W. H. GARLOCK & R. COOKE.

Steam-Engine.

No. 217,088. Patented July 1, 1879.

Fig. 1.

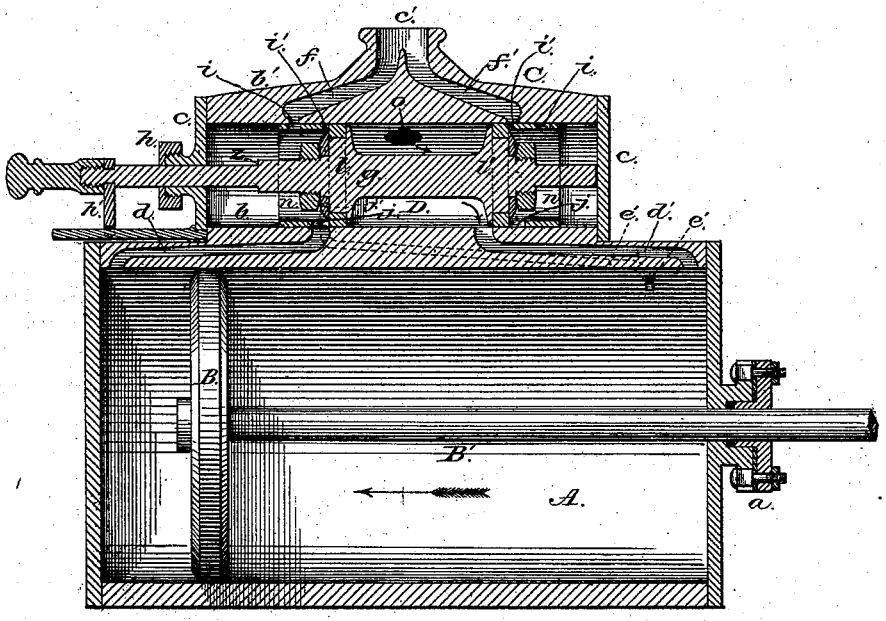


Fig. 2.

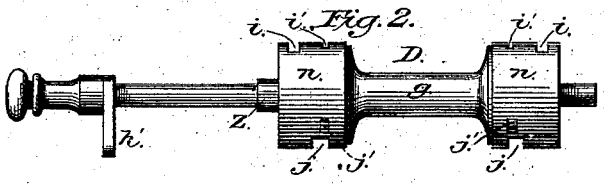


Fig. 3.

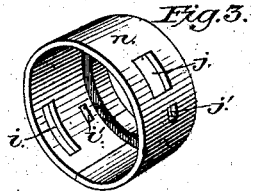


Fig. 4.

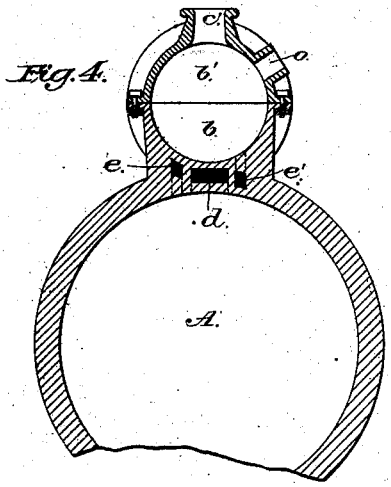
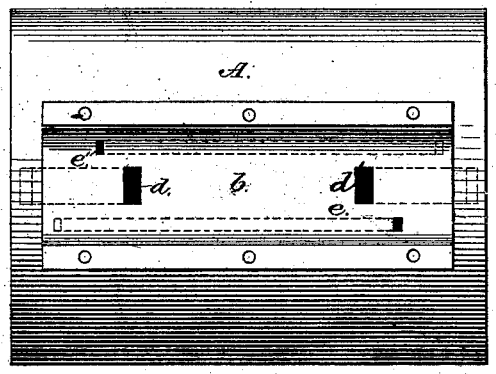


Fig. 5.



WITNESSES

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WILLIAM H. GARLOCK AND RICHARD COOKE, OF DENISON, TEXAS.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **217,088**, dated July 1, 1879; application filed April 1, 1879.

To all whom it may concern:

Be it known that we, WILLIAM H. GARLOCK and RICHARD COOKE, of Denison, in the county of Grayson and State of Texas, have invented a new and valuable Improvement in Self-Working Steam-Engines; and we 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 drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a vertical longitudinal section of this invention. Fig. 2 is a side view of the valve and rod. Figs. 3, 4, and 5 are details.

This invention has relation to improvements in steam-engines.

The object of the invention is to devise means whereby the valves may be actuated automatically without the employment of exterior mechanisms by the use of exhaust-steam.

The nature of the invention consists in the combination, with a cylinder having steam-passages and partial-exhaust passages of small size in its wall, and a steam-chest having diverging exhaust-passages, of a valve in said chest, having two spaced heads provided with extensions or rings, each of the said rings being provided with a main and a partial-exhaust port, working in connection with the exhaust-passages of the chest, and with two ports working in connection with the steam-passages and partial-exhaust passages of the cylinder, as will be hereinafter fully explained.

In the annexed drawings, the letter A designates an ordinary steam-cylinder, having a piston, B, and piston-rod B′, working through a stuffing-box, *a*, in one of the cylinder-heads.

C represents a valve-box, usually at the top of the cylinder, and generally made in two sections, *b b′*, joined together by flanges and bolts. The section *b* is cast with the cylinder, and the box is closed at each end by means of heads *c*. In the top wall of the cylinder are formed the steam-passages *d d′*, in line with each other, and opening into the cylinder close to its heads at one end, and into the valve-box C at each side of the middle of the length of said cylinder.

e e′ indicate smaller passages, arranged in the said wall, one at each side of the passages *d d′*, and opening into the cylinder independently thereof. The passages *e e′* extend from opposite directions past the middle of the length of the cylinder, and open into the valve-box near to, but outside of, the passages *d d′*. The top wall of the box is provided with two converging ducts, *f f′*, having an educt-opening, *c′*, common to both, and leading into the box in line, or nearly so, with the steam-passages *d d′*. The object of these passages will be fully explained hereinafter.

D indicates the valve mechanism, consisting essentially of a shaft, *g*, extending axially through the box, with one end passing through a stuffing-box, *h*, and supported by a guide, *h′*, outside thereof, provided with two spaced heads, *l l′*, provided each with a cylindrical hollow extension or flange, *n*, in which are formed on one side the ports *i i′*, and on the other side the ports *j* and *j′*. The ports *j* supply the main steam-passages *d d′*, and the ports *j′* the partial-exhaust passages *e e′*, the relative positions of the said ports being the same as that of the openings of the passages aforesaid. The extent of movement of the valve is controlled by means of a shoulder, *z*, on the valve-rod *g*, and, if desired, a stop or collar on the said rod outside of the chest; or we may depend upon the abutting of the inner end of the said rod against the contiguous head of the chest.

The operation of our improved engine is as follows, reference being especially had to Fig. 1 of the drawings: Steam is let into the chest through an opening, *o*, in its wall between the heads of the valve, and passes through passage *d′*, the valve-head *l′* being clear of the opening thereof, into the steam-cylinder, forcing the piston in the direction indicated by the arrow. It being premised that the piston has already made a stroke, and that there is steam on both sides thereof, steam is exhausted from the other end of the cylinder through passage *d*, and passes therefrom into the contiguous end of the chest through the port *j* of the ring *n* of head *l*, whence it escapes into the main exhaust-passage *f* through the port *i* of the said head. A portion of the exhaust-steam passes through the partial-exhaust passage *e* and port *j′* of head *l′* into the opposite end of the chest, and by its pressure forces the valve away from this

end of the chest toward the other end thereof, the steam in this latter end being exhausted through the port *i* of head *l* into the main exhaust-passage *f*, only sufficient remaining to cushion the valve and prevent noise. This movement of the valve is due to the fact that the partial-exhaust ports *i'* are much smaller than the main exhaust-ports *i*, and that in consequence steam has free egress through the port *i* at one end of the valve-box, but is obstructed in passing through port *i'* at the other end thereof. By this means an equilibrium of pressure in the valve-case is prevented. This movement throws the valve-head *l* clear of the opening of passage *d* into the chest precisely as shown in Fig. 1 for the passage *d'* and valve-head *l'*, and steam rushes into the opposite end of the cylinder, reversing the movement of the piston. The steam in the exhausting end of the cylinder passes out therefrom through passage *d'*, ports *j i* of the ring *n* of head *l'*, and the main exhaust-passage *f'*, a portion, however, passing through passage *e'* and port *j'* of head *l* into the opposite end of the chest, and reversing the valve as before, the exhaust-steam in front of head *l'* escaping through the port *i'* and main exhaust-passage *f'*. A regular reciprocating movement of the valve D is thus had, that automatically lets on and cuts off steam from the cylinder without using eccentrics or other like devices.

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

In a steam-engine, the combination, with a cylinder having the steam-passages *d d'* and the reduced partial-exhaust passages *e e'*, of the chest C, having the diverging exhaust-passages *f f'*, and the valve D, having the spaced heads *l l'*, provided with rings *n*, having ports *i* and *i'*, working in connection with passages *f f'*, and ports *j j'*, working in connection with passages *d d'* and *e e'*, respectively, substantially as specified.

In testimony that we claim the above we have hereunto subscribed our names in the presence of two witnesses.

WILLIAM H. GARLOCK.
RICHARD COOKE.

Witnesses:
JOHN G. WEST,
JOHN J. WENDORFER.