Sheet 1-4 Sheets.

E. Rogers,

Valve for Steam Engine,

No. 50,389, Patented Oct. 10, 1865.

Fig. 1.

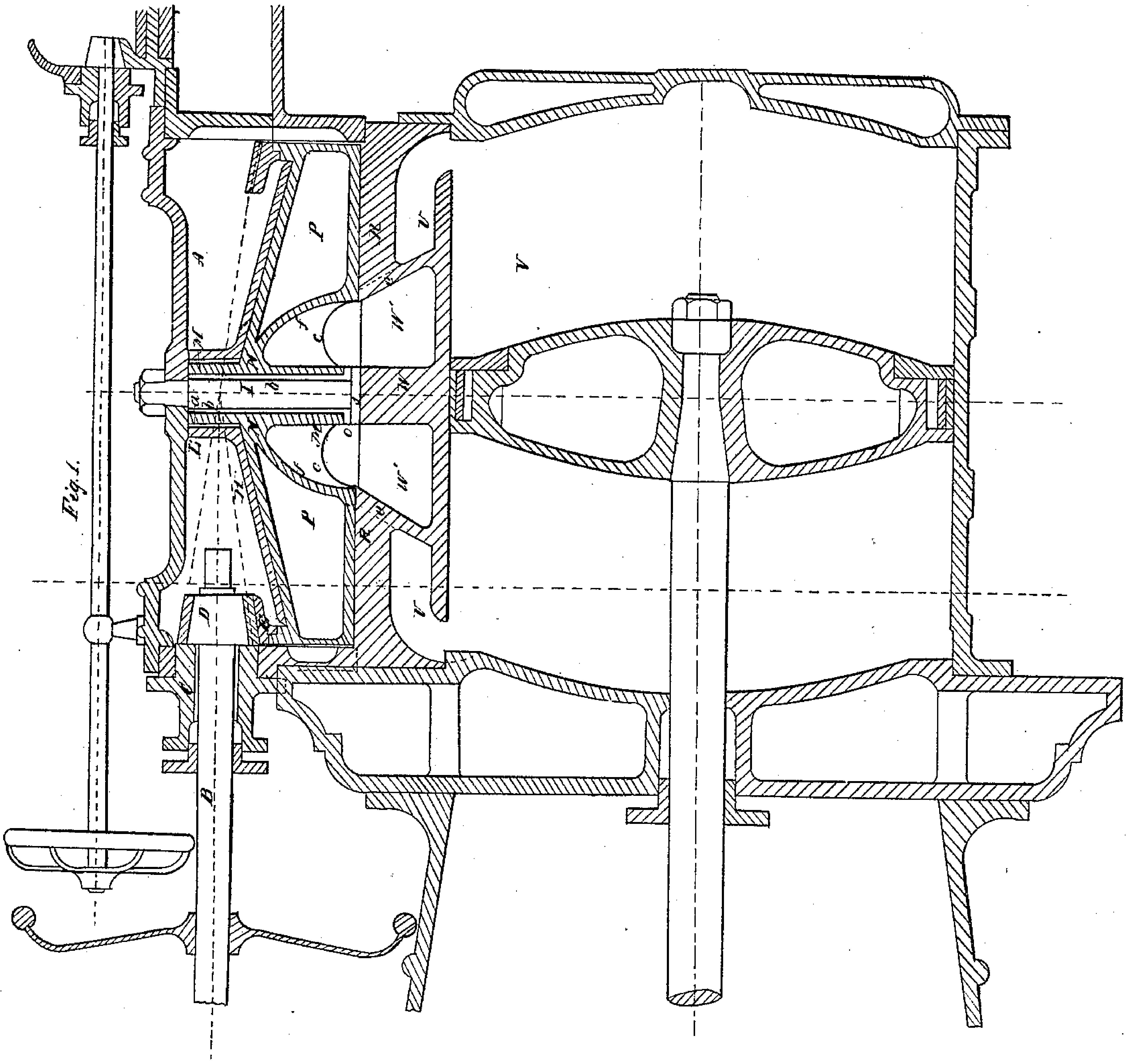
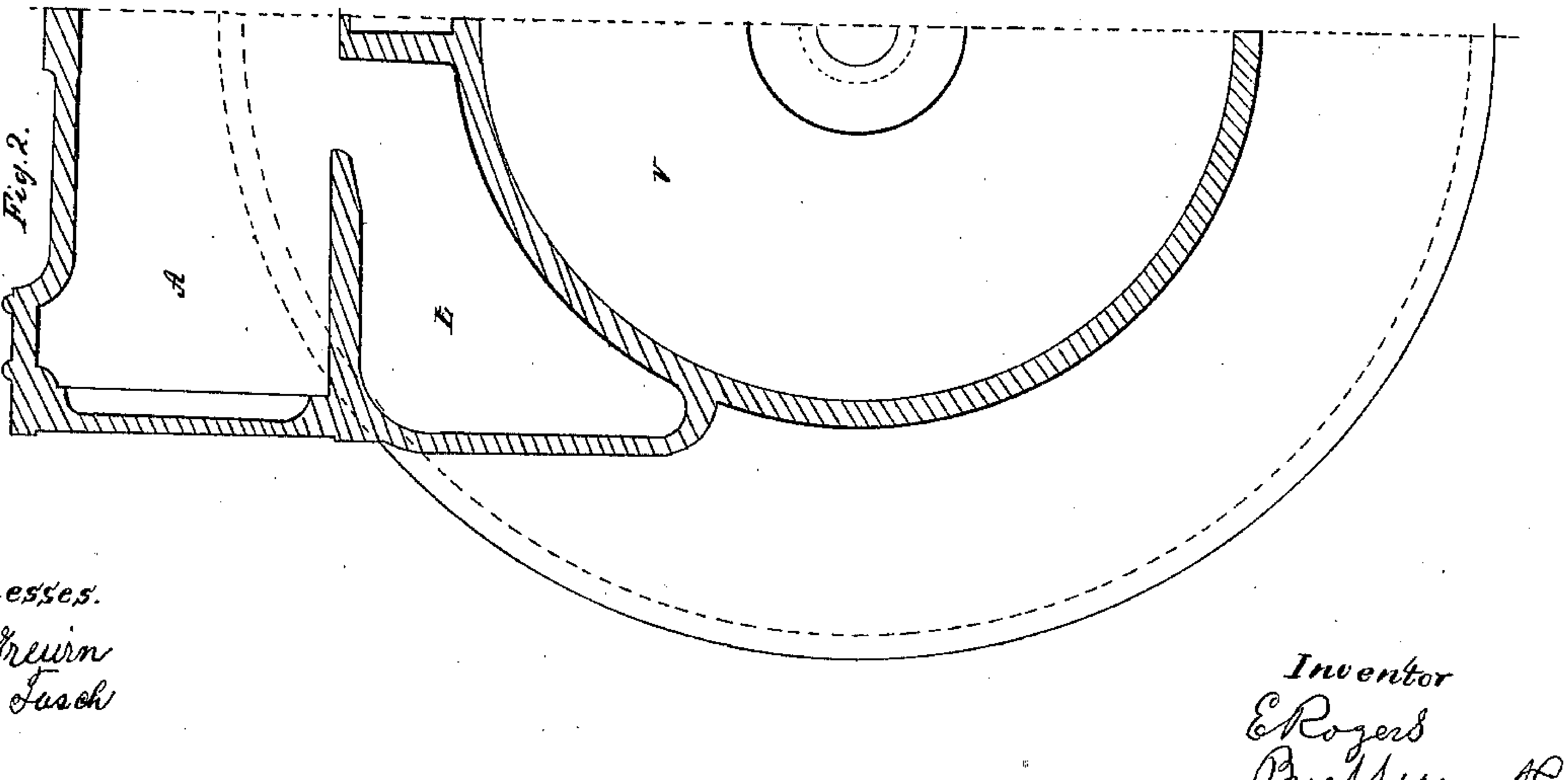


Fig. 2.



Witnesses.

Wm Trewin
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Inventor

E Rogers
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Sheet 2 - 4 Sheets

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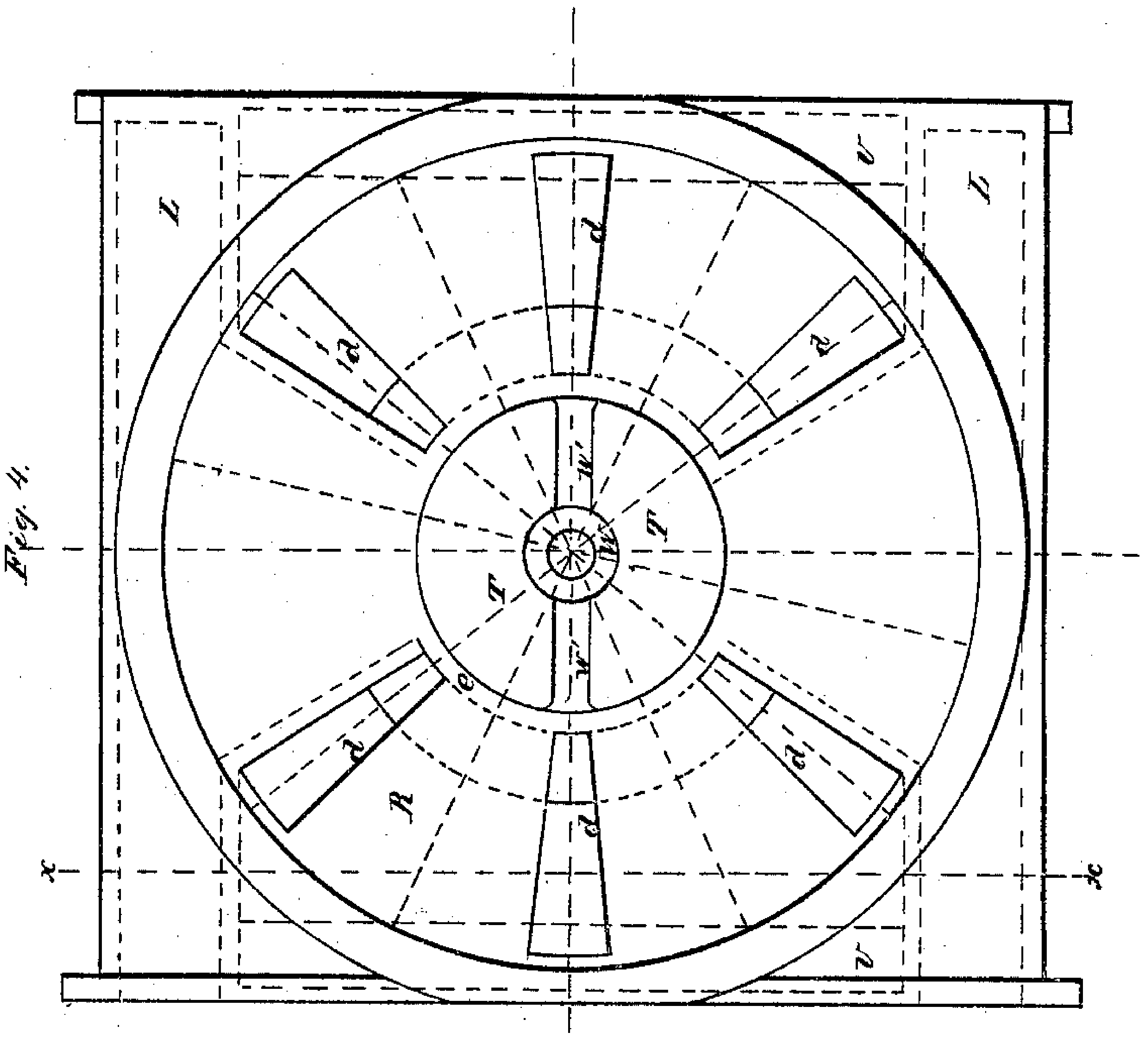
Fig. 4.

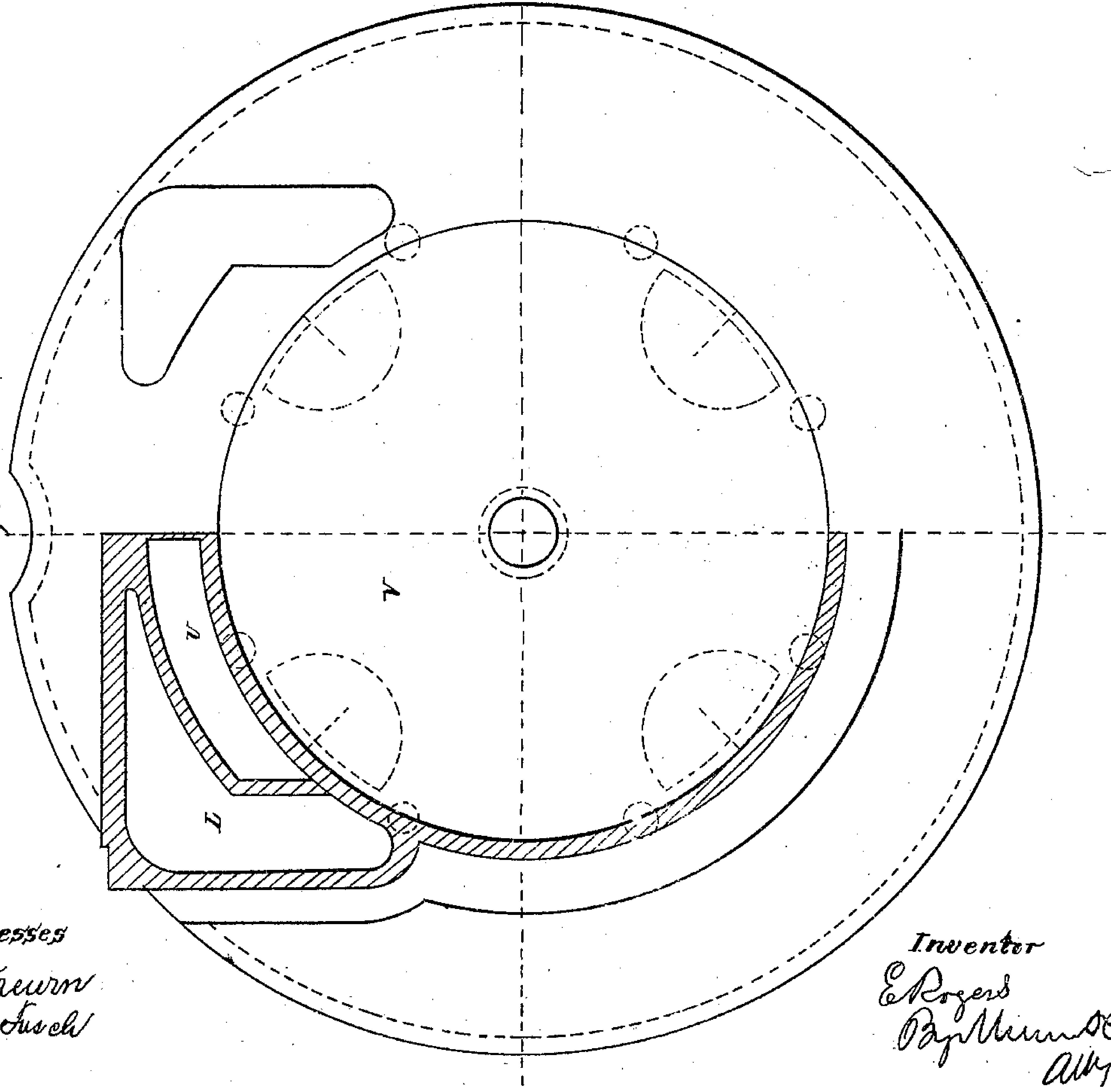
Fig. 3

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Sheet 3 – 4 Sheets

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Fig. 5

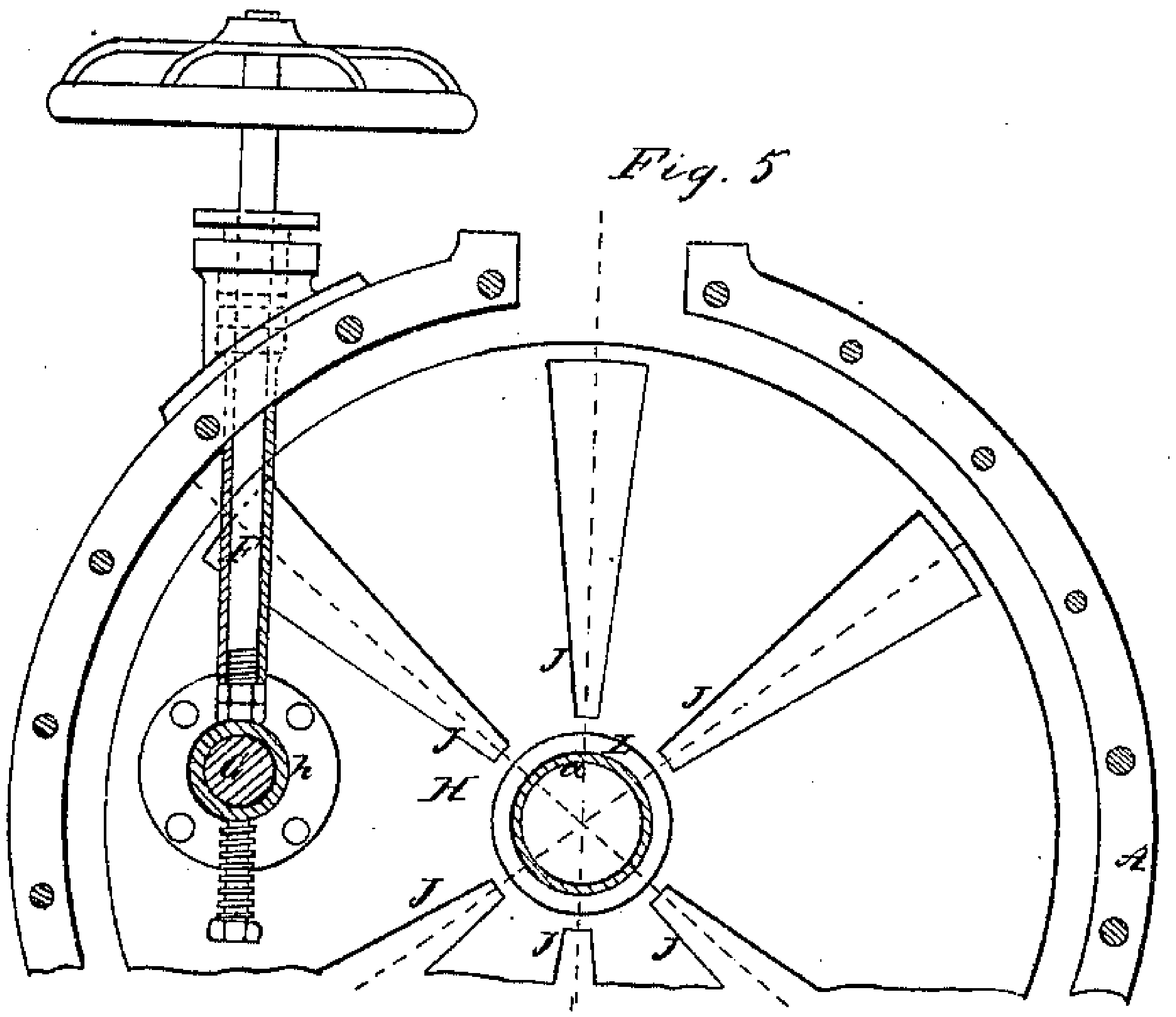


Fig. 6.

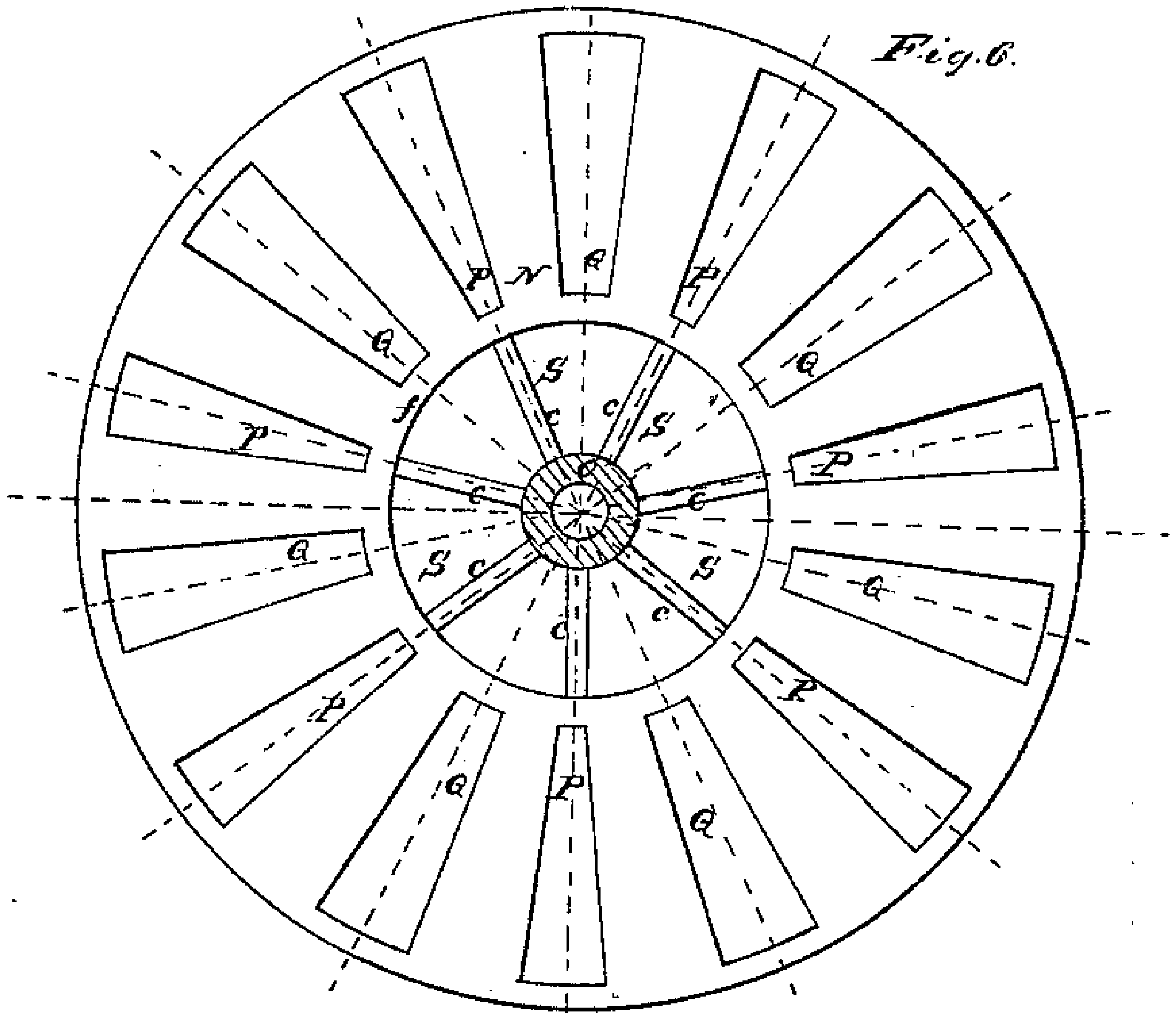
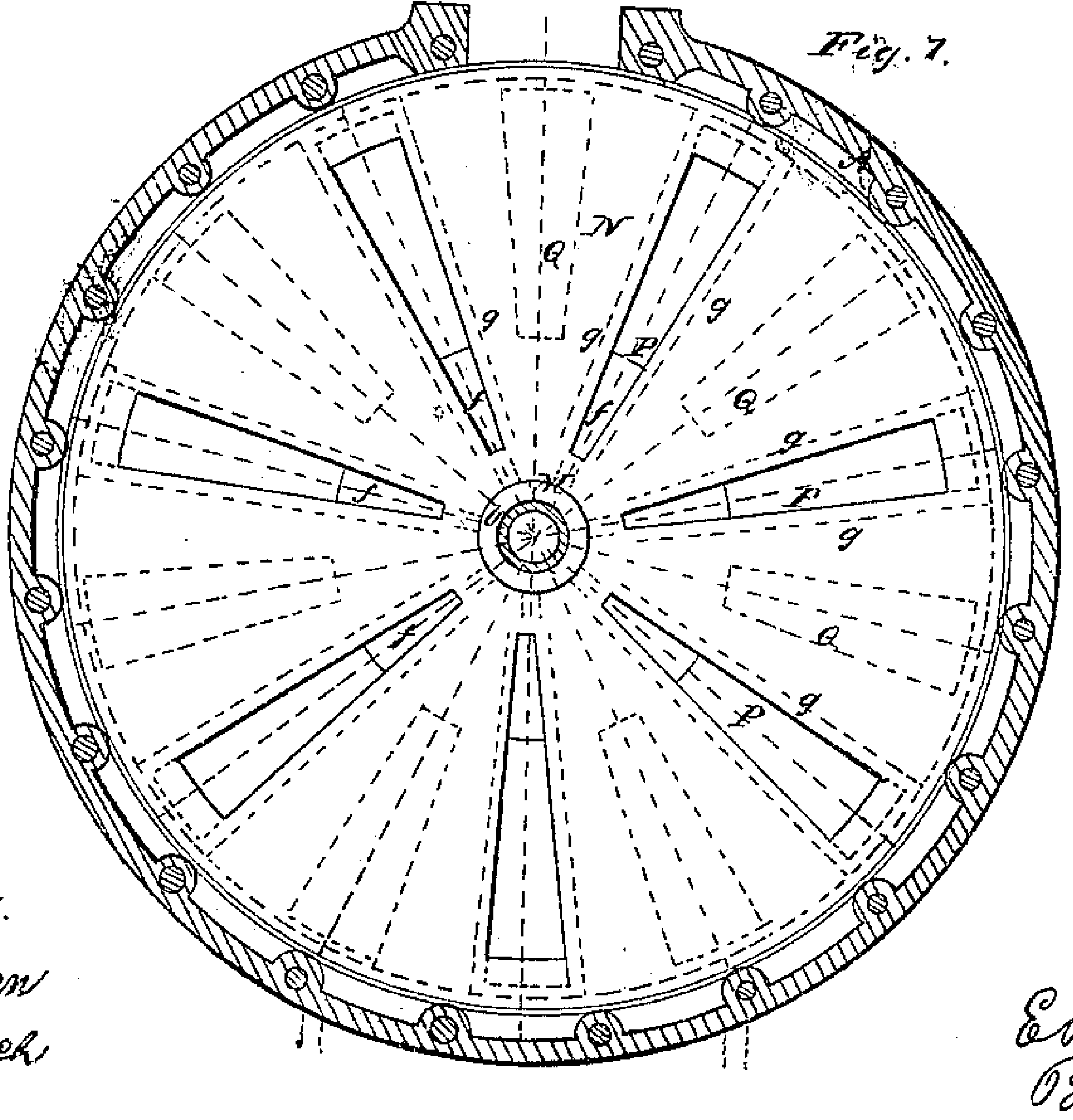


Fig. 7.



Witnesses.
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Sheet 4-4 Sheets

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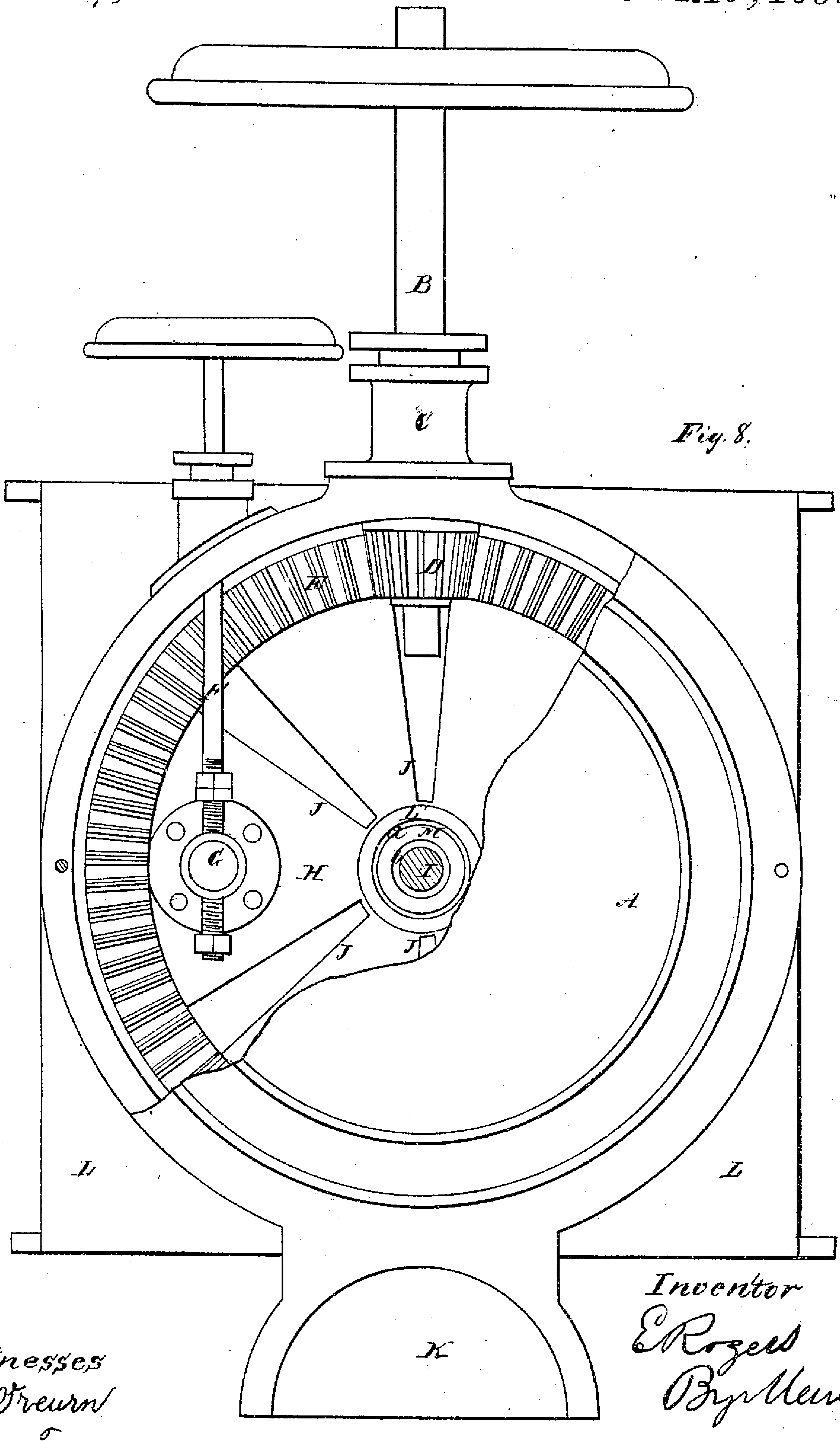

Fig. 8.

Witnesses
Wm Treurn
Theo Tusch

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UNITED STATES PATENT OFFICE.

ETHAN ROGERS, OF NEW YORK, N. Y.

IMPROVED VALVE FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **50,389**, dated October 10, 1865.

To all whom it may concern:

Be it known that I, ETHAN ROGERS, of the city, county, and State of New York, have invented a new and useful Improvement in Steam-Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of an axial section of a steam-cylinder and valve-chest, in connection with which I propose to illustrate my invention; but the line of section is slightly deflected in passing through the valve. Fig. 2 is an elevation of the left-hand side of a cross-section taken through the middle of the cylinder, exhaust-pipe, and steam-chest. Fig. 3 is a front elevation of the cylinder, the left-hand side of the figure being drawn in section on the line *x* of Fig. 4. Fig. 4 is a plan of the seat of the valve, the steam-chest and valve having been laid aside. Fig. 5 is a plan of a portion of the steam-chest, showing the cut-off and the device for operating it. Fig. 6 is an under-side view of the valve. Fig. 7 is a plan of the valve. Fig. 8 is a plan of the steam-chest and cylinder, the cover of the former having been laid aside.

Similar letters of reference indicate corresponding parts.

This invention relates to the valves of steam-engines. Its character makes it especially suitable for use in propellers, but it is applicable to all kinds of steam-engines. The valve is counterbalanced or supported at its center of rotation, and is fitted with a graduated cut-off, which is so constructed and applied that the steam is cut off by the motion of the main valve itself. The cut-off may, however, be applied so as to work also independently of the motion of the main valve.

V designates the cylinder of a steam-engine, its exhaust-pipes L L being placed on opposite sides of the top of the cylinder, parallel with its axis.

A designates the steam-chest, which receives steam through an induction-pipe, K. The steam-chest surmounts the cylinder and the exhaust-pipes, and is circular in form and incloses a circular valve, N. This valve is seen in section in Fig. 1. R designates its seat, which is formed on the cylinder and has radial openings, that are indicated by the letters *d* in Fig. 4. These openings are arranged over the ends of the cylinder and communicate with the steam-passages U U, through which steam passes into and out of the cylinder at either end thereof. The openings are so arranged that each passage U has three of them communicating with it. The steam-passages U U are designated in dotted outline in Fig. 4. They are separated by a conical partition, *e*, from the spaces T T, formed in the face of the cylinder, which partition is carried up to the level of the valve-seat. The spaces T T are separated from each other by the partition W′, which extends from one side of the conical partition *e* to the other, being intersected by the pillar W, which forms part of the partition W′. The spindle I, about which the main valve rotates, rises from the pillar W, as seen in Fig. 1, the hub M of the valve being separated from the spindle by a bush, *a*, which has a flange, *o*, extending outward from its inner end. The inner end of the hub M of the valve turns on the flange *o* of the bush, which is separated from the top of the pillar by one or more steel rings or collars, *s*. The spaces T are in constant communication with the exhaust-pipes L L.

The main valve in this example of my invention has seven radial openings through it, arranged at equal distances apart. Their inner ends are shut off from spaces S, formed around the central part of the valve by means of curtains *f*, which are severally joined at top to the hub M of the valve.

The letters *c* designate radial partitions, which extend from the several curtains *f* to the hub of the valve and form seven central divisions or spaces, S, which severally communicate with exhaust-passages Q, formed in the valve and opening only on its lower side. Their positions are indicated in Fig. 6, which is an under-side view of the valve, and also in dotted outline in Fig. 7, which is a top view of the valve. These passages Q therefore have no communication with the steam-chest. The passages Q are enlarged laterally in the body of the valve, so as to form chambers therein, which extend from the walls of one steam passage or opening P, to the walls of the adjacent openings P, the extent of such chambers being indicated by the dotted outlines *g* in Fig. 7. The object of these chambers is to facilitate the exhausting of the steam from the cylinder.

The valve is surmounted by a cut-off consisting of a circular plate, H, whose hub L′ surrounds the hub M of the valve, a bush, *a*, being interposed between them. The top or cover of the steam-chest incloses the valve and cut-off, and is held in place by proper fastenings, one of which is screwed on the end of the spindle I. The cut-off H is seen in plan view, partly broken away, in Fig. 5. It has radial openings J, equal in number and similarly arranged to the steam-ports *d* in the face of the cylinder. It is free to take any required position on the valve, and is governed by a shaft, F, whose inner end, which has a screw-thread on it, works through a nut, G, which is free to turn in a fixed box, *h*, fast to the surface of the cut-off. The graduations of the cut-off are effected by the turning of the screw-shaft F, which operates to move it to and fro on the face of the valve.

E is a circular rack, fixed about the outer edge of the valve N, its teeth being in the same plane as the valve, or otherwise conveniently arranged to work with the geared wheel D of the shaft B. This shaft is directly connected with the main shaft of the engine by miter-wheels and makes the same number of turns as said shaft, and is fitted with a stuffing-box, C, where it enters the steam-chest. The number of teeth in the rack E in this example is seven times greater than the number in the gear or pinion D, so as to correspond with the number of steam-openings in the valve, whence it results that one revolution of the pinion will move the valve only one-seventh of a revolution, which is equal to the distance of the steam-openings P from each other. The course of the steam is through the openings P, into those ports *d* which are in coincidence with them at any time, and thence into the steam-passages U, each of which will, in the revolution of the valve, be alternately in coincidence with some of the valve-openings P. The steam is exhausted through the ports *d* into the spaces Q in the valve, and thence into the divisions S around the center of the valve, and thence into the open spaces T T in the face of the cylinder, whence it passes into the exhaust-pipes L L, which communicate from each side with the said spaces T.

It will be observed that owing to the construction and arrangement shown of the main valve N it can be adjusted with ease and with mathematical exactness, while the simplicity of construction of the valve and of its appurtenances bring the expense and labor and time of construction very low compared with other valve-gear. This valve embraces the principle of a slide-valve in moving in a plane parallel with its seat; but it has no reciprocations thereon, and therefore no motion is lost, as in ordinary reciprocating valves. It is moved continually around its center, causing its steam-openings to be presented opposite to the ports *d* in endless succession, producing the effect of a constant succession of single valves. The valve is supported or counterbalanced on its spindle by means of one or more loose rings or collars, *s*, of steel or other suitable material, which are placed directly behind the flange of the bush, and which rings receive the greater portion of the steam-pressure on the back of the valve, and thereby prevent the tendency to wear and cut the seat, as is common with the ordinary slide-valves, and also enable the valve to be moved with a small expenditure of power.

The cut-off H is seated on the back of the main valve, cutting either by the motion of the main valve or by an independent motion of its own in connection with the motion of the main valve and graduated at pleasure by the screw F.

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

1. In valves for steam-engines which have a constant onward movement around their center, constructing them with several steam-openings so arranged that the engine shall make a plurality of revolutions while the valve makes one, and that they communicate with two, three, or more of the ports of the cylinder simultaneously in constant succession, substantially as described.

2. In valves which have a constant motion around their center, giving to them a speed less than the speed of the engine-shaft in the proportion of the number of their steam-openings, so that one entire revolution of the engine shall move the main valve only the distance from one of its steam-openings to the next steam-opening, substantially as described.

3. Supporting or counterbalancing the main valve by means of or upon one or more rings, *s*, at the center of said valve, substantially as described.

4. The graduated cut-off valve H on the back of the main valve, so constructed and applied, substantially as shown, that the steam is cut off by the motion of the main valve.

5. The exhaust-passages Q, made and arranged in the main valve intermediate of the steam-passages, substantially as described.

6. In combination, the main valve N and the cut-off H, when constructed and arranged substantially as described.

7. The arrangement of the steam and exhaust ports U and L in combination with the main valve N, substantially as shown.

ETHAN ROGERS.

Witnesses:
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WM. F. MCNAMARA.