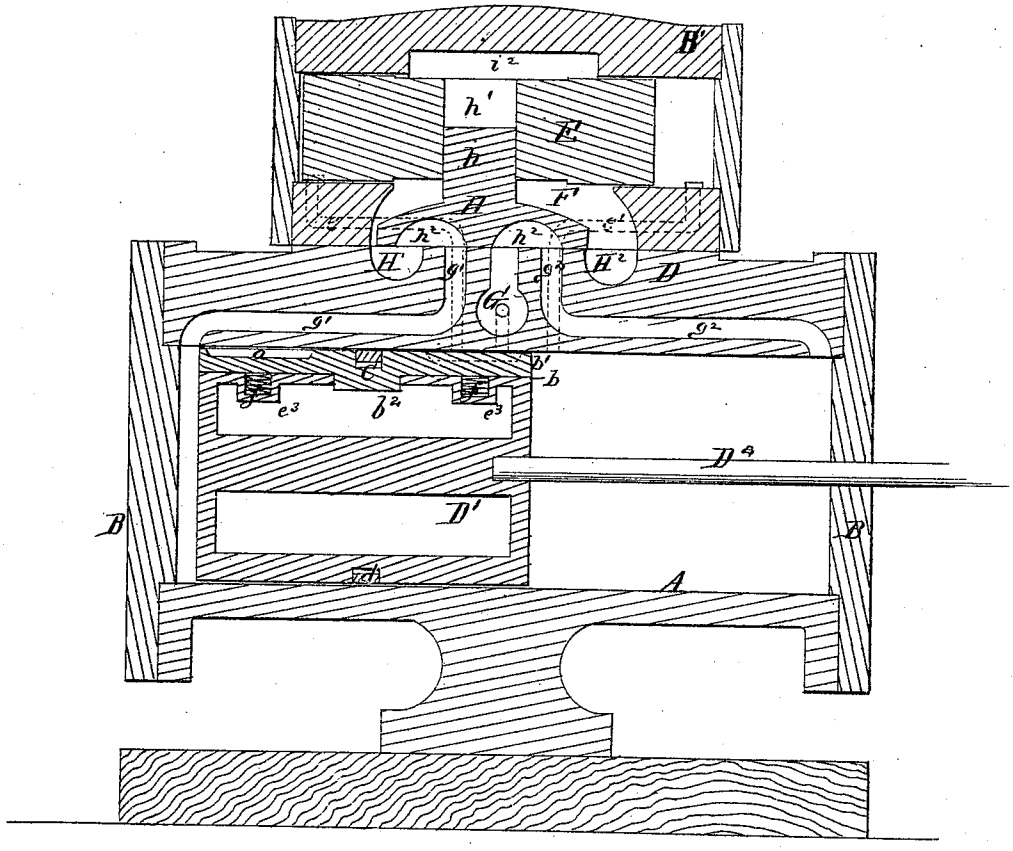
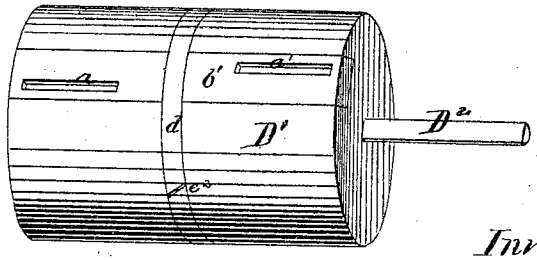


Fig. 3



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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

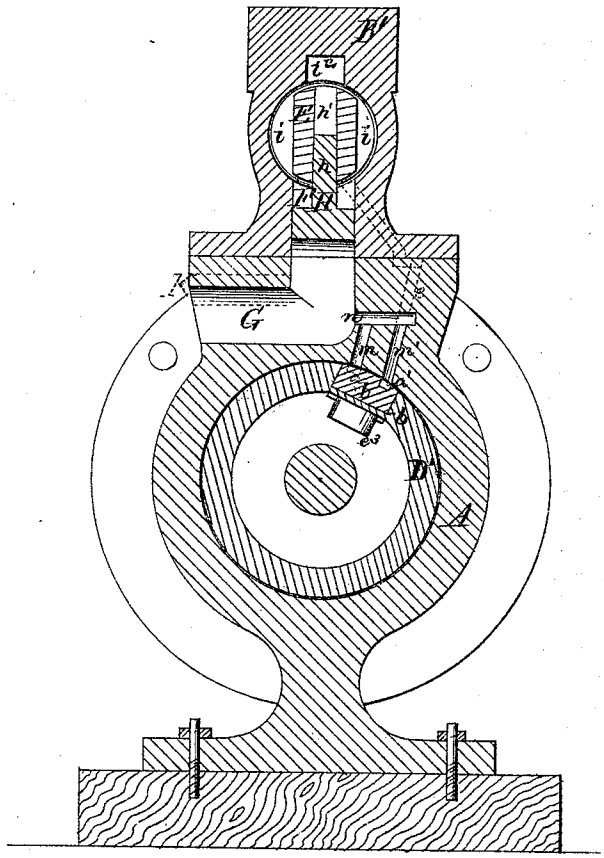
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C. A. CONDÉ.

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Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES A. CONDÉ, OF INDIANAPOLIS, INDIANA.

IMPROVEMENT IN VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 129,532, dated July 16, 1872.

To all whom it may concern:

Be it known that I, CHAS. A. CONDÉ, of Indianapolis, in the county of Marion and State of Indiana, have invented a new and valuable Improvement in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of a central vertical longitudinal section of my invention. Fig. 2 is a central vertical transverse section of the same. Fig. 3 is a perspective view of the piston.

This invention has relation to steam-engines; and it consists in the novel construction of the piston and steam-valve, and the arrangement of the steam ports and passages, as hereinafter described. The object of this invention is to provide for the operation of an automatic steam-valve, which shall be actuated by the direct force of steam received into the valve-box through passages leading thereto from the cylinder.

In the accompanying drawing, illustrating this invention, A designates the steam-cylinder, having the heads B B. B′ indicates the valve-box, located above the cylinder upon a suitable bed, D. This valve-box is constructed with a cylindrical bore, within which operates a double-headed plunger, E, which is driven by the force of steam admitted at either end through ports e e^1 leading into the valve-box from the interior of the cylinder A in the direction shown in the drawing. Below the bore of the valve-box is constructed a longitudinal chamber, F, which opens into said bore. The bottom of said chamber is the valve-slide, provided with the openings formed by ports and passages used for the transmission of steam to and from the cylinder A. G represents the main exhaust-port. g^1 g^2 are the supply and exhaust passages, running from the chamber F or from the valve-slide to either end of the cylinder. Through these passages steam is admitted to the cylinder to operate the piston D′. As will be observed, the mouths of the passages g^1 g^2 are located on either side of and at equal distances from the exhaust-port. H represents the valve, which is constructed with a neck, h, fitting a vertical longitudinal slot, h^1, formed in the plunger midway between its ends. In the under side of the valve are formed the steam-chambers h^2, each of sufficient dimension to create a passage between or span the mouths of any two of the ports G g^1 g^2. H^1 H^2 designate two recesses, formed in the valve-slide or bed, one at each end of the chamber F. The distance between these recesses and the mouths of the ports g^1 g^2 is equal to the distance between either of said ports and the main exhaust G. The mouths of said recesses should be somewhat wider than those of the ports g^1 g^2. Between the heads of the plunger, on either side of the slot h^1, the plunger is narrowed, as shown in Fig. 2, so as to create a steam-passage, i, which shall communicate with the chamber F. Above the plunger a recess, i^2 is formed in the valve-box, and serves as a continuation of the passage i over the plunger. As may be observed in Fig. 1, the form of the valve is such as to allow the free passage of steam above and at either end of it.

Steam from the boiler is admitted to the recess H^1 through a passage, K, and, when the valve is in the position clearly shown in Fig. 3, passes thence through one of the chambers h^2 into the port g^1, by which it is conducted to the end of the cylinder, whereat the piston is located for the time being. Now, supposing the engine to have been in motion, and the space between the forward end of the cylinder and the end of the piston to be filled with steam, as soon as the piston moves forward an exhaust takes place, the exhaust steam passing through the port g^2, thence through the chamber h^2, into which said port leads, and out through the main exhaust G. As soon as the piston has traveled its full distance, the valve moves swiftly over the slide, makes communication between the port g^1 and the exhaust G, and creates a steam-passage, beginning at the recess H^1, thence extending above the valve, embracing the unoccupied spaces there formed, and continues through the recess H^2 and chamber h^2, into the port g^2. Steam is thus admitted to the forward end of the cylinder, while the exhaust takes place from the other end.

It remains now to explain the means by which the valve is actuated: As will be

seen, the piston used consists of a hollow cylinder, which extends about half the length of the bore of the cylinder A. At a suitable part of the periphery of the piston a longitudinal channel, *b*, is formed for the reception of a convex plate, b^1, which, in its proper position, coincides with the surface of said piston. The under surface of the plate b^1 is formed with a square shoulder, b^2, which fits closely an opening formed from the middle part of the channel *b* into the piston. Around the periphery of the piston is formed a channel or groove, *c*, with which coincides a channel across the face of the plate b^1. The channel *c* is adapted to hold an elastic ring, *d*, which is severed at the point e^2, and which has a tendency to expand so as to form a packing, which will compensate for wear on the piston, and which will prevent the passage of steam from one end of the piston to the other through the cylinder. The shoulder b^2 fits the recess or opening in the piston perfectly steam-tight, so as to prevent the passage of steam under or around it. The steam finding its way under the ends of the plate b^1 has a tendency to press the plate against the surface of the bore of the cylinder A. To aid this pressure springs *f* are provided. These springs are arranged within boxes e^3, cast or otherwise formed in the piston below the channel *b*, and exert their force against the under surface of the plate b^1. At either end of the plate b^1, near opposite sides, are, respectively, formed the longitudinal channels *a a'*, which are designed for the purpose of establishing communication between the ports *e* e^1, which conduct steam to and from the valve-box to actuate the valve and the exhausts *m m'*. The ports *e* e^1 extending through the case of the valve-box and cylinder A have their openings into the cylinder on lines coincident with the channels *a a'*. On the same lines are located, respectively, the openings of exhaust-passages *m m'* leading into an exhaust-passage, *n*, which opens into the main exhaust G.

The location of the exhausts *m m'* is exactly midway between the ends of the cylinder. The ports *e* e^1 are located at a distance from said exhausts about equal to the distance between the ports g^1 g^2 and the main exhaust, or in such positions that as the piston travels they shall be passed by it, respectively, before it has moved its full limit either way.

Now, when the piston has almost reached the end of the cylinder, the steam which has propelled it rushes up through one of the ports, say the port e^1, is conducted thence to the end of the plunger, and causes it to move in the direction of the piston, carrying the valve with it. The position of the plunger and valve after such operation is shown in Fig. 1. The plunger and valve complete their travel in a shorter time than the piston, and thus make the change necessary for the reverse movement of the piston in good time. At the same time that steam is passing through the port e^1 a communication is established between the port *e* and the exhaust *m* through the medium of the channel *a* of the plate b^1, thus creating a simultaneous supply and exhaust to and from the plunger. When the piston moves forward the port *e* conducts steam to the plunger, while the ports e^1 *m'* and channel *a'* serve to exhaust. The plunger is adapted to reach the end of the valve-box before the exhaust is quite completed, so as to be cushioned.

D^2 designates the piston-rod, having a flat surface on one side corresponding to the form of the opening in the cylinder-head. The object of this peculiar construction of the piston-rod is to guide the piston in the same line, so that the relative positions of the channels *a a'* and the steam and exhaust ports *e* e^1, *m m'* may not be disturbed. Other equivalent means may be employed for the same purpose.

I claim as my invention—

1. The ports *e* e^1, exhausts *m m'*, plunger E, and valve B, in combination with the piston D', having the channels *a a'*, all constructed and arranged substantially as and for the purpose set forth.

2. The plate b^1 fitting the recessed cylinder D', and constructed with the channels *a a'*, arranged as and for the purpose set forth.

3. The adjustable plate b^1, having the channels *a a'*, in combination with the springs *f*, substantially as specified.

4. The combination, with the channeled plate *b'* and cylinder D' having the groove *c*, of the elastic expansible ring *d*, substantially as specified.

5. The channeled plate b^1, constructed with the shoulder b^2, fitting an opening in the cylinder D', as and for the purpose specified.

6. The ports *e* e^1 and the exhausts *m m'*, located at the middle portion of the cylinder, and arranged at the angles of a rhomb or lozenge, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

CHARLES A. CONDÉ.

Witnesses:
F. B. CURTIS,
D. D. KANE.