

No. 662,697

Patented Nov. 27, 1900.

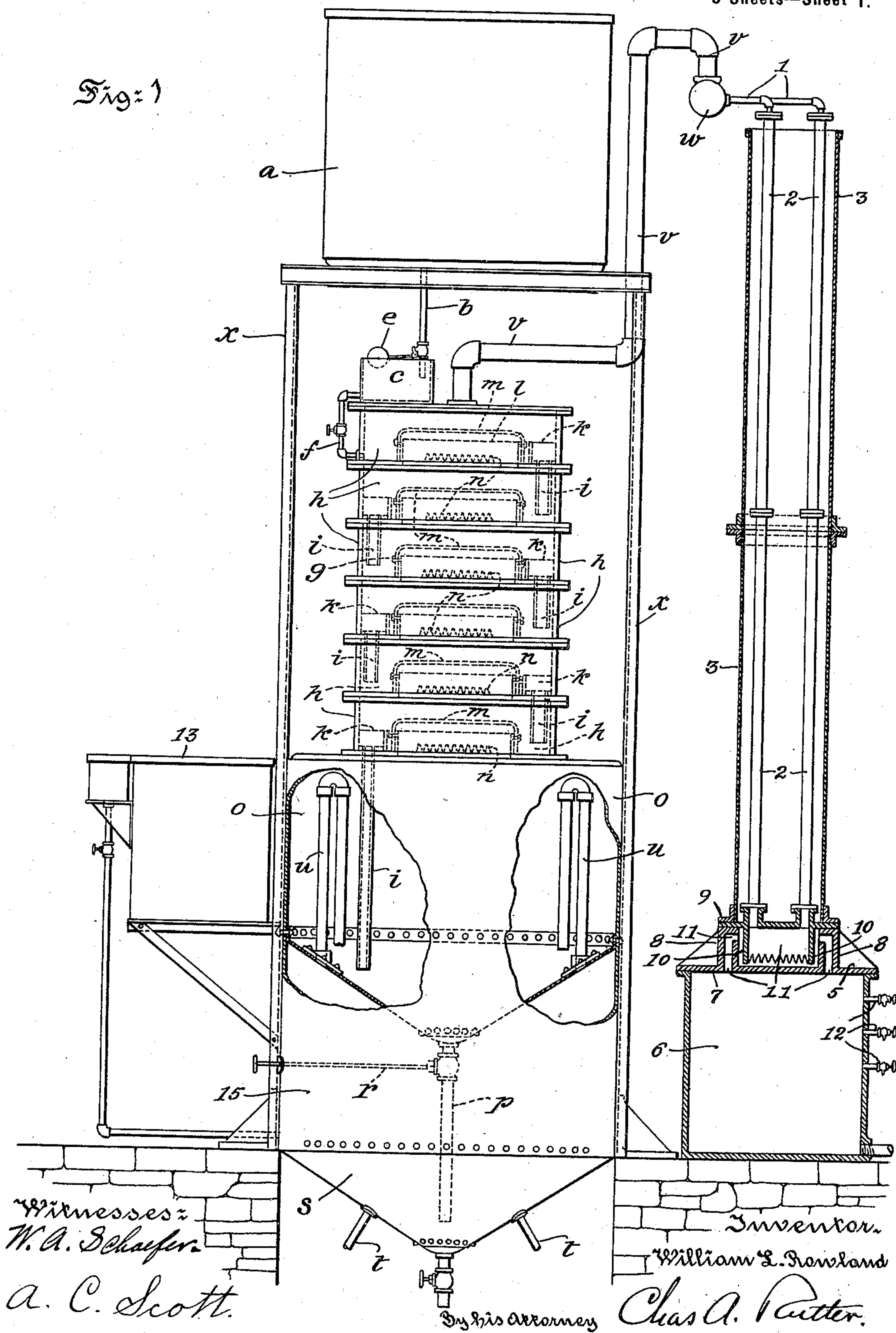
W. L. ROWLAND.
DISTILLING AND CONCENTRATING APPARATUS.

(Application filed June 2, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1



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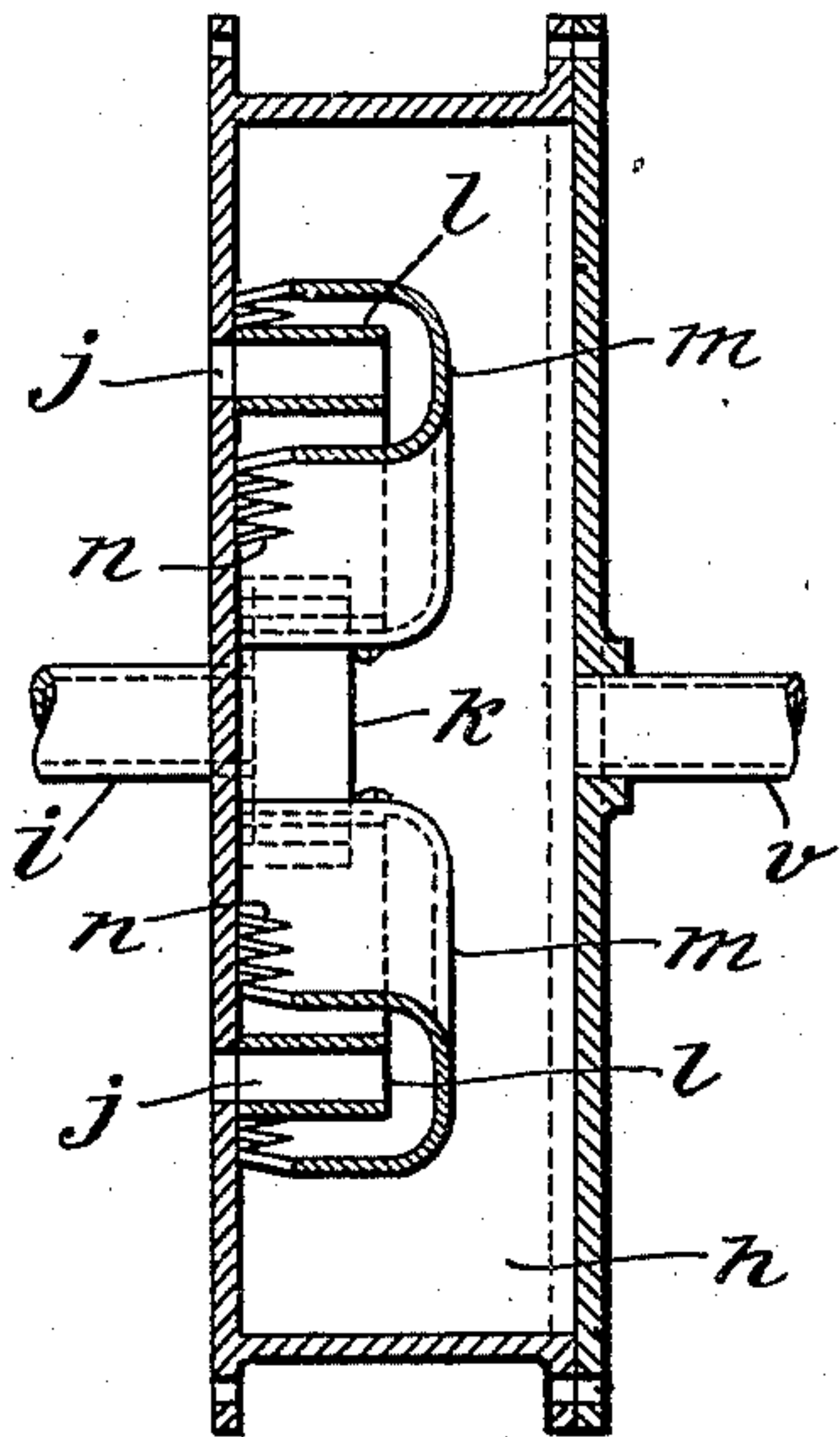


Fig. 3

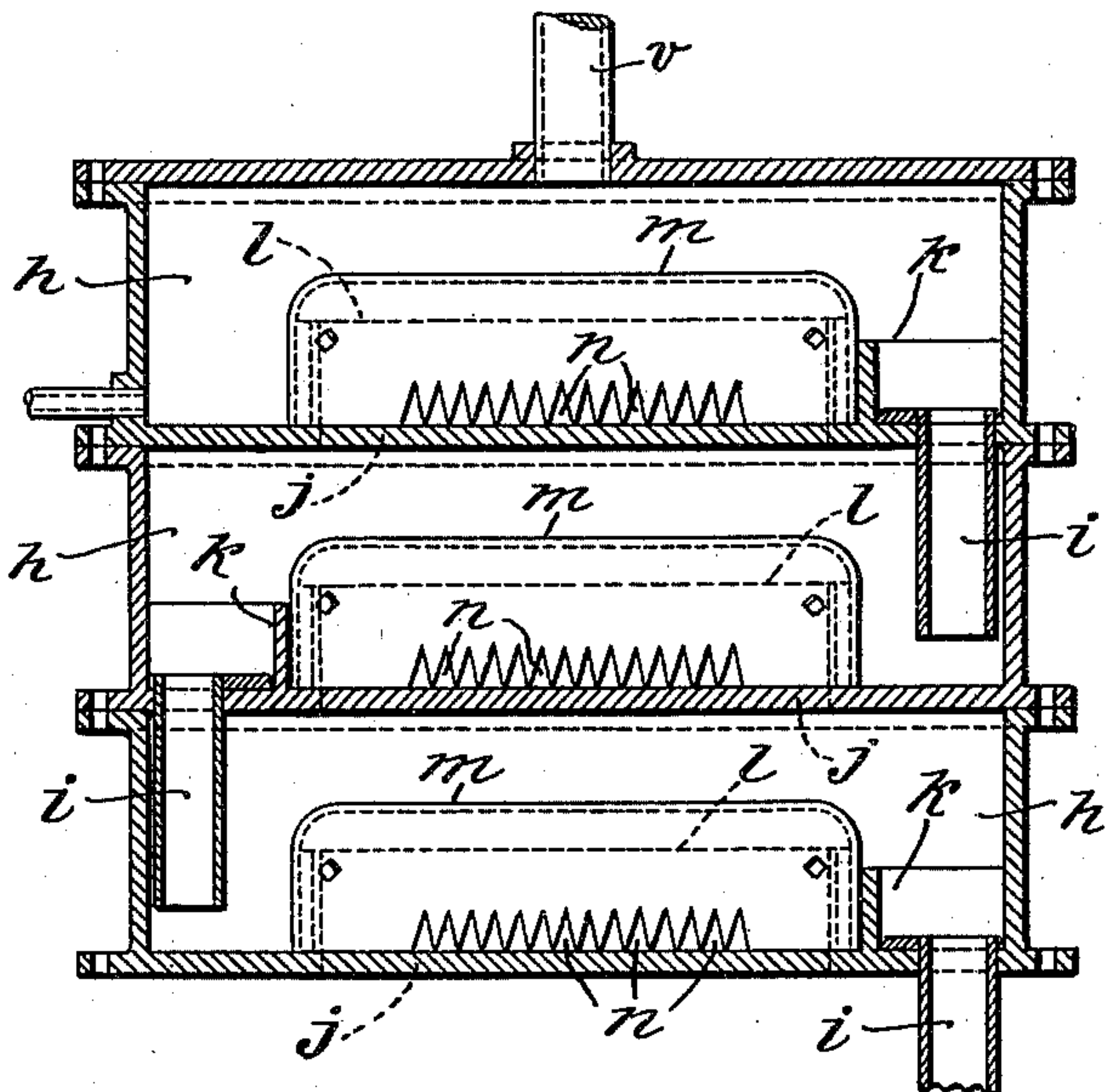
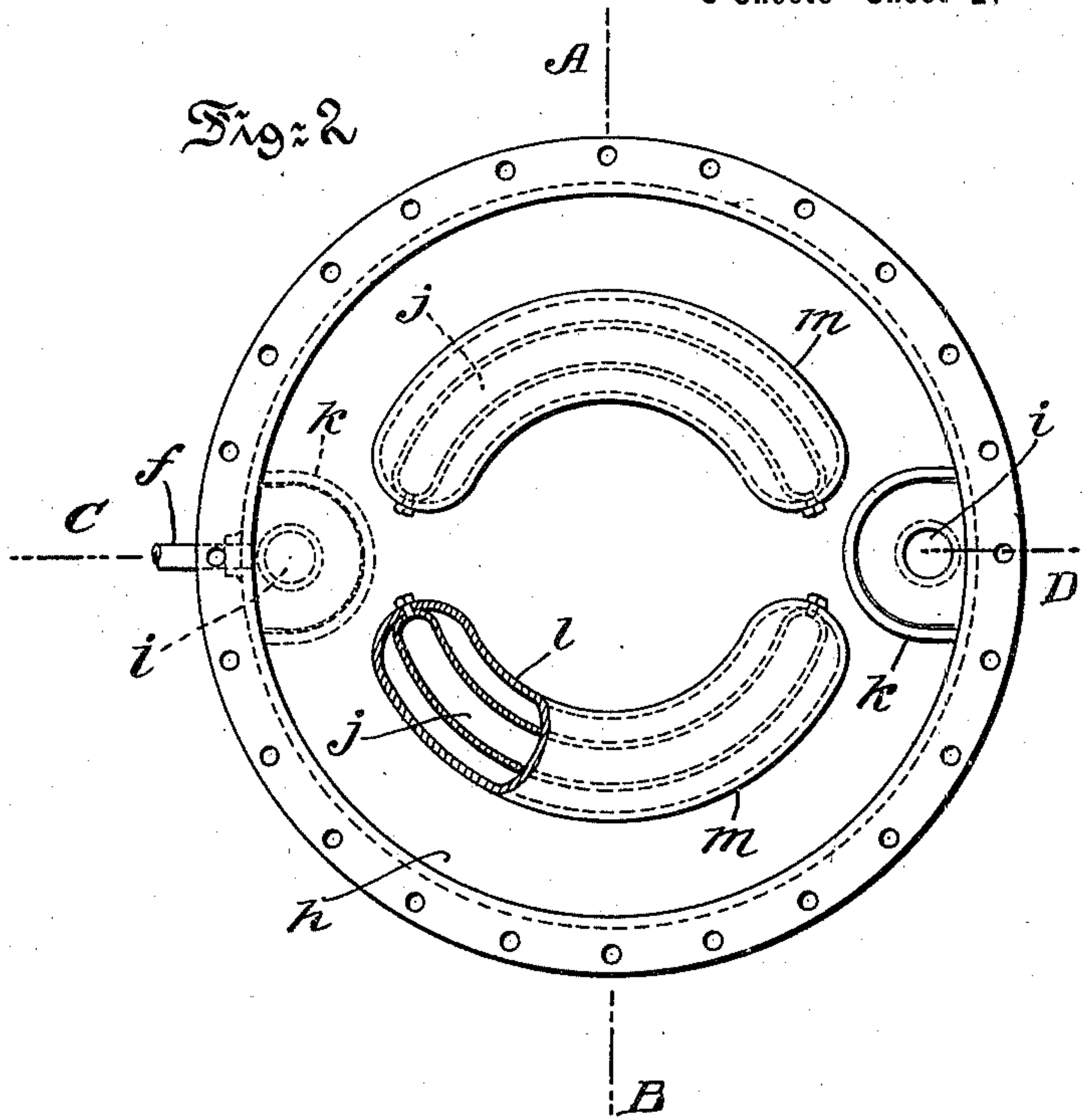


Fig. 4

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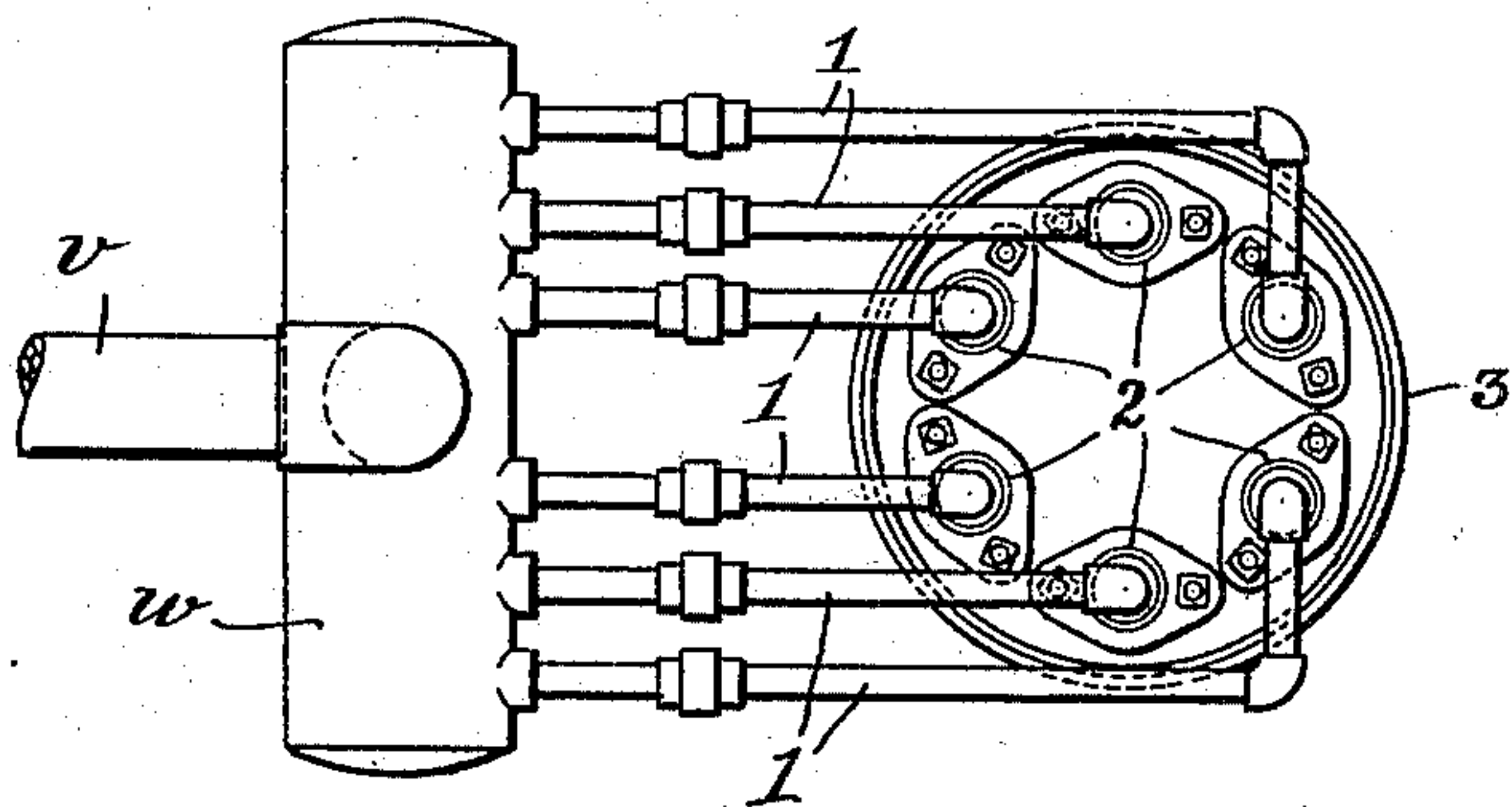


Fig. 5

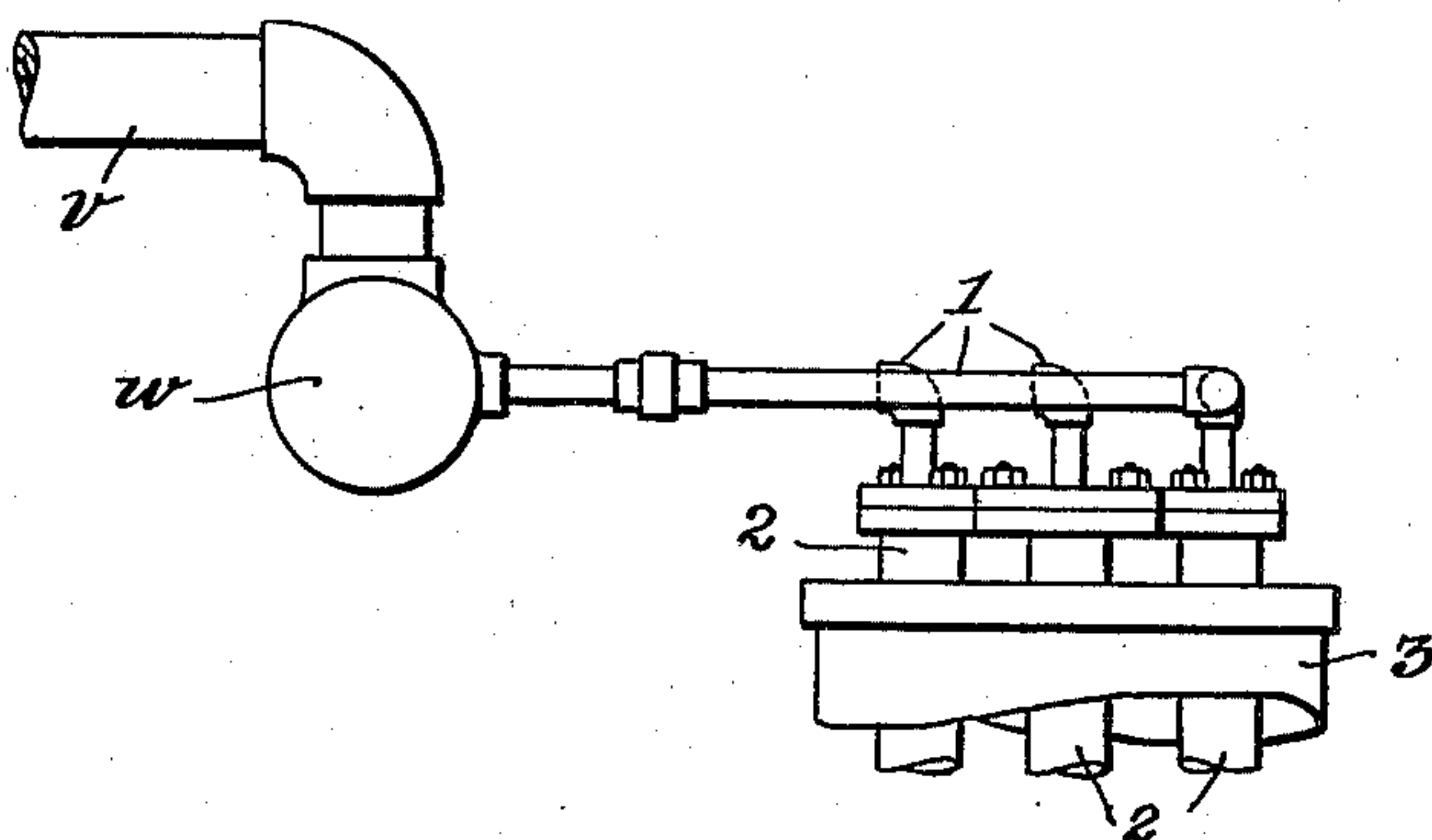


Fig. 6

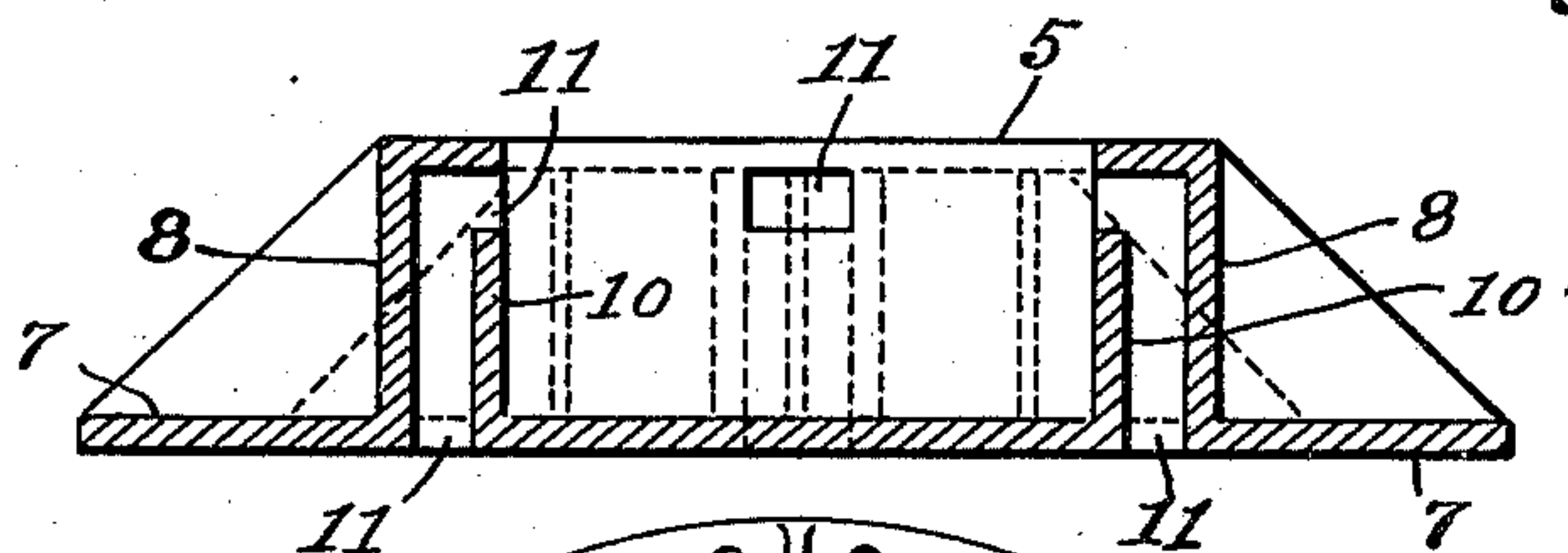
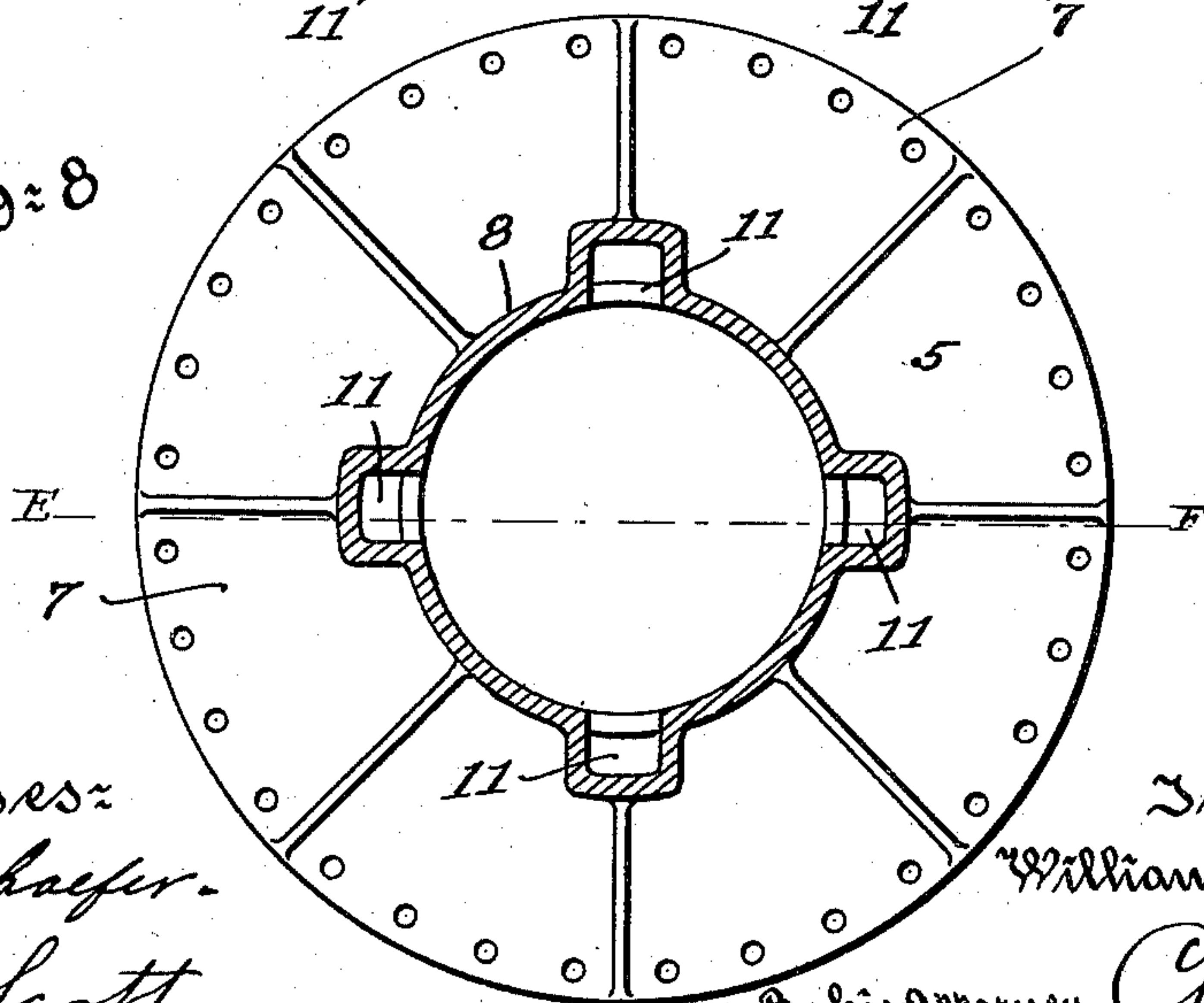


Fig. 7

Fig. 8



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UNITED STATES PATENT OFFICE.

WILLIAM L. ROWLAND, OF PHILADELPHIA, PENNSYLVANIA.

DISTILLING AND CONCENTRATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 662,697, dated November 27, 1900.

Application filed June 2, 1900. Serial No. 18,821. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. ROWLAND, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Distilling and Concentrating Apparatus, of which the following is a specification.

My invention relates to improvements in apparatus for distilling and concentrating ammoniacal liquor; and the object of my invention is to simplify and cheapen the apparatus ordinarily used for this purpose and to construct it so that it will occupy but a very small ground-space.

My apparatus consists, as is usual, of a tank for holding the weak liquor, of a concentrating-column and stills into which the weak liquor passes from the tank, of a condenser in which the vapors from the still are condensed, and of a receiver into which the condensed and concentrated vapors pass from an absorber into which they are passed from the condenser. These parts are, broadly speaking, all well known; but they have generally heretofore been arranged each upon a separate foundation or support and have occupied much more ground-space than is necessary or in most cases convenient. In my improved construction I so arrange the apparatus that it is entirely supported upon two small foundations, one foundation carrying the stills, the concentrating-columns, the weak-liquor tank, &c., the other foundation carrying the receiver and the condenser and their connected parts. In order to economize space as much as possible, the several parts carried by each foundation are placed one directly above the other.

In the accompanying drawings, forming part of this specification, and in which similar characters of reference indicate similar parts throughout the several views, Figure 1 is partly a side and partly a central sectional elevation of my distilling and concentrating apparatus arranged upon two foundations; Fig. 2, a plan of a section of the concentrating-column, the top or cover being removed; Fig. 3, a section through one of the sections of the concentrating-column on line A B, Fig. 2; Fig. 4, a section through several sections of

the concentrator on line C D, Fig. 2; Fig. 5, a plan of top of condenser, manifold, and pipes leading from former to latter; Fig. 6, a side elevation of upper end of condenser, manifold, and connecting-pipes; Fig. 7, a sectional elevation of the lower section of the condenser, taken on a line E F, Fig. 8; Fig. 8, a plan of lower section of condenser.

Referring to Fig. 1, *a* is a tank containing a weak ammoniacal liquor; *b*, a pipe connecting tank *a* with a small feed-tank *c*; *d*, a valve in pipe *b*, which is operated by a float *e* in tank *c*; *f*, a pipe connecting feed-tank *c* with the upper section of the concentrating-column *g*.

The concentrating-column *g* consists of a number of sections or boxes *h*, placed one on top of the other and connected with one another by the pipes *i* and the openings *j*. The upper ends of pipes *i* are surrounded by a flange *k*, and the openings *j* have walls *l*, which are somewhat higher than the tops of the flanges *k*. *m* indicates caps closed at the top and sides and furnished with serrations *n* at their bottoms, which are placed over the openings *j*. All these parts are best shown in Figs. 2, 3, and 4.

The weak liquor being admitted through pipe *f* to the upper section of the concentrator rises until it reaches the top of the flange *k*, whence it overflows to pipe *i* and passes down to the next section, which it fills to the level of the top of flange *k*, and so on to the secondary still *o*, Fig. 1, and thence through a pipe *p*, which can be opened or closed by a suitable valve, and its stem *r* operated from without the still to the primary still *s*. Steam is admitted to still *s* through pipes *t*, and the vapors pass from this still through the bent pipes *u* to the upper or secondary still *o*, and thence through openings *j* to interior of caps *m*. From these caps they escape by bubbling out through the serrations *n* and through the liquor in the sections *h* of the concentrator to the space above the liquor, thence through the next opening *j* to the next upper section, and so on. The lower ends of the pipes *i* dip into the liquor in the section next below that which carries them, so as to seal their lower ends to prevent gas or vapor passing upward through them. From the upper section of the concentrator the va-

pors pass through a pipe *v*, Figs. 1, 3, and 4, to a manifold *w*, Figs. 1, 5, and 6, which is connected by pipes 1 with pipes 2 in the condenser 3. In order that they may better resist the corrosive action of the ammoniacal liquor, the pipes 2 are made of cast-iron, and in order that repairs may be quickly and easily made they are constructed, preferably, in two sections, as shown, although a greater number of sections may be used, if desired. The outside shell 3 of the condenser is filled with water, and the vapors in pipes 2 are thereby cooled and fall into the absorber 5, Figs. 1, 7, and 8, from which they pass to the receiver 6, Fig. 1, from which they may be pumped in the usual manner. The absorber 5 is preferably constructed of cast metal and consists of a base 7, which forms the top of the receiver 6, and a vertical annular flange 8, to the top of which is bolted the cover 9, which carries the condenser-pipes 2 and the shell 3. The cover 9 has projecting down from it a flange 10, the lower end of which is serrated and which reaches to or almost to the top of the base 7 of the receiver. The condensed vapors from the pipe 2 are discharged into this flange and pass out through the serrations around its bottom to the interior of the flange 8. They rise in flange 8 to the tops of openings 11, down which they flow to the receiver 6.

12 indicates gage-cocks in the receiver 6, through which samples of the concentrated liquor may be obtained for testing.

13, Fig. 1, is a lime-tank, from which lime may be introduced through a pipe 14 to the lower still *s*.

The secondary still *o* is carried directly on top of the primary still *s*, which is supported upon a suitable foundation. The concentrating-column is carried upon the top of still *o*, and the weak-liquor tank *a* may be carried upon supports *x*, carried by the top of still *o* or by the foundation which carries still *s*. The lime-tank is carried by a bracket *y*, carried by the stills, as shown.

The receiver 6 and the condenser 3 and their connected parts are carried one above the other upon a suitable and single foundation, as shown.

The pipes 2 of the condenser are, as has before been stated, constructed, preferably, of cast-iron, as it better withstands the action of the ammoniacal liquor. The pipes 1, connecting the upper ends of the pipes 2 with the manifold *w*, are, however, preferably constructed of wrought-iron, so that they may not be broken by the strains incident to the con-

traction and expansion of the several parts of the device.

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

1. In an ammonia distilling and concentrating apparatus, in combination, a primary and a secondary still the latter placed vertically above the former, a pipe leading from said secondary to said primary still, a valve on said pipe, U-shaped steam connections one end of which is open to the top of primary still and the other ends of which are open to the secondary still near its bottom, a concentrating-column as described placed vertically above the secondary still, a weak-liquor tank placed above the concentrating-column, a feed-tank placed between said weak-liquor tank and said concentrating-column, a float-valve automatically controlling the flow of liquor from the liquor-tank to the feed-tank, a connection leading from the feed-tank to the concentrating-column, a condenser consisting of a vertical shell inclosing vertical condensing-pipes and a condensing liquid, a connection leading from the top of the concentrating-column to the tops of said condensing-pipes, an absorber connected with the lower ends of said condensing-pipes, and a receiver beneath said absorber, all substantially as and for the purposes set forth.

2. The combination with a condensing-column consisting of a series of vertical condensing-pipes and a surrounding casing, of an absorber consisting of a shell or case furnished within with a chamber the lower end of which is open and the upper end of which is connected with the lower ends of the condensing-pipes and with passages outside said chamber leading from its top to and through its bottom, and a receiver beneath said absorber with which said passages connect.

3. The combination with a condensing-column consisting of a series of vertical condensing-pipes and a surrounding casing, of an absorber consisting of a shell or case furnished within with a chamber the lower ends of the walls of which are serrated, into which the lower ends of the condensing-pipes pass, and with openings leading from its top to and through its bottom, and a receiver beneath said absorber with which said openings connect.

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Witnesses:

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