

No. 885,100.

PATENTED APR. 21, 1908.

J. STEWART.

FIRE GRATE.

APPLICATION FILED JULY 2, 1907.

2 SHEETS—SHEET 1.

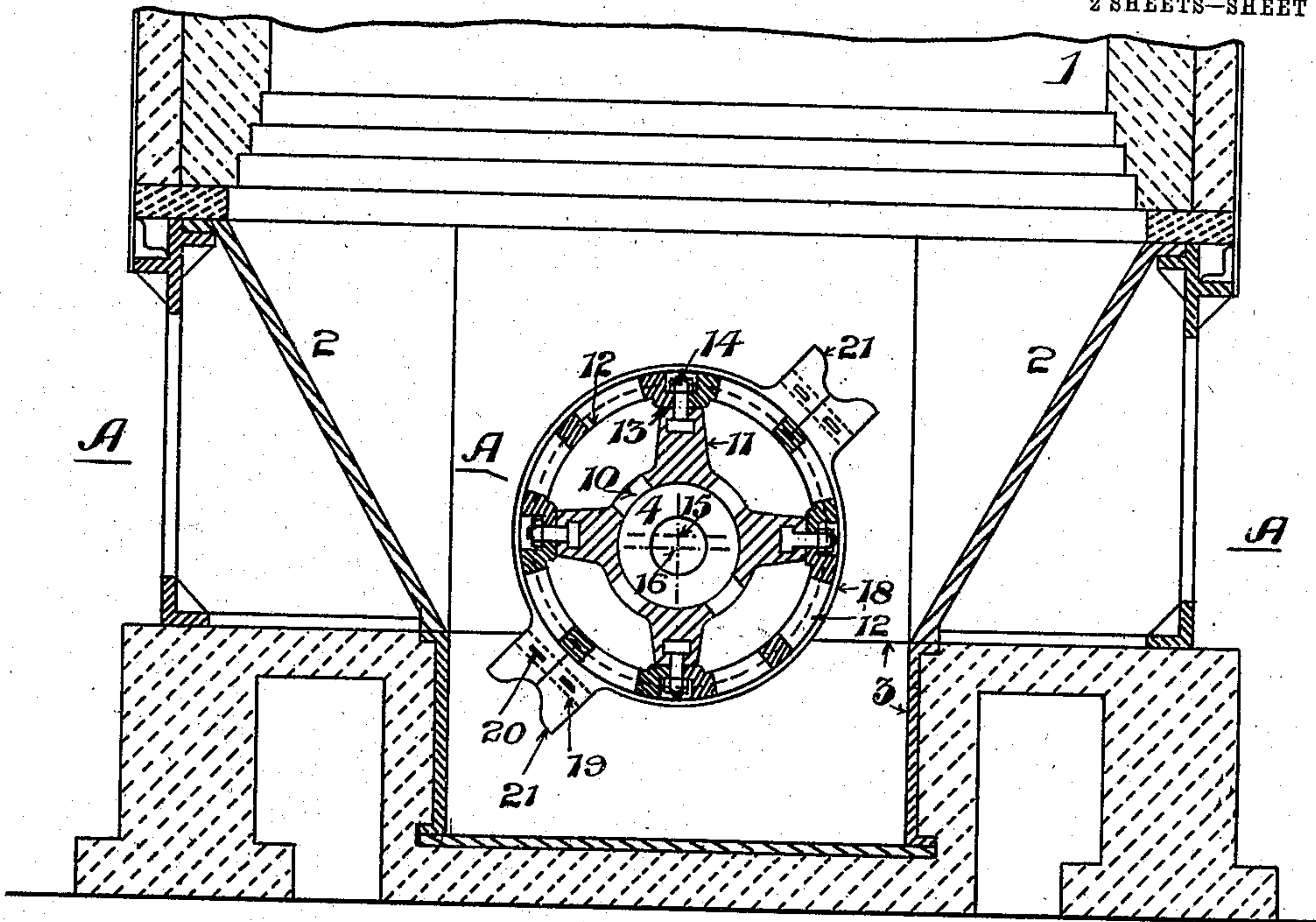


Fig 1

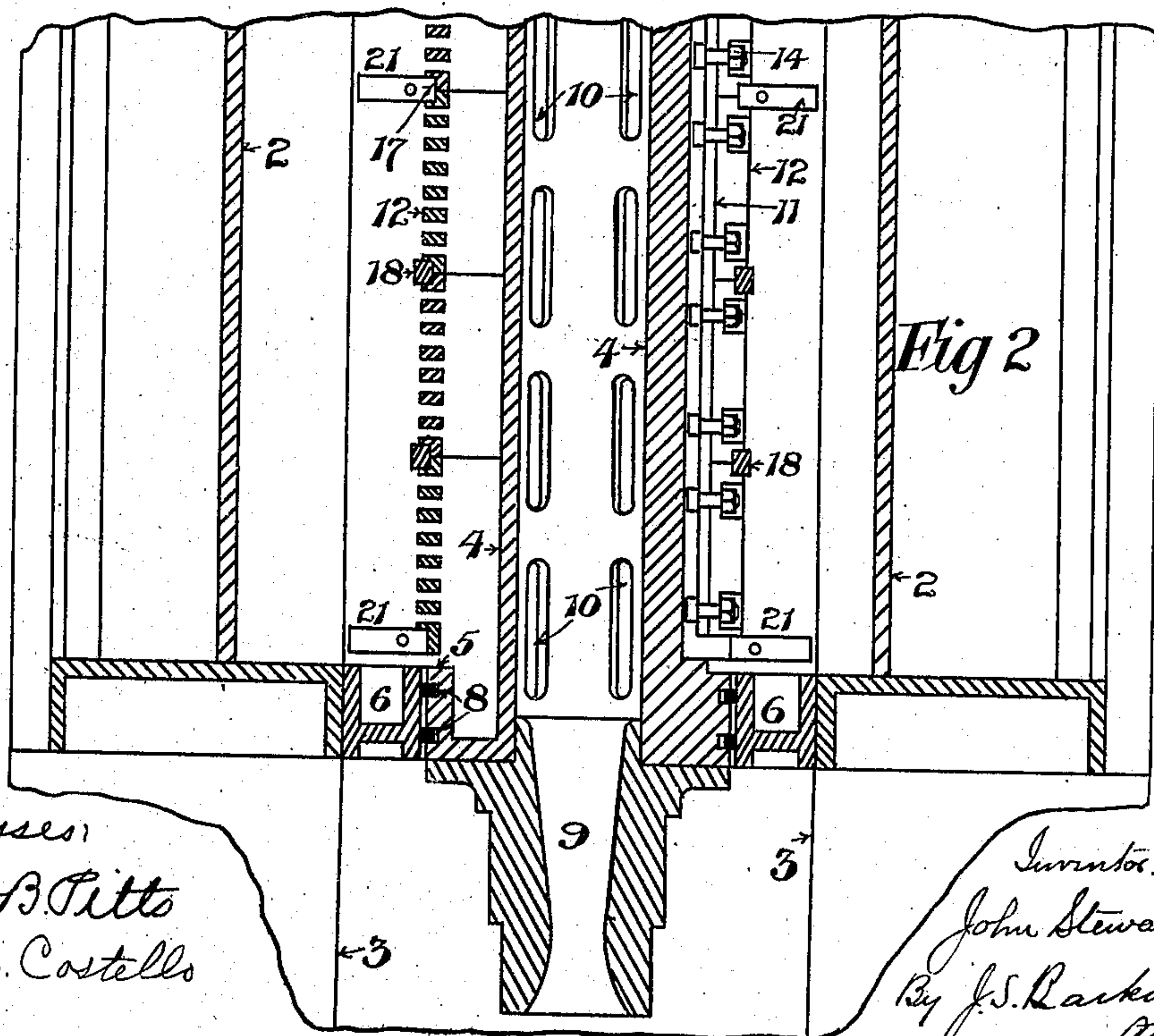


Fig 2

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N. E. Costello

Inventor:  
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By J. S. Barker  
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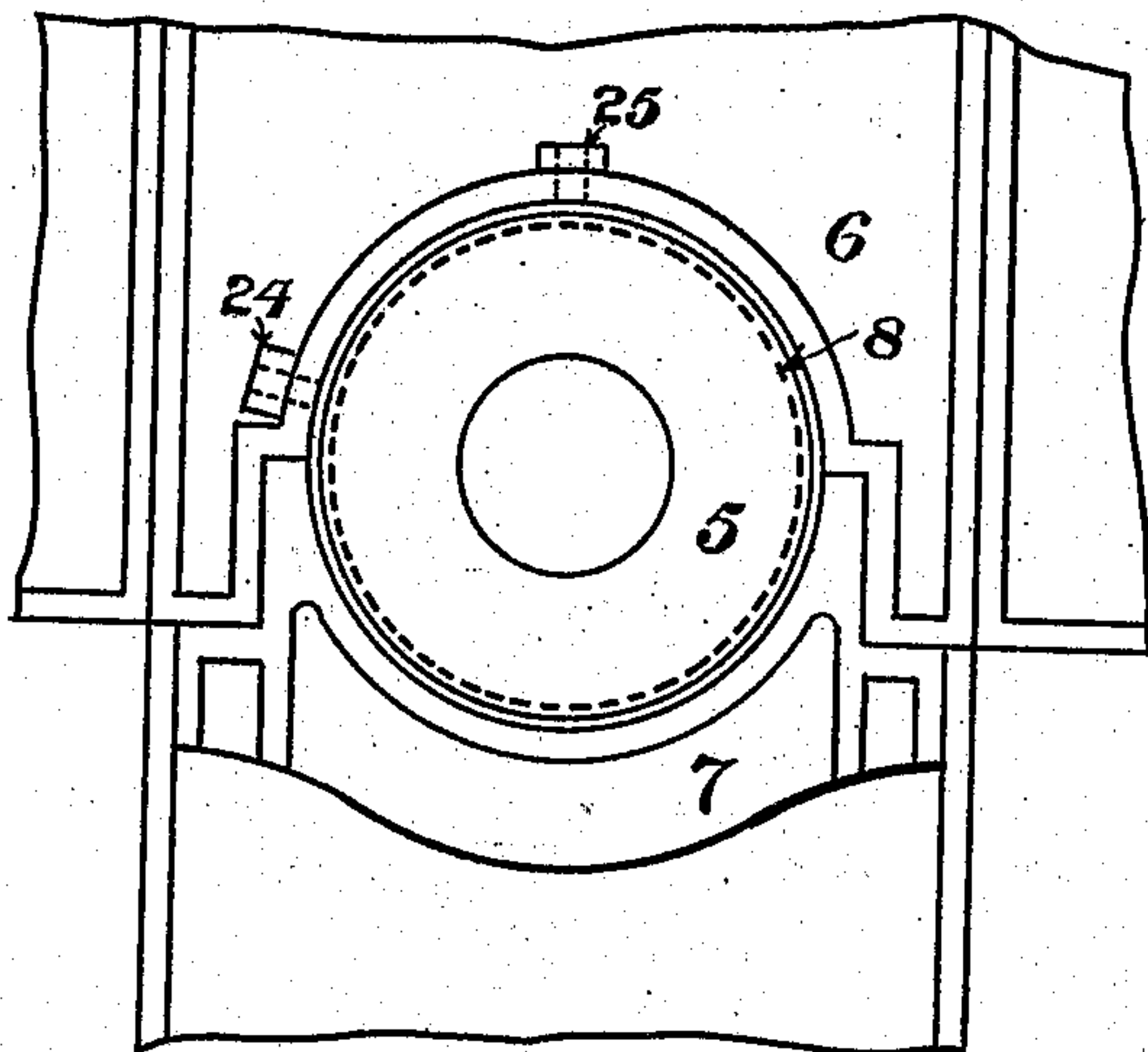


Fig 3

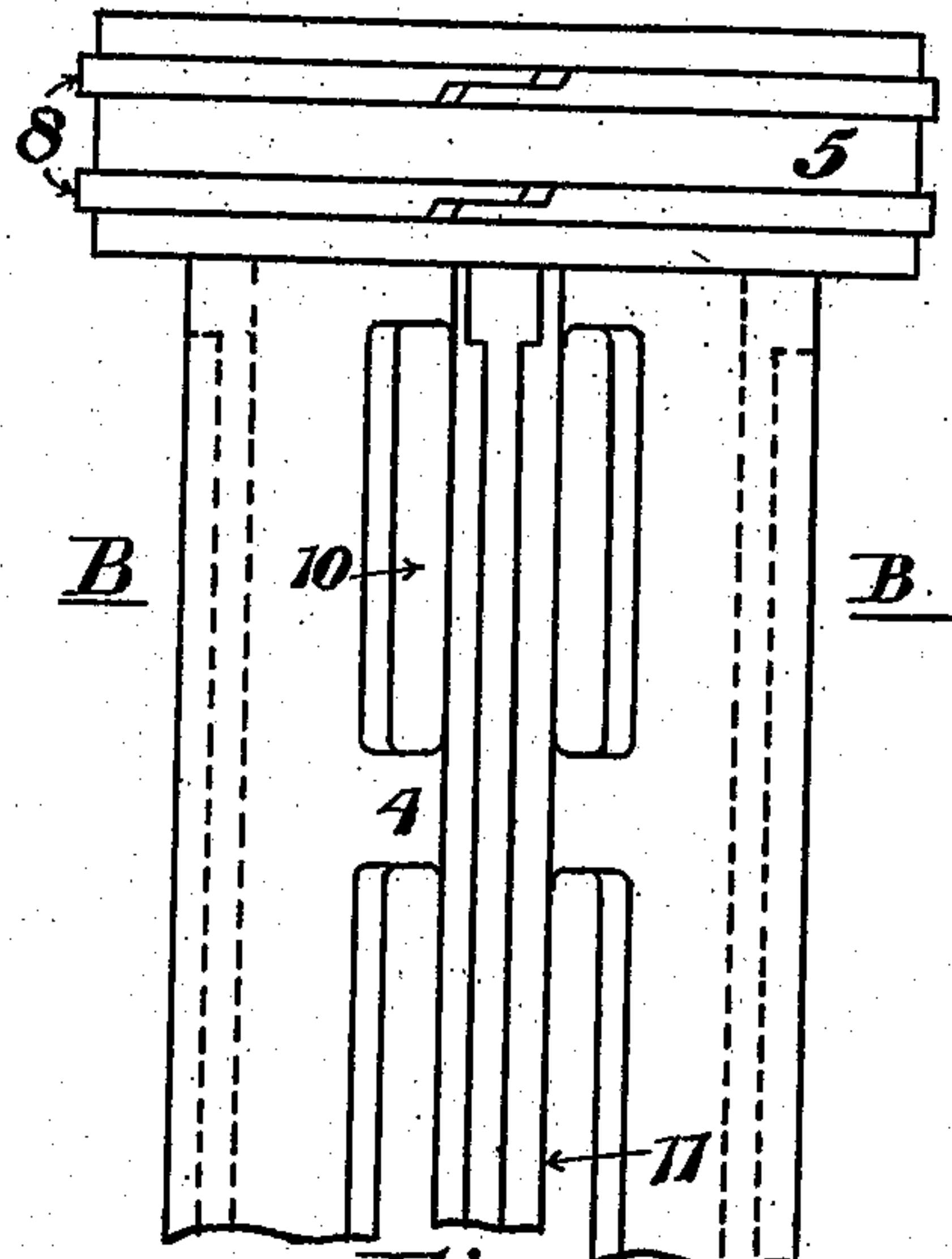


Fig 4

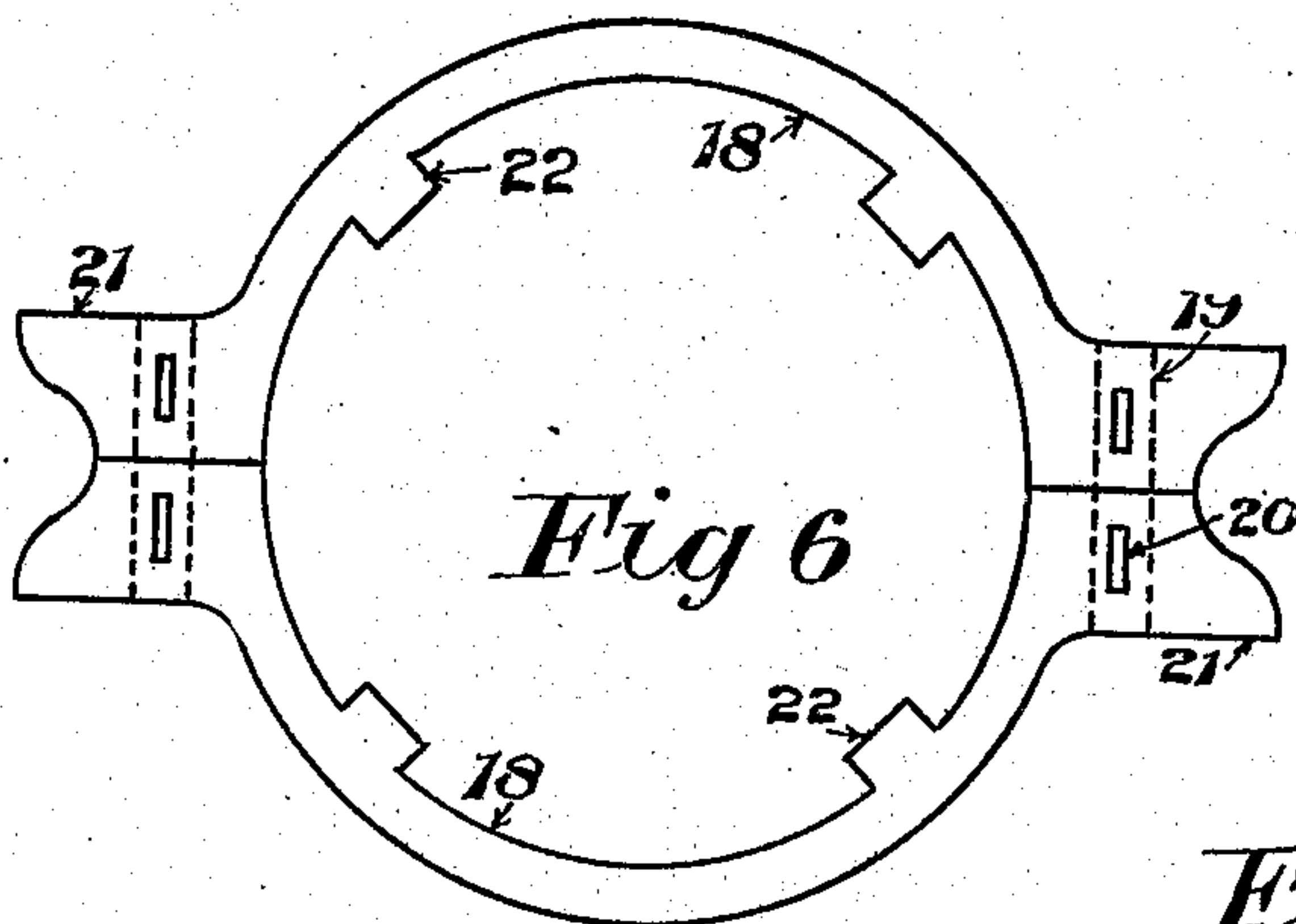


Fig 5

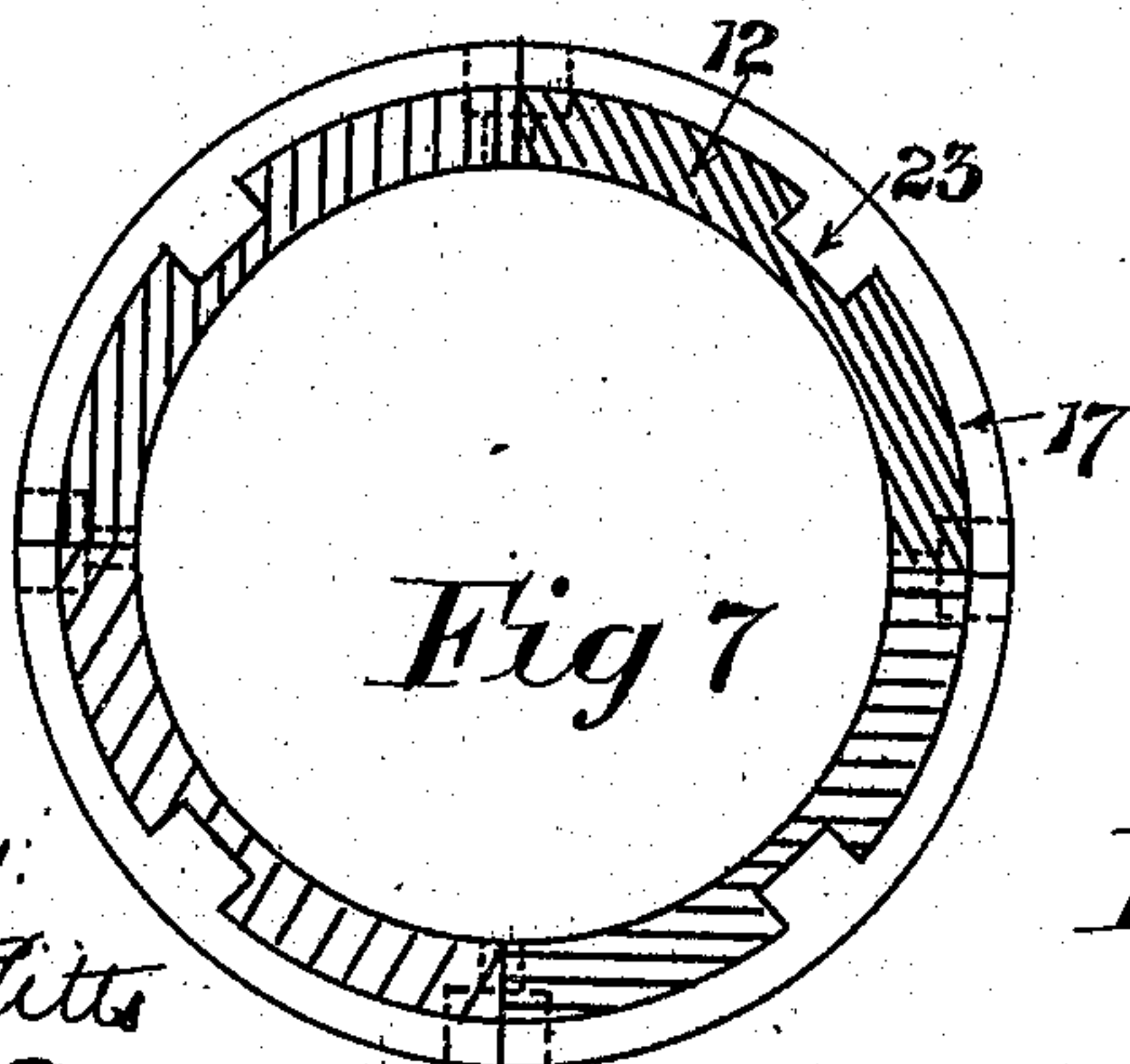
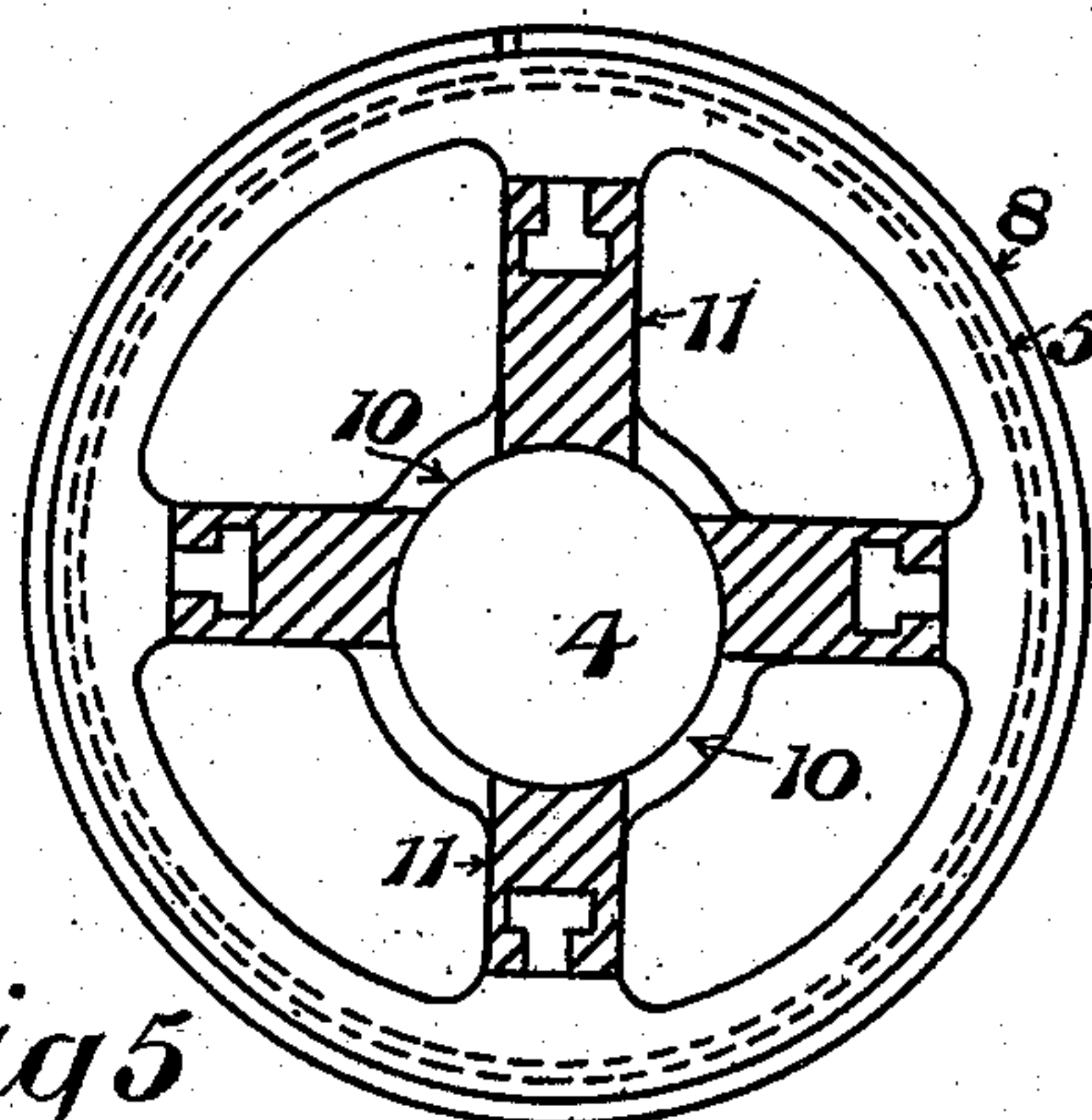
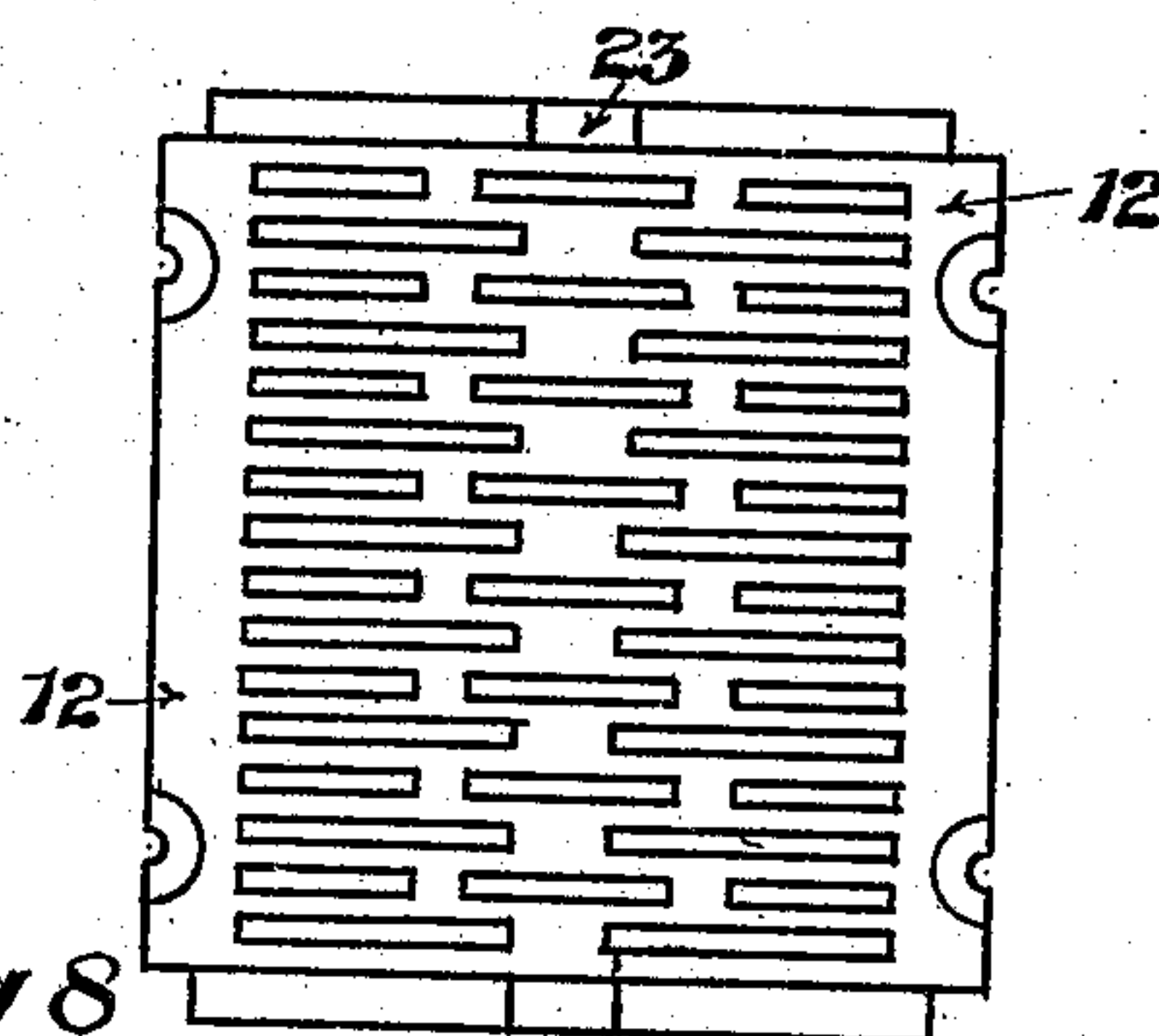


Fig 8



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# UNITED STATES PATENT OFFICE.

JOHN STEWART, OF CODNOR PARK, ENGLAND.

## FIRE-GRATE.

No. 885,100.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed July 2, 1907. Serial No. 381,941.

*To all whom it may concern:*

Be it known that I, JOHN STEWART, a subject of the King of Great Britain, and resident of Codnor Park, in the county of Derby, England, have invented new and useful Improvements in Fire-Grates, of which the following is a specification.

This invention relates to improvements in fire grates applicable to gas producers or generators of the water bottom type, and has for its object the construction of a revolving fire grate by which the clinker which forms near the grate is broken up and removed from the producer; also, the provision of means by which a gas tight joint is formed between the revolving fire grate and the framework of the producer, and means by which the grate and the gas tight joint are prevented from being destroyed by the heat of the producer.

In the drawings which are attached to this specification, Figure 1. is a transverse sectional elevation of the lower part of a water bottom producer showing the application of the improved fire grate. Fig. 2. is a part sectional plan on the line A. A. Fig. 1. Fig. 3. is an outside end elevation of the fire grate and producer framework surrounding it, the fire-grate trunnion being removed. Fig. 4. is a part plan of the inner drum of the fire grate. Fig. 5. is a sectional elevation on the line B. B Fig. 4. Fig. 6. is an elevation of the claw rings which surround the fire grate. Fig. 7. is a section of a set of fire grids showing the groove and recesses for a claw ring and Fig. 8. is a development of a fire grate grid.

The producer 1 is lined with fire brick and the lower portion is provided with inclined sides 2 which rest on the upper edges of a parallel water tank or bosh 3, and this tank extends at both ends beyond the producer, and is kept full of water, all these parts being constructed and arranged in substantially the usual manner.

According to the present invention the fire grate is carried by an inner drum 4 which extends the full width of the producer and at each end is provided with an enlarged circular portion 5 which is surrounded by a part 6 of the end framing of the producer, and a cap 7 attached to such framing. The enlarged end 5 is grooved to receive two spilt metal spring rings 8 which fit the inside of the hole formed by the casing 6 and cap 7 and form a gas tight joint, which prevents the gases escaping from the inside of the producer and

at the same time allows a limited end movement of the drum and parts carried by it. Outside the producer, each end 5 of the inner drum is fitted with a hollow trunnion 9 from which the fire grate may be supported and rotated.

The inner drum 4 is provided with a number of openings 10, and on its outer surface there are a number of longitudinal ribs 11 which extend from end to end of the drum. There are preferably four ribs 11 extending radially from a point 15 (see Fig. 1) that is eccentric to the drum 4 and to its axis of rotation. By this construction it will be seen that the grid surface, secured to the free edges of the ribs, is mounted eccentric to the axis of rotation of the drum.

The fire grate is built up of a number of curved grids 12 which are provided with holes or slots and are made with square feet or faces 13 which rest upon the outer ends or free edges of the ribs 11. Each of the ribs has a tee slot, for tee ended bolts 14 by which the grids are connected to the ribs 11 and the edges of the adjacent grids meet at the center of the ribs, whereby a continuously curved grate is formed, the particular shape of which depends upon the variation in the radii of the ribs and the curve of the grids attached thereto. In the drawings, a circular grate is shown the surface of which is eccentric with regard to the drum 4 and is a circle described from the center 15, and rotates round the center 16 which is the center of the bearing carrying the inner drum. The longitudinal ends of each grid are of a reduced size and the reduced ends of two adjacent circumferential sets of grids form a groove 17 for the reception of bands 18. These bands are made in halves which are connected together by pins 19 and cotters 20 and on the bands there are claw projections 21 which may be arranged in any order round the grate. On the inside of the bands there are lugs 22 which fit corresponding recesses 23 formed at the bottom of the grooves 17 and by which the claw bands are compelled to rotate with the fire grate, while the bands assist in holding together the sections of which the grate is built up.

For keeping cool the ends 5 of the drum 4 and also the jointing spring rings 8, the framework 6 surrounding such ends of the drum is provided with an inlet 24 and outlet 25 for a water supply, which flows round the ends 5 between the rings 8, while the fire



grate and claws are cooled as they rotate through the water in the tank 3.

In a water bottom type of gas producer fitted with a fire grate of the kind herein described, the grate is continuously rotated at a speed suitable to the particular class of fuel used. The necessary air, or air and steam for the producer are forced or drawn through the trunnions 9 into the inside of the drum 4 from which they pass into the producer through the drum openings 10 and the holes or slots in the fire grate grids, and the generation of the gas then proceed in the usual manner. The continued rotation of the grate and the action of the claws prevents the formation of any large masses of clinker because the fuel is kept in a continual state of movement, particularly the fuel in the lower portion of the producer, while any clinker that is formed is broken up by the claws 21 and by such claws is drawn into the water tank from which the clinker and ashes are removed by any usual means.

By means of this invention the fire adjacent to the grate is kept clear of clinker and a more rapid combustion of the fuel is rendered possible, and at the same time the cost of renewals is reduced and the length of time the producer can remain in action is increased.

What I claim is:

1. In a furnace, the combination of the revolving drum, and a series of curved grids surrounding the revolving drum and means between the drum and grids for supporting the latter, the said grids being arranged eccentric to the axis of rotation of the drum.

2. In a furnace, the combination of a revolving drum, a series of curved grids surrounding the drum, and a plurality of ribs extending outward from the drum arranged to support the grids at their free ends, the ribs being of unequal length, whereby the grids are supported eccentrically to the axis of rotation of the drum.

3. In a furnace, the combination of a revolving drum, a series of longitudinal ribs on its outer surface, the said ribs extending outward on lines radiating from an axis eccentric to the axis of rotation of the drum and parallel therewith, and curved grids supported by the free ends of the ribs.

4. In a furnace, the combination of a revolving drum, curved grids surrounding the drum, a series of ribs between the drum and the grids arranged to support the latter eccentrically to the axis of rotation of the

drum, and bands provided with claws, surrounding the grids.

5. In a furnace, the combination of a revolving drum, curved grids surrounding the drum, a series of ribs between the drum and the grids arranged to support the latter eccentrically to the axis of rotation of the drum, and means between the adjoining ends of the grids for securing them to the edges of the ribs.

6. The combination with a supporting frame-work, of a hollow drum provided with ends to form bearings on which the drum rotates, hollow trunnions secured to the ends of the drum, ribs arranged longitudinally of the drum and extending outward therefrom, and curved grids constituting a grate surface secured to the free ends of the ribs.

7. In a furnace, the combination with a frame, of a rotatable drum provided with ends, trunnions secured to the said ends, ribs arranged longitudinally of the drum and extending outward therefrom, a series of curved plates secured to the free ends of the ribs, and liquid tight joints between the ends of the drum and the frame.

8. In a furnace, the combination of an inner fire grate drum provided with holes, ribs extending outward from the surface of the drum, curved grids attached to said ribs, and bands carrying claws surrounding the grids, substantially as set forth.

9. In a furnace, the combination of an inner drum in which is formed holes or air passages, ribs on the drum the outer faces of which are eccentric to the axis of rotation of the drum, circular grids formed in sections and attached to the ribs, the grids having grooves formed in their surfaces, and bands fitting the said grooves, carrying claws, substantially as set forth.

10. In a furnace, the combination with the furnace casing, of a rotatable drum provided with ends constituting bearings, circumferential rings between the said ends and the casing to form liquid tight joints, the said rings being spaced apart to form a conduit between them, and the said casing being provided with inlet and discharge openings communicating with the conduit between the rings.

JOHN STEWART.

Witnesses:

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JOHN ARCHER.