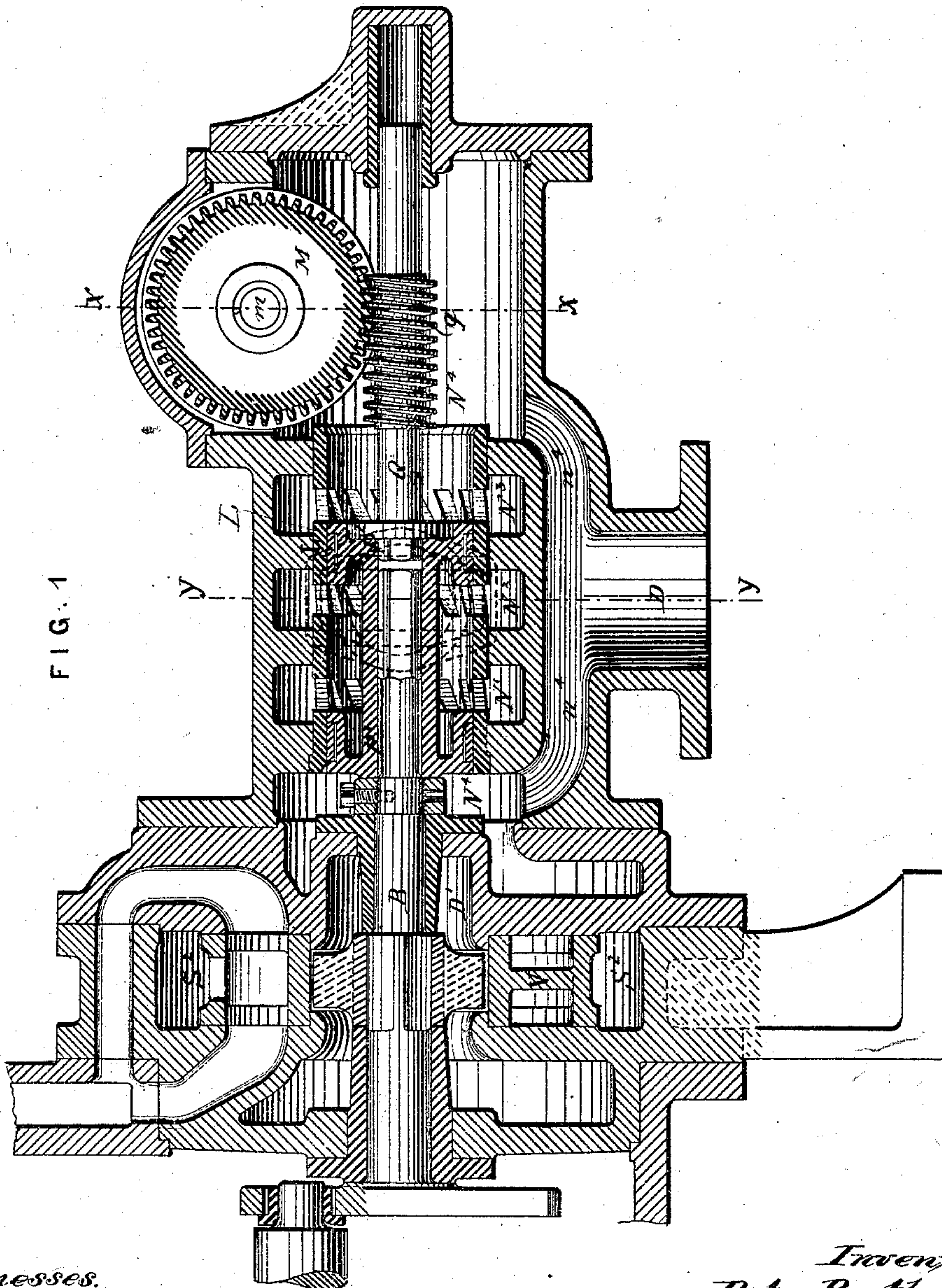


(No Model.)

2 Sheets—Sheet 1.

P. BROTHERHOOD.
Balanced Rotary Reversing Valve.
No. 242,876. Patented June 14, 1881.



Witnesses.

J. A. Rutherford
Robert Everett

Inventor,
Peter Brotherhood.

By James L. Norris.
Atty.

(No Model.)

2 Sheets—Sheet 2.

P. BROTHERHOOD.
Balanced Rotary Reversing Valve.
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FIG. 3

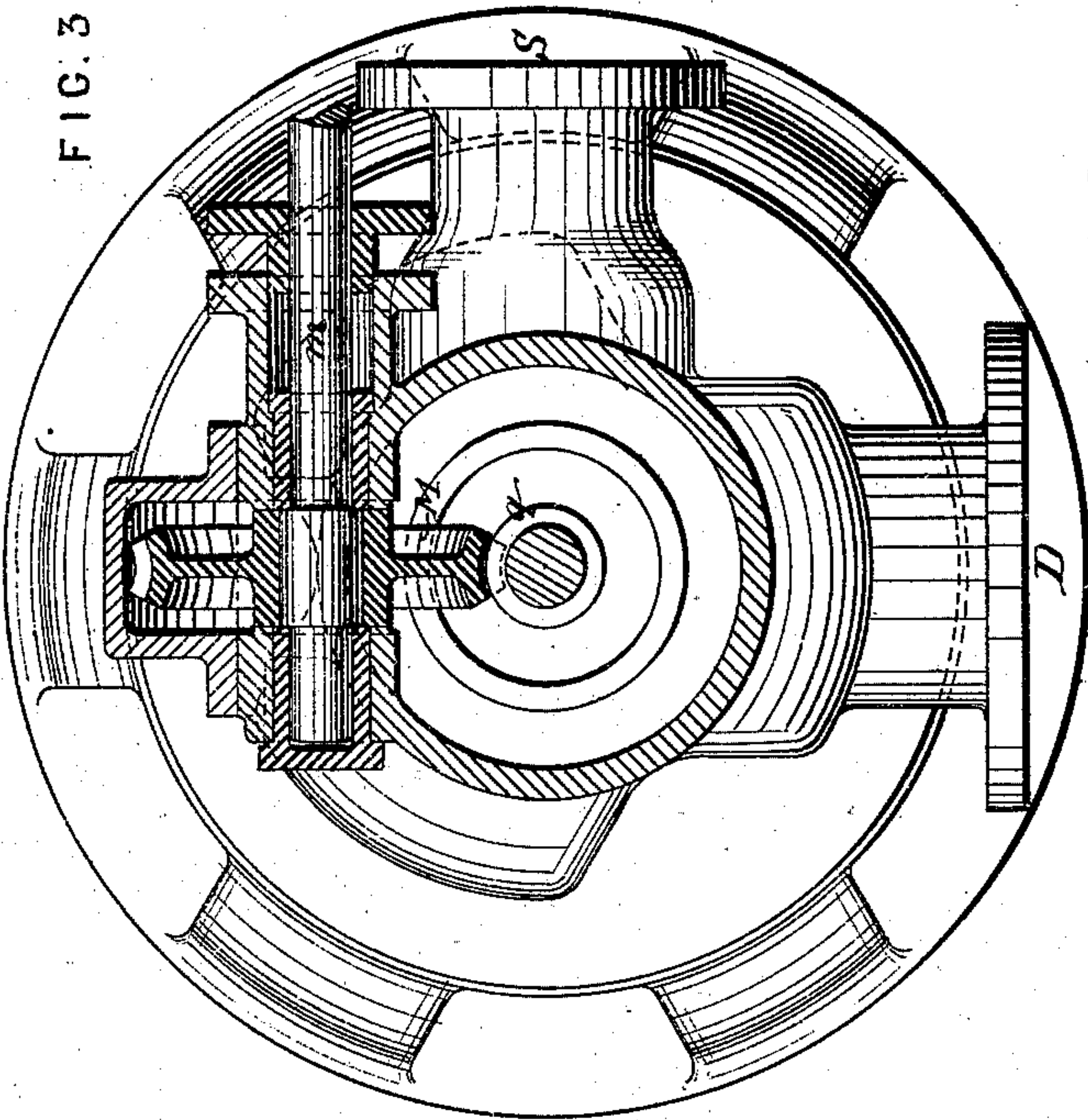


FIG. 2

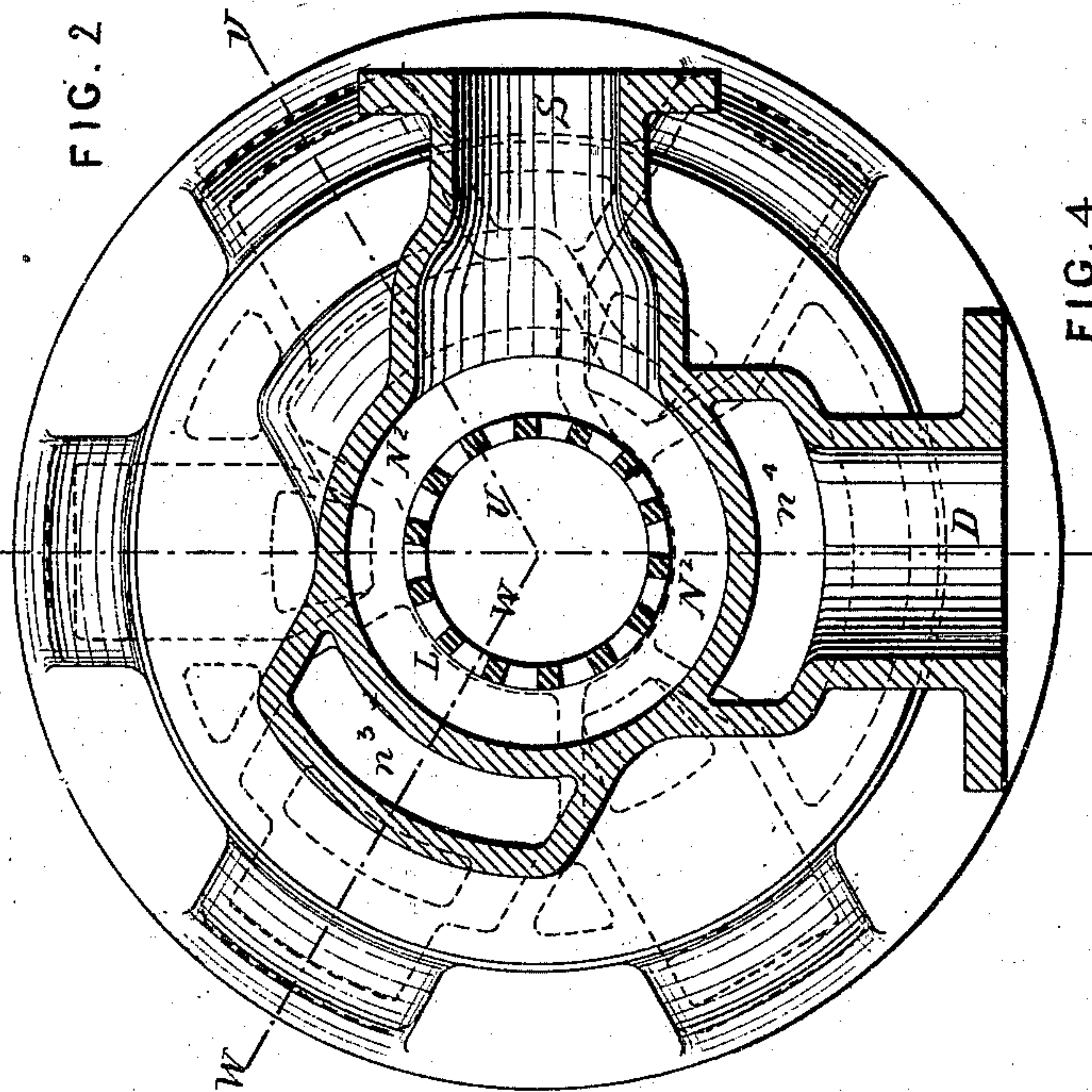


FIG. 5

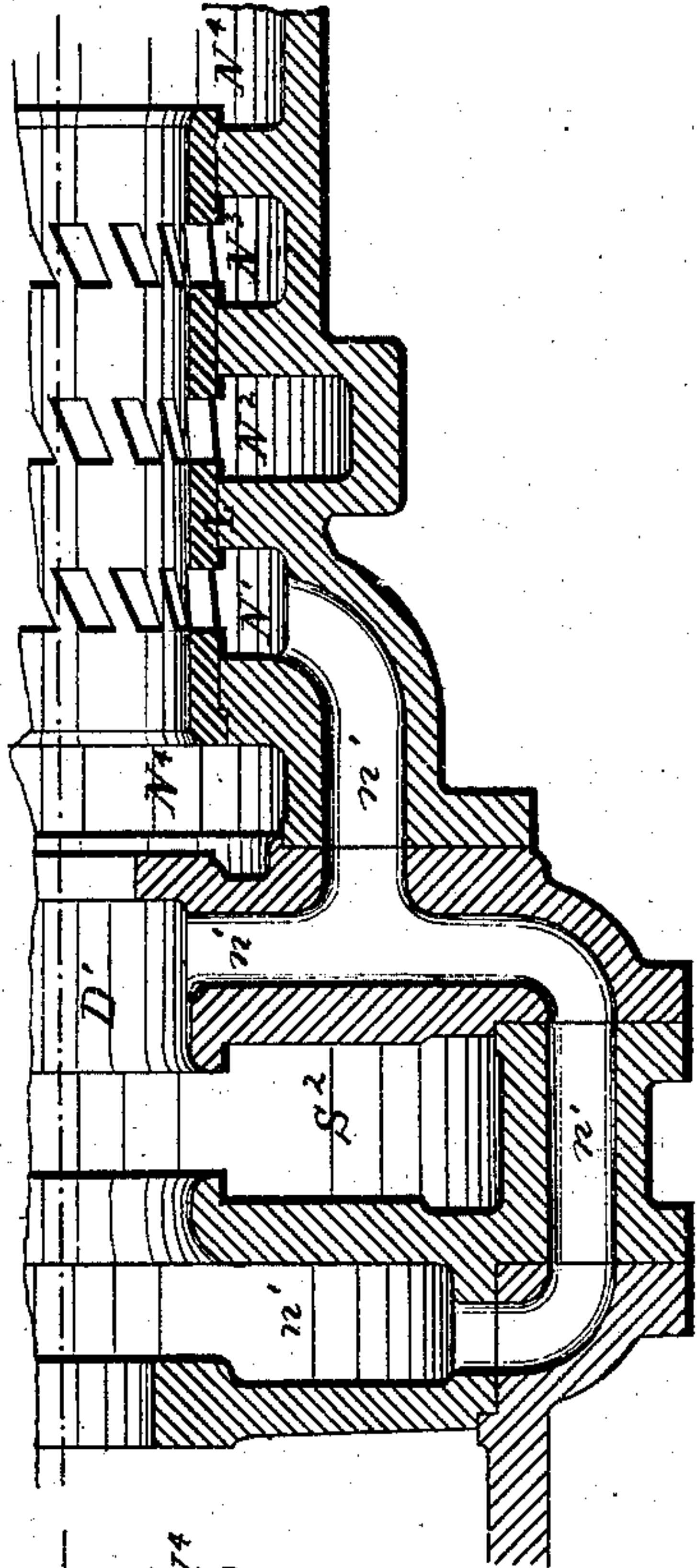
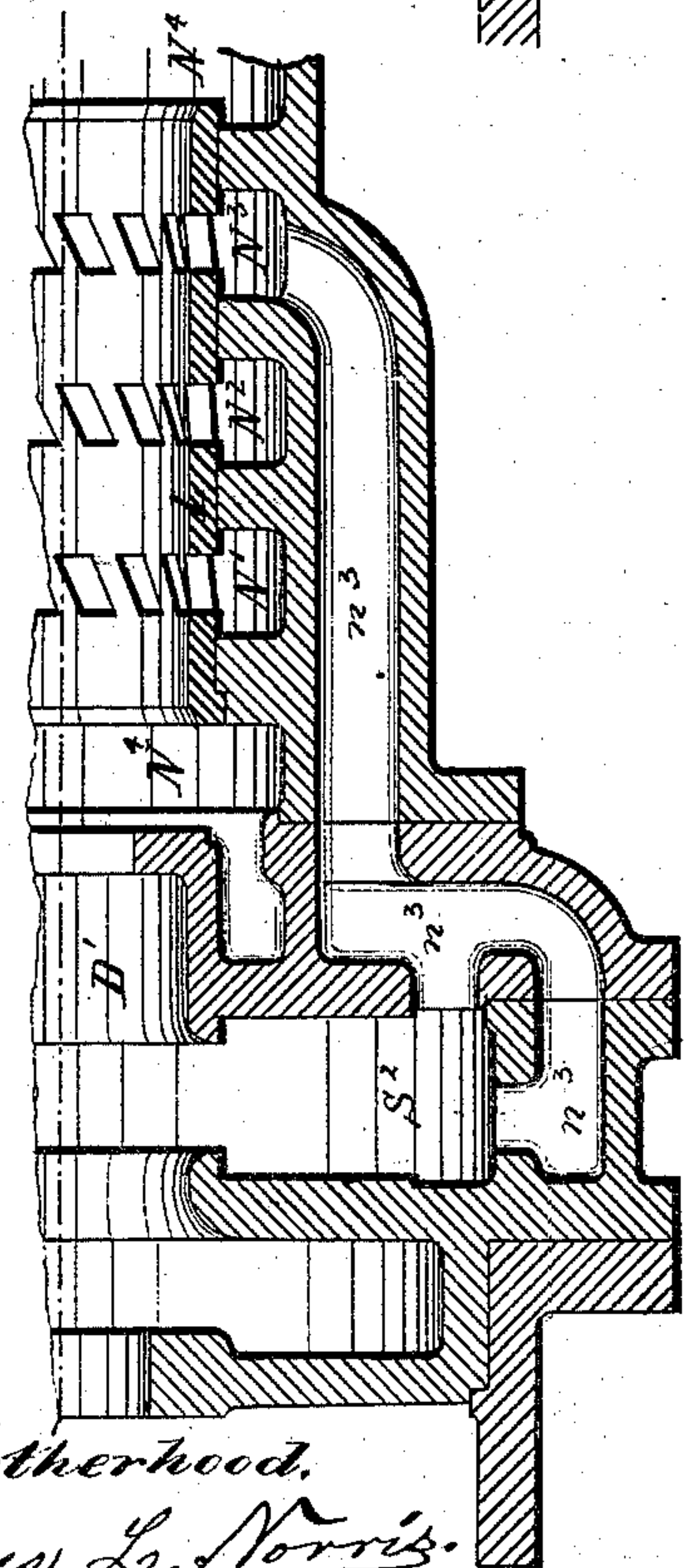


FIG. 4



Witnesses.

J. A. Rutheford
Robert Emmett

Inventor,
Peter Brotherhood.

By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

PETER BROTHERHOOD, OF CLERKENWELL, COUNTY OF MIDDLESEX,
ENGLAND.

BALANCED ROTARY REVERSING-VALVE.

SPECIFICATION forming part of Letters Patent No. 242,876, dated June 14, 1881.

Application filed May 11, 1881. (No model.) Patented in England February 17, 1881.

To all whom it may concern:

Be it known that I, PETER BROTHERHOOD, a citizen of England, residing at Clerkenwell, in the county of Middlesex, England, have invented an Improved Balanced Rotary Reversing-Valve, (for which I have obtained a patent in Great Britain, No. 697, bearing date February 17, 1881,) of which the following is a specification.

10 In another application for patent filed this day I have described my invention of a balanced rotary valve for governing the ports of several cylinders.

My present invention consists in combining
15 with such a valve means of effecting reversal of the engine to which it is applied, as I will describe, referring to the accompanying drawings. As in this combination the valve itself and its casing are constructed in substantially the
20 same manner as described in the specification accompanying my application above referred to, I do not now repeat the description of those parts, which in the accompanying drawings I have marked with reference-letters similar to
25 those used to designate the corresponding parts in the drawings accompanying my said application.

Figure 1 is a vertical section of the rotary valve and casing and the reversing-gear, taken
30 on a plane passing through the axis. Figs. 2 and 3 are vertical sections, respectively, on planes Y Y and X X perpendicular to the axis, and Figs. 4 and 5 are part sections on W W and U U respectively.

35 I attach to the valve-case a cylinder, L, containing two pistons, p' p^2 , connected together and to a shaft, Q, on which is cut a screw-thread, q , gearing with a worm-wheel, M, on a shaft, m , that passes through a stuffing-box. The
40 cylinder L has through its side three sets of openings communicating respectively with three annular cavities, N' N^2 N^3 . The first cavity, N' , communicates by passages n' with the central part, D' , of the valve-box. The second cavity, N^2 , communicates with the supply-pipe S. The third cavity, N^3 , communicates
45 by passages n^3 with the annular space s^2 sur-

rounding the valve V; also, the ends of the cylinder L are open to cavities N^4 , communicating by passages n^4 with the discharge-pipe D. When the pistons p' p^2 are in the position
50 shown in Fig. 1 they put the spaces N' N^2 in communication with each other and the space N^3 with N^4 ; consequently the fluid supplied by S to N^2 passes by N' and n' to the central
55 part, D' , of the valve, while from the space S^2 surrounding the valve fluid can pass by n^3 and N^3 to N^4 , and thence to the discharge-pipe D. If, now, the pistons p' p^2 were moved to the
60 right, putting N^2 and N^3 in communication with one another and N' in communication with N^4 , the fluid supplied by S to N^2 would pass by
 N^3 and n^3 to the space S^2 surrounding the valve, while from the central space, D' , of the valve
65 fluid would pass by n' and N' to N^4 , and thence by n^4 to the discharge-pipe D. As the shaft Q revolves along with the axis B of the valve the worm-wheel M is also caused to revolve. If, however, the rotation of this wheel were re-
70 tardated or arrested by a brake or stop applied to its shaft m , then the screw-thread q , acting on the retarded or stationary teeth of M, would cause the pistons p' p^2 to move so as to effect the inversion of the passages, as above de-
75 scribed, and so to reverse the engine.

Having thus described the nature of my invention, and the best means I know of carrying it into practical effect, I claim—

The combination of a balanced rotary valve and its casing with a cylindrical reversing-
80 valve and its casing, the stem of the reversing-valve having on it a screw-thread gearing with a worm-wheel having its shaft accessible externally to the valve-casing, substantially as herein described.

85 In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 12th day of April, A. D. 1881.

PETER BROTHERHOOD.

Witnesses:

OLIVER IMRAY,
H. E. HOPKINS.