

No. 753,777.

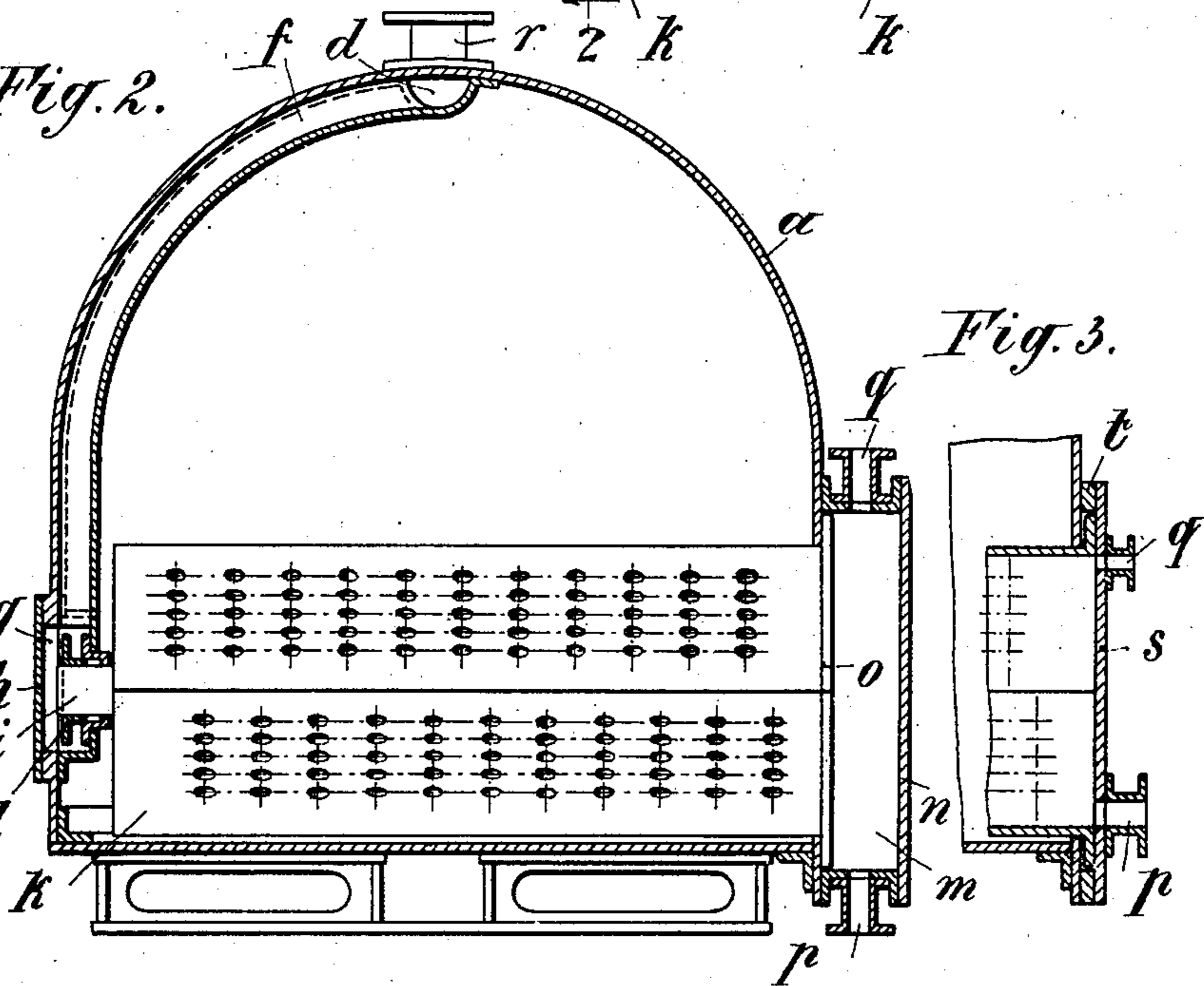
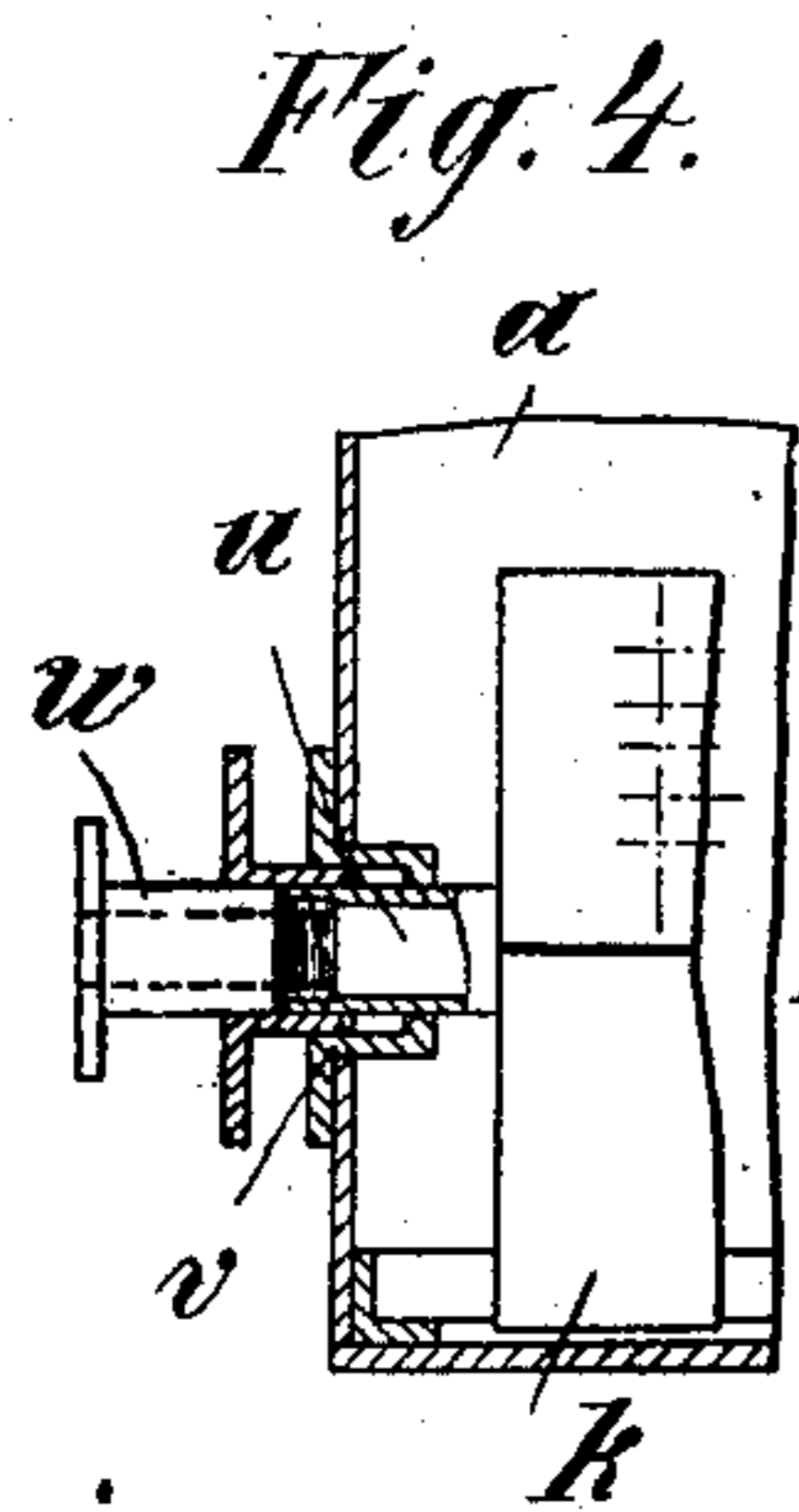
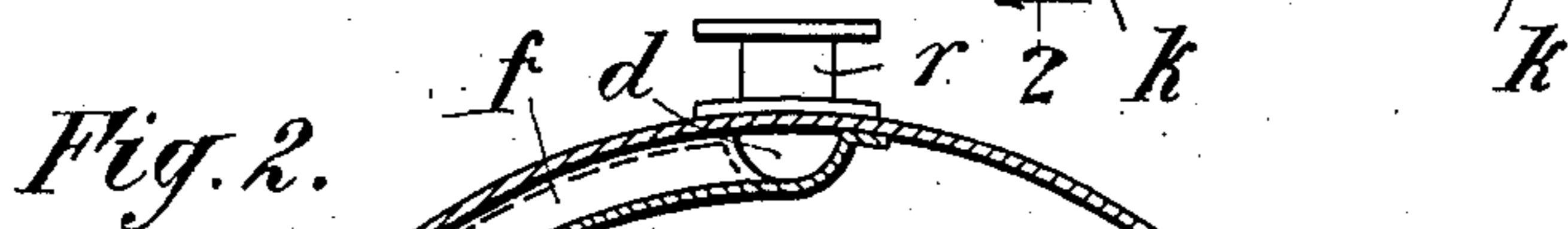
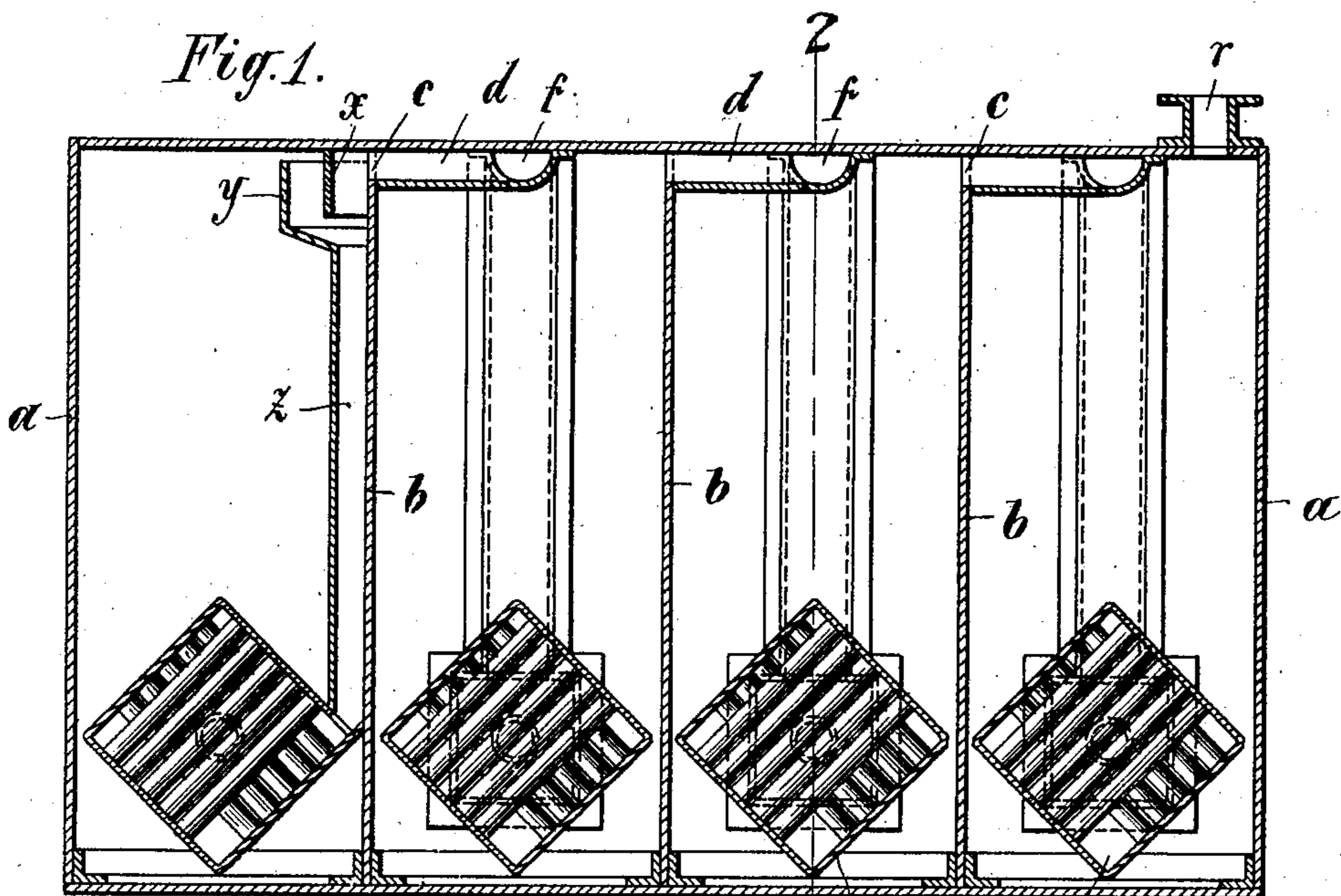
PATENTED MAR. 1, 1904.

W. WITKOWICZ.  
MULTIPLE EVAPORATING APPARATUS.

APPLICATION FILED FEB. 17, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig:5.

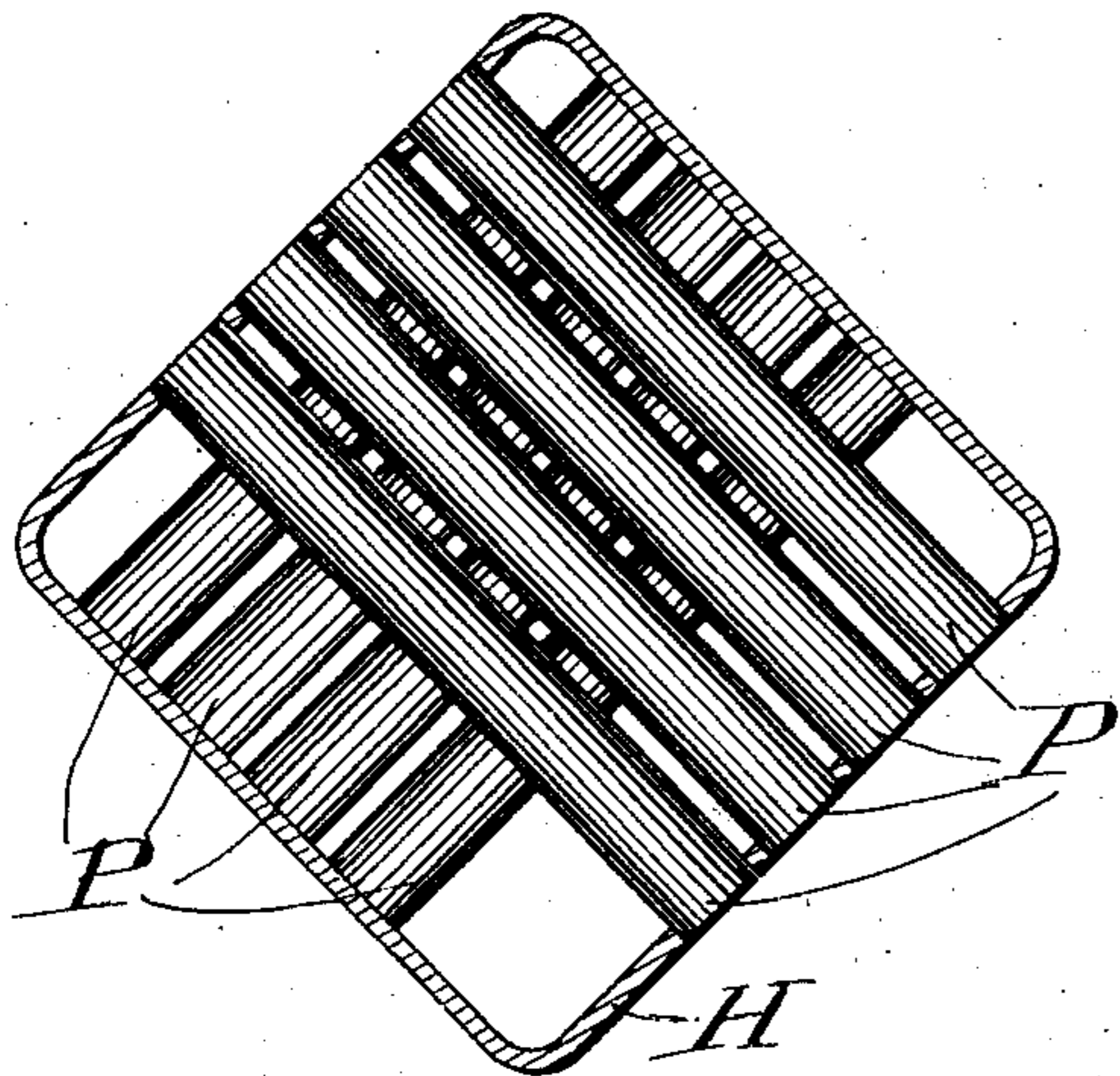


Fig:6.

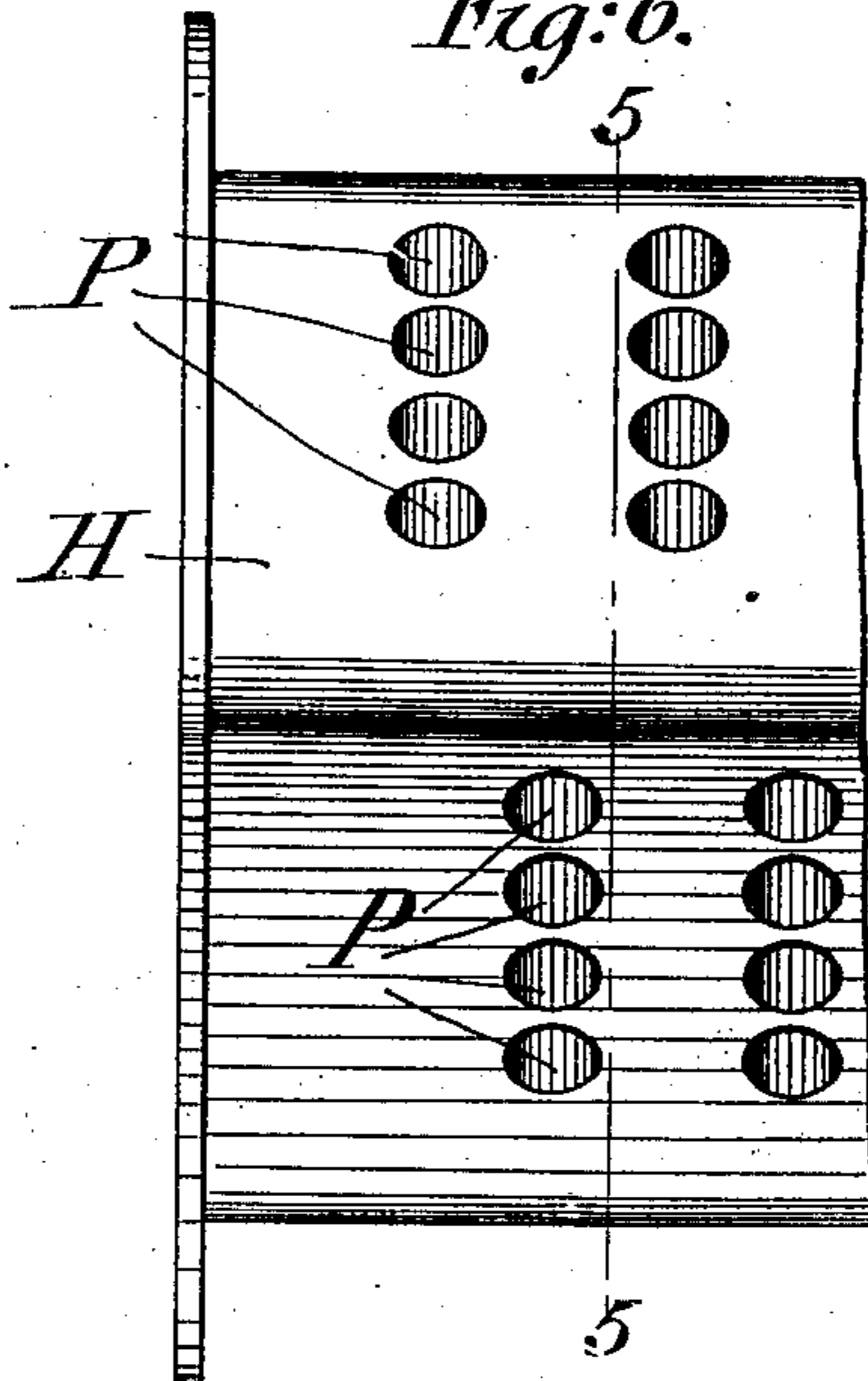
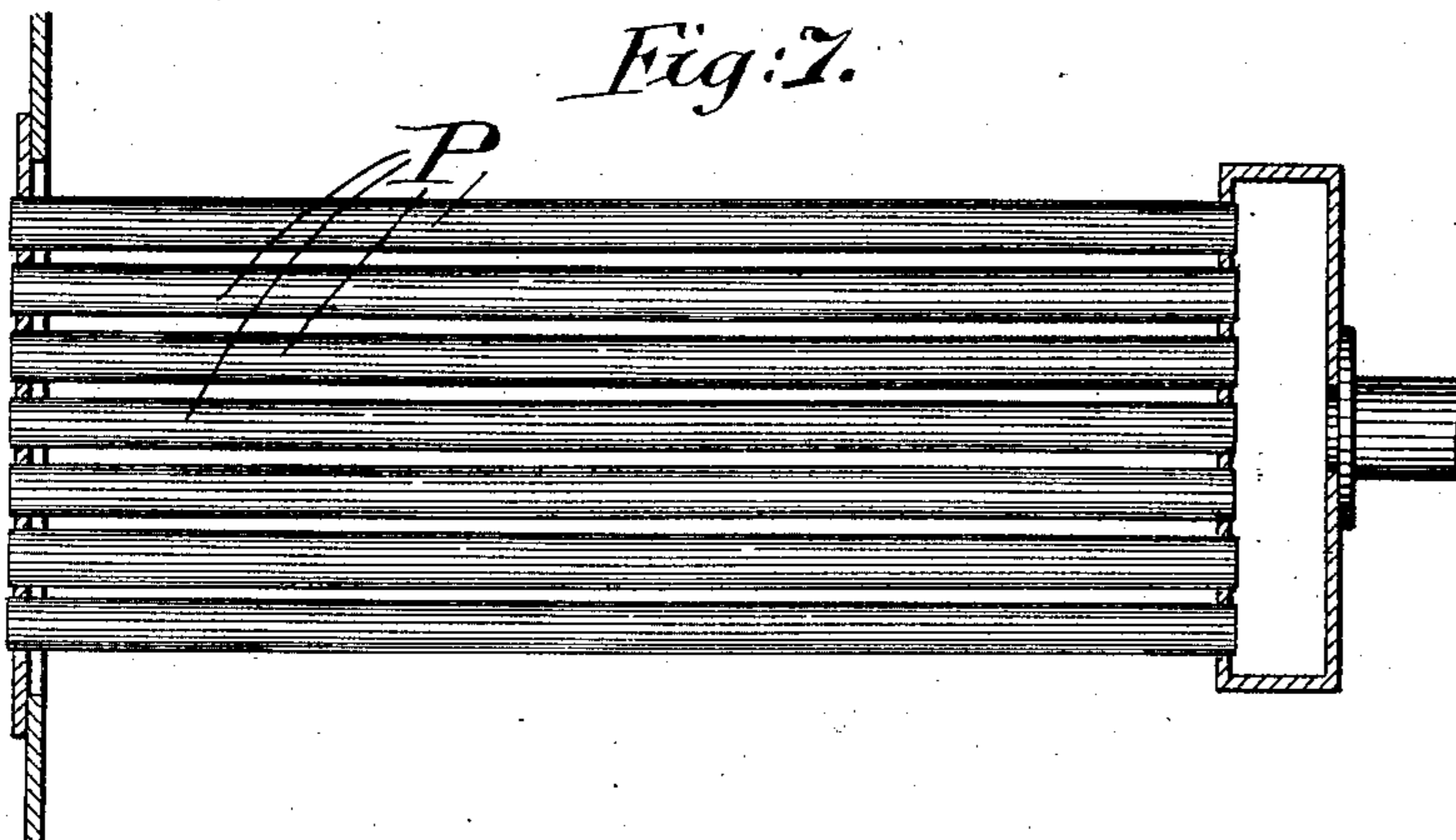


Fig:7.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WLADIMIR WITKOWICZ, OF KIEW, RUSSIA.

## MULTIPLE EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 753,777, dated March 1, 1904.

Application filed February 17, 1903. Serial No. 143,808. (No model.)

*To all whom it may concern:*

Be it known that I, WLADIMIR WITKOWICZ, a subject of the Emperor of Russia, and a resident of 30 Bolschaja Wladimirskaja, Kiew, Empire of Russia, have invented certain new and useful Improvements in Multiple Evaporating Apparatus, of which the following is a specification.

With the systems of evaporation-stations with multiple action hitherto in use the installations are, on the one hand, very expensive, owing to the many apparatus and the long piping required, and, on the other hand, a considerable condensation takes place in the vapor-conduits, as these are to be of a large sectional area in consequence of the low pressure of the vapors. This condensation ought also to be avoided. Attempts have already been made to construct multiple evaporators united in one apparatus; but thus far a suitable construction has not been created, as the establishment of a communication between the heating-surface and the steam-space of the preceding chamber in the same apparatus offers great practical difficulties. This is now attained in a very simple and practical manner by the new apparatus which forms the subject of the present invention and which is represented in the accompanying drawings, in—

Figure 1, in a longitudinal section, but showing the pipes of the heating-bodies in elevation, and in Fig. 2 in a cross-section taken on line 2 2 of Fig. 1, showing the heating-body in elevation, Fig. 3 showing a section through a special closure of the heating-bodies; Fig. 4, a section through the stuffing-box on the first heating-body through which the steam is admitted. Fig. 5 shows a section of a heating-body having the pipes arranged crosswise, taken on line 5 5 of Fig. 6. Fig. 6 shows a side elevation of one end of a heating-body having the pipes arranged crosswise, and Fig. 7 shows a heating-body provided with horizontally-arranged pipes.

Similar letters refer to similar parts throughout the several views.

The common casing *a* is by means of partition-walls *b b b* divided into as many compartments as are required for the intended multiple action of the evaporating-station—

in the present case into four compartments for a quadruple action. The partition-walls are provided in their upper parts with holes *c c c*, through which the steam generated in one compartment passes to the heating-body of the next compartment. For this purpose the steam is led in the steam-space of the next compartment through the corresponding steam-channels *d* and *f* to the steam-chamber *g*. The steam-channels *d* and *f* are, as can be seen from the drawings, partly formed by the wall of the apparatus itself and stand in rigid communication with the steam-chamber *g*, to which easy access can be had from the outside through the movable lid *h* and which has on the other side a bore, through which the socket *i* of the heating-body *k* passes and is made air-tight against the interior of the apparatus by the stuffing-box *l*. On the opposite side the evaporating-chamber *m* has been provided, which is also closed off against the outside by a movable lid *n* and through which the heating-body *k* after removal of the lid *n* and loosening of the stuffing-box *l* can be drawn out. The heating-body itself, therefore, is open in front and is made tight through flange *o* on the wall of the apparatus. Socket *p* serves to let off the waste water, socket *q* to let off the ammonia-gases. Socket *r* leads to the condenser. It can be seen that none of the conduits required in the apparatus need be removed if anything is to be done at the heating-body itself. If a heating-body is not tight or is to be cleaned, it is only necessary to remove the lids *h* and *n* and loosen the fastening of the heating-body in order to take it out of the apparatus.

The evaporating-chamber *m* is not absolutely necessary. I may also screw the heating-bodies direct to the closing-lid *s*, as shown in Fig. 3. The sockets *q* and *p* are in this case secured direct to the lid *s*, which itself is screwed tightly to the flange *t*, riveted to the wall of the apparatus.

Into the first heating-body the steam must of course enter from outside, for which purpose a special socket *u*, Fig. 4, has been provided. Here the casing of the stuffing-box *v* is secured direct in the interior of the wall of the apparatus. The socket *w*, extending out—

side, is screwed to the socket of the heating-body, so that the latter as well as the socket *w* are made tight against the interior of the apparatus. If it is necessary to remove the heating-body from the apparatus, I need only loosen the stuffing-box and screw off the socket *w*, when the heating-body can be taken out the same as the others toward the other side.

In the drawings are represented heating-bodies *H*, with pipes *P* lying crosswise; but of course bundles of pipes which have on the right and left a corresponding steam-chamber may also be used. As the ratio of transmission of heat is much higher with the heating-bodies having pipes arranged crosswise, as shown in Fig. 5, than with pipes arranged horizontally, as shown in Fig. 7, the former arrangement is preferable. In each chamber there is to be made provision for a suitable collecting appliance for any stray particles of liquid. As an example how this can be accomplished, there has been provided in the first compartment on the left the partition-wall *x* before the opening *c* in the partition-wall, and before this wall *x* a second wall *y* has been provided. These partition-walls force the vapors to pass around them, whereby the particles of liquid carried away with them become separated and are conveyed through the channel *z* again to the bottom space.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel arranged transversely to the same and extending from the bottom to the top of the vessel and having openings in the upper part of the partitions forming communication between one compartment and the next, and heating means in each of said compartments, substantially as set forth.

2. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the upper part of the same forming communication between one compartment and the next, a stuffing-box for each compartment, and removable heating-bodies in each of said compartments, said heating-bodies being secured at one end by the stuffing-box to one side of the vessel and secured at the other end direct to the other side of the vessel, substantially as set forth.

3. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the upper part of the same forming communication between one compartment and the next, a stuffing-box for each compartment secured to one side of the vessel, a lid for each compartment secured to the other side of the vessel, heating-bodies in each of said compartments, said heat-

ing-bodies being secured at one end by the stuffing-box to one side of the vessel and secured at the other end by the lid to the other side of the vessel, and a chamber at the stuffing-box end of the heating-body, substantially as set forth.

4. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the upper part of the same forming communication between one compartment and the next, heating-bodies in each of said compartments, chambers at each side of the compartments at the ends of the heating-bodies, and detachable lids for said chambers, substantially as set forth.

5. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the upper part of the same forming communication between one compartment and the next, heating-bodies in each of said compartments, a feed-tube for the heating-body in the first of said compartments, and a stuffing-box for hermetically closing both the heating-body and the feed-tube against the interior of the vessel, substantially as set forth.

6. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the upper part of the same forming communication between one compartment and the next, heating means in each of said compartments, chambers at the ends of the heating means of each compartment, and a pipe connected with the opening of the partition and with one of the chambers at the end of the heating means, substantially as set forth.

7. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the upper part of the same forming communication between one compartment and the next, heating means in each of said compartments, chambers at the ends of the heating means of each compartment, and a pipe formed integral with the wall of the vessel and connected with the opening in the partitions and with one of the chambers, substantially as set forth.

8. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the same forming communication between one compartment and the next, heating means in each of said compartments, and a wall before each opening of the partitions and in proximity thereto extending downwardly from the top of the vessel, substantially as set forth.

9. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of

compartments and having openings in the same forming communication between one compartment and the next, heating means in each of said compartments, a wall before each opening of said partitions and in proximity thereto extending downwardly from the top of the vessel, and a second wall in front of said first wall in proximity thereto and extending up to some distance from the top of the vessel, substantially as set forth.

10. A multiple evaporating apparatus, comprising a closed vessel, a plurality of vertical partitions in said vessel forming a plurality of compartments and having openings in the same forming communication between one compartment and the next, heating means in each of said compartments, a wall before each

opening of said partitions and in proximity thereto extending downwardly from the top of the vessel, a second wall in front of said first wall in proximity thereto and extending up to some distance from the top of the vessel, and a channel connected with said second wall extending downwardly to the heating means in said compartments, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WLADIMIR WITKOWICZ.

Witnesses:

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EDMUND B. DE ST. CLAIR.