

No. 859,338.

PATENTED JULY 9, 1907.

F. SAMUELSON.
EMERGENCY GOVERNOR.
APPLICATION FILED JAN. 17, 1905.

2 SHEETS—SHEET 1.

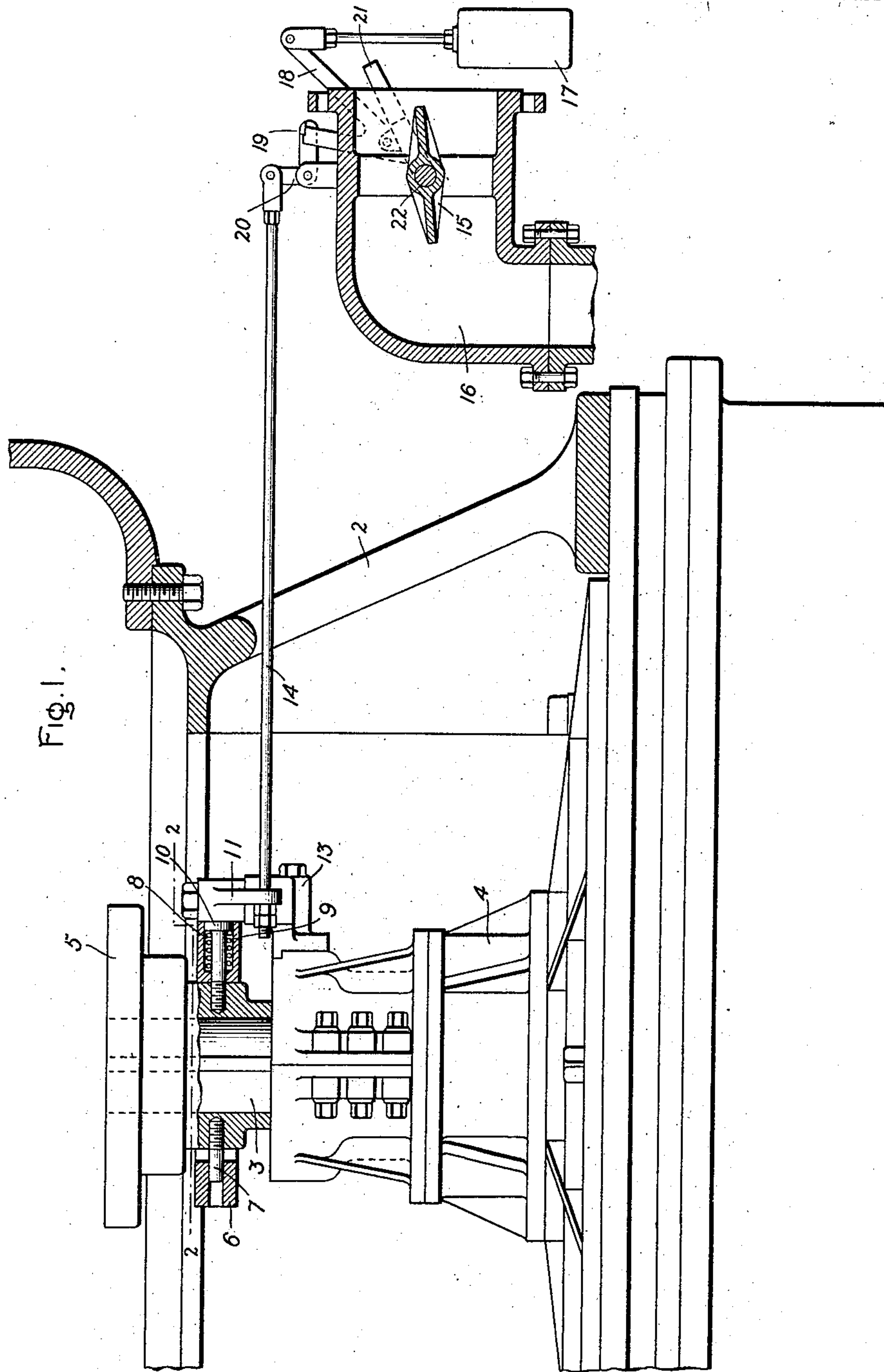


Fig. 1.

Witnesses.

Nancy M. Tilden
Ellen Oxford

Inventor.

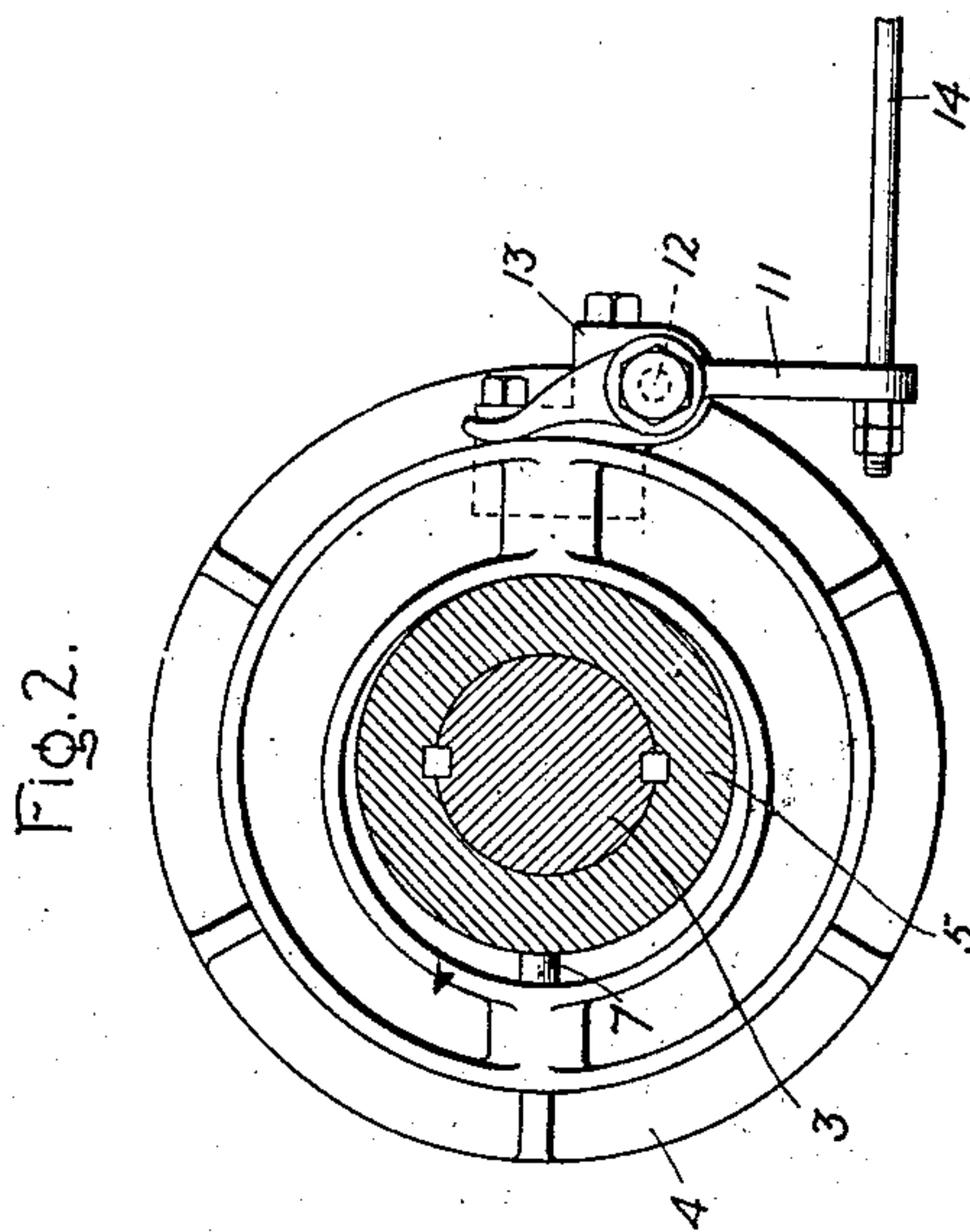
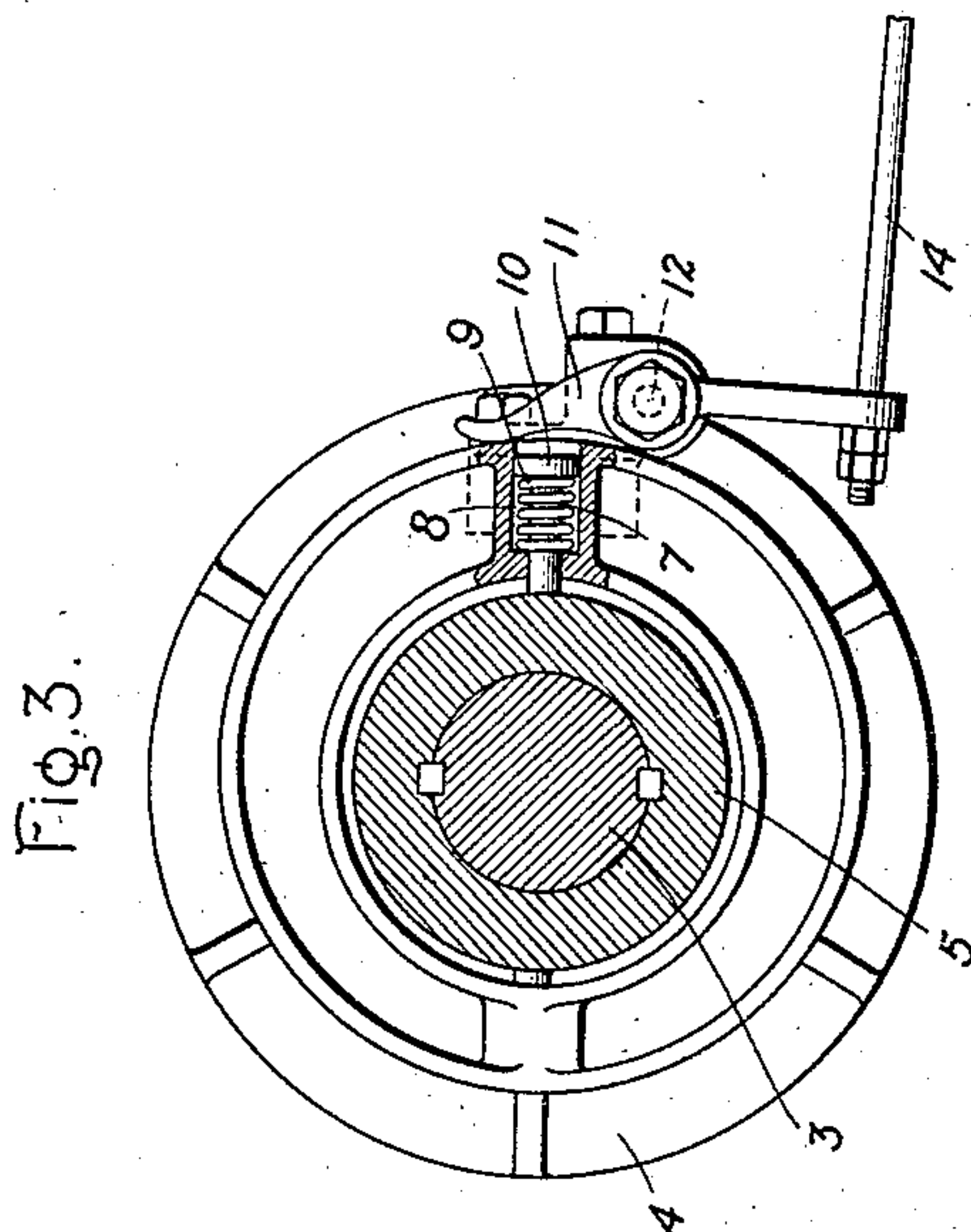
Frederick Samuelson.
by *Albert S. Davis*
Att'y.

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2 SHEETS—SHEET 2.



Witnesses.

Harry M. Tilden
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UNITED STATES PATENT OFFICE.

FREDERICK SAMUELSON, OF RUGBY, ENGLAND, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

EMERGENCY-GOVERNOR.

No. 859,338.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed January 17, 1905. Serial No. 241,461.

To all whom it may concern:

Be it known that I, FREDERICK SAMUELSON, a subject of the King of Sweden, residing at Rugby, England, have invented certain new and useful Improvements in Emergency-Governors, of which the following is a specification.

My invention relates to emergency governing devices for steam turbines, electrical or other machines of the type in which a centrifugally-operating governing device is employed to effect the release of an automatically-acting valve, an electrical circuit-breaker, or other controlling mechanism, so that the power supplied to the machine in the case of a prime mover, or current delivered from the machine in the case of an electric generator, is automatically cut off when the speed becomes excessive.

The object of my invention is to provide a centrifugally-operated governing device of improved construction which shall operate more smoothly upon the valve releasing or controlling mechanism than apparatus usually employed.

In carrying out my invention I provide a centrifugally-acting weight, such as a ring, which surrounds the rotating shaft of the machine or a shaft driven thereby and while positively rotated by the shaft is free to move in a plane transverse to the axis of rotation. The mass of the weight or centrifugally-acting element is unequally distributed with respect to the axis of rotation and is normally held in position by a yielding member or spring which is overpowered when the centrifugal force exceeds a certain amount. In its normal position the periphery of the weight is preferably but not necessarily concentric with the axis of the shaft but in its operative or abnormal position it is eccentric. Co-operating with a suitable portion of the weight is any suitable regulating mechanism which is operated when the weight assumes an abnormal position.

In the accompanying drawings which illustrate one embodiment of the invention, Figure 1 is an elevation, with portions in section, of an elastic-fluid turbine of the vertical type with my invention applied thereto; Fig. 2 is a transverse section on line 2-2, Fig. 1, showing the centrifugally-acting weight in its normal or inoperative position; and Fig. 3 is a similar section showing the said centrifugal weight in its operative position.

Referring to the drawings, 1 represents a casing of a turbine of any desired construction, which turbine may be of the horizontal or vertical type. The casing contains the usual buckets and fluid-discharging devices.

2 is a stool for supporting a dynamo-electric machine of any suitable character (not shown).

3 is the main shaft and 4 a guide bearing between

the turbine casing 1 and the superposed dynamo-electric machine. Above the guide bearing and keyed to the shaft is one member or sleeve 5 of a coupling to which the centrifugally-acting weight 6 is preferably, although not necessarily, attached so as to rotate therewith. The weight is preferably a ring having a smooth circular periphery and surrounds the hub of the sleeve 5. The ring is supported in a horizontal position, or in a position transverse to the axis of the shaft, and is preferably supported on two radially-disposed diametrically-opposite guide pins 7 on which it is capable of sliding. As shown in Figs. 2 and 3, the mass of the ring is unequally distributed about its geometrical center. In the heavier side of the ring is provided a radially-disposed opening 8 into which one of the pins extend, and in the opening is arranged a spiral compression spring 9 that tends to oppose the centrifugal action of the weight. The outer end of the pin that holds the spring is provided with a head 10 or its equivalent which forms one abutment for the spring, the wall located at the inner end of the opening 8 forming the other abutment. The spring is supported by the pin so that there is a clearance between its periphery and the cylindrical wall of the opening. By supporting the spring on the pin instead of supporting it on the weight, the balancing of the parts is facilitated. The spring is normally under compression and is of sufficient strength to maintain the weight in the position indicated in Fig. 2 with its inner surface against the sleeve 5, for all speeds below the critical. When the angular velocity of the turbine shaft reaches the critical speed the weight is moved transversely against the increasing tension of the spring to the operative position shown in Fig. 3. This transverse movement is utilized to operate any suitable regulating or governing mechanism which, in the present instance, is an emergency valve for shutting off the supply of elastic fluid to the turbine.

The governing mechanism comprises a lever 11 which is fulcrumed on a vertical pivot 12 supported on the bracket 13 which is bolted or otherwise secured to the guide bearing 4 of the turbine shaft. Through a link 14 the lever 11 is adapted to actuate a shut-off valve 15, Fig. 1, which may be of the butterfly or other type, the said valve being located in a supply conduit 16 which delivers motive fluid to the nozzles. Any suitable quick acting mechanism may be employed for closing the valve 15 when the emergency governor is called into play. I have shown in this connection a motor, such as a weight 17 carried on a release lever 18 which is held in set position by interlocking latches 19 located on the lever 18 and bell-crank lever 20. The bell-crank lever is attached to the rod 14. With this arrangement when the rod 14 is moved by the action of the governing weight the

latches 19 are released, thereby permitting the weight 17 to fall and strike the arm 21, secured to the spindle 22 of the butterfly, a hammer blow, which causes the valve to close.

5 It will be obvious that while I have described this invention as applied to an elastic-fluid turbine it is equally applicable to any other high speed apparatus such as engines, dynamos, motors and the like. It will also be obvious that instead of being attached
10 to the main driving shaft of a machine it might equally well be attached to a countershaft driven at a speed proportional to that of the main shaft.

In accordance with the provisions of the patent statutes, I have described the principles of operation
15 of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by equivalent means.

20 What I claim as new and desire to secure by Letters Patent of the United States, is,

1. In an emergency governor of the character described, the combination of a rotating shaft, a single centrifugally-acting weight positively driven by the shaft and arranged
25 to move bodily in one plane, and a regulating mechanism operated by said weight.

2. In an emergency governor of the character described, the combination of a rotating shaft, a centrifugally-acting weight which surrounds the shaft and is positively
30 driven thereby, means for opposing the action of the weight, and a mechanism arranged adjacent the path of the weight which is operated by the latter when it acts centrifugally for shutting off the supply power to or from the machine.

3. In a governor, the combination of a rotating shaft, a centrifugally-acting weight, means carried by the shaft
35 on which the weight is slidably mounted to move in a plane transverse to the axis of rotation, means for opposing the action of the weight, and a mechanism operated by the weight.

4. In a governor, the combination of a rotating shaft, a centrifugally-acting weight which surrounds the shaft, means for supporting the weight on the shaft and permit-
40 ting it to move in a plane at right angles to the latter, means located between the shaft and the weight for opposing the movement of the latter, and a mechanism operated by the weight.

5. In a governor, the combination of a rotating shaft, a centrifugally-acting weight which surrounds the shaft,
50 radially-extending supporting means on the shaft for the weight and on which the latter is free to move, means for opposing the action of the weight, and a mechanism operated by the weight.

6. In a governor, the combination of a rotating shaft, an annular centrifugally-acting member surrounding the
55 shaft, radially-extending and diametrically-opposed pro-

jections on the shaft, which support the said member, means for opposing the action of the member and a regulating mechanism operated by the member.

7. In a governor, the combination of a rotating shaft, 60 a centrifugally-acting member on the shaft, diametrically-disposed projections on the shaft for supporting the member, means arranged on one of the projections and disposed within the periphery of the member for opposing the cen-
65 trifugal action of the latter, and a means actuated by the said member.

8. In a governor, the combination of a rotating shaft, an unequally weighted ring, projections on the shaft which
70 movably support the ring, an abutment arranged on one of the projections which is disposed within the periphery of the ring, a spring on the said projection between the abutment and the ring which opposes the centrifugal action of the latter, and a means adapted to be actuated by the ring which engages the periphery thereof.

9. In a governing mechanism of the character described, the combination of a shaft, a radially-moving weight
75 driven by the shaft, a guide which directs the radial movements of the weight, a means opposing the movements of the weight, and a controller actuated by the weight.

10. In a governor, the combination of a rotating shaft, 80 a ring surrounding the shaft and rotating therewith, the axis of the ring being offset from the axis of the shaft so that it will tend to move under centrifugal action, means for supporting the ring which permits it to move in a plane transverse to the axis of the shaft, and a regulating
85 mechanism adapted to be actuated by the ring.

11. In a governor, the combination of a shaft, a cen-
90 trifugally-acting ring having a smooth periphery, and a regulating mechanism adapted to engage with the periphery of the ring so as to be actuated thereby.

12. In a governor, the combination of a shaft, a cen-
95 trifugally-acting ring having a smooth periphery and of minimum and maximum cross-section at diametrically opposite points, and a regulating mechanism adapted to engage with the periphery of the ring so as to be actuated thereby.

13. In a governor, the combination of a rotating shaft, an element rotating with the shaft whose mass is un-
100 equally distributed with respect to the axis of rotation, means connecting the element with the shaft which permits it to move under centrifugal action in a plane transverse to the axis of rotation, a device which opposes the movement of the element, and a regulating mechanism arranged to be actuated by said element when the speed of rotation exceeds a certain limit.

14. In a governor, the combination of a rotating shaft, a centrifugally-acting member, projections on the shaft
105 which movably supports the member, a spring mounted on one of the projections which opposes the centrifugal action of the member, and regulating means actuated by the said member.

In witness whereof, I have hereunto set my hand this second day of January, 1905.

FREDERICK SAMUELSON.

Witnesses:

ERNEST PARKER,
ETHEL M. WEBB.