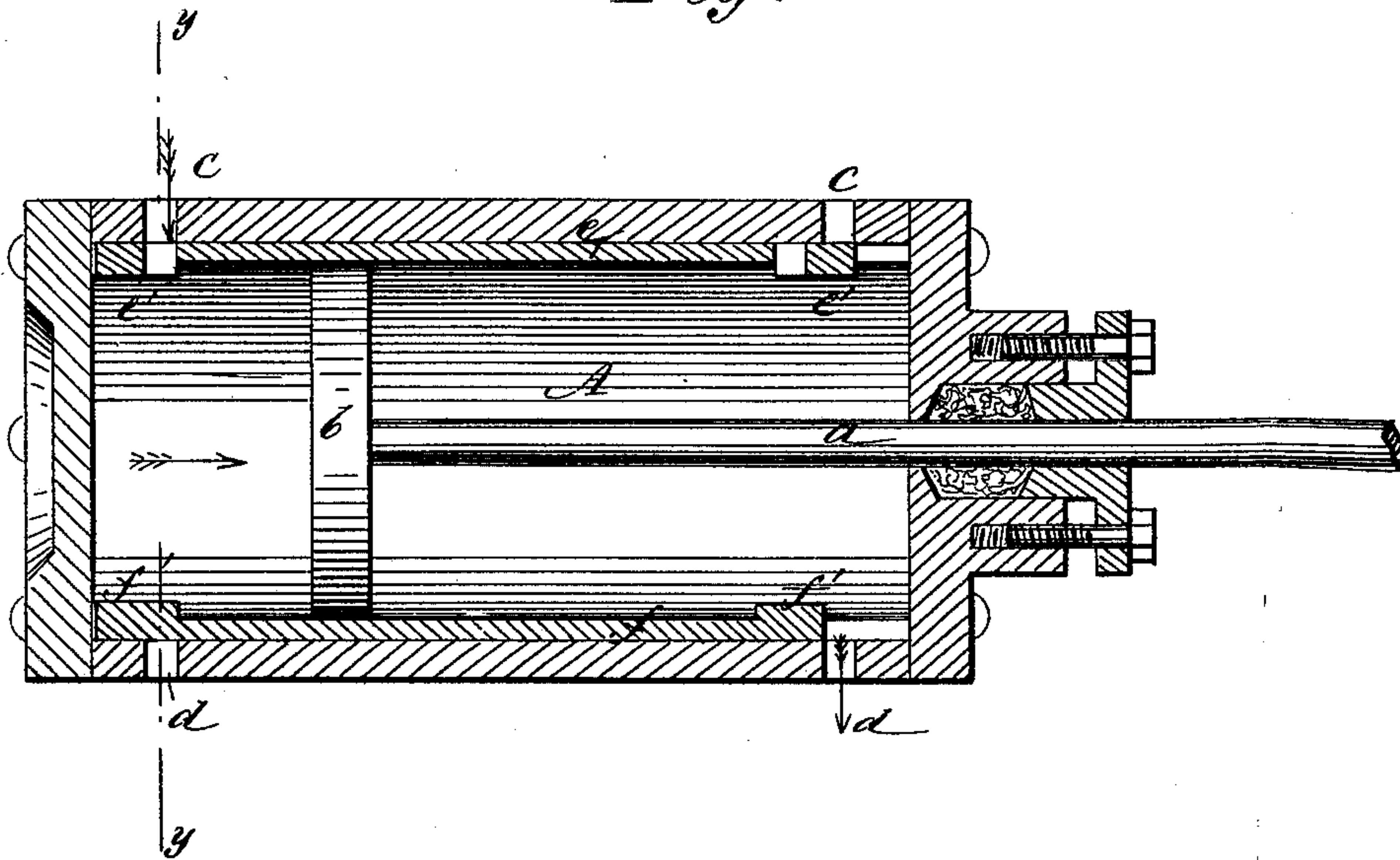


A. F. KIRSTEN.  
Valve for Steam-Engines.

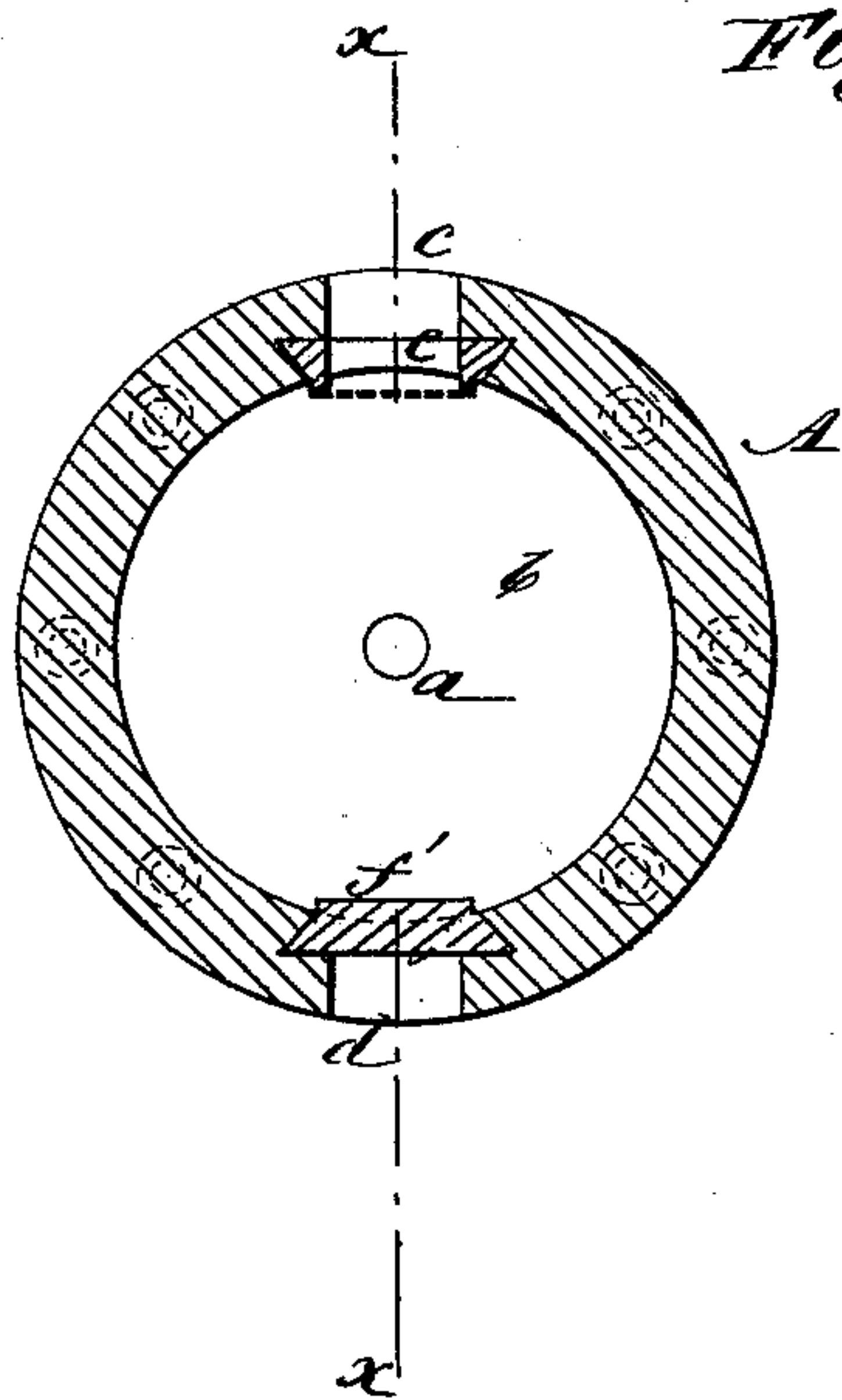
No. 219,739.

Patented Sept. 16, 1879.

*Fig. 1*



*Fig. 2*



WITNESSES:

*C. Nereux*  
*C. Sedgwick*

INVENTOR:

*A. F. Kirsten*

BY

*Wm. H. Co.*

ATTORNEYS.

# UNITED STATES PATENT OFFICE.

ALBERT F. KIRSTEN, OF ORANGE, NEW JERSEY.

## IMPROVEMENT IN VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **219,739**, dated September 16, 1879; application filed March 24, 1879.

*To all whom it may concern:*

Be it known that I, ALBERT F. KIRSTEN, of Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Valves for Steam-Engines, of which the following is a specification.

The object of my invention is to dispense with steam and valve chests in connection with the cylinders of steam-engines, and operate the valves by direct action of the piston without levers or other intervening mechanism. For this purpose I place the valves in slide-ways within the cylinder, and move them by contact of the piston-head with lugs projecting from the valves.

In the accompanying drawings, Figure 1 is a longitudinal section of a steam-engine cylinder constructed in accordance with my invention. Fig. 2 is a cross-section on line *y y* of Fig. 1.

Similar letters of reference indicate corresponding parts.

*A* is the cylinder; *a*, the piston-rod, and *b* the piston-head. At one side of cylinder *A*, and near each end, are steam-ports *cc*, that will communicate by pipes with the generator.

*d d* are exhaust-ports, formed at opposite ends of the cylinder.

*e* is the steam-valve, and *f* the exhaust-valve. These valves *e* and *f* are each fitted in dovetail recesses cut in the inner surface of cylinder *A*, so as to lie flush with the surface of the cylinder. Each valve extends the entire length of the cylinder, except the distance required for their movement, and each valve operates in connection with the two ports.

The steam-valve *e* is formed with apertures, which admit steam when they coincide with ports *c*, and valve *f* uncovers one port, *d*, at the moment it covers the other exhaust-port.

At opposite ends of each valve *e* and *f* are inwardly-projecting lugs *e'* and *f'*, that extend in the path of the piston-head. These lugs *e'* and *f'* may be fitted adjustably on the valves, if desired.

In operation, as the piston-head *b* approaches the end of its stroke in one direction it comes in contact with the projection *e'* of valve *e* at that end and projection *f'* of valve *f*, and moves both valves—one to admit steam, and the other to close the exhaust at that end—and shut off steam and open the exhaust at the other end.

The valves may be fitted with hand-levers for reversing, and the valves may be covered to reduce the friction caused by steam-pressure.

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

The combination, with steam-engine cylinder *A*, formed with steam-ports *cc* and exhaust-ports *d d*, of the slide-valves *e* and *f*, fitted in recesses within the cylinder, and having lugs or projections *e'* and *f'*, substantially as described and shown, and for the purposes set forth.

ALBERT FREDERICK KIRSTEN.

Witnesses:

LEWIS KIRSTEN,

JOSEPH WAERHEFFER.