

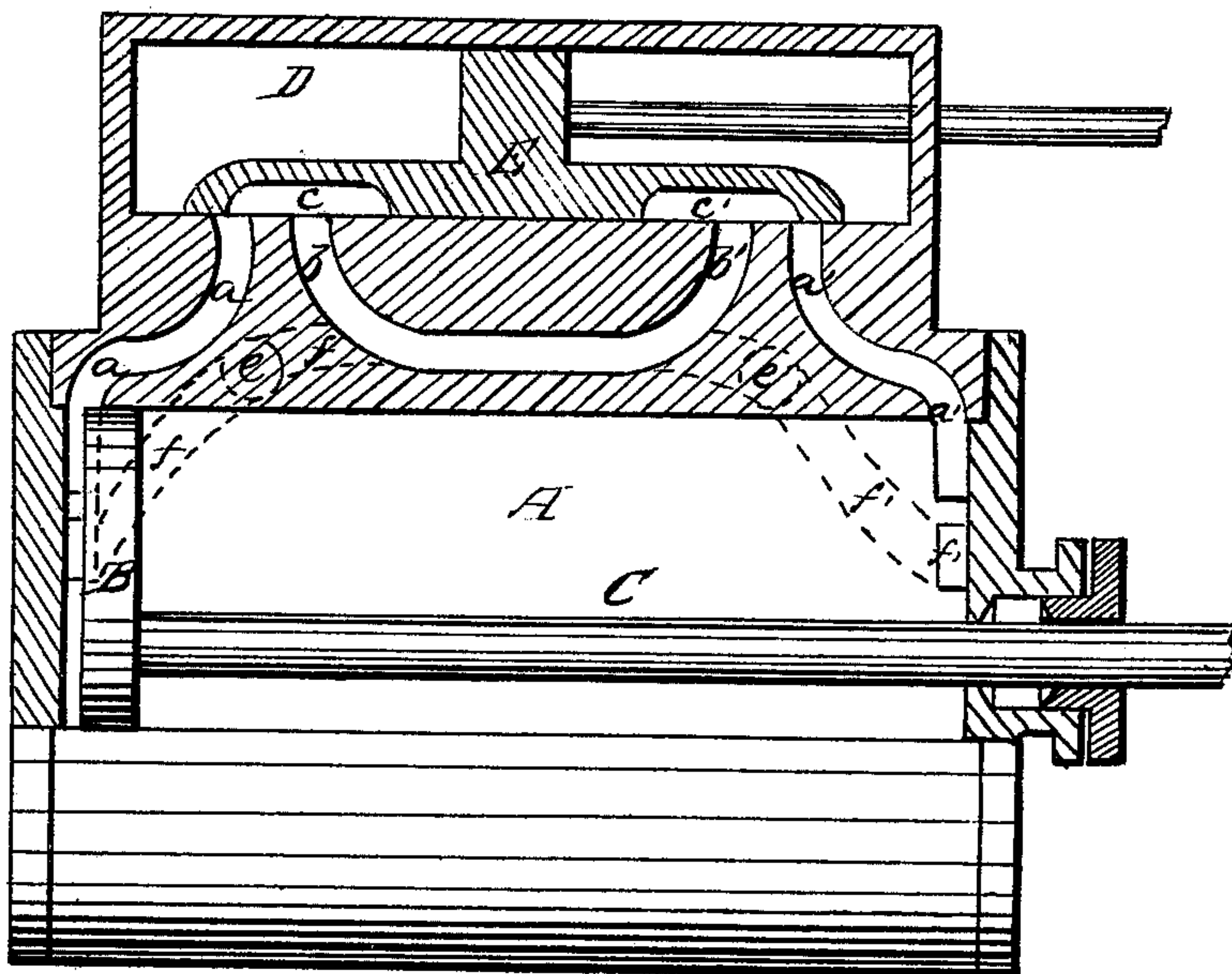
*W. Fizzard.*

*Steam Engine.*

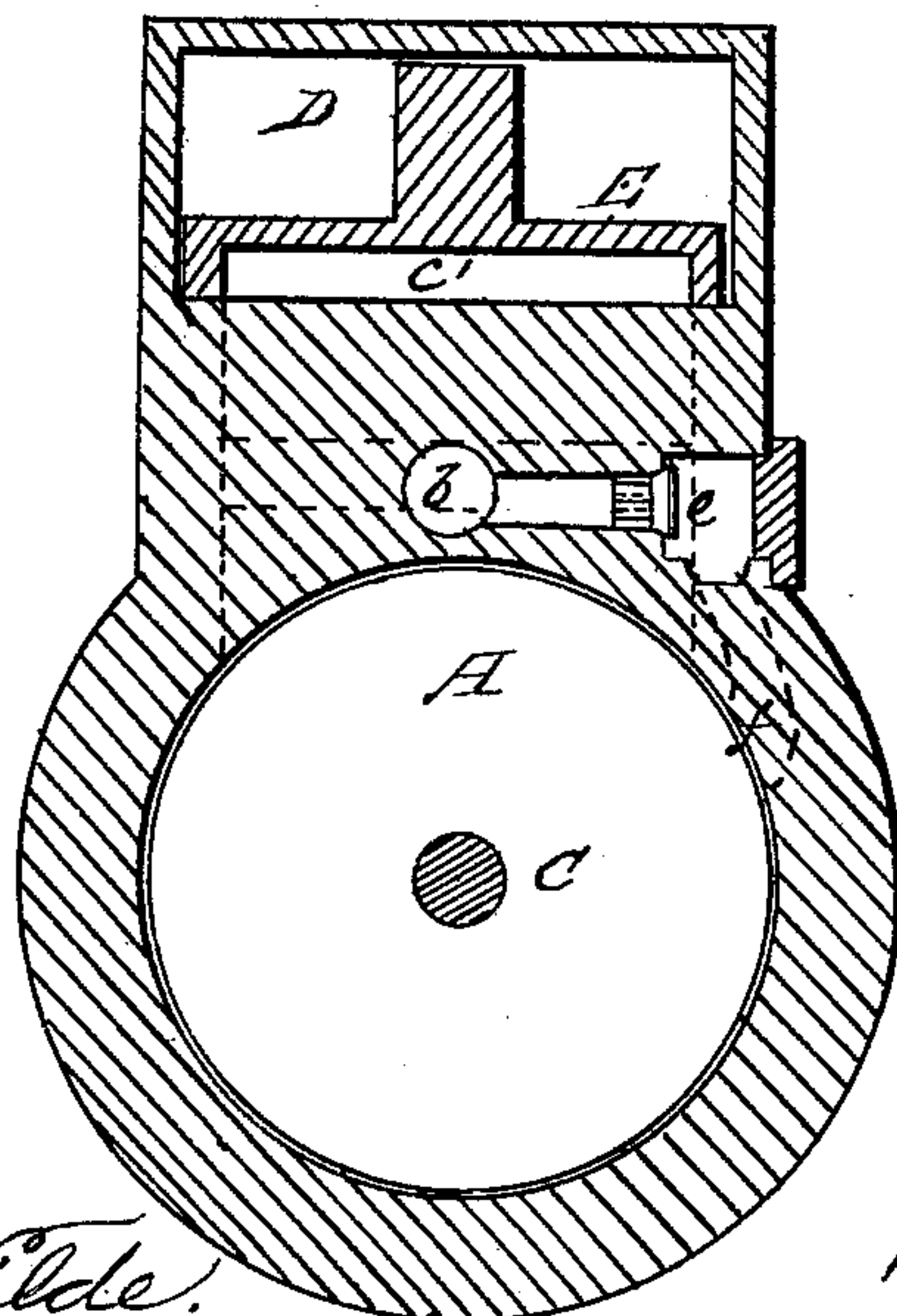
*Nº 9,224.*

*Patented Jan. 15, 1869.*

*Fig. 1.*



*Fig. 2.*



*Witnesses:*

*Ch. S. G. Wilde.  
Austin G. Howarth.*

*Inventor.  
William Fizzard by  
Carroll A. Wright  
his atty—*

# UNITED STATES PATENT OFFICE.

WILLIAM FUZZARD, OF CHELSEA, MASSACHUSETTS.

## IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 91,224, dated June 15, 1869.

*To all whom it may concern:*

Be it known that I, WILLIAM FUZZARD, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Steam-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a vertical longitudinal section of the steam-cylinder embodying my invention. Fig. 2 is a vertical transverse section of the same.

The same letters refer to the same parts in the different figures.

The nature of my invention consists in devices whereby to admit exhaust-steam on one or both sides of the piston before fresh steam from the boiler enters the cylinder, thus balancing the pressure on the piston during the opening of the exhaust-ports; and my invention consists, further, in the construction and arrangement of stop-valves, which will be opened by the exhaust-steam, but closed by the steam-pressure in the cylinder, as hereinafter more fully made known.

Referring to the drawings, A is a steam-cylinder, with piston B, steam-chest D, and sliding valve E, of ordinary construction.

The exhaust-passage *b b'* is connected, by means of stop-valves *e e'* and passages *f f'* and *f' f'*, with the ends of the cylinder respectively.

The steam, having acted upon the piston and the valve-closing port *a'*, exhausts now through said port into exhaust-passage *b' b*, and enters, through stop-valve *e* and passage *f*, into the cylinder on the opposite side of the piston, thus reducing and equalizing the pressure on the latter to that of the exhaust-steam. When fresh steam is admitted through port *a* into the cylinder, it will also enter passage *f* and close stop-valve.

It will be seen that fresh steam will only be admitted at a fraction of the stroke, and at the most favorable position of the crank for receiving and transmitting the power to the

shaft, and after the required stroke of the piston is completed the pressure on piston B will be immediately balanced by the exhaust-steam, which in ordinary engines escapes through the exhaust. At the opening of the steam-ports the fresh steam will mingle with the exhaust-steam left in that portion of the cylinder in which the fresh steam enters, and, increasing the temperature, will work at a higher average pressure, and at the same time with considerable saving of steam.

In engines as commonly constructed the valve opens the steam-port a little before the piston finishes the stroke, for the purpose of admitting steam to act as a cushion against the piston; but the steam acts also under great disadvantage before the piston has attained nearly the first quarter-stroke, and may be counted as almost entirely wasted, the same of which may be said after the piston has passed three-quarters of the stroke.

Now, I do save all this expenditure of steam by using the exhaust-steam for balancing the pressure of the piston during the beginning and closing of the stroke, and thus considerably ease and facilitate the motion of the engine.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The construction and arrangement of the exhaust-steam ports of an engine, whereby to be enabled to admit the exhaust-steam to one or both sides of the piston, substantially as herein set forth.

2. The arrangement of the exhaust-passages *b b'*, stop-valves *e e'*, passages *f f'*, and openings *g g* with reference to the cylinder A, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM FUZZARD.

Witnesses:

CARROLL D. WRIGHT,  
M. S. G. WILDE.