

(No Model.)

L. G. ENGEL.

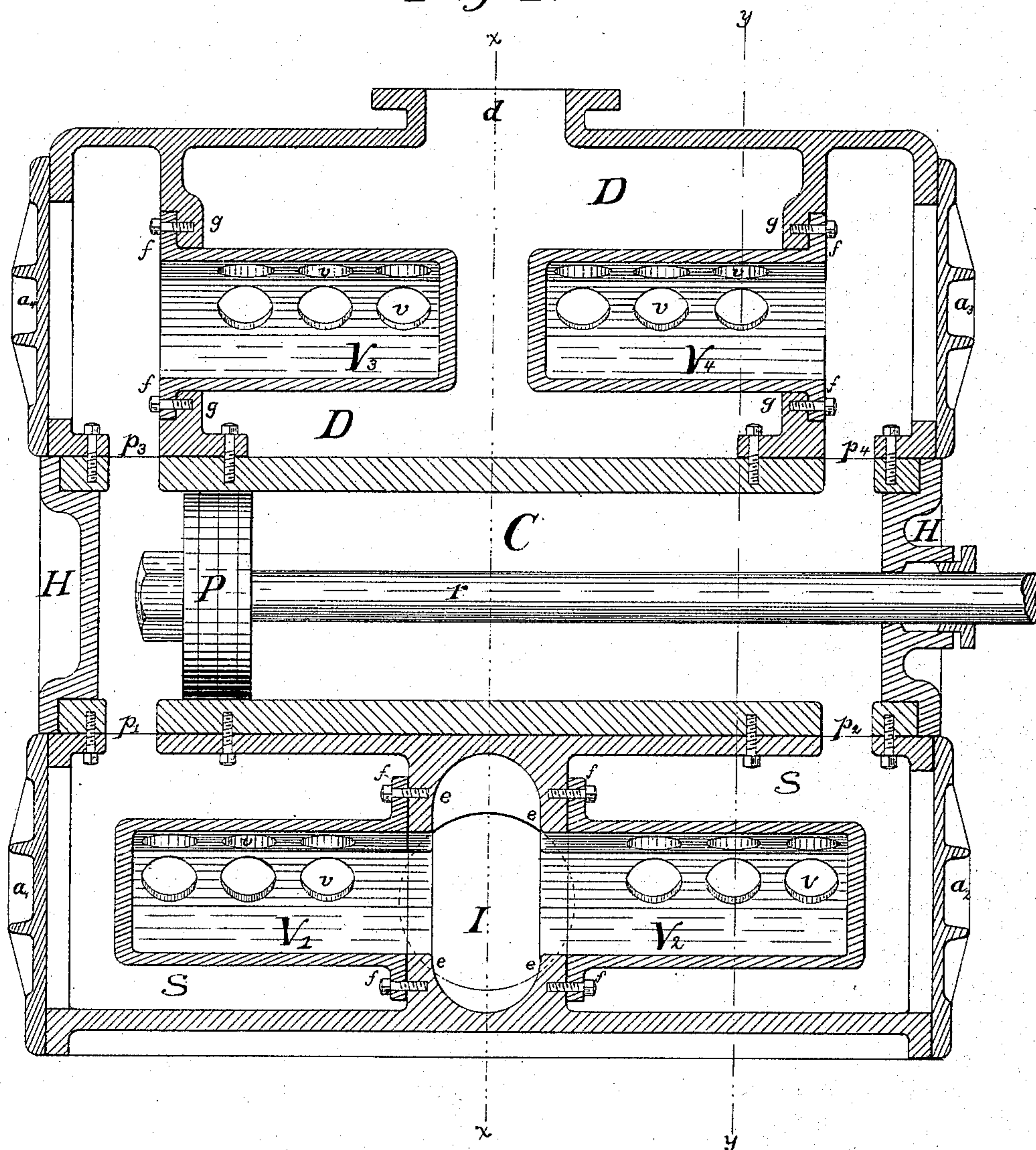
3 Sheets—Sheet 1.

PUMP.

No. 322,269.

Patented July 14, 1885.

Fig. 1.



Witnesses:

E. Koch  
Geo. C. Hollerith

Inventor:

Louis S. Engel  
by H. Hollerith atty

(No Model.)

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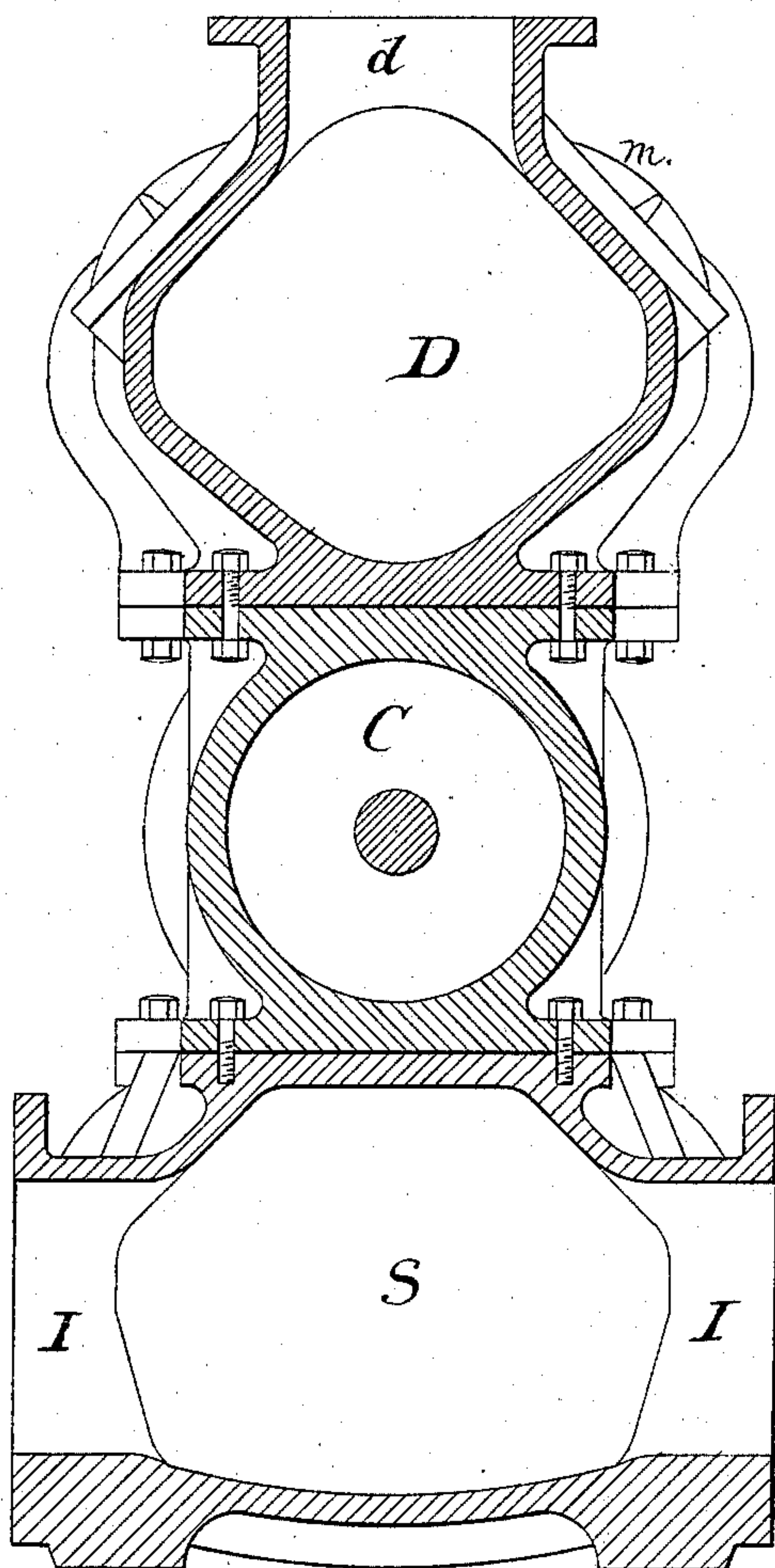
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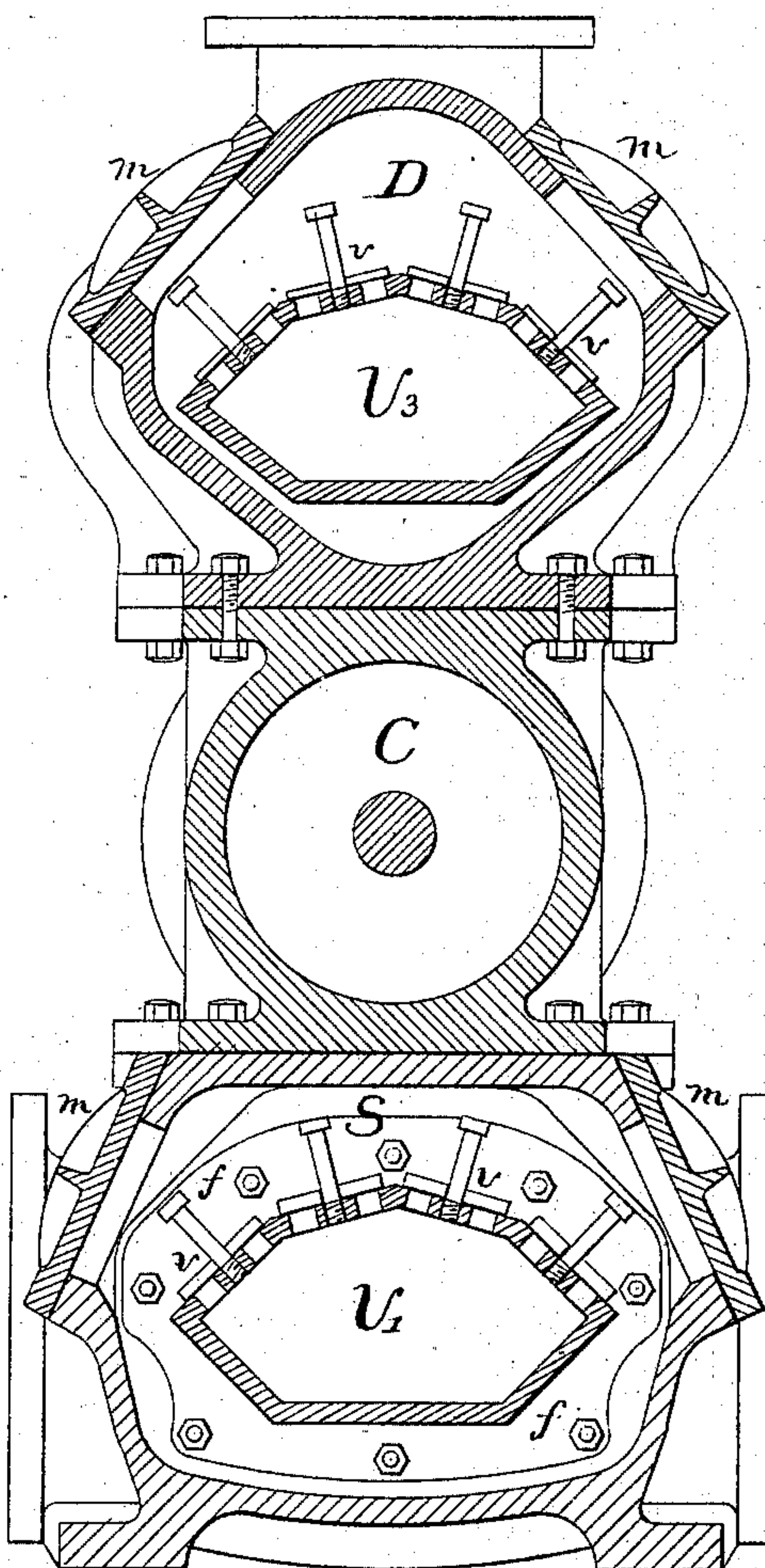
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*Fig. 2.*



*Fig. 3.*



Witnesses:

*E. Koch*  
*Geo. C. Hollerith*

Inventor:

*Louis G. Engel*  
*by H. Stoll*



(No Model.)

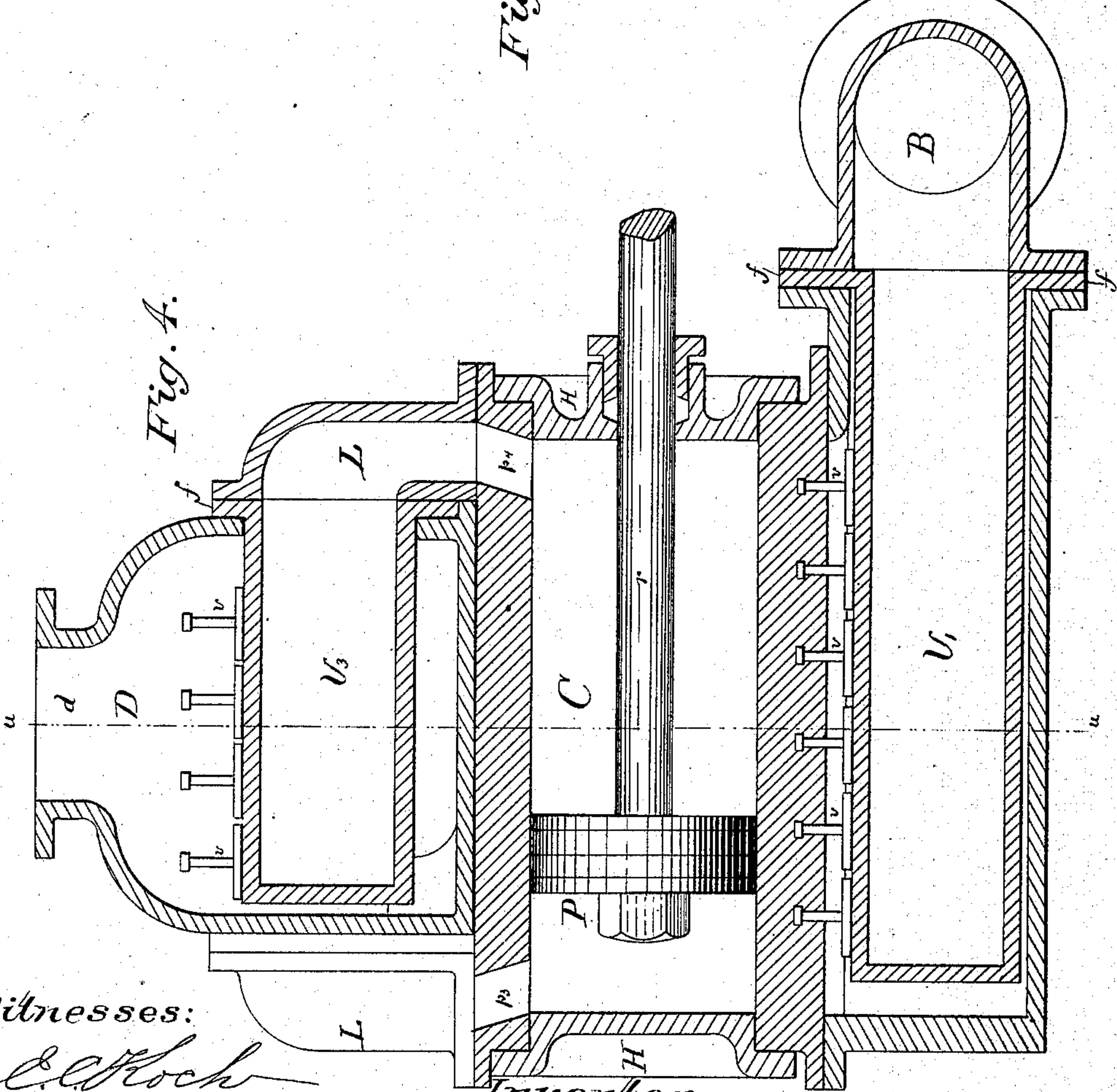
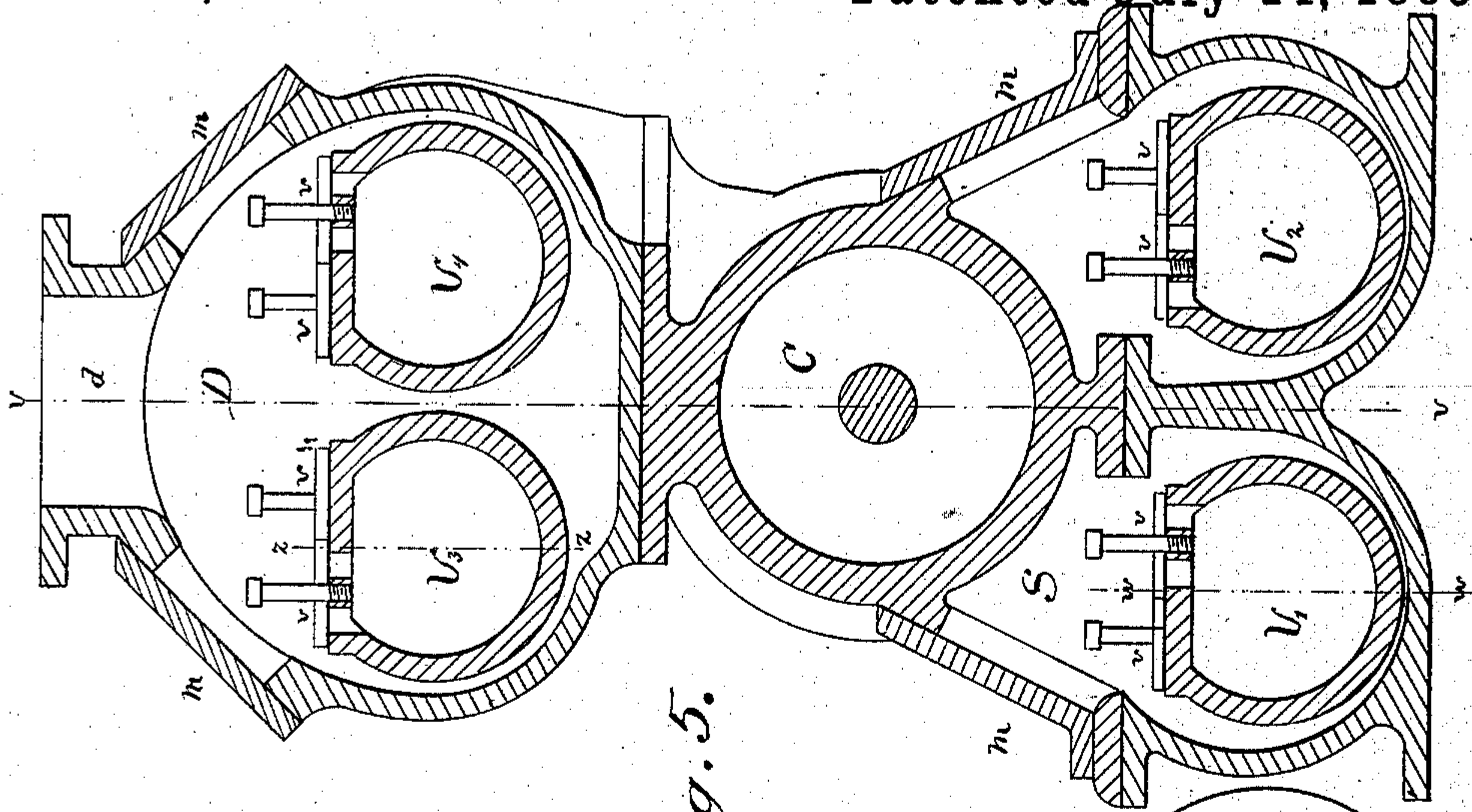
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3 Sheets—Sheet 3.

PUMP.

No. 322,269.

Patented July 14, 1885.



Witnesses:

*C. C. Koch*  
*Geo. C. Hollerith*

Inventor:

*Louis G. Engel*  
*by H. Hollerith Atty*



# UNITED STATES PATENT OFFICE.

LOUIS G. ENGEL, OF TILLY FOSTER, NEW YORK.

## PUMP.

SPECIFICATION forming part of Letters Patent No. 322,269, dated July 14, 1885.

Application filed May 6, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS G. ENGEL, a citizen of the United States, residing at Tilly Foster, in the county of Putnam and State of New York, have invented certain new and useful Improvements in Pumps, of which the following, together with the accompanying drawings, forms a specification.

My invention relates to improvements in pumps, and is more particularly applicable to steam-pumps used for forcing water against high heads, such, for instance, as are used in certain mining operations.

In the ordinary forms of steam-pumps the valves are placed in a flat valve-plate, which, in order to resist the high pressure and severe shock to which such plates are subjected, must be made very heavy. In practice these plates are often fractured, and to replace them requires that the whole pump be taken apart. This necessitates considerable expense and loss of time.

The object of my improvement is to replace the flat valve-plate as ordinarily found in pumps by a valve-pipe of circular, elliptical, polygonal, or similar cross-section, on the periphery of which the valves are placed. Due to the shape of such cross-section, these valve-pipes will be able to resist much higher pressures than the ordinary flat valve-plates. These valve-pipes also are so arranged as to be readily removed, and so that they can be quickly replaced in case of accident or injury, or when valve-seats or valves are worn, by simply removing a bonnet held in place by bolts, thus saving considerable delay and expense. I attain these objects by the use of the construction illustrated in the accompanying drawings, in which—

Figure 1 represents a central vertical longitudinal section of a pump embodying the features of my invention. Fig. 2 represents a vertical central transverse section of the pump on line  $x x$ , Fig. 1. Fig. 3 represents a vertical transverse section of the pump on line  $y y$  of Fig. 1. Fig. 4 represents a vertical longitudinal section of a modified form of pump embodying the features of my invention. This section is taken in three parallel planes, as shown by lines  $z z$ ,  $v v$ , and  $w w$  of Fig. 5. Fig. 5 represents a vertical transverse sec-

tion of the pump illustrated in Fig. 4, the section being taken along line  $u u$  in Fig. 4.

Two differently-arranged pumps embodying the general features of my invention are illustrated in the accompanying drawings and will not be described, the first method of construction being shown in Figs. 1, 2, and 3. This pump is made in three main pieces or castings, the cylinder C, suction-chamber S, and discharge-chamber D. The cylinder C is constructed as an ordinary pump, having cylinder-heads H H, piston P, and piston-rod  $r$ , which is connected to any convenient motor in the usual manner. The cylinder C is secured between the suction-chamber S below and the discharge-chamber D above. Communication is established between the ends of the cylinder C and suction and discharge chambers by ports  $p'$ ,  $p^2$ ,  $p^3$ , and  $p^4$ .

The suction enters at either or both sides of the pump at I and passes into the valve-pipes  $V' V^2$ , each communicating with one end of pump-cylinder C through valves  $v$  and ports  $p'$  and  $p^2$ . These valve-pipes are virtually a continuation of the suction-pipe into the suction-chamber of the pump. As before stated, these valve-pipes can be made of any desired or convenient cross-section. Valves of any ordinary or desired construction are fitted on the outer surface of these valve-pipes, as shown at  $v$ , Fig. 3. From each valve-pipe  $V' V^2$  the water passes through valves  $v$  and ports  $p'$  and  $p^2$  alternately into the corresponding end of the pump-cylinder C, according to the direction in which the piston P is moving. The water is then forced through ports  $p^3 p^4$  into the valve-pipes  $V^3 V^4$ , projecting into the discharge-chamber, as shown in Fig. 1. Through the valves  $v$  on the valve-pipes  $V^3 V^4$  the water passes into the discharge-chamber D and is discharged from the pump into the force-main at  $d$ .

The valve-pipes are secured in the suction and discharge chambers in any suitable manner. I prefer to form them closed at one end and with flanges  $f$  at the other end, as shown in the drawings. All four valve-pipes can, if desired, be made alike and interchangeable. The valve-pipes, by flanges  $f$ , are bolted to flanges or ribs  $e' e^2$  in suction-chamber and to flanges or ribs  $g' g^2$  in the discharge-chamber,



a tight joint being made in any usual manner—as, for instance, by use of rubber gasket.

The suction and discharge chambers are closed at each end by covers or bonnets  $a'$ ,  $a^2$ ,  $a^3$ , and  $a^4$ , bolted to flanges at end of chambers. By removing these bonnets the valve-pipes can be removed by unscrewing the bolts in flanges  $f$ . The valve-pipes being alike and interchangeable, another pipe can be inserted and bonnet replaced when pump is again ready for use, thus greatly reducing the delay necessary in case of breakage. Any usual form of valve can be used in such valve-pipes. The seat of the valve can be formed either directly on surface of pipe or a removable valve-seat may be screwed or otherwise suitably secured in opening in valve-pipe.

In the construction illustrated in Figs. 4 and 5 we have, as before, a pump consisting of three main pieces or castings. The cylinder C is secured between the double suction-chamber S below and the discharge-chamber D above. The suction enters the two suction valve-pipes  $V^1$   $V^2$  at one end of the pump through double T B and passes alternately through valves  $v$  and ports  $p'$  and  $p^2$  at each end and side of the cylinder C, according to the direction in which the piston is moving. Through the ports  $p^3$  and  $p^4$  the water passes into the discharge valve-pipes  $V^3$   $V^4$ , through valve  $v$  into the discharge-chamber D, and is finally discharged from the pump into the force-main at  $d$ .

In this construction as in former the valve-pipes are formed closed at one end and with flanges  $f$  at the other end. Instead of being placed end to end, as in previous construction, the valve-pipes are made of smaller diameter and are placed side by side, each one extending the full length of the cylinder. The valve-pipes are secured in place by flange  $f$  being bolted between flange at end of suction-chamber and flange of double T B, and between flange at each end of discharge-chamber and bonnets L. These bonnets have ports connecting the discharge valve-pipes with ends of cylinder.

In both constructions hand-holes  $m$  are provided at each side of suction and of discharge chambers, through which access can be had to any of the valves  $v$ .

I have shown only one valve-pipe in each section of the suction and discharge chambers. Two or more similar valve-pipes could, if desired, be used in each section. This, however, would only be desirable in larger pumps.

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

1. In a pump, a movable valve-pipe provided with outwardly-opening valves on its periphery closed at one end, connected directly at its open end with the suction-main and extending into the suction-chamber, substantially as shown and described.

2. The combination, in a pump, of a suction-chamber having a removable bonnet, a removable valve-pipe provided with outwardly-opening valves on its periphery closed at one end, connected directly at its open end with the suction-main and extending into the suction-chamber, substantially as shown and described.

3. The combination, in a pump, of a cylinder and piston, suction and discharge chambers provided with removable bonnets and communicating with the cylinder, a removable valve-pipe closed at one end and provided with outwardly-opening valves on its periphery, said pipe communicating at its open end with the suction-main and extending into the suction-chamber, and a removable valve-pipe closed at one end and provided with outwardly-opening valves on its periphery, said valve-pipe communicating at its open end with the cylinder and extending into the discharge-chamber, all arranged and operating substantially as shown and described.

4. The combination, in a pump, of a suction-chamber, S, having removable bonnets  $a'$   $a^2$ , removable valve-pipes  $V^1$   $V^2$ , closed at one end and provided with valves  $v$  on their peripheries, said valve-pipes communicating at their open ends with the suction-main and extending into the suction-chamber, a cylinder, C, having a piston, P, and communicating at its opposite ends with the suction-chamber, a discharge-chamber, D, communicating with opposite ends of the cylinder C, and provided with removable bonnets  $a^3$   $a^4$ , removable valve-pipes  $V^3$   $V^4$ , closed at one end and provided with valves  $v$  on their peripheries, said valve-pipes communicating at their open ends with the cylinder C and extending into the discharge-chamber, all arranged and operating substantially as shown and described.

LOUIS G. ENGEL.

Witnesses:

H. HOLERRITH,  
S. G. METCALF.

It is hereby certified that in Letters Patent No. 322,269, granted July 14, 1885, upon the application of Louis G. Engel, of Tilly Foster, New York, for an improvement in "Pumps," an error appears in line 59, page 2, of the printed specification requiring the following correction, viz: The word "movable" should be read *removable*; and that the Letters Patent should be read with this correction therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 21st day of July, A. D. 1885.

[SEAL.]

H. L. MULDROW,  
*Acting Secretary of the Interior.*

Countersigned:

M. V. MONTGOMERY,  
*Commissioner of Patents.*