

No. 688,204.

Patented Dec. 3, 1901.

E. SHAW.

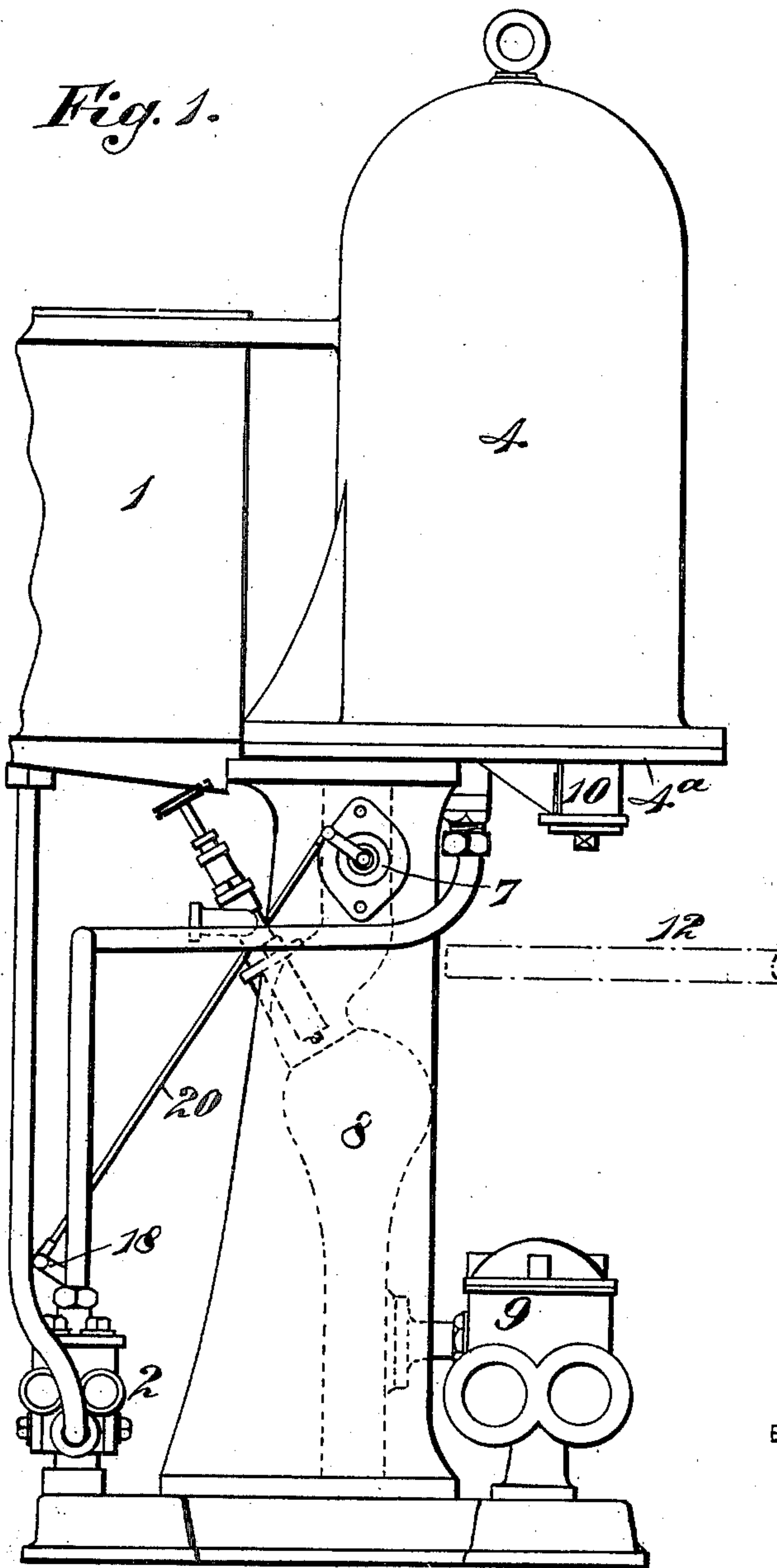
APPARATUS FOR CONCENTRATING LIQUIDS.

(Application filed Oct. 1, 1898.)

(No Model.)

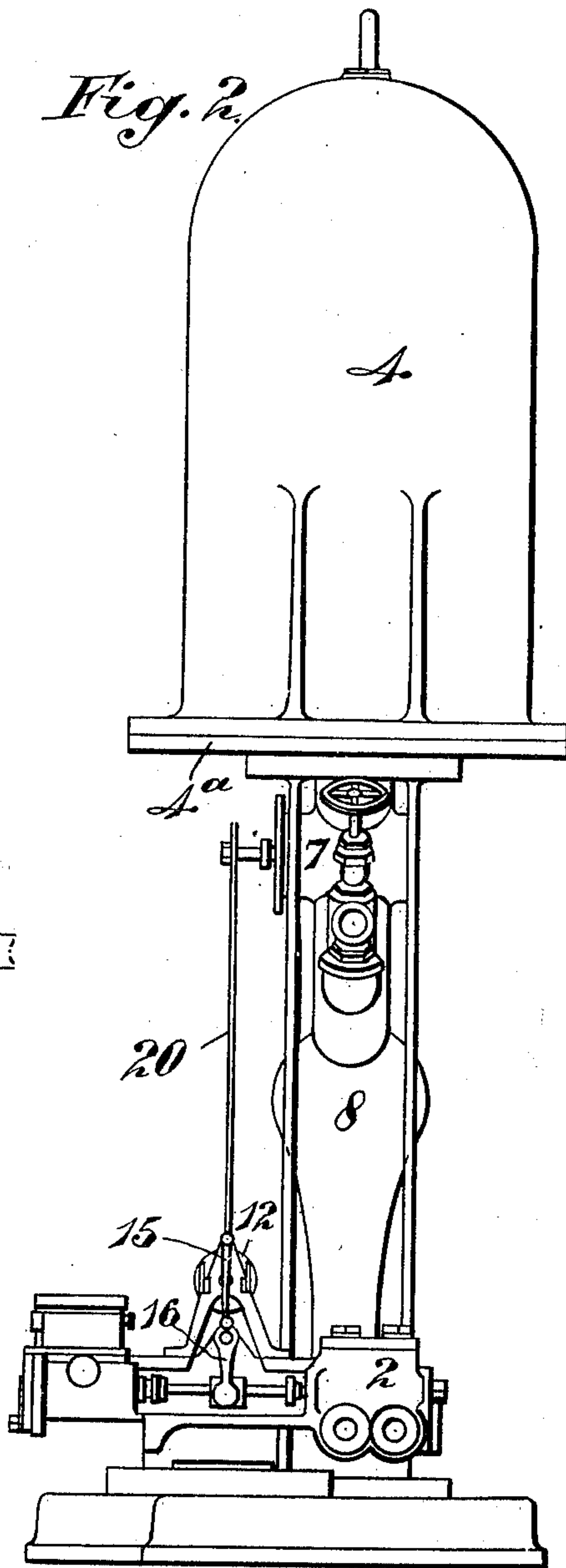
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Fig. 1.



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Fig. 2.



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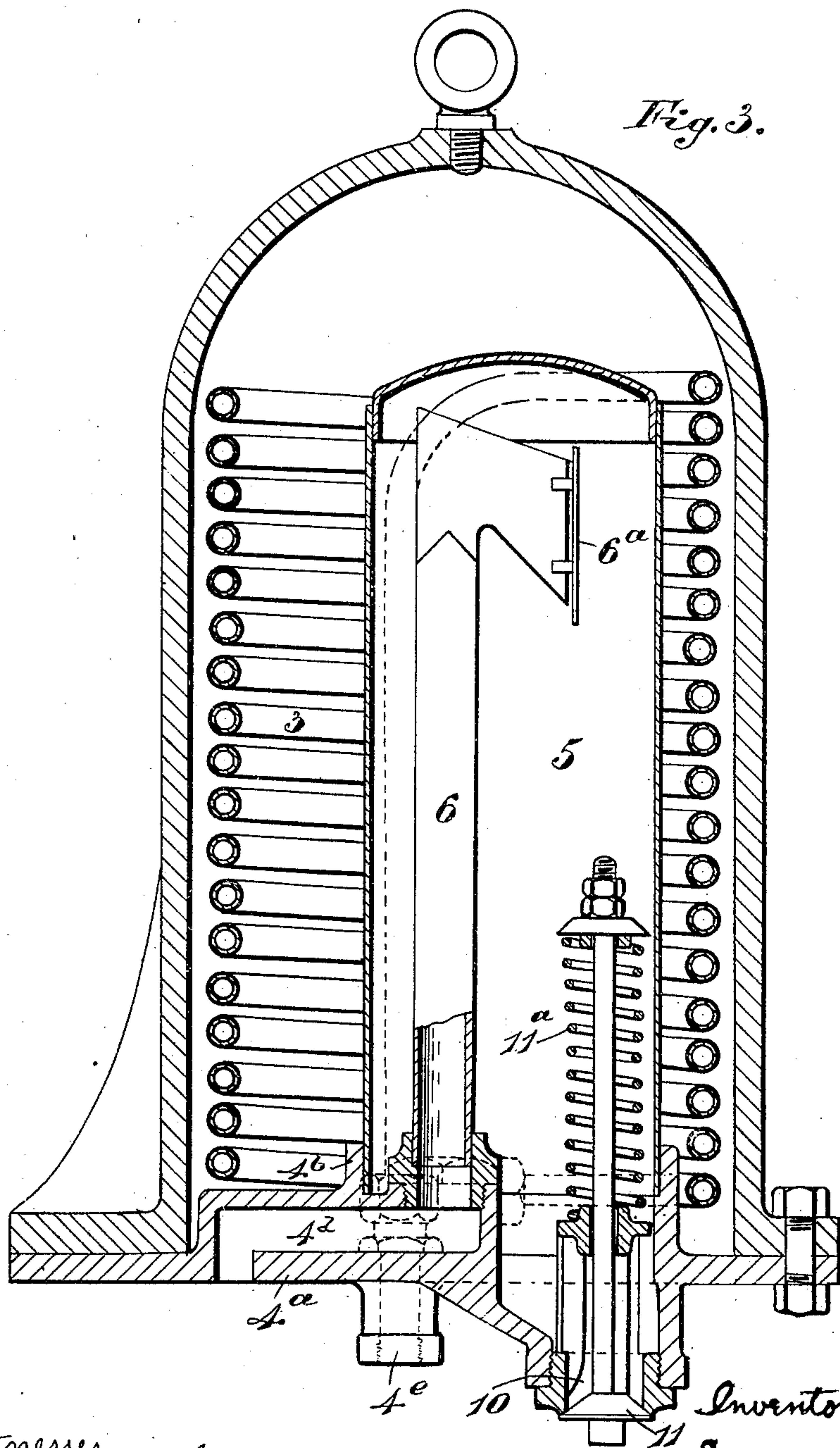
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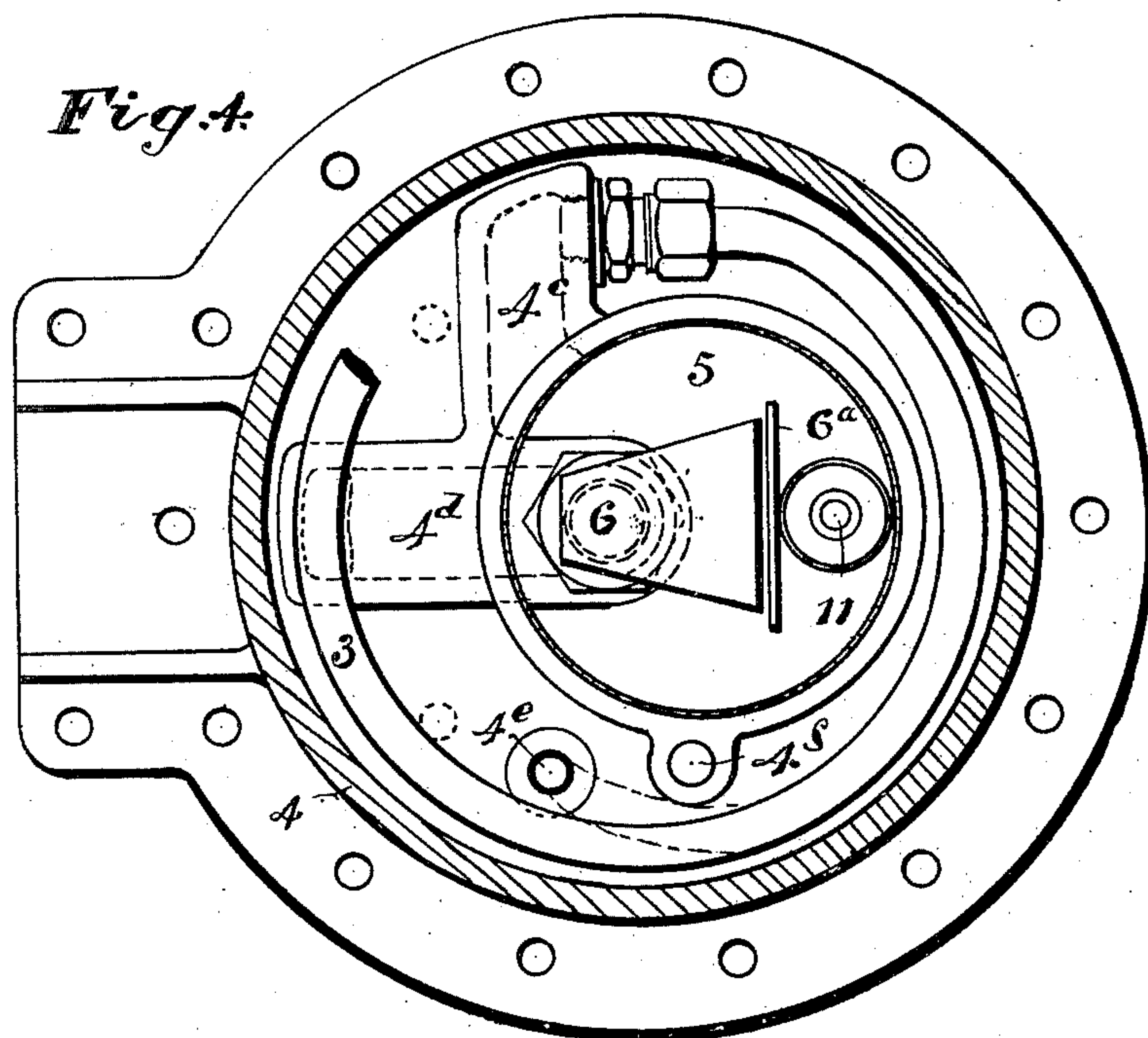
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Fig. 8.

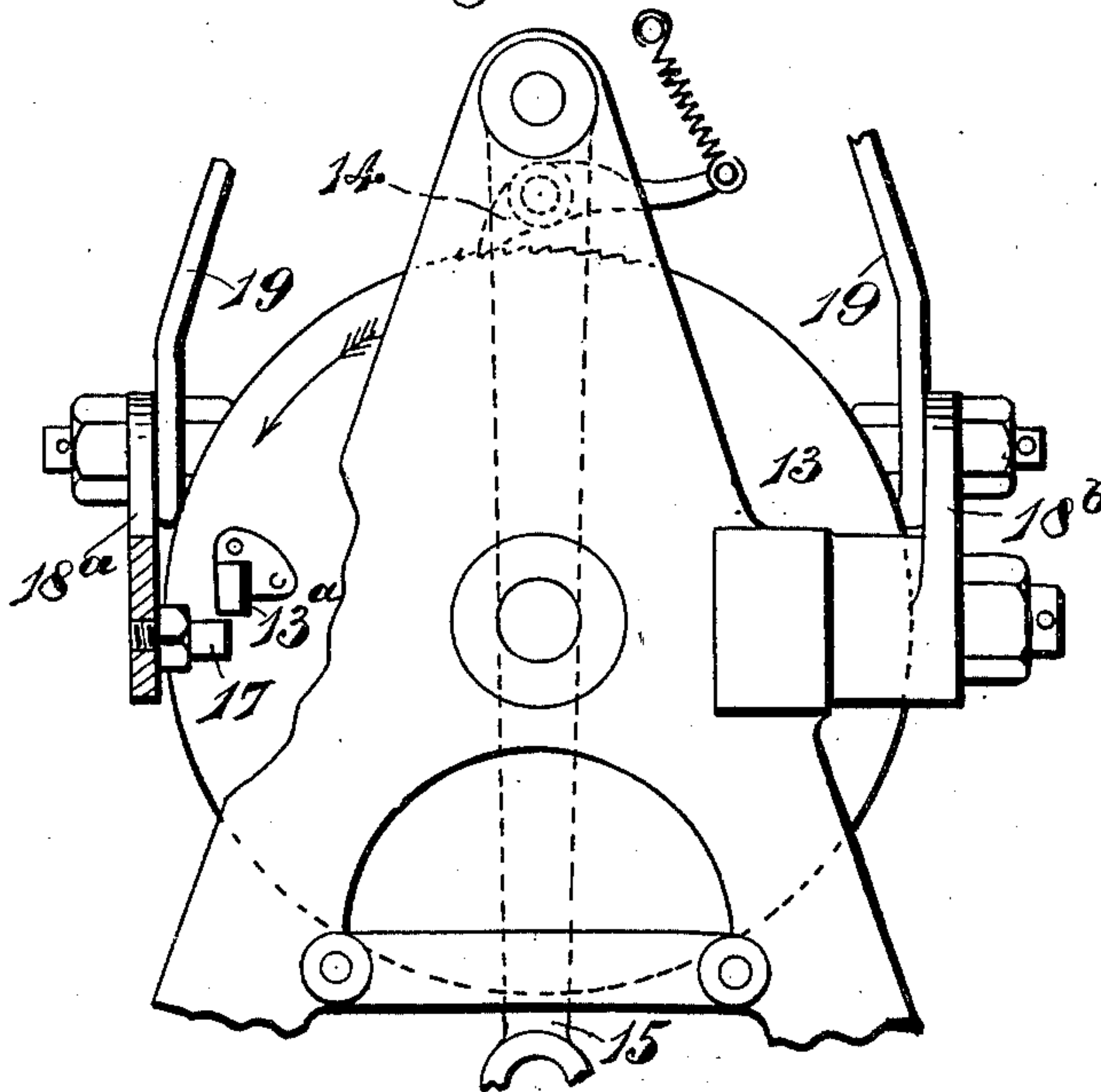
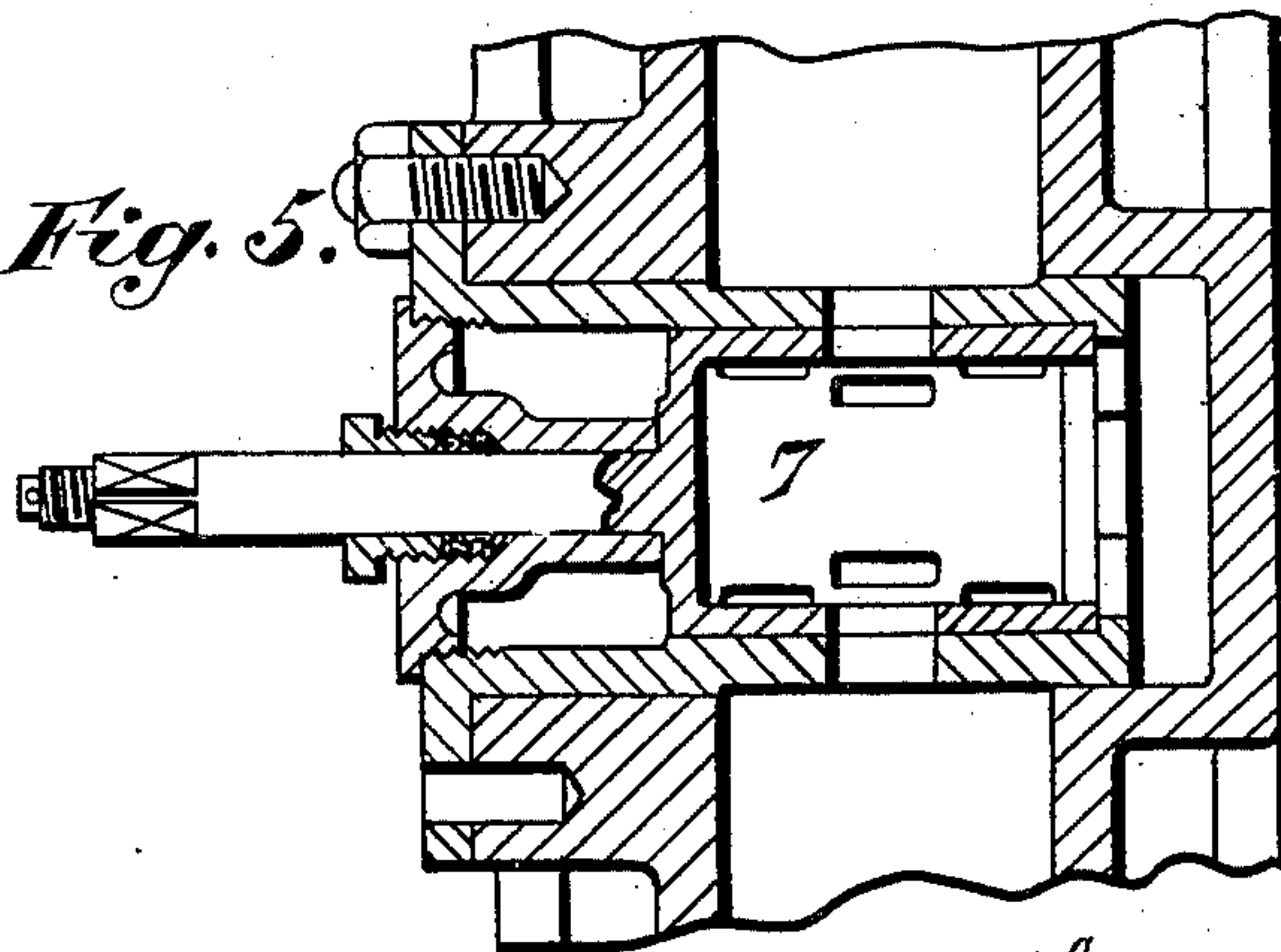


Fig. 5.



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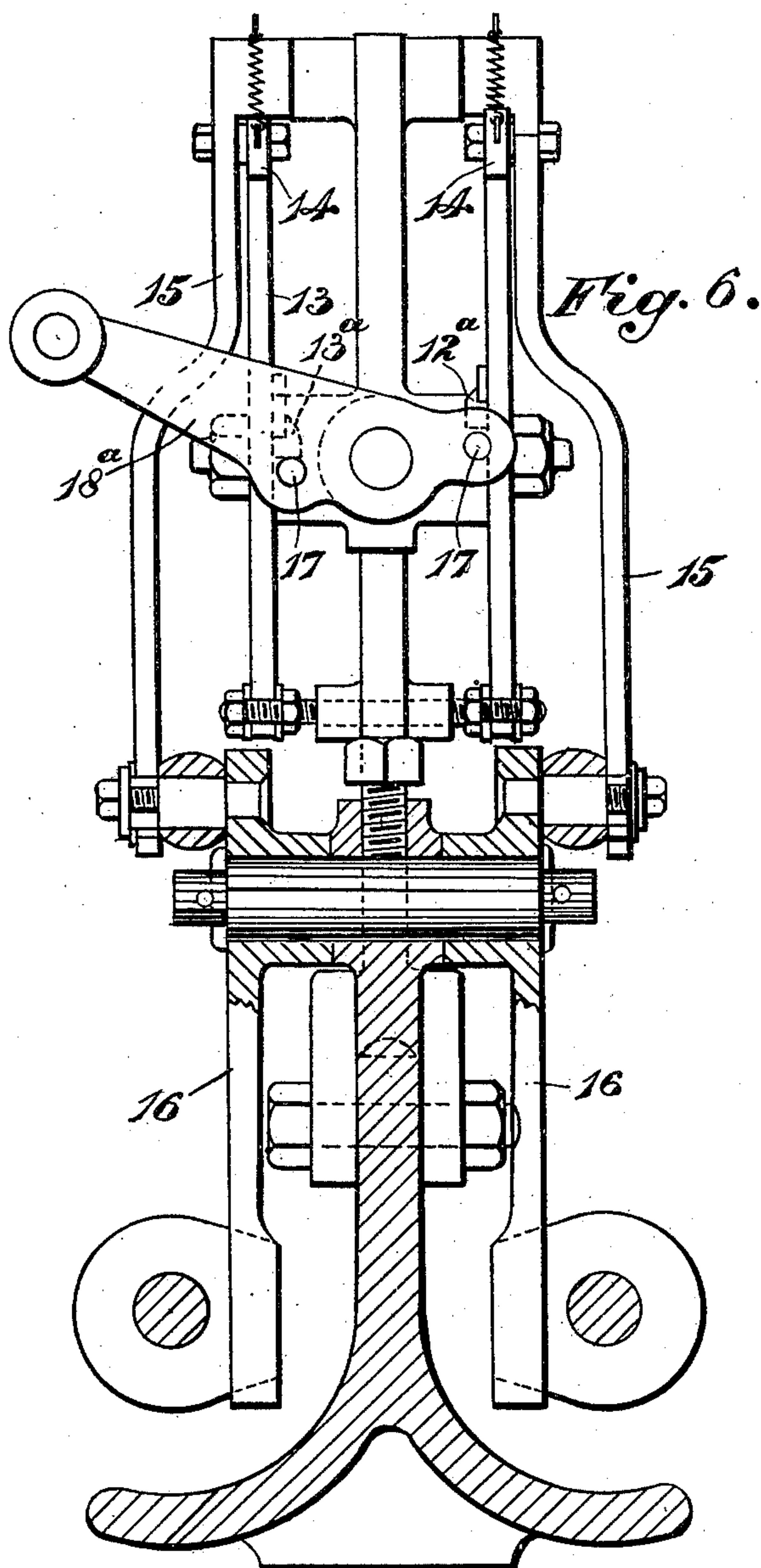
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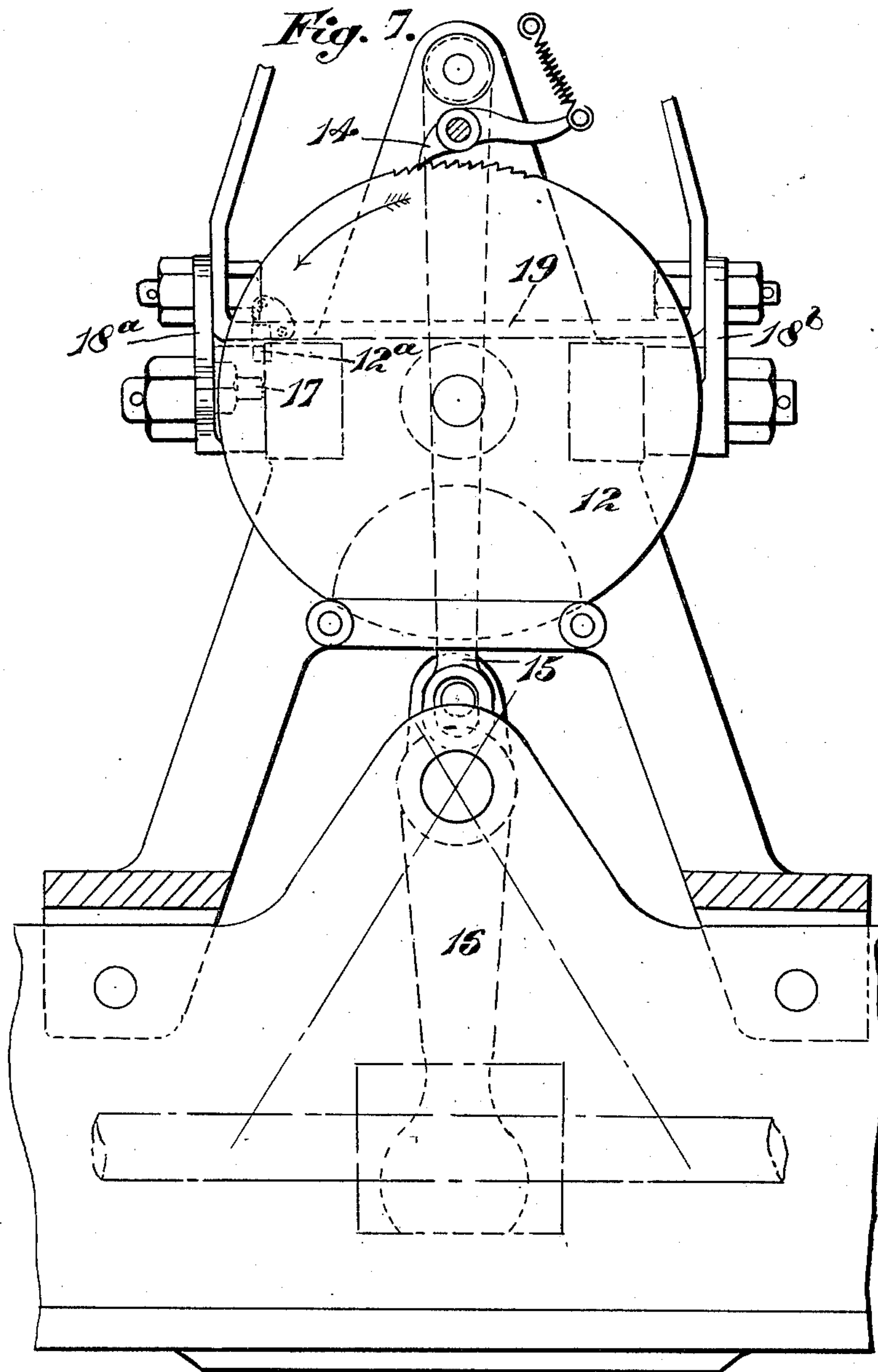
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6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

EDWARD SHAW, OF LONDON, ENGLAND.

APPARATUS FOR CONCENTRATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 688,204, dated December 3, 1901.

Application filed October 1, 1898. Serial No. 692,434. (No model.)

To all whom it may concern:

Be it known that I, EDWARD SHAW, a subject of the Queen of Great Britain and Ireland, residing at Broad street, London, England, have invented Improvements in Apparatus for Cooking, Concentrating, and Evaporating Liquids, of which the following is a specification.

In order that liquid—such, for example, as a solution of sugar or glucose or a mixture thereof—may be cooked, concentrated, or evaporated in a practically continuous manner and at a comparatively low temperature, the liquid is treated in apparatus comprising an externally-heated tube or coil through which the liquid is fed continuously by means of a pump, a collecting-chamber into which the said tube discharges and in which the treated liquid and the vapor driven off by the heat separate, and means for separately removing from said chamber the treated liquid and the vapor and for maintaining a low pressure in the said chamber and the externally-heated tube.

The accompanying drawings illustrate a construction of apparatus according to this invention which is suitable for cooking or boiling syrup for use in the manufacture of sweetmeats.

Figures 1 and 2 are elevations at right angles to each other of the entire apparatus. Fig. 3 is a vertical section of the cooking-coil and collecting-chamber. Fig. 4 is a horizontal section of the same. Fig. 5 is a sectional view of the valve controlling the withdrawal of vapor from the collecting-chamber; and Figs. 6, 7, and 8 are respectively a sectional end elevation and two side elevations, with parts removed, of means for imparting motion to the said valve.

1 is a tank containing untreated liquid, hereinafter referred to as "syrup."

2 is a pump by which the syrup is fed to the cooking-coil 3, which is contained within a dome-shaped chamber 4, charged with steam for heating the coil 3. The coil 3 discharges into a collecting-chamber 5, that is also contained within the steam-chamber 4 and the

upper portion of which is connected by a pipe 6, provided with a valve 7, to a jet-condenser 8, which communicates with an air-pump 9. The chamber 5 has a discharge-passage 10, that is controlled by an outwardly-opening valve 11, normally kept against its seat by a spring 11^a, or it may be by a weight or by other means. The valve 7, which is shown in section in Fig. 5, is adapted to be operated intermittently, so as to close for a given period communication between the collecting-chamber 5 and the condenser and the air-pump, thus temporarily preventing the steam generated within the coil from escaping from the chamber 5 and causing an increase of pressure therein. The pressure of the steam on the syrup eventually overcomes the resistance of the valve 11 and forces the cooked syrup through the outlet 10 onto a cooling table or slab 12. After the syrup has been discharged the valve 7 is again operated, so as to reestablish communication between the chamber 5 and the condenser and air-pump, thereby causing the pressure in said chamber to be reduced below that of the atmosphere and the valve 11 to be again closed.

The valve 7 may be operated periodically in any convenient way; but in the example illustrated the feed-pump 2 is provided with means (illustrated in Figs. 6, 7, and 8) for imparting motion to the valve 7. These means comprise a couple of ratchet-wheels 12 13, which are driven by pawls 14, carried by levers 15, that are rocked by tappet-levers 16 and tappets on the piston-rods of the pump. The ratchet-wheels carry driving-studs 12^a 13^a, that come into contact with pins or abutments 17 on opposite sides of the fulcrum of one of two levers 18^a 18^b, that are coupled together by a stirrup-piece 19, that is connected by a rod or link 20 with the spindle of the valve 7. The arrangement is such that the valve is opened and closed at the required times. If desired, the valve 11 may be arranged to be similarly operated at the required times instead of operating automatically.

The collecting-chamber 5 is arranged inside

the steam-chamber 4, so that the steam which supplies heat for cooking the syrup may also serve to maintain the temperature of the cooked syrup and the steam or vapor contained in the chamber 5.

The chamber 4 is detachably connected by bolts to a base-plate 4^a, so that it can be readily lifted and the coil 3 and collecting-chamber 5 exposed for inspection or repair. The base-plate 4^a has cast on its upper side a circular rim 4^b, into which the copper cylinder forming the chamber 5 is brazed. It is also formed with a passage 4^c, leading from the coil 3 to the chamber 5, and with a passage 4^d, by which the pipe 6, whose upper end opens into the upper part of the chamber 5 and is provided with a baffle-plate 6^a to prevent the entry of bubbles of syrup, is placed in communication with the condenser.

4^e and 4^f are passages or apertures through the base-plate 4^a, through which syrup and steam, respectively, are supplied to the coil 3 and to the chamber 4.

The outlet 10 is at the bottom of a depression or well formed in the base-plate 4^a and in which the syrup collects. The seat of the valve 11 is formed with an inwardly-extending portion that serves to support the valve-spindle and its spring 11^a, as shown, the arrangement being such that the seat and valve can be screwed into and out of the base-plate. The condenser is preferably formed in the column supporting the cooking-chamber.

While I have shown and described an automatic means for periodically closing the valve 7, and hence automatically causing periodically an increased pressure in the separating-chamber, I do not limit my invention to the automatic closing of the valve, for this may be done by hand for periodically causing an increased pressure in said chamber, and thereby delivering the cooked liquid therefrom.

What I claim is—

1. An apparatus for cooking, concentrating and evaporating liquids, comprising an externally-heated tube, a syrup-collecting chamber into which said tube discharges, said chamber having a liquid-escape, a vapor-escape passage-way, and an intermittently-operated check for said vapor passage-way, the parts adapted to operate as and for the purpose described.

2. An apparatus for cooking concentrating and evaporating liquids, comprising an externally-heated tube, a syrup-collecting chamber into which the tube discharges, said chamber having a liquid-escape passage-way and a vapor-escape passage-way, an intermittently-controlled check for said vapor passage-way, and an outwardly-opening pressure-closed valve for said liquid passage-way, whereby the pressure within the syrup-collecting chamber is intermittently increased for forcing the syrup through the outwardly-

opening pressure-closed valve, substantially as described.

3. In an apparatus for cooking, concentrating and evaporating liquids, a syrup-collecting chamber into which the syrup is discharged, said chamber having a liquid-escape passage-way and a vapor-escape passage-way, an intermittently-controlled check for said vapor passage-way, and an outwardly-opening pressure-closed valve for said liquid passage-way, whereby the pressure within the syrup-collecting chamber is intermittently increased for forcing the syrup through the outwardly-opening pressure-closed valve, substantially as described.

4. An apparatus for cooking, concentrating and evaporating liquids, comprising a steam-chamber, a separating-chamber within the steam-chamber and out of communication therewith, and a cooking-tube also within the steam-chamber and out of communication therewith, said cooking-tube surrounding said separating-chamber, whereby the cooking-tube and the separating-chamber are both heated by the same body of steam, substantially as described.

5. Apparatus for cooking, concentrating and evaporating liquids comprising a coiled tube and a collecting-chamber communicating therewith and formed with a liquid-discharging aperture, both said tube and chamber being contained within a steam-charged chamber, a liquid-feeding pump, an air or vapor pump, a valve controlling communication between said chamber and the air or vapor pump and connected to mechanism driven by the feed-pump whereby it is periodically closed as set forth.

6. Apparatus for cooking, concentrating and evaporating liquid, comprising a tank 1, feed-pump 2, coil 3, steam-chamber, 4, collecting-chamber 5 with liquid-discharging aperture 10, vapor-pipe 6 fitted with baffle 6^a and leading to a condenser 8 and an air-pump 9, as set forth.

7. Apparatus for cooking, concentrating and evaporating liquid, comprising a tank 1, a feed-pump 2, coil 3, a collecting-chamber 5 with valved liquid-discharge aperture 10, a steam-chamber 4 inclosing both coil 4 and chamber 5, a vapor-pipe 6 fitted with baffle 6^a and leading to a jet-condenser 8 arranged in the stand of the apparatus, an air-pump 9, and a valve 7 that controls communication between chamber 5 and condenser 8 and is operated by the feed-pump 2 so as to periodically close said communication as set forth.

8. Apparatus for cooking, concentrating and evaporating liquids, comprising a liquid-feeding pump, an externally-heated tube, a collecting-chamber into which said tube discharges and which has a liquid-discharging aperture, a vapor or air pump, a valve controlling communication between said collecting-chamber and vapor air-pump, a rod con-

necting said valve to a lever provided on opposite sides of its fulcrum with a pin or abutment a couple of wheels driven by said feed-pump and each carrying a stud the pins or
5 abutments being arranged respectively in the paths of the said studs, which come successively in contact with their respective studs and intermittently rock the lever and open

and close the valve as and for the purpose set forth.

Signed at 2 Popes Head alley, Cornhill, London, England, this 21st day of September, 1898.

EDWARD SHAW.

Witnesses:

PERCY E. MATTOCKS,
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