

J. Sutherland,

Piston Meter,

No 78,551,

Patented June 2, 1868.

Fig. 1.

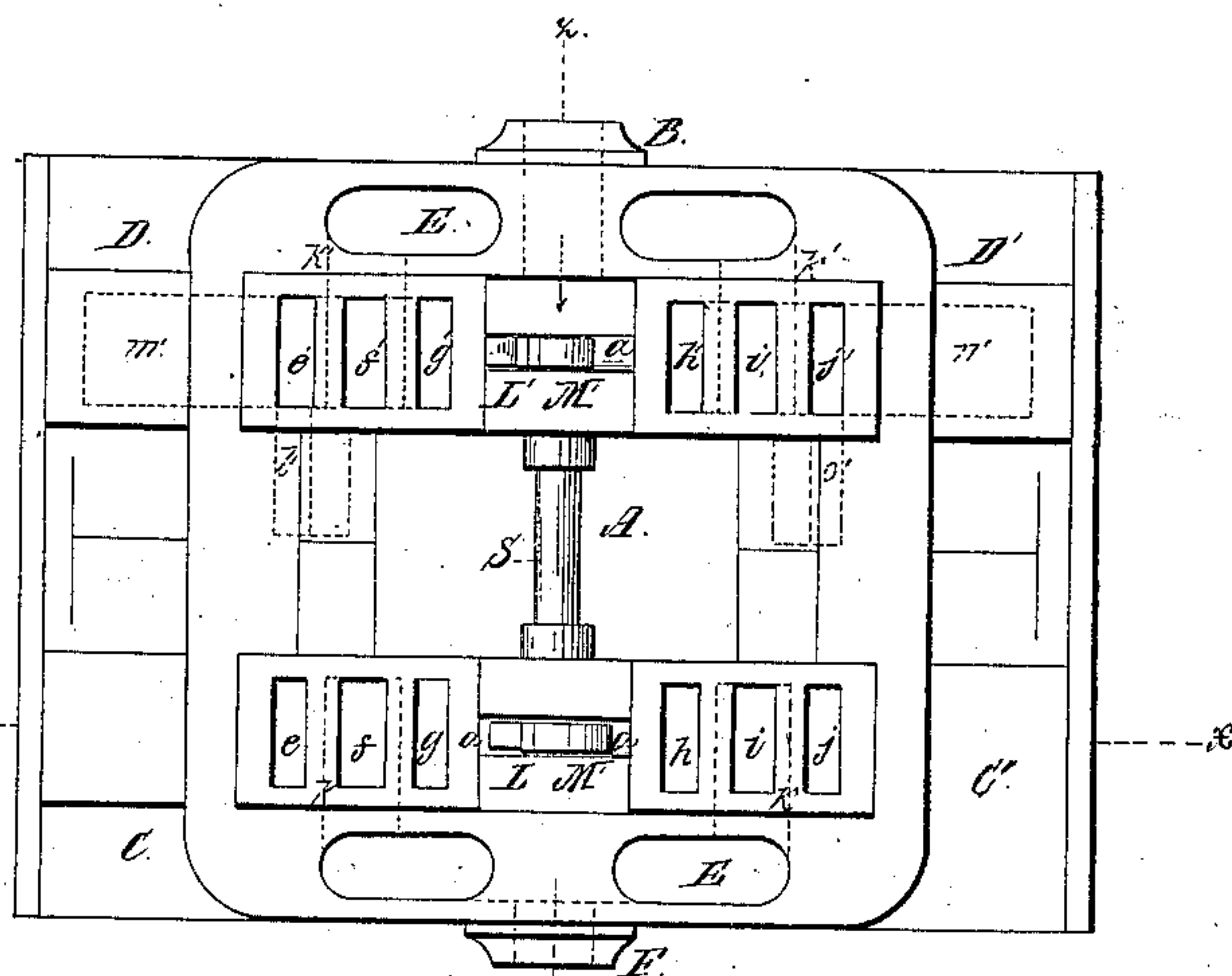


Fig. 2.

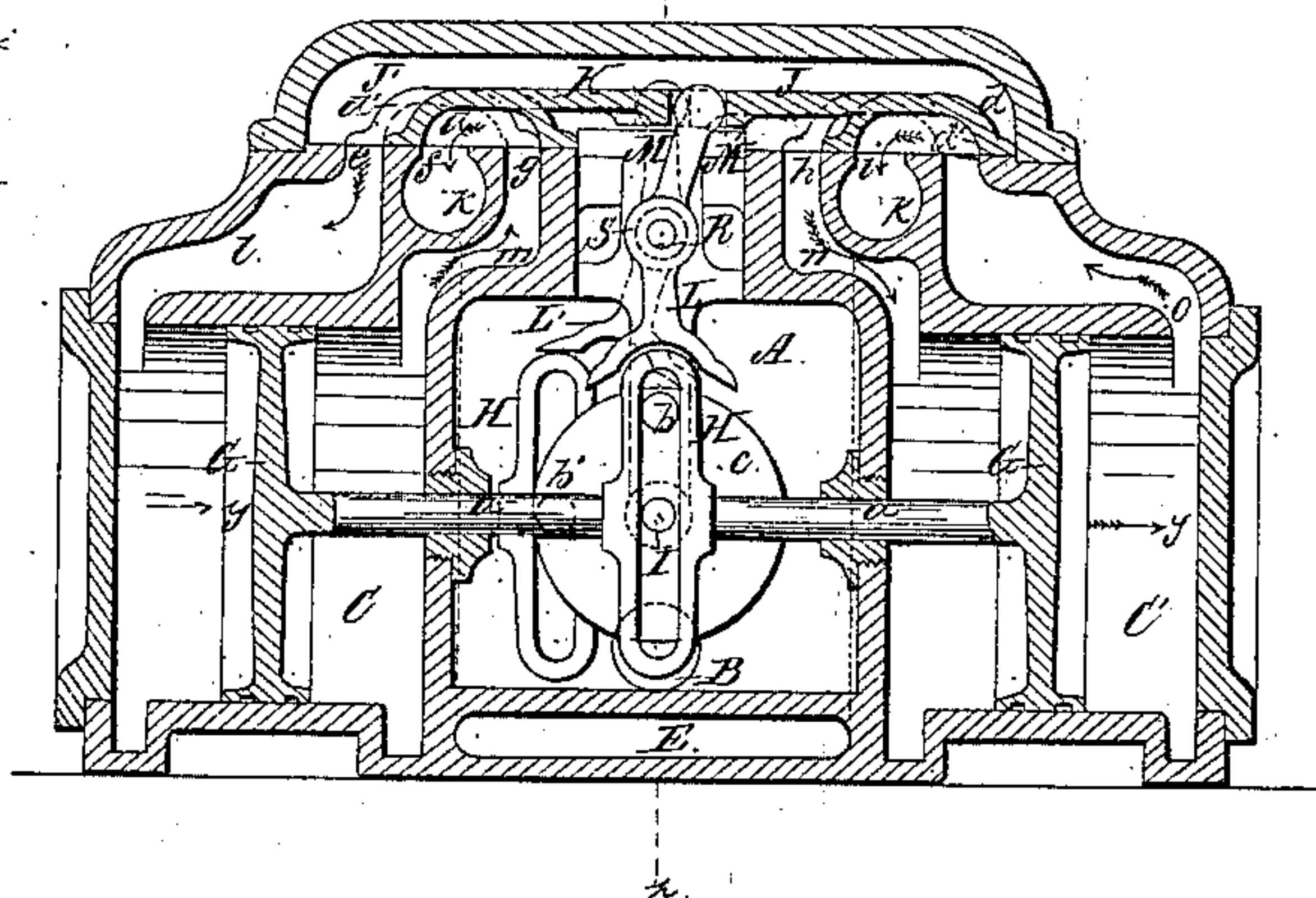
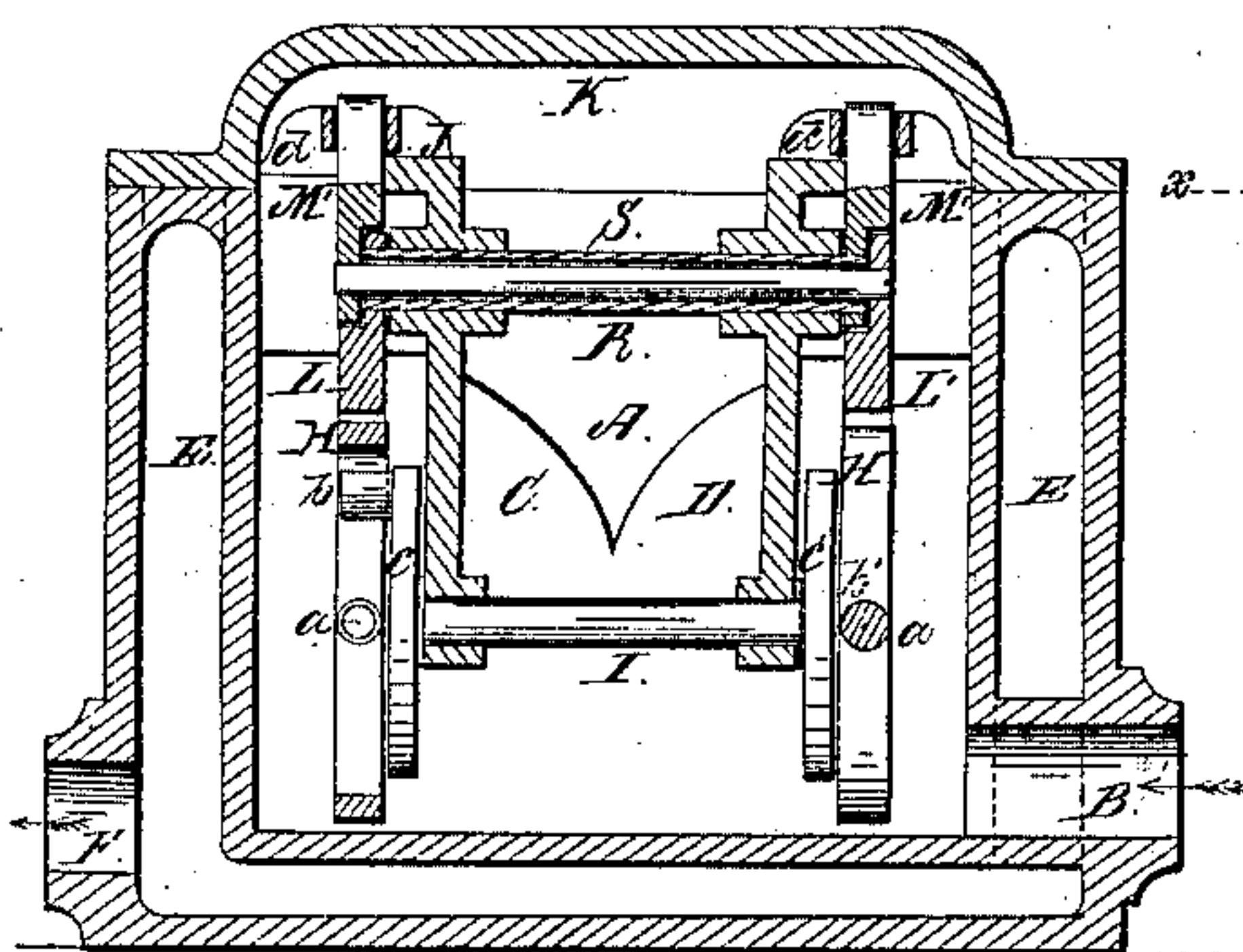


Fig. 3.



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Inventor:
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UNITED STATES PATENT OFFICE.

JAMES SUTHERLAND, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. 78,551, dated June 2, 1868.

To all whom it may concern:

Be it known that I, JAMES SUTHERLAND, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Liquid-Meters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which—

Figure 1 represents a plan of a meter constructed according to my improvement with the valves and their covers removed; Fig. 2, a vertical longitudinal section taken as denoted by the line *xx* in Fig. 1, and Fig. 3 a transverse vertical section taken as indicated by the line *zz* in Figs. 1 and 2.

Similar letters of reference indicate corresponding parts throughout the several figures.

My invention consists in the employment of two or more cylinders or measuring-chambers, arranged preferably horizontally and side by side, with pistons and valves for independent action, the same being so combined and geared and the ways or passages so arranged as that the piston or, say, pistons, on either one side alternately, and when half-way, or thereabout, of their travel through their cylinders, are caused to suddenly work or throw the valve or valves which control the piston or pistons on the opposite side, for the purpose of securing a reversal in the action of the same, whereby the cylinders are opened and closed suddenly and kept open to fill and discharge, instead of being gradually opened and closed, and with no such latitude as regards remaining open as occurs where the valves are operated by the pistons which they serve to control, instead of by independently-moving pistons, as in my improvement. Said invention also includes a novel arrangement of valve-operating gear for producing the action hereinbefore described.

Referring to the accompanying drawings, which show the improvement applied to a four-cylinder meter embracing one set or pair of cylinders or measuring-chambers, with their connected pistons arranged side by side of another independent set or pair of cylinders, with their pistons connected or linked together, to work in unison with but independently of the adjacent set or pair of pistons, A is a central or intermediate box or chamber, which serves as a receiving-compartment

for the water or other liquid entering by an inlet, B, and from which the several cylinders C C' and D D' are fed by or through the action of valves, substantially as hereinafter described. The sides and bottom of this intermediate chamber, A, are made hollow, or with connecting-passages E for passing off the water from the cylinders to the outlet F. Each pair of cylinders C C' and D D' is provided with pistons G G, linked together by rods *aa* and yoke H or H', said yokes receiving within them wrist-pins *b b'*, which occupy a right-angled position, or thereabout, relatively to each other and a shaft, I, with which latter they are connected by cranks or disks *c c'*, whereby on the pistons being reciprocated a rotary motion is communicated to the shaft I, that through a suitable indicator thus serves to register the quantities of liquid passing through the cylinders or measuring-chambers of the meter. The water is admitted to and exhausted from the cylinders—that is, either pair or set C C' or D D' alternately—by slide-valves J J', of a double D form or construction—that is, each valve made with two bonnets, *d d* and *d' d'*. These valves control, as they are reciprocated in parallel directions to the pistons, ports *e f g* and *h i j* on or to the cylinders on the one side, and *e' f' g'* and *h' i' j'* on or to the cylinders on the other side, the ports *f i* and *f' i'* being exhaust-ways in connection by passages *k k* and *k' k'* with the passages E, that lead to the outlet F, while the ports *e g h j* and *e' g' h' j'* connect, by ways *l m* and *n o* and *l' m' n' o'* and *l' m' n' o'*, the ends of the cylinders C C' and D D' with the bonnets of the valves or water-receiving channels or spaces outside thereof, accordingly as said valves are reciprocated to cover or uncover the ports *e g h j* and *e' g' h' j'*. There is this peculiarity, however, about these several cylinder-ports and their passages, which is that while the ports *e j* communicate with the outer ends of the cylinders C C', and the ports *g h* with the inner ends of said cylinders, the ports *e' j'* and *g' h'* communicate, respectively, with the opposite ends of the cylinders D D'. The receiving or supply chamber A, it may be observed, is in constant communication by suitable openings with the valve cover or covers K. The valves J J' are not operated by the pistons immediately over which they are arranged, but by the pistons of the adjacent pair

of cylinders. Thus the yoke H is made to operate the valve J', and the yoke H' the valve J. This is done, and suddenly toward the closing half of the piston's stroke in either direction, by the yokes H H' striking tappets L L', the one of which is secured to a shaft, R, while the other is secured to a sleeve, S, said shaft and sleeve carrying at their opposite ends arms M M', which gear, respectively, with the valves J J.

In illustration of the operation, supposing the pistons G G of the cylinders C C' to be traveling as indicated by the arrows $y \bar{y}$ in Fig. 2, and to be situated as represented, when the pistons in the adjacent cylinders D D' will be at the end of their left-hand stroke, then the continued motion of the pistons G G will cause the yoke H to trip the tappet L, and, through the arm M, suddenly throw the valve J' so as to open the ports $g' j'$ and passages $l' o'$ for water to enter the cylinders D D' to start the pistons in the same direction as the pistons in the cylinders C C' are running, and to pass off the water in front of the pistons of the cylinders to the outlet. A like action takes place, as regards the reversal of the pistons in the cylinders C C' at the end of their right-hand stroke, when the pistons in the cylinders D D' reach half of their travel in said cylinders, by the yoke H' acting on the tappet L' and through the lever M' on the valve J. In this way are the valves operated successively by the adjacent independent piston or pistons to that or those which they control, and, being operated

suddenly and while the pistons which operate them are midway, or thereabout, of their stroke, abundance of time is given for the cylinder or cylinders which they control to fill and discharge.

What is here claimed, and desired to be secured by Letters Patent, is—

1. A liquid-meter composed of two or more cylinders fitted with independent pistons, when these latter are controlled by valves operated so that either one piston or connected pair or set of pistons is or are made to actuate the valve which controls the other piston or connected pair or set of pistons, substantially as specified.

2. The combination of the cylinders C C' and D D' with their pistons and valves so arranged and operating as that either one set of pistons to said cylinders are reversed in their action by the motion of the valves which control them when the other set of pistons are midway of their stroke, or thereabout, essentially as herein set forth.

3. The combination of the cylinders C C' and D D' with their pistons, yokes H H', tappets L L', arms M M', and valves J J', for operation together and in connection with suitable inlet and outlet passages, substantially as shown and described.

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Witnesses:

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