

No. 688,206.

Patented Dec. 3, 1901.

E. SHAW.

APPARATUS FOR CONCENTRATING LIQUIDS.

(Application filed Oct. 25, 1898.)

(No Model.)

6 Sheets—Sheet 1.

Fig. 1.

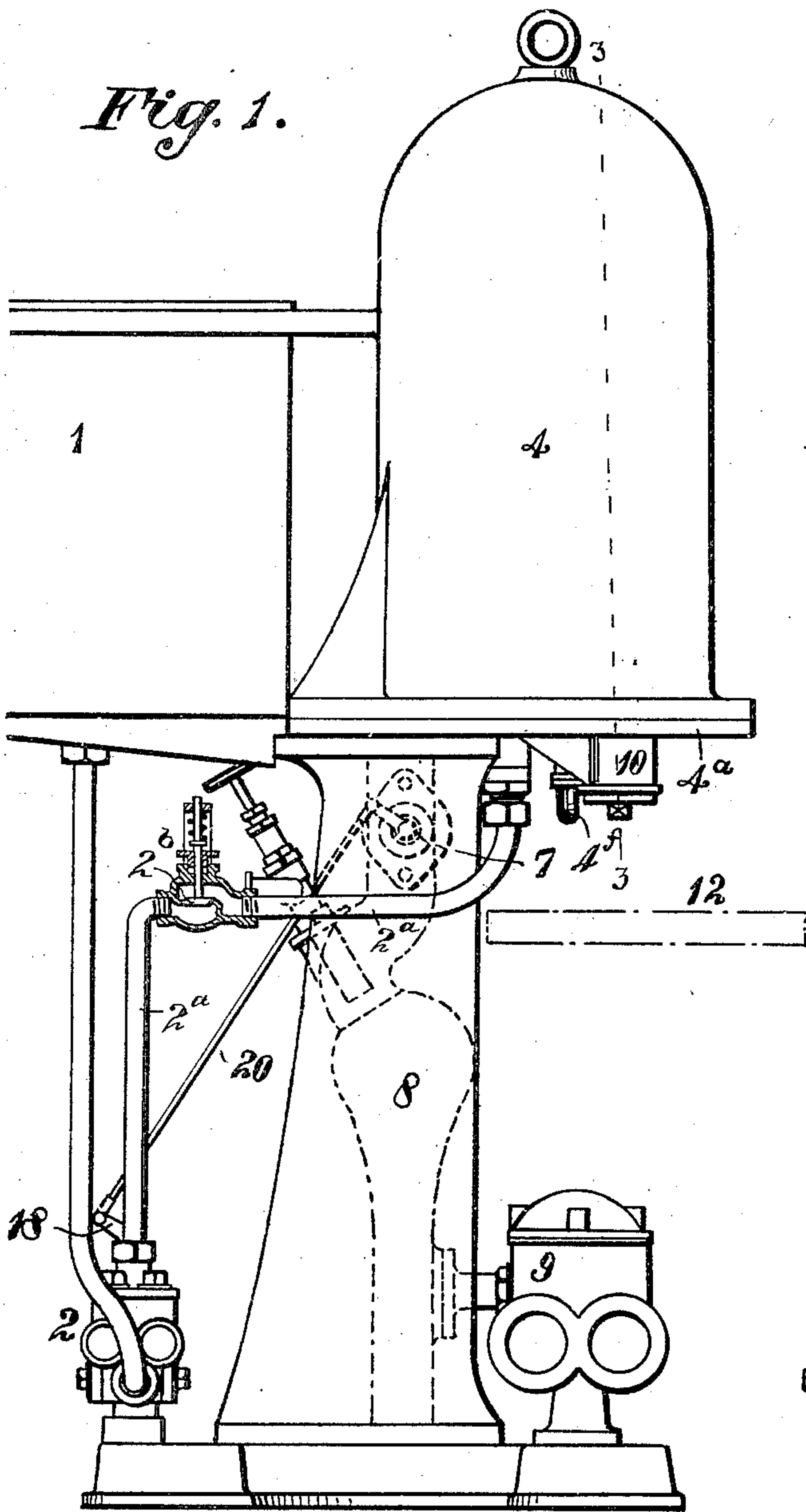
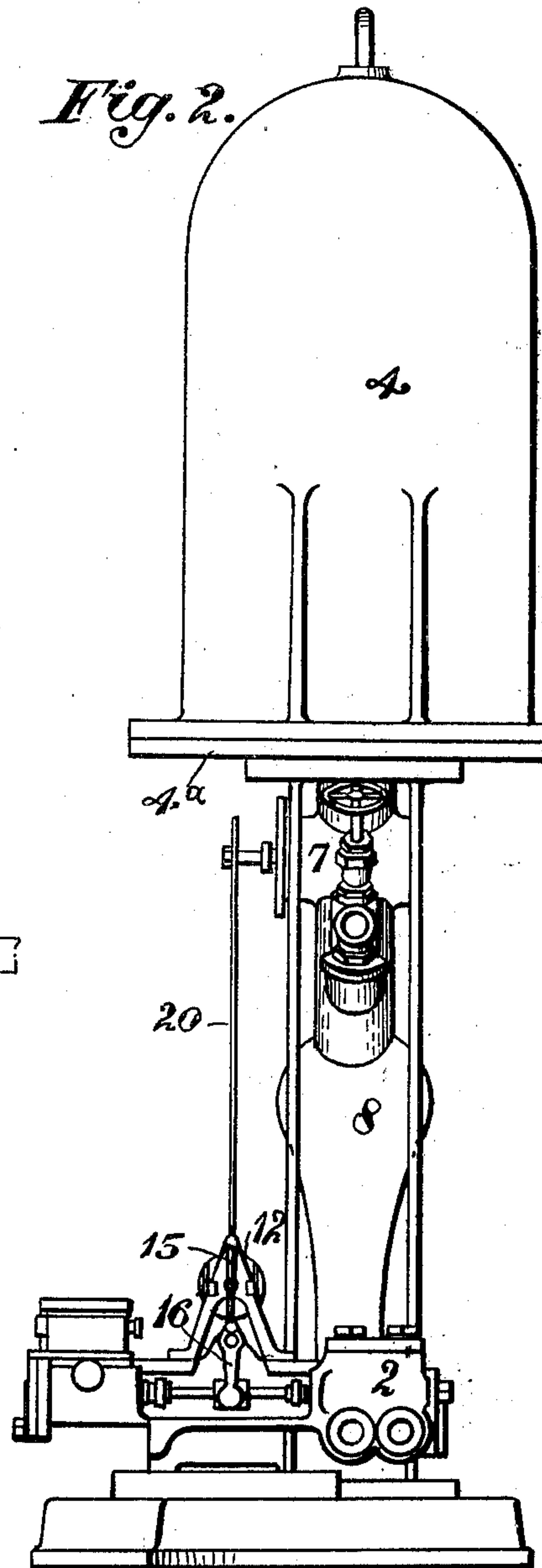


Fig. 2.



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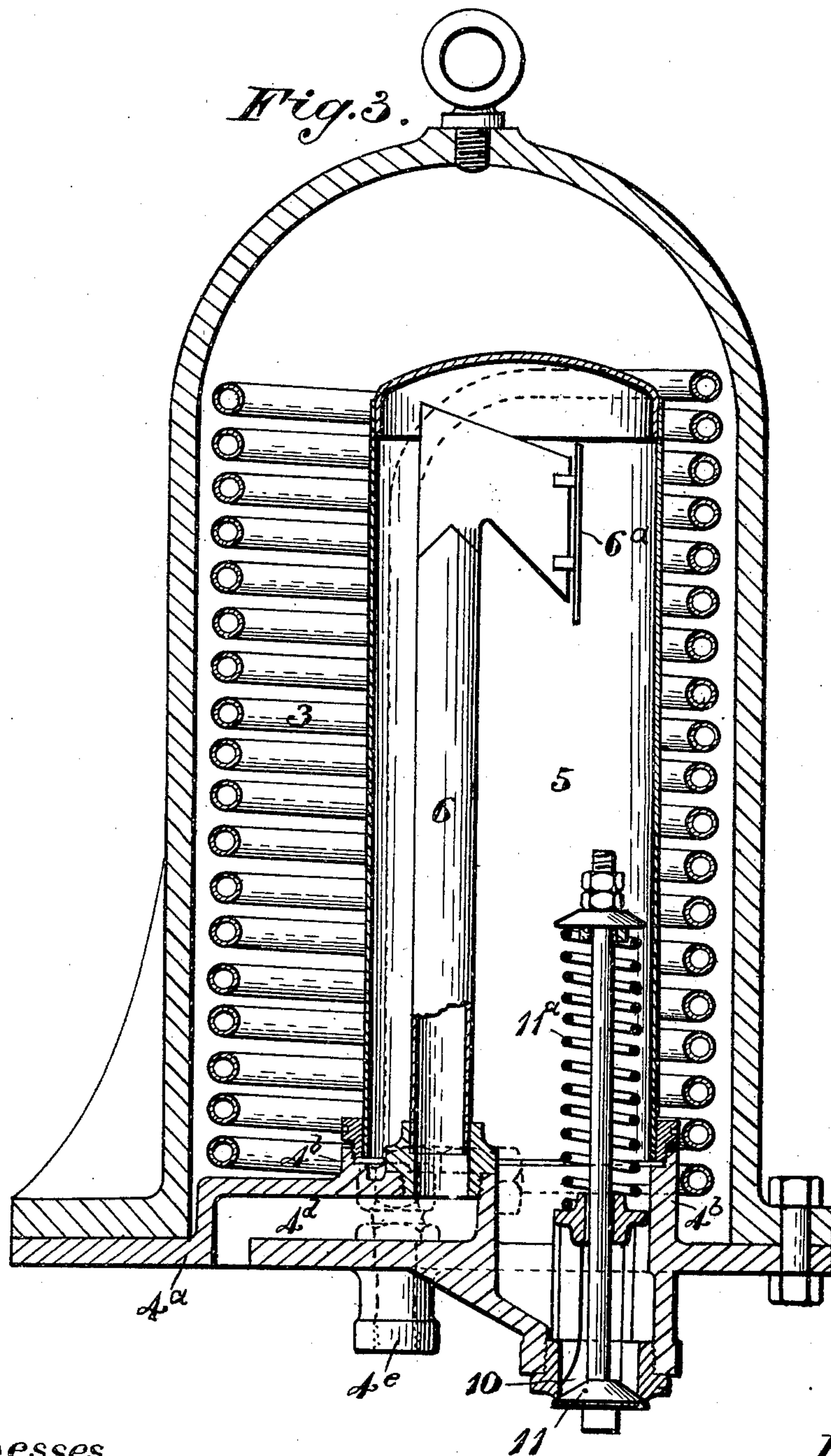
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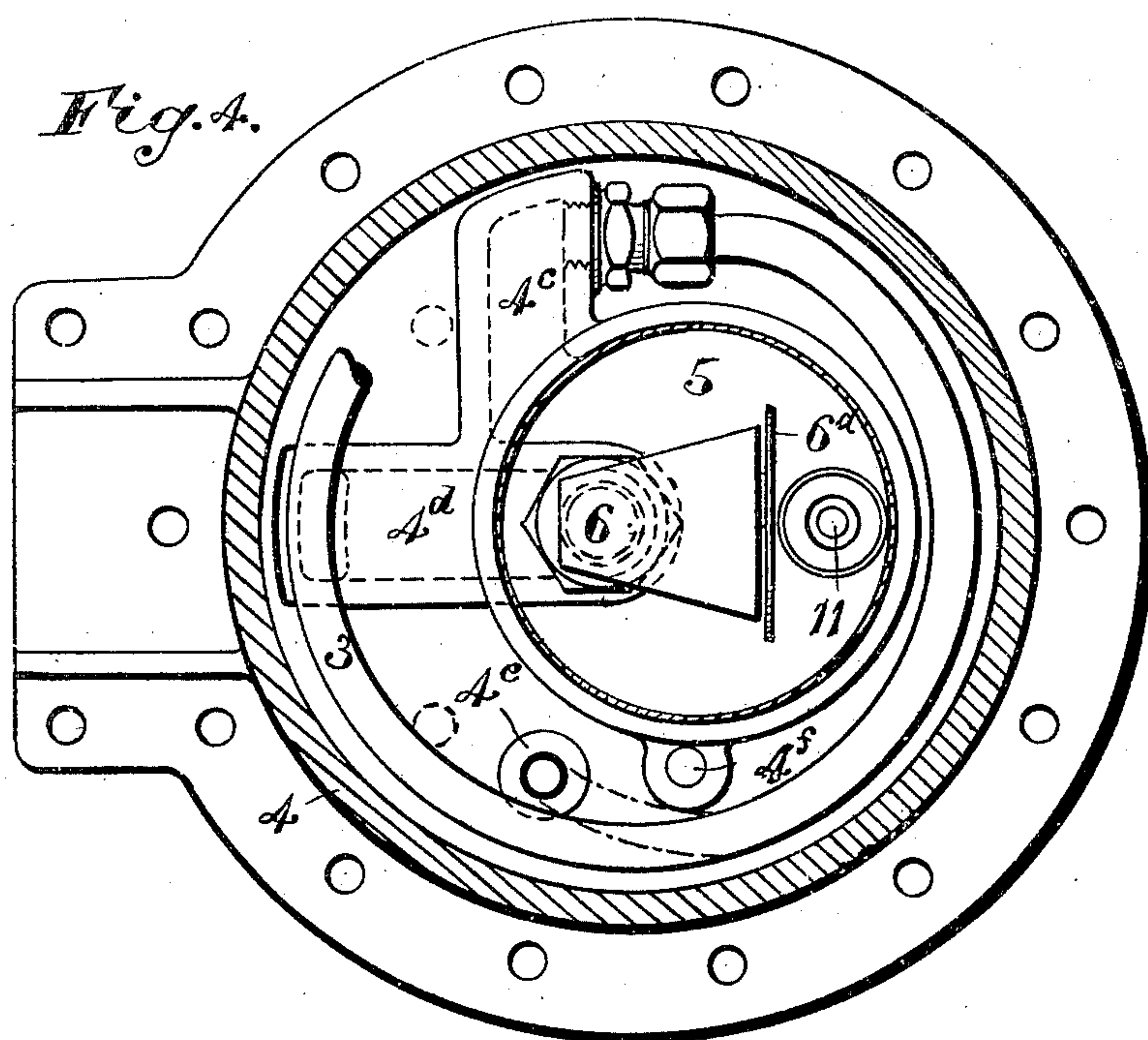
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Fig. 8.

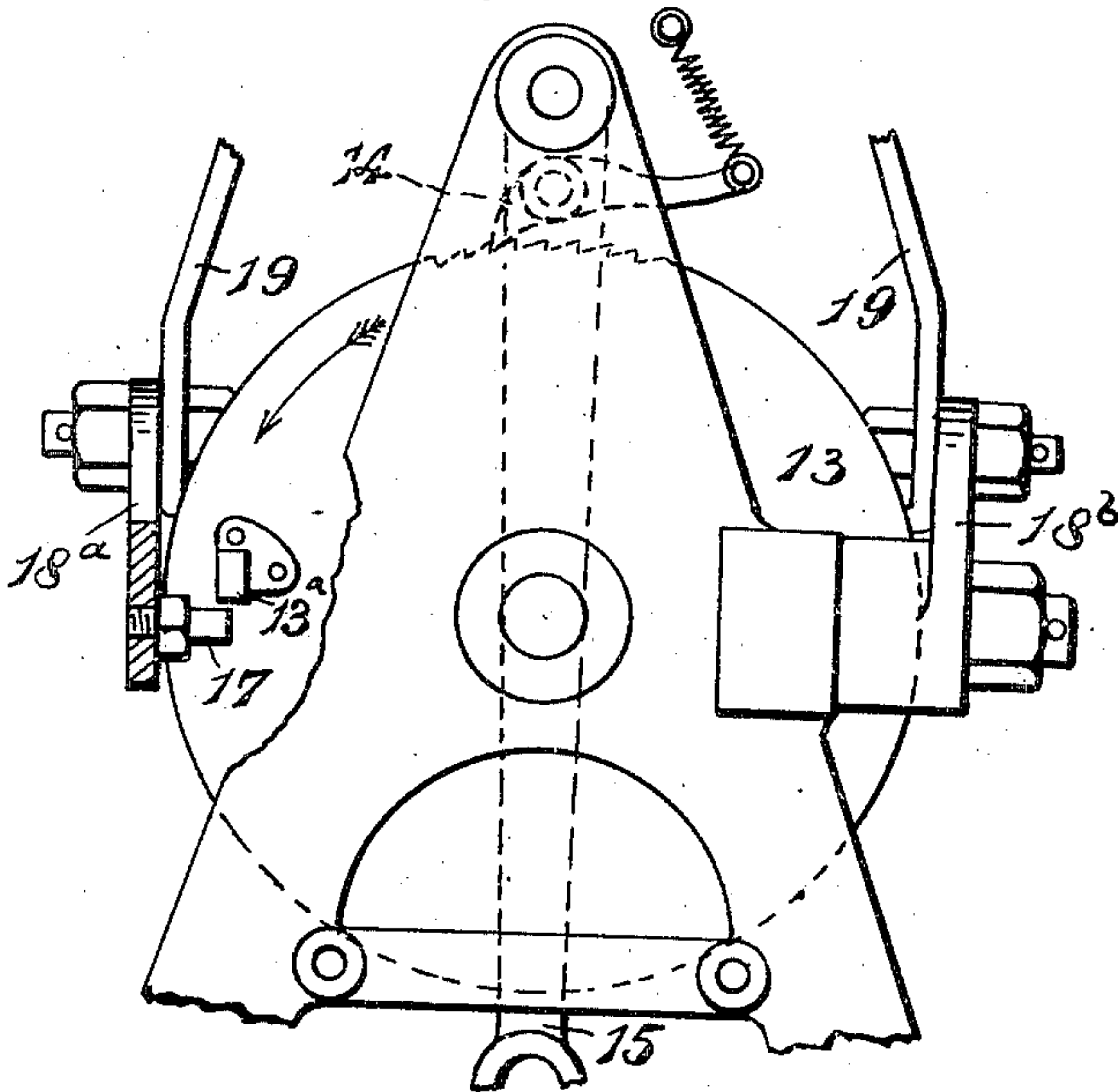
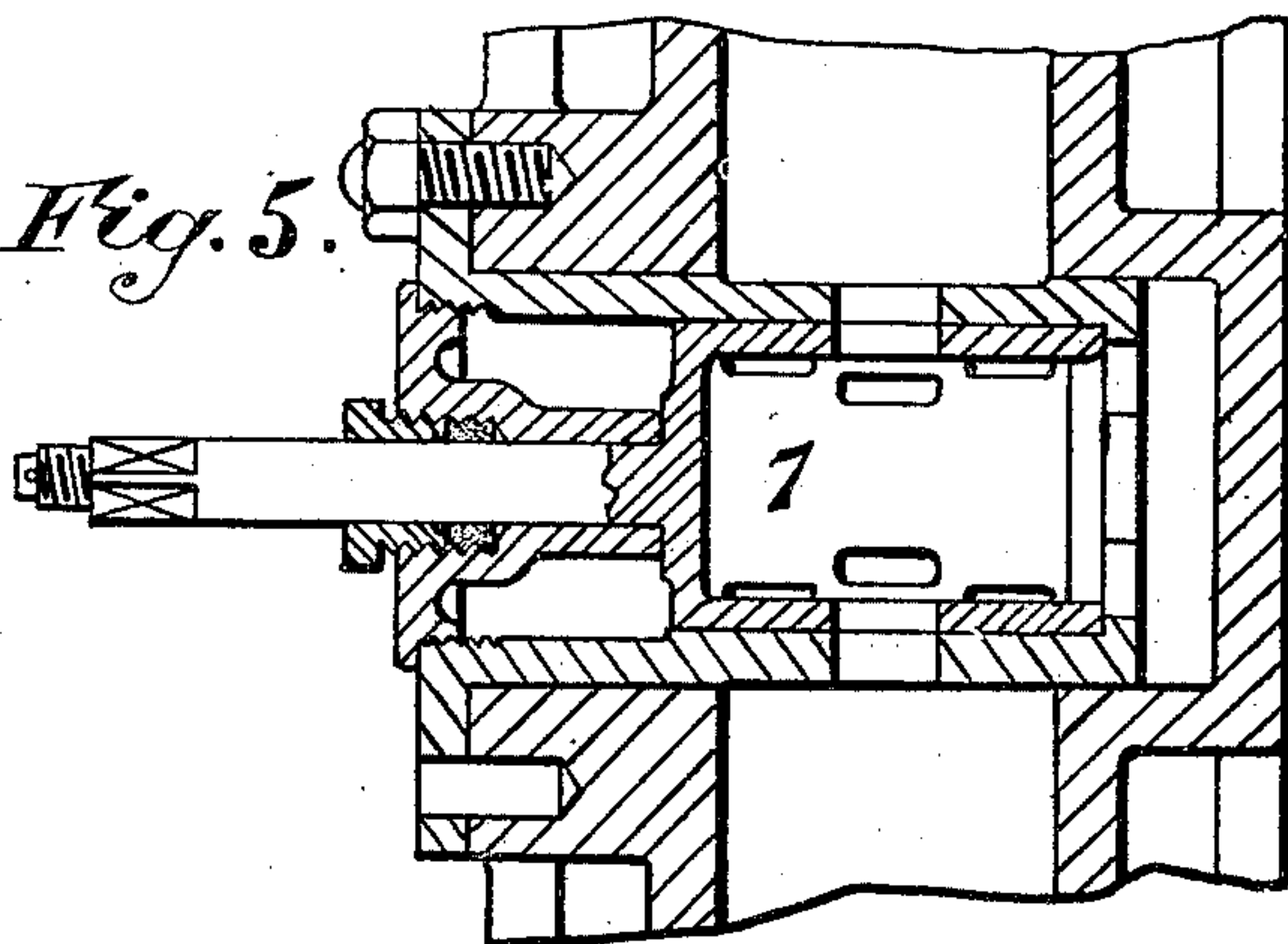


Fig. 5.



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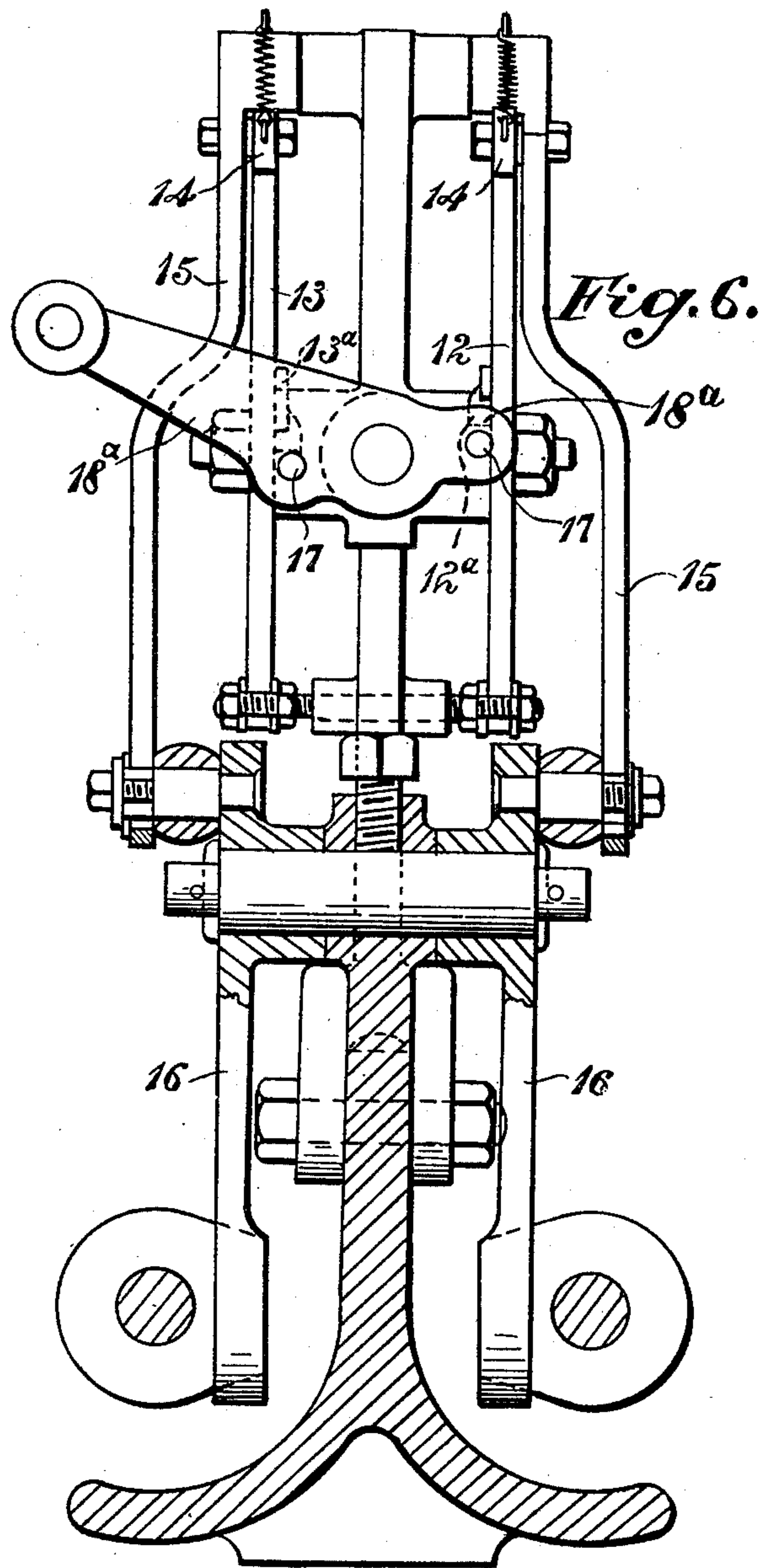
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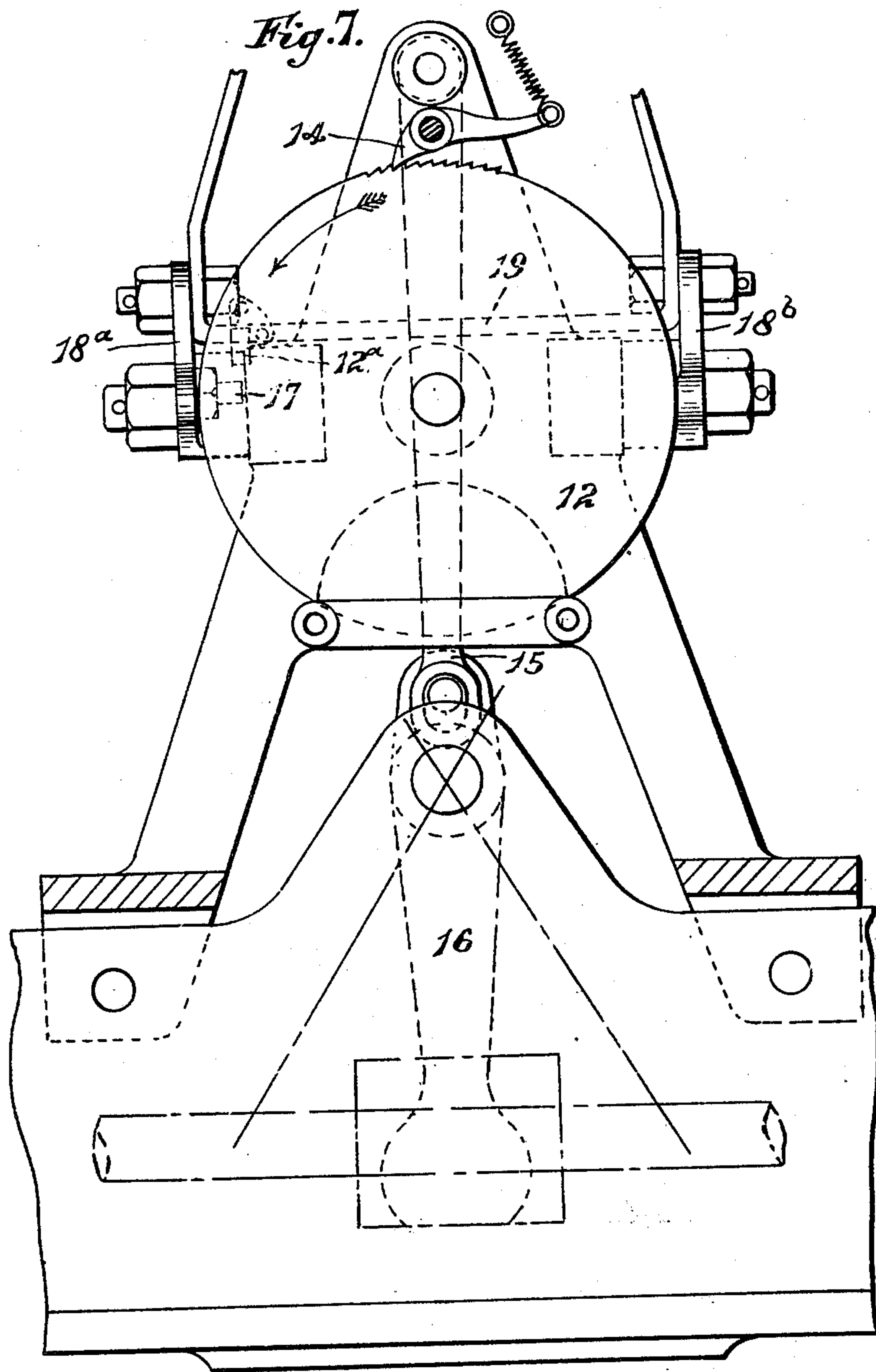
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UNITED STATES PATENT OFFICE.

EDWARD SHAW, OF LONDON, ENGLAND.

APPARATUS FOR CONCENTRATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 688,206, dated December 3, 1901.

Application filed October 25, 1898. Serial No. 694,550. (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 Apparatus for Concentrating Liquids, of which the following is a specification.

The object of my present invention is to cook syrup in its passage through a tube to some fixed predetermined degree. Having a fixed steam-pressure, and therefore a constant predetermined temperature outside of the tube, the required results can be obtained only by having control over the rate at which the syrup passes through the tube. In order to prevent any variation of the pressure inside of the tube affecting the speed of the pump or other pressure-feeding device, and therefore the flow of the syrup through the tube, I introduce an artificial load between the pressure-feeding device and the tube of sufficient magnitude to enable the pump or pressure-feeding device to work steadily irrespective of the said variations of pressure in the tube, which always occurs. This artificial load is further of great importance should there be a vacuum in the tube, as it prevents the pressure of the atmosphere driving the syrup through the pump or pressure-feeding device into the tube, an effect which may result even when the pump is working.

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 on line 3 3 of Fig. 1. 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 secured into and out of the base-plate. The condenser is preferably formed in the column supporting the cooking-chamber. In order to prevent the syrup being forced through the feed-pump 2 and cooking-coil 3 by the pressure of the atmosphere when the pressure in the collecting-chamber 5 is reduced, the discharge-pipe 2^a of the feed-pump is provided with a suitably-loaded valve 2^b, that will only open when the pressure against it exceeds atmospheric pressure. The rate of feed is thus capable of being completely controlled by the feed-pump 2 and is not influenced by the vacuum in the cooking-coil and collecting-chamber.

In the operation of the apparatus the syrup that is to be cooked is placed in the vessel or receiving-chamber 1, and passes from thence

through a pipe extending from the bottom thereof to the pump 2. From the pump 2 it is forced through the pipe 2^a, past the valve 2^b, which is a resistance member for placing a load upon the said pump, and from thence on through the pipe 2^a into the cooking-coil 3, located within the chamber 4. The syrup in passing through the cooking-coil is cooked and is delivered into the lower end of the separating-chamber 5, from which it is delivered through the pressure-controlled liquid-escape opening 10 upon a table or other receiving member 12.

What I claim is—

1. A syrup-cooking apparatus comprising an externally-heated cooking-tube, a syrup-feed tube forming a continuation of said cooking-tube, and a constantly-acting resistance member situated in said feed-tube at a point in advance of the cooking-tube, substantially as described.

2. A syrup-cooking apparatus comprising an externally-heated cooking-tube, a syrup-feed tube forming a continuation of said cooking-tube, a pressure-feeding device in communication with said feed-tube, and a constantly-acting resistance member in said feed-tube between the pressure-feeding device and the cooking-tube, substantially as described.

3. A syrup-cooking apparatus comprising an externally-heated cooking-tube, a separating and discharging chamber in communication with the exit of said cooking-tube, means for varying the pressure in said chamber, a syrup-feed tube forming a continuation of said cooking-tube, a pressure-feeding device in communication with said feed-tube, and a constantly-acting resistance member in said feed-tube, substantially as described.

Signed at Euston Station, London, England, this 8th day of October, 1898.

EDWARD SHAW.

Witnesses:

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