

C. W. MERRILL.
PRESSURE FILTER.

APPLICATION FILED JUNE 3, 1905. RENEWED JULY 29, 1908.

900,184.

Patented Oct. 6, 1908.

2 SHEETS—SHEET 1.

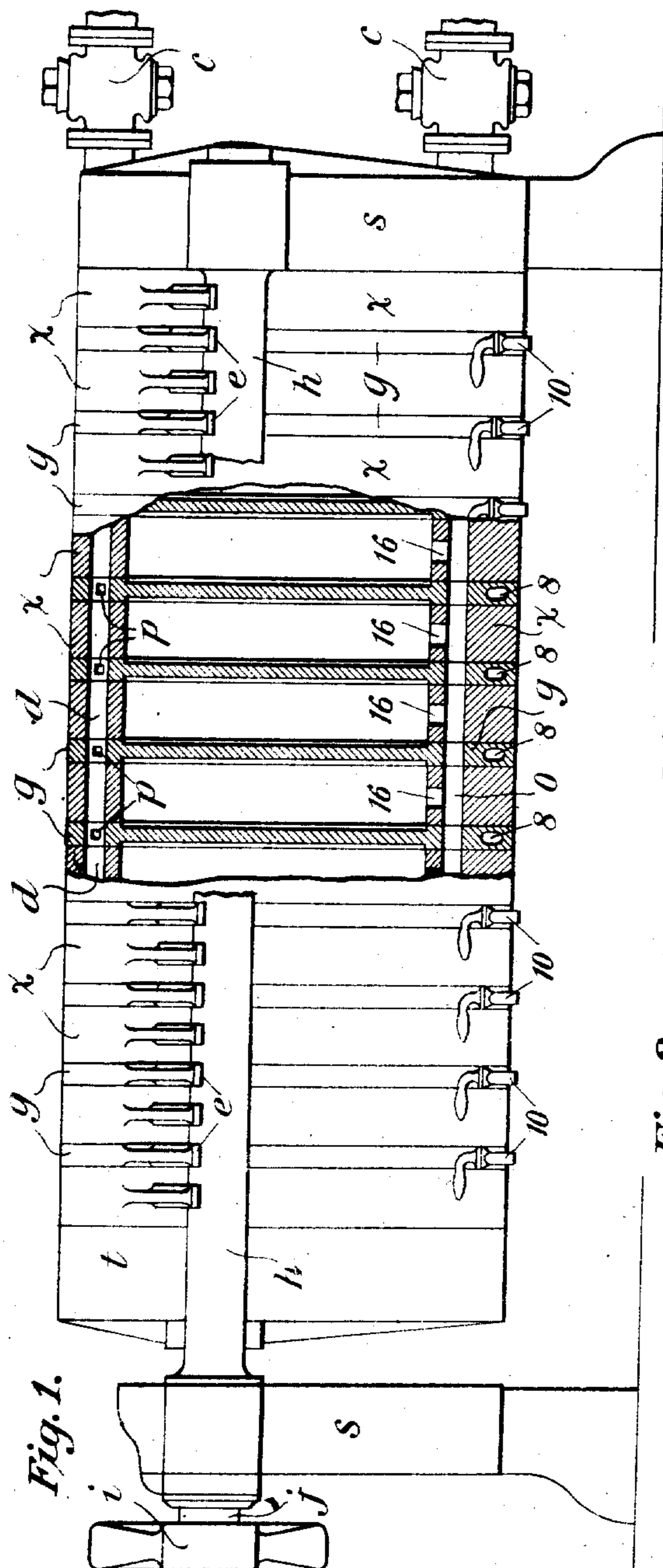


Fig. 1.

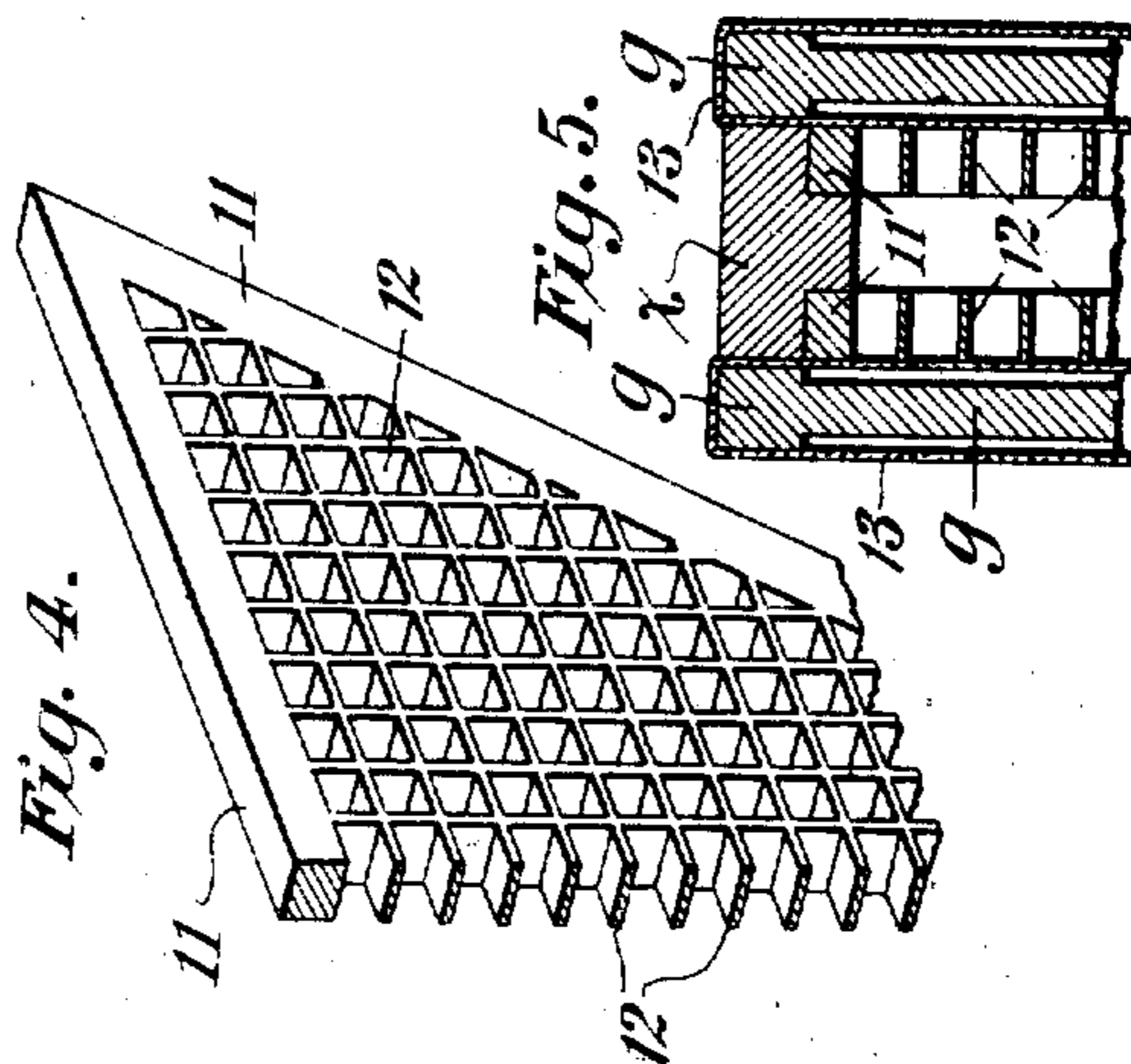


Fig. 4.

Fig. 3.

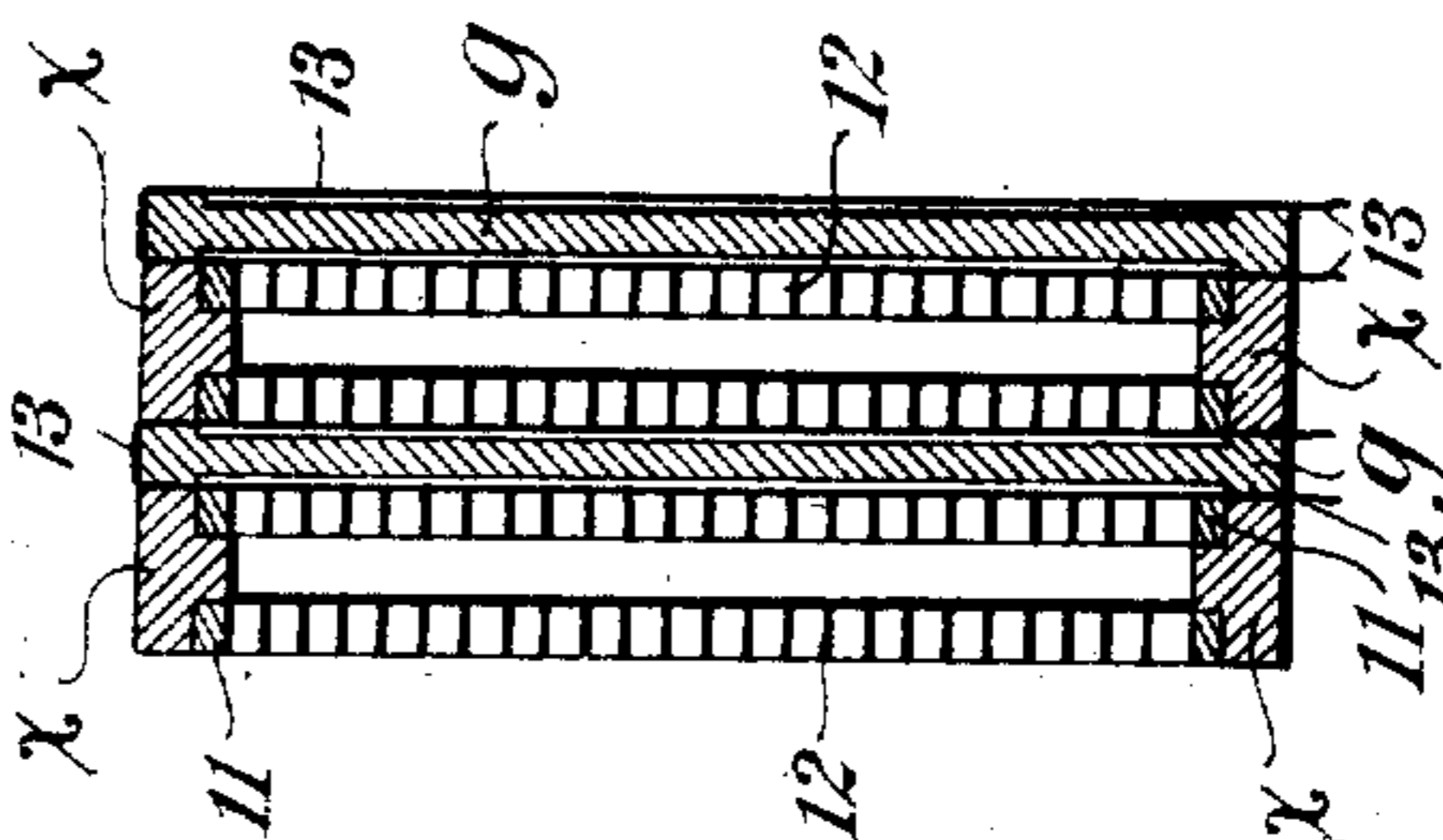


Fig. 2.

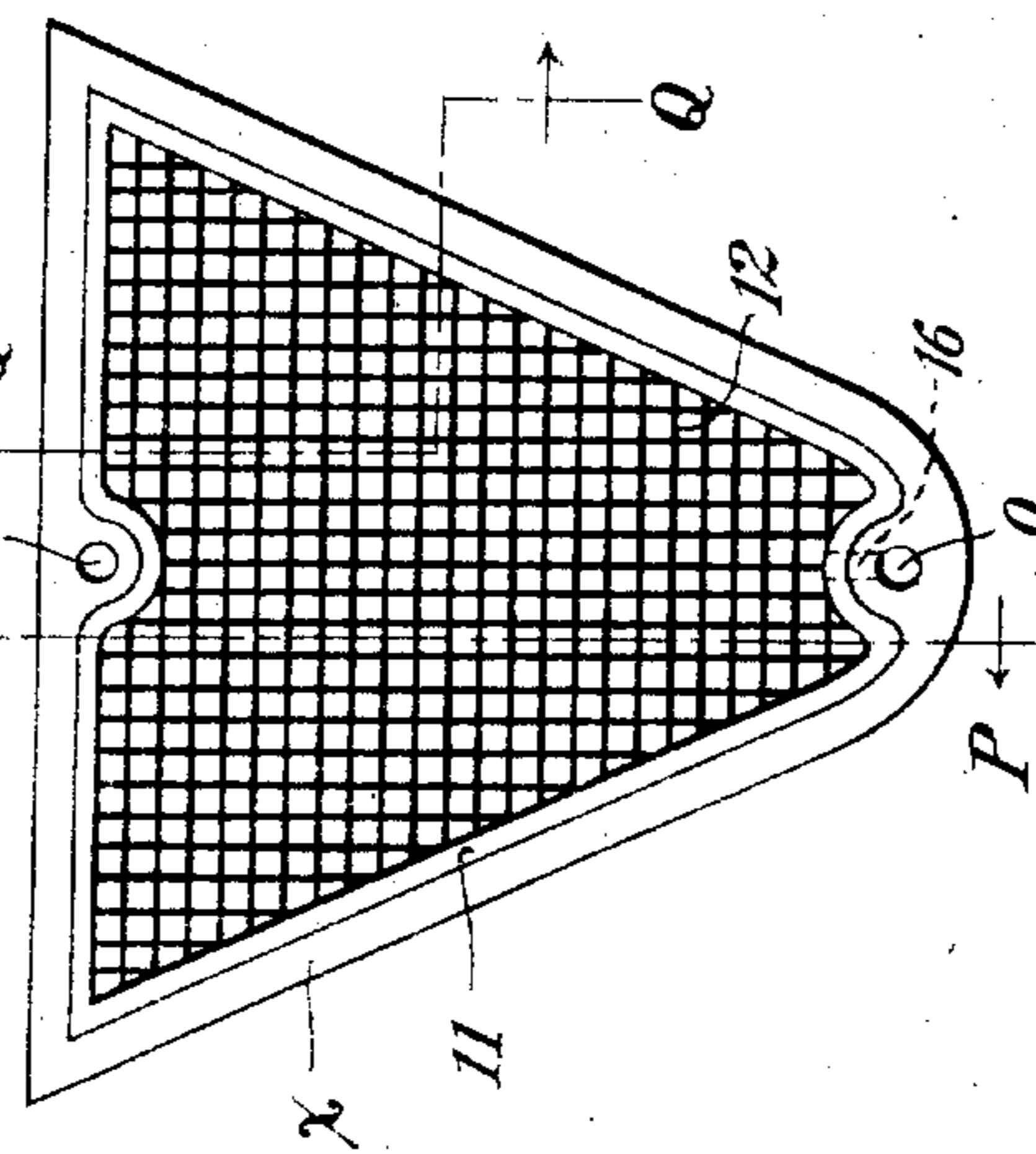
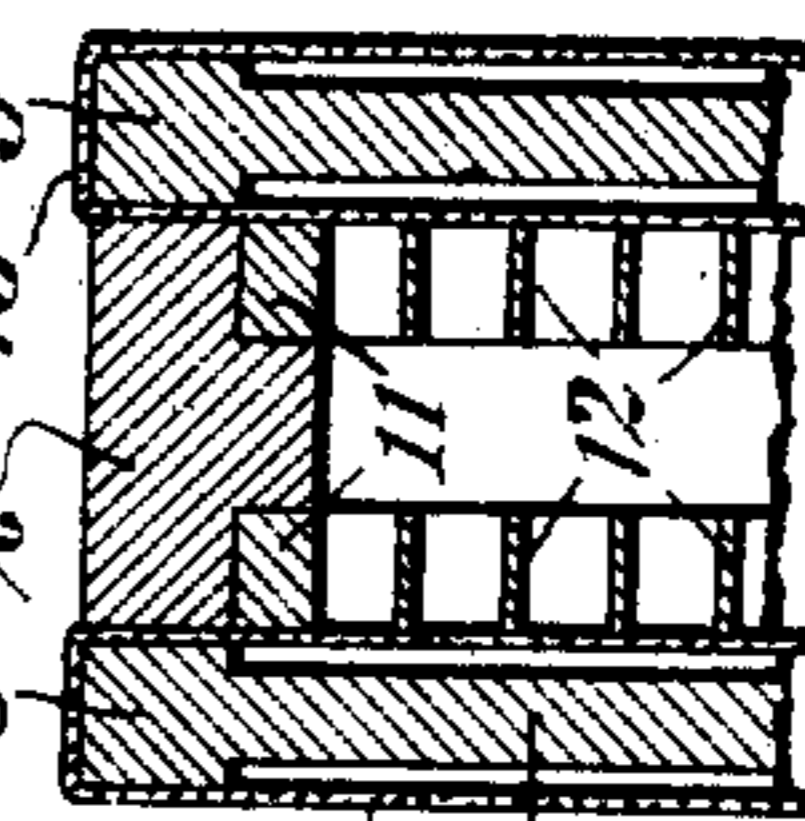


Fig. 5.



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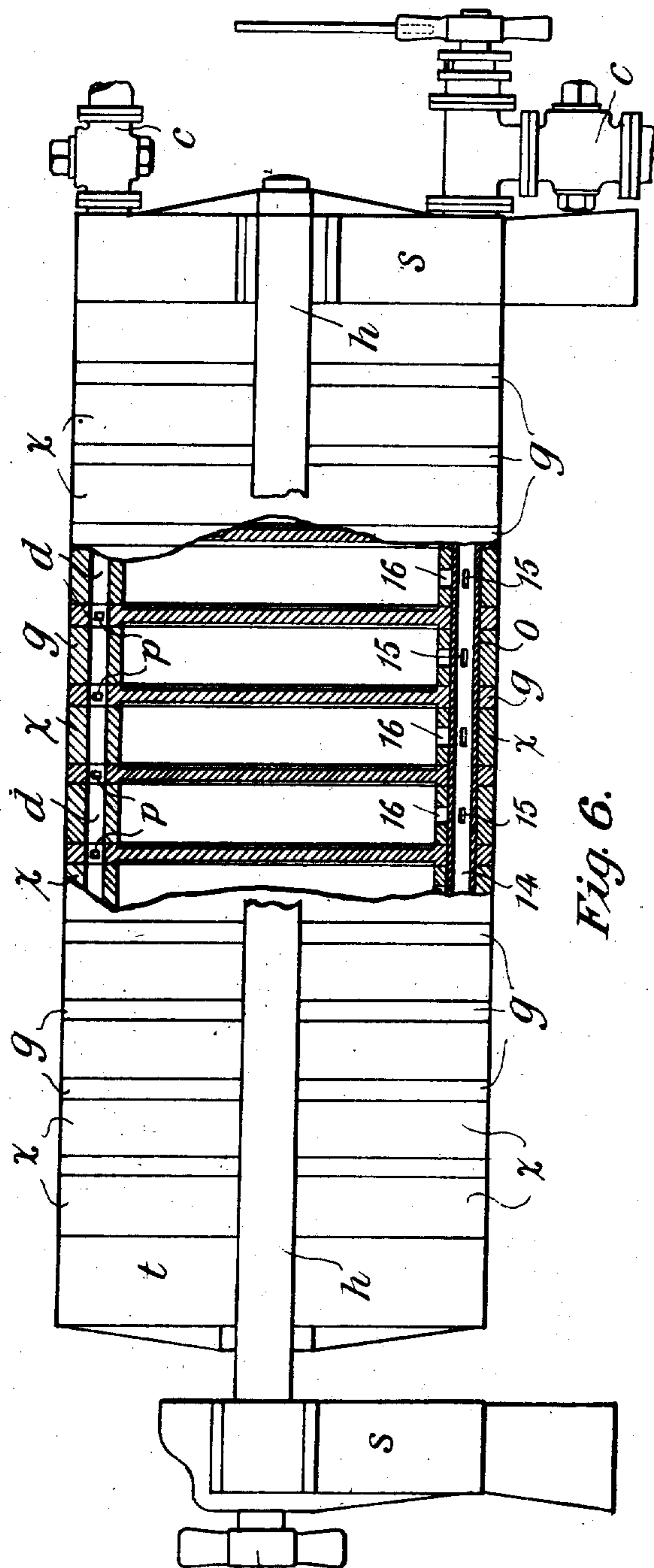


Fig. 6.

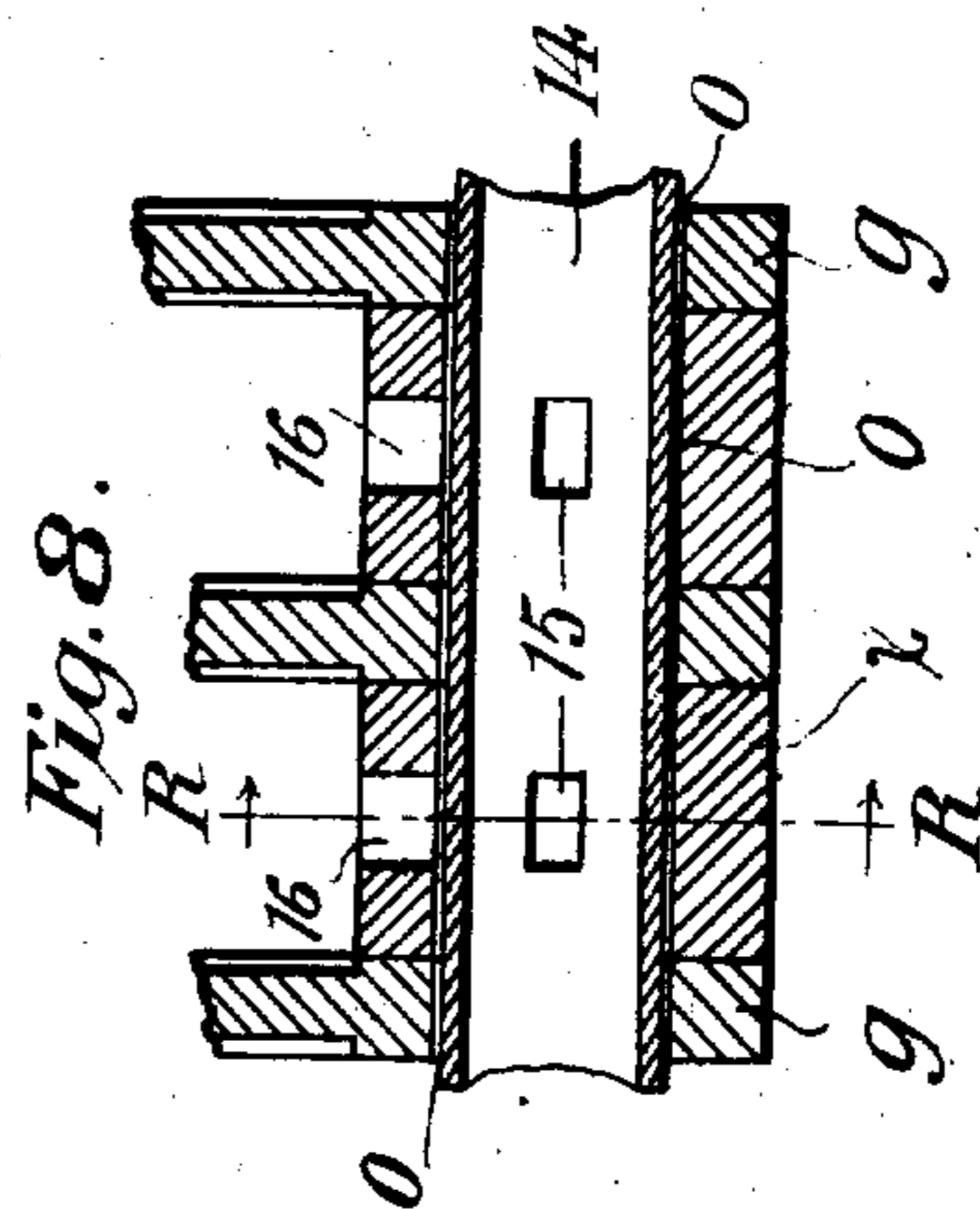


Fig. 8.

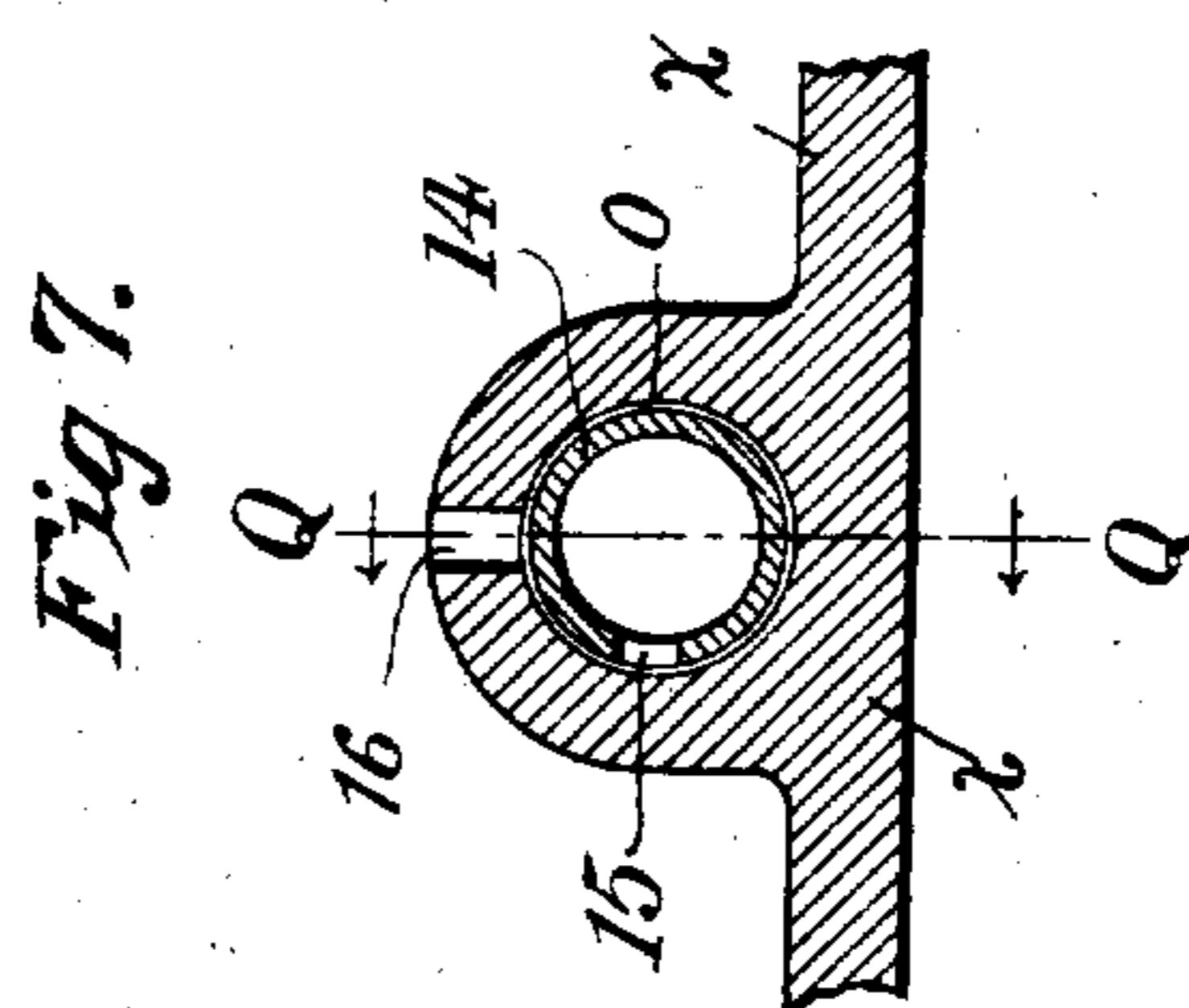


Fig. 7.

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UNITED STATES PATENT OFFICE.

CHARLES W. MERRILL, OF LEAD, SOUTH DAKOTA.

PRESSURE-FILTER.

No. 900,184.

Specification of Letters Patent.

Patented Oct. 6, 1908.

Application filed June 3, 1905, Serial No. 263,511. Renewed July 29, 1908. Serial No. 445,925.

To all whom it may concern:

Be it known that I, CHARLES W. MERRILL, a citizen of the United States, and resident of Lead, Lawrence county, State of South Dakota, have invented certain new and useful Improvements in Pressure - Filters, of which the following is a specification.

My invention relates to improvements in apparatus for separating unfilterable material from a mixture of filterable and unfilterable matter, and it particularly relates to improvements in pressure filters in which the separation of such materials is effected and in which the unfilterable matter is subsequently subjected to metallurgical treatment.

The object of my invention is to provide devices for maintaining a comparatively thick layer of precipitant and precipitate on the cloths of the filter plates through which the solution has to pass, in filter presses which are composed of a series of containers and filter plates, and particularly presses in which containers and filter plates are employed, the sides of which converge toward the bottom inlet, and the object of maintaining such comparatively thick layer is to insure practically a molecular contact between the precipitant and the solution to be precipitated, thereby effecting much more thorough precipitation.

A further object is to provide devices which will prevent the material in the containers from settling back into the channels of the press when the latter is not in use. This I accomplish by means of a continuous valve arrangement for closing all inlets.

The invention will be best understood by reference to the accompanying two sheets of drawings, in which

Figure 1 is an elevation partly in section, of a filter press of the type aforesaid; Fig. 2 shows the container of the press changed to embody the present invention; Fig. 3 shows a vertical section of the present invention, on the line P, P of Fig. 2, looking in the direction of the arrows, and Fig. 4 shows a partial perspective of a part of the invention on the line Q Q of Fig. 2, looking in the direction of the arrows; Fig. 5 is an enlarged sectional view of the container plates and grilles showing the filter cloths in place; Fig. 6 shows an elevation, partly in cross-section, of a press provided with a continuous valve arrangement for closing all inlets to the containers if the press is not in use; Figs. 7 and 8 are en-

larged detailed views of parts of the mechanism shown in Fig. 6.

Similar letters refer to similar parts throughout the views.

In Fig. 1 of the drawings, *s* represents the standards at either end of the press, *h* the frame of the press, *j* is the screw which forces the end *t* forward on the frame by means of the handle *i*, *x x* are the exterior frames of the series of containers, *g g* are the filter plates, *c c* the inlet pipes. All of these devices and parts, are common to the ordinary form of filter press.

e e are lugs upon which the containers and filter plates are supported upon the frame *h*; *d* is an inlet through which the liquids, vapors or gas may be introduced behind the filter cloths; *o* is an opening or inlet at the bottom, through which the solid, semi-solid or unfilterable material (hereinafter for convenience called the "precipitant") is introduced into the containers through the port 16. When a series of containers is put together in a filter press, the opening *o* makes a continuous opening through the press which is closed at the ends in any convenient manner.

8 8 are the outlets in each of the filter plates, which are provided for the effluent liquids, vapors or gases, and in the form of open delivery shown in Fig. 1, they terminate in each case in the stop cocks 10 which discharge into a trough of suitable dimensions.

In Fig. 2, *x* represents the container, the sides of which are made converging as shown. Into this is inserted a grille 12, which is set in the frame 11, which rests in a recess or depression in the outer vertical face of the container *x*, as shown in Fig. 3. The grille or grating is composed of a series of sheet metal strips of a width equal to the thickness of the grille. The grille corresponds in shape to the shape of the container and the filter plate and is fitted tightly into the recess on the edge of the container. The filter cloths 13, or other filtering media shown in Fig. 5, are placed between the surface of the filter plate and the face of the grille and in this way spaces are formed in front of the filter cloth on each side of the container, in which the precipitant collects and is held. As a result thereof, the solution to be precipitated must pass through a thicker layer of precipitant than could be otherwise formed upon the surface of the cloths provided the grille was not there, thus promoting the efficiency of the precipitation.

In Figs. 5, 6 and 7, *o* represents the inlet through which the mixture of precipitant and liquid is introduced, and which is provided, as shown in these figures, with an interior pipe 14, capable of being rotated within the press, which pipe extends the entire length of the press. The containers are each provided with an opening 16, and opposite each such opening in the pipe 14 is a corresponding opening 15. The effect of rotating the pipe 14 in the opening *o* would be to open or close the opening 16 as shown in these views. The shape of the container may vary from time to time, provided however that in all cases the sides converge toward the bottom in the manner shown.

The method of operation is as follows: The material to be filtered, consisting of a liquid, gas or vapor and the semi-solid or unfilterable material for convenience called the precipitant, is brought into the container *x* through the bottom inlet channel *O*. The plates 9 9 are covered with filtering material, which completes the closure of the filters *x*, so far as the unfilterable material is concerned, while the liquid, gas or vapor pass through the filtering medium and out through the grooves in the filter plate. The effect of the employment of the grilles or gratings 11, so placed in the containers as to leave a space between the interior of the container and the cloths of the filter plates, is to maintain at all times a comparatively thick layer of precipitate upon the cloths through which the solution is to pass. The clarified liquid passes out from the filter plate 9 by means of the opening 8, either into a continuous channel within the press, or through openings closed by suitable stop cocks into a trough in the case of an open discharge. The unfilterable contents of the containers *x*, is deposited upon the plates 9 and may be then leached or treated if desired while in place, by forcing liquid or gas through it, when vapor or gas may be then introduced by means of inlet *d* which connects with the plate. When the desired treatment of the precipitant and precipitate in the containers has been completed, the containers are then opened and are cleaned up by hand, and new cloths are then inserted and the outlets are

closed and the pressure filter is again ready for charging. When it is desired to suspend the use of the press or prevent the material in the containers from settling back into the feed channel, the pipe 15 is rotated, and the ports 16 are closed until such time as the press is to be used again.

I claim as my invention:

1. In a pressure filter, the combination with a container, of a grille or grating placed on either side thereof entirely within the same and in such position that when the container is put together with the filter plates in a filter press, said grille will retain a layer of unfilterable matter or precipitate.

2. In a pressure filter a series of containers, the sides of which converge toward the bottom substantially as set forth, each having an opening in the bottom angle forming a continuous channel entirely within the press when the containers are put together, and an opening which opens directly upward from said channel into the interior, and devices substantially as described whereby the openings into the containers may be closed at will.

3. In a pressure filter the combination with the feed channel, of a rotative pipe placed therein, provided with a series of ports, each one of which corresponds with and comes opposite to the inlet port of each container, whereby by the rotation of the pipe, closure of each port of all the containers is effected.

4. In a pressure filter the combination with the feed channel, of a rotative pipe placed therein, provided with a series of ports, each one of which corresponds with and comes opposite to the inlet port of each container, whereby by the rotation of the pipe, closure of each port of all the containers is effected, and means for rotating the pipe substantially as described.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 17th day of May 1905.

CHARLES W. MERRILL.

Witnesses:

H. E. JOHNSTON,
H. C. STEINBACH.