

Sheet No 1.

*J. Sutherland and F. Moakley,  
Steam-Pump Engine.*

No 75,998.

fig 1

Patented Mar. 24. 1868.

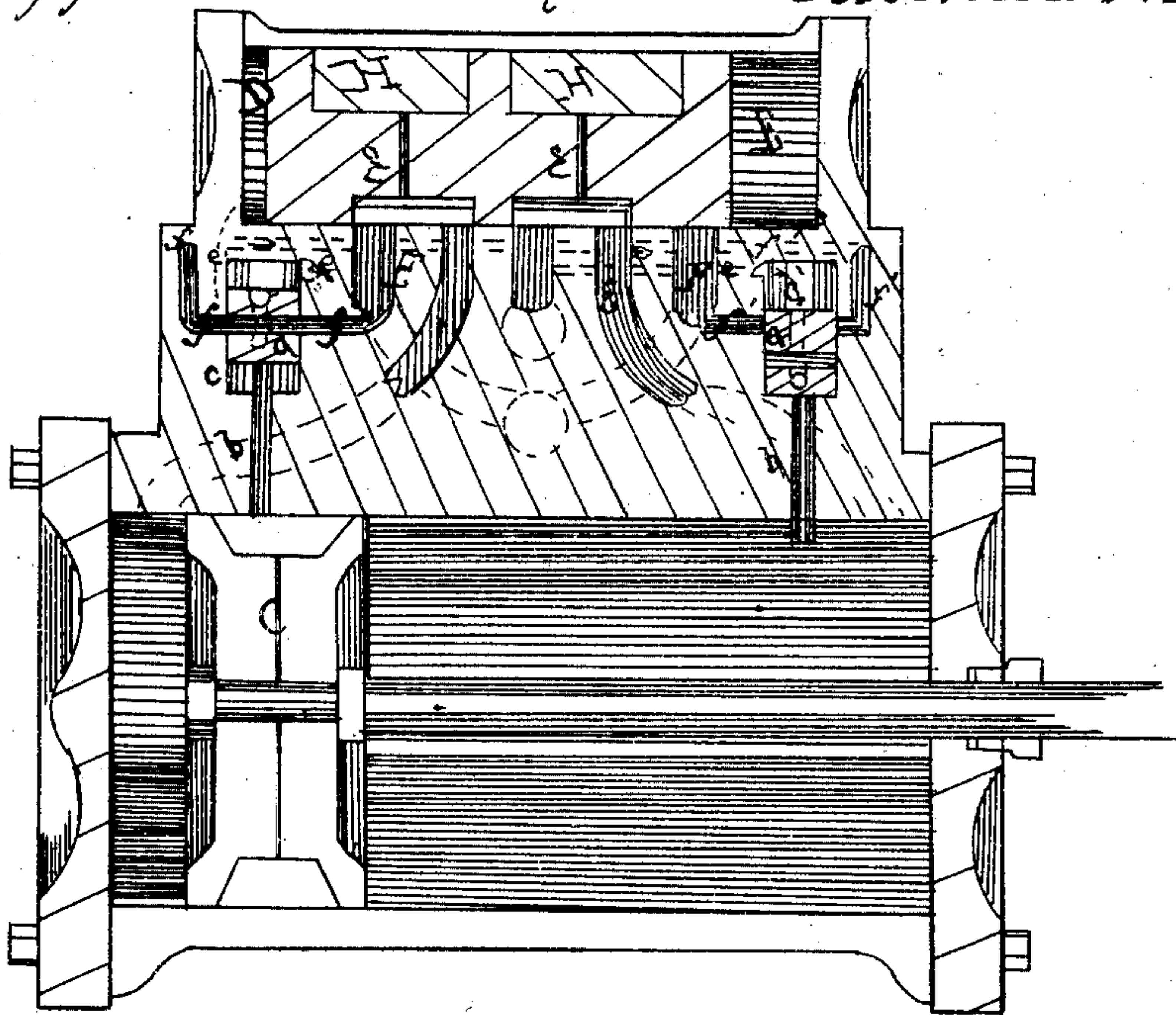


fig 2

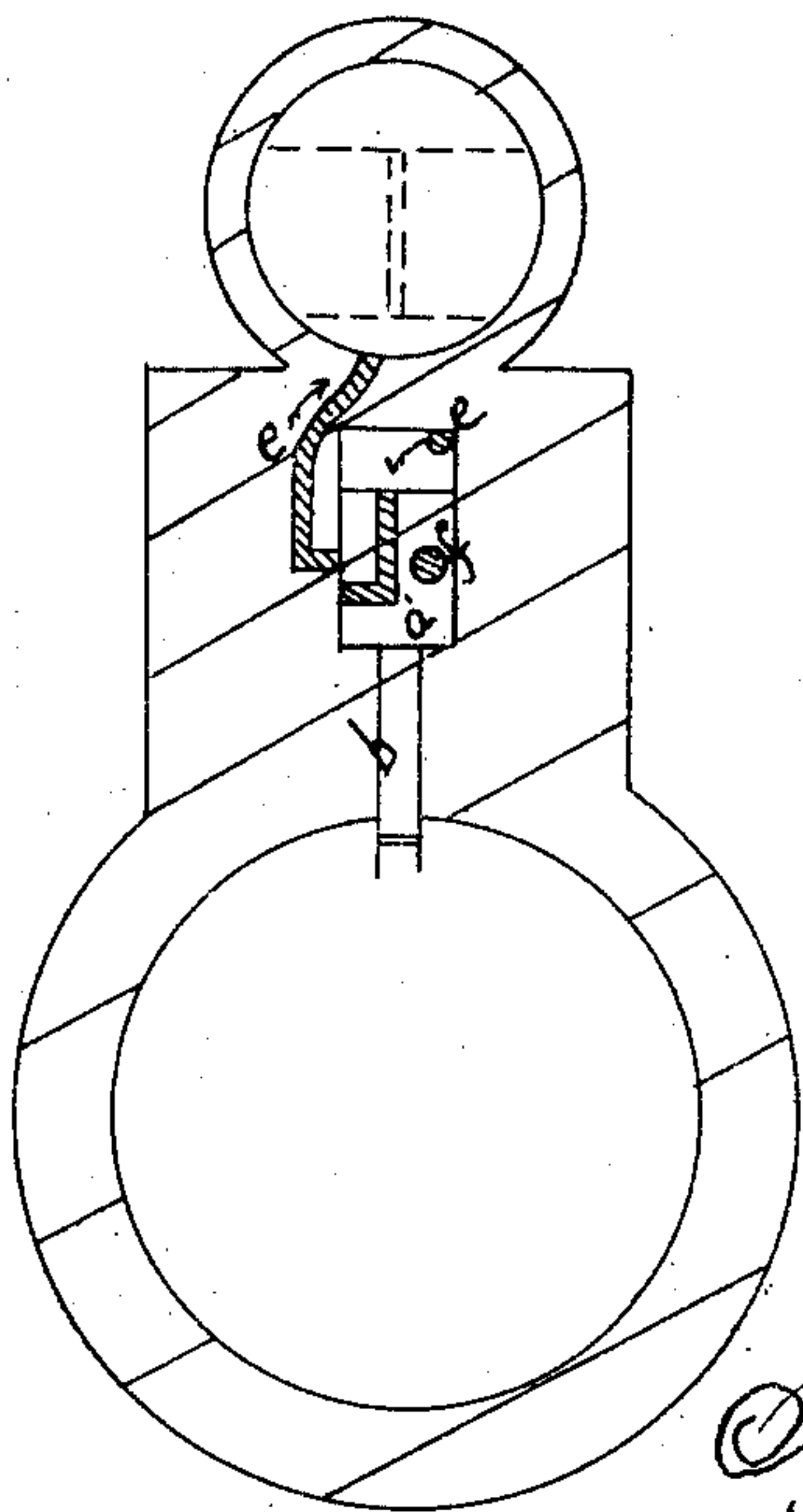
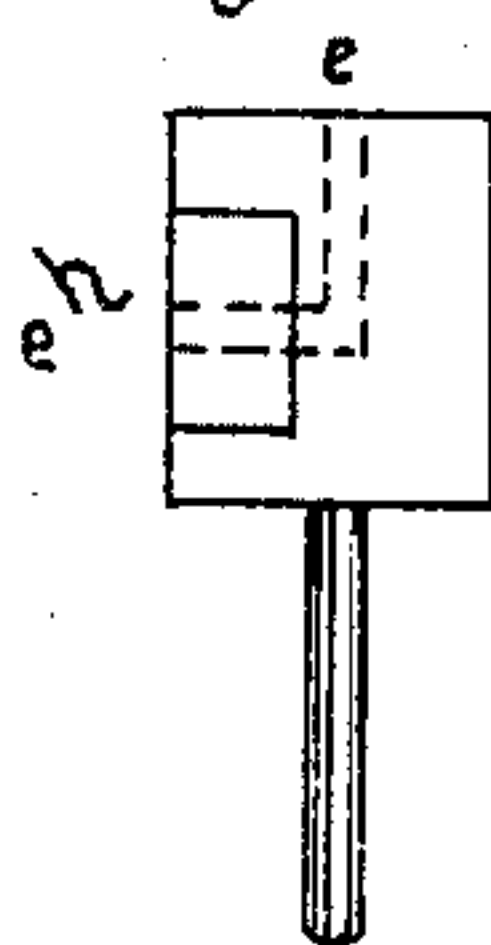


fig 3



Witnesses

Chas. S. Cook.  
W. J. Emerson

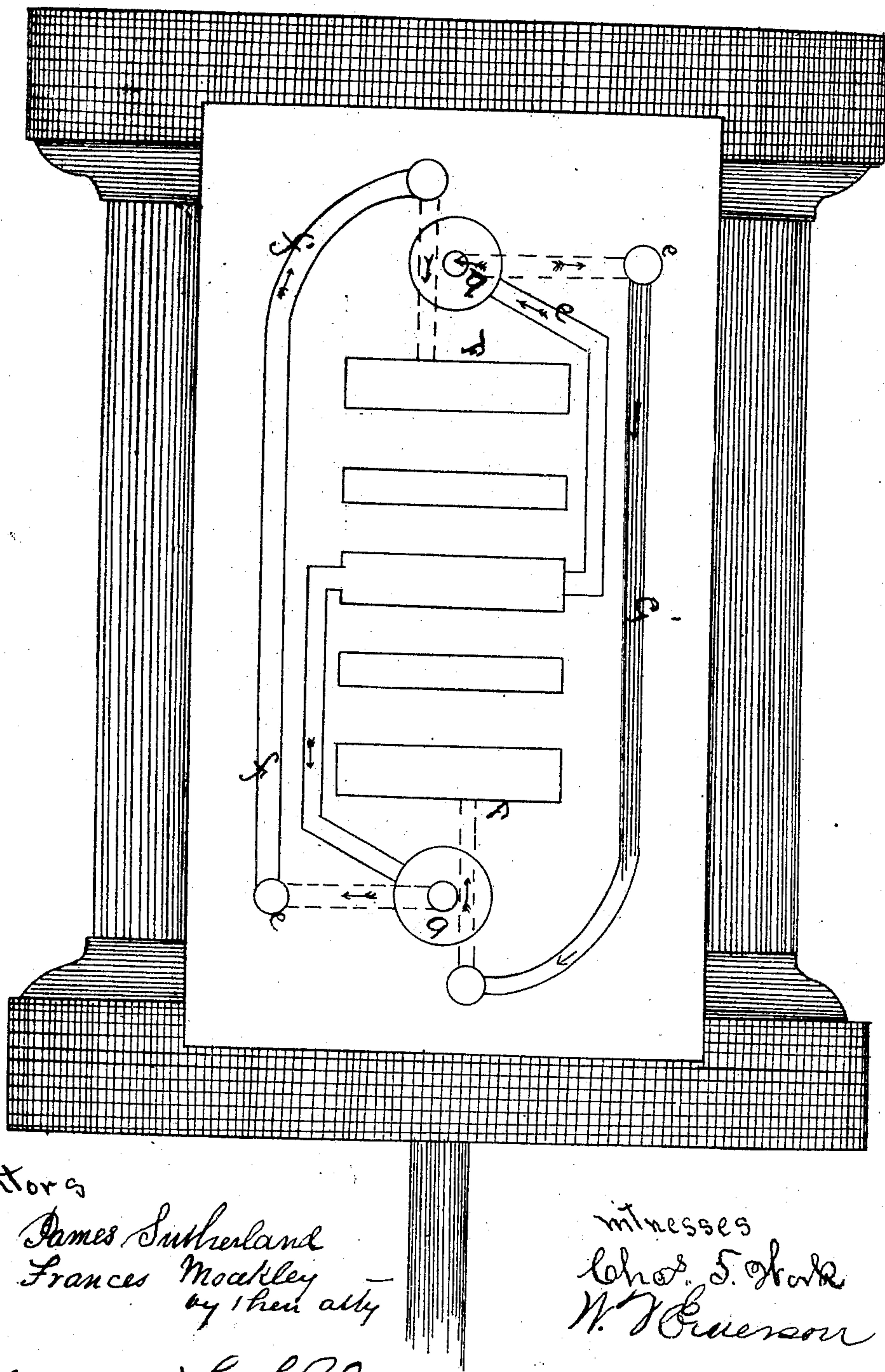
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Sheet No. 2

*J. Sutherland and F. Moakley,  
Steam-Pump Engine.*

No. 75,998.

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# United States Patent Office.

JAMES SUTHERLAND AND FRANCIS MOAKLY, OF EASTHAMPTON, MASSACHUSETTS.

*Letters Patent No. 75,998, dated March 24, 1868; antedated February 18, 1868.*

## IMPROVEMENT IN STEAM-PUMP ENGINES.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that we, JAMES SUTHERLAND and FRANCIS MOAKLY, both of Easthampton, Hampshire county, Commonwealth of Massachusetts, have invented certain new and useful Improvements in Steam-Pumps and Engines; and we do hereby declare that the following is a full and clear description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon. In the drawings—

Figure 1 is a sectional view through the main cylinder and valve-chest of a steam-pump lengthwise, and

Figure 2 is a similar sectional view crosswise, both views being cut vertically.

Figure 3 is a detailed view of a secondary valve with our improvements.

Figure 4 is a sectional view of the space between the valve and main cylinders, and shows the arrangement of ports.

The first important point in this invention is the operation of the main valve, which operation is applicable to any steam-engine or pump having a direct-acting valve.

The principle is as follows: The valve is moved by a direct flow of live steam, and is then held in its new position by the expansive force of the steam which has moved it last, until the next flow of steam from the supply against its other end moves it back again, and holds it in the same manner.

The operation is as follows: The steam that is let on at one end of the valve is supplied by the movement of a secondary valve, which at the same time allows the steam from the other end of the valve to exhaust. As soon as the valve has moved, the supply is cut off by the secondary valve resuming its former place, and the valve is held by the confined steam until it in turn is released by the movement of another secondary valve, which also supplies steam to the other end.

In order to explain this more fully, we will refer to its application to the Rodice steam-pump, patented August 14, 1866.

Figure 1 shows a sectional view of this pump, with our improved arrangement of valves and ports.

In this it is seen that the secondary valves *a* and *a'* are cylindrical pieces, working in corresponding valve-seats *c* and *c'*, and have stems *b* and *b'*, which are moved by the piston-head *C*, working the valves vertically. Each of these secondary valves performs two functions when moved up by the piston-head, one in allowing steam, fresh from the main port, to enter into the valve-chest, and move the valve, and the other in allowing the escape of the steam from the other end of the valve-chest, both of these functions being performed at the same time. Thus, the valve *a'*, represented in fig. 1 as up, elevated by the piston-head, connects two sets of ports, the one set, *e*, allowing steam to pass from the supply, through the valve *a*, and into the end, *D*, of the main valve-chest, and the other, *f*, which allows the old steam, from the other end, *E*, of the valve-chest, to escape through into the exhaust *F*. The main valve here is shown as just before being moved by the steam admitted through the valve *a* and port *e*. The exhaust-ports *f* and *f'* of the main valve are either carried directly into the ends of the main valve-chest, or are connected with the supply-ports of the same, at each end respectively, as may be convenient. But the exhaust-port of either end of the valve-chest is operated by the secondary valve at the opposite end of the pump respectively.

When the main valve has moved it allows steam to pass into the main cylinder and move the piston, which allows the valve *a* to drop back to its former position, and cuts off the connection with the ports *e* and *f*, and leaves the main valve to be held by the expansive force of the steam which has last moved it, and which is now confined in the valve-chest behind it, until the valve *a'*, at the other end of the main cylinder, releases it, connecting the ports *e'* and *f'*, and operating as the valve *a* did before.

By this operation of the main valve we economize in steam, not allowing it to blow through while the valve is being held, and also render the valve sure of its movement, by exhausting one side at the same time that steam is being let on at the other, by the same secondary valve. This also prevents "kicking," a very objectionable feature in the operation of these self-acting valves.

Fig. 2 of the drawings shows a cross-sectional view of the same pump as fig. 1, and exhibits the construc-

tion of the secondary valve *a* at another view. The valve is represented as down. Similar letters denominate similar parts as in fig. 1.

In figs. 1 and 2 it is shown that the main valve is formed with pieces *H* and *H*, let into the top, corresponding in outside curvature to the rest of the valve. These pieces are for the purpose of packing the valve so as to make it work evenly and steadily, by preventing the steam from getting upon the top, and deranging its motion. They are pressed against the top of the valve-chest by means of the steam passing through the main ports, channels *g* and *g* being cut through from the under side of the valve to the under sides of the pieces *H* and *H*.

The secondary valves *a* and *a* may be constructed also on this principle, as is shown in fig. 3, where a piece, *h*, is let into the side of the valve opposite to the port *e*. This keeps the valve packed when steam is on, and also compensates for wear.

Now, having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The secondary valves *a* and *a'*, with their respective ports *e* and *e'* and *f* and *f'*, whereby each performs the functions of exhausting steam from one end of the main valve, and supplying steam at the other, by their alternate movement respectively, substantially as shown.
2. The arrangement of ports *e* and *e'* and *f* and *f'* with the secondary valves *a* and *a'*, substantially as shown and described.
3. The arrangement of the pieces *H* and *H* in the main valve, and channels *g* and *g*, in communication with them, substantially as shown.
4. The arrangement of the piece *h* in the secondary valves, as shown.

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Witnesses:

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EDMUND TUCKER.