

No. 617,860.

Patented Jan. 17, 1899.

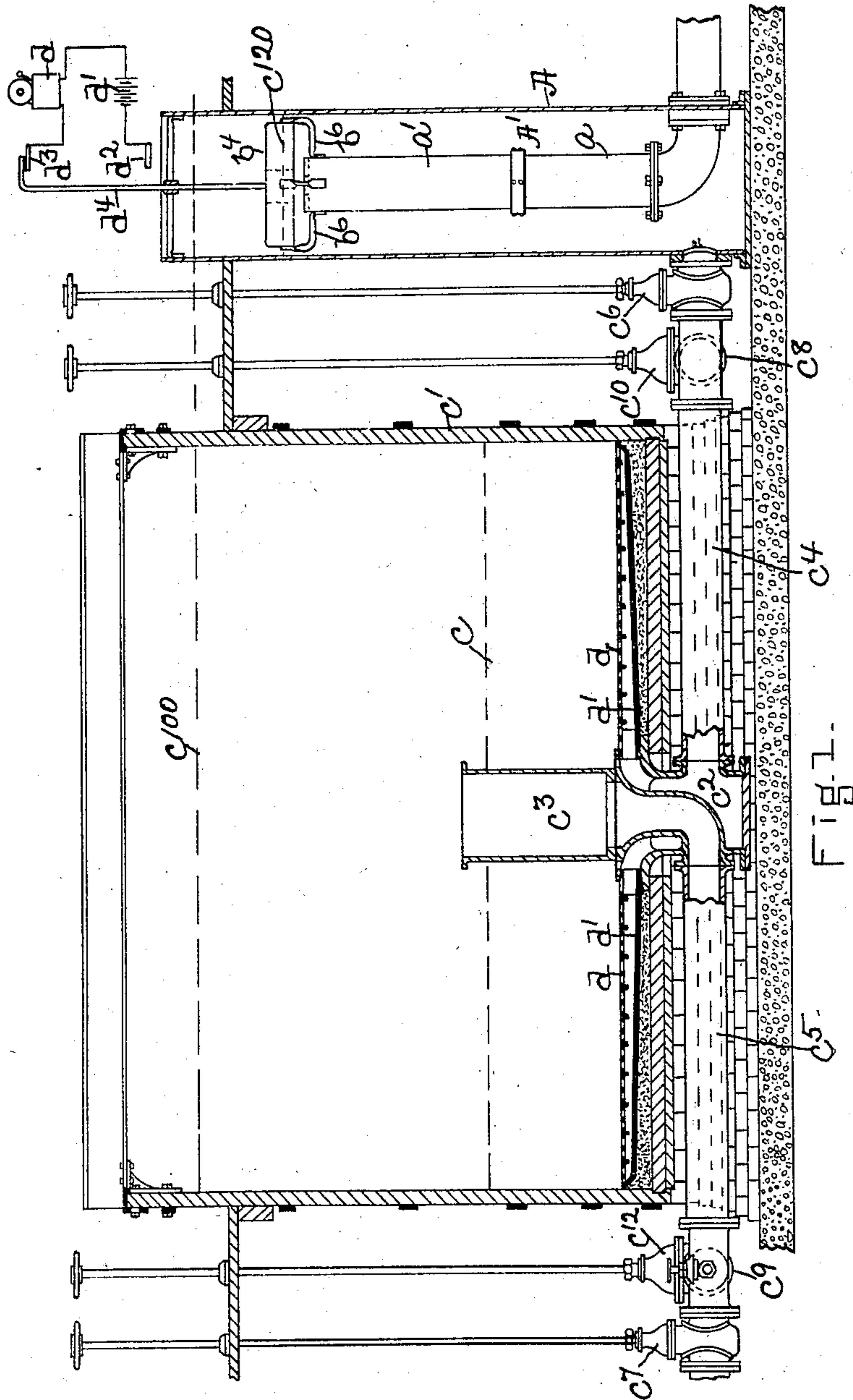
W. B. NYE.

AUTOMATIC REGULATING WEIR FOR FILTERS.

(Application filed Jan. 27, 1898.)

(No Model.)

3 Sheets—Sheet I.



WITNESSES.

Matthew M. Blunt.

J. Murphy.

INVENTOR.

Walter B. Nye

by Jas. H. Churchill

ATTY.

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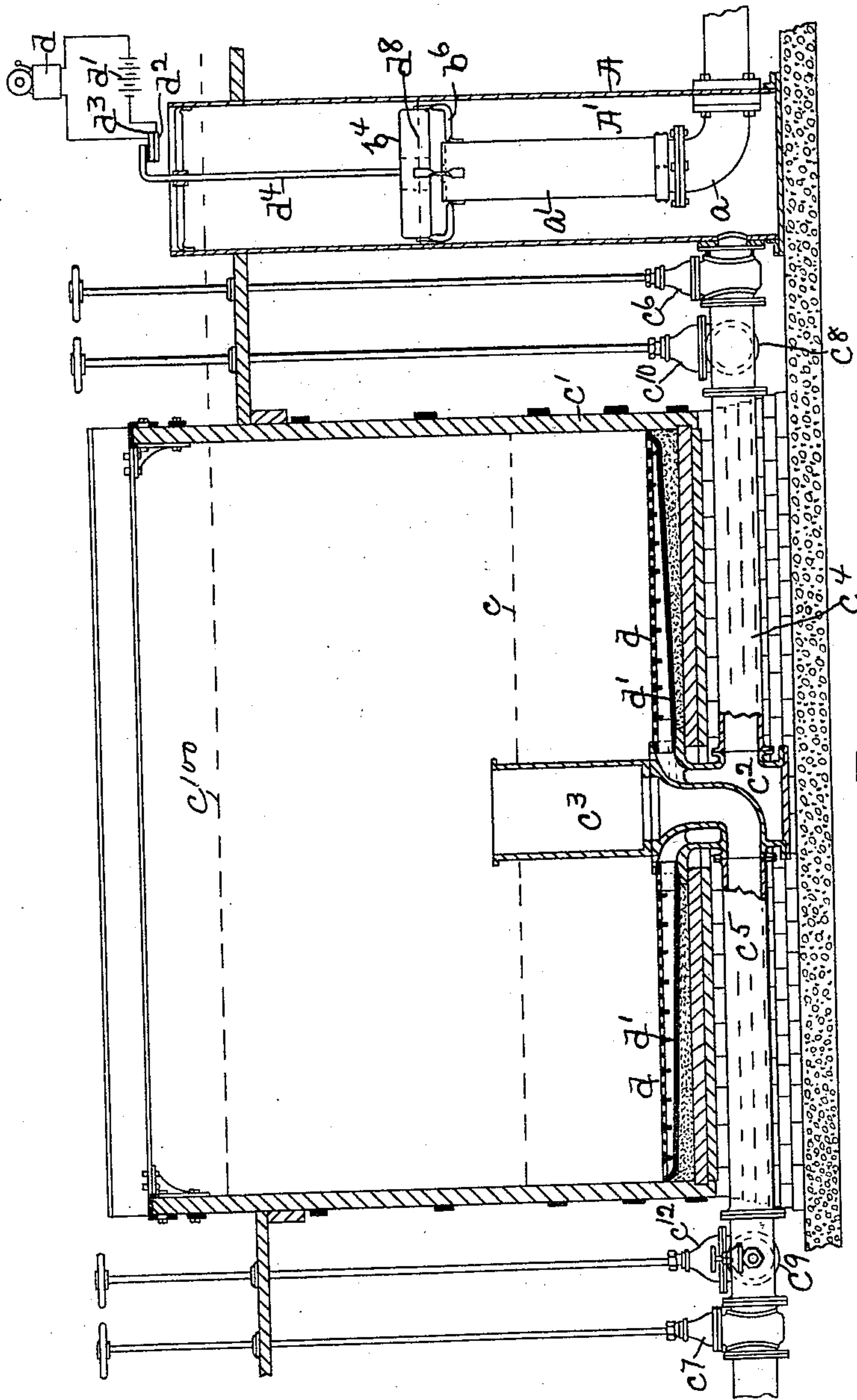
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3 Sheets—Sheet 2.



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Matthew M. Blunt.  
J. Murphy.

INVENTOR.  
Walter B. Nye  
by Jas. H. Churchill  
ATT'Y.

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3 Sheets—Sheet 3.

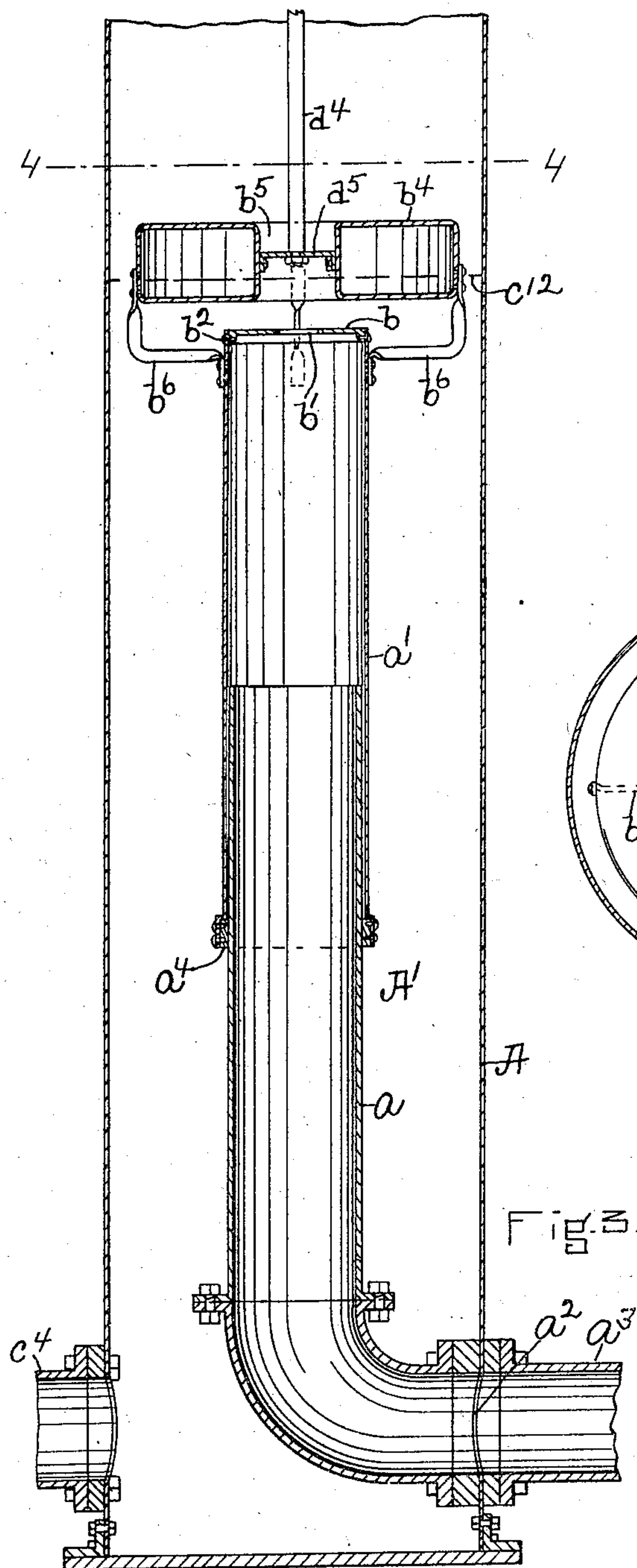


Fig-4.

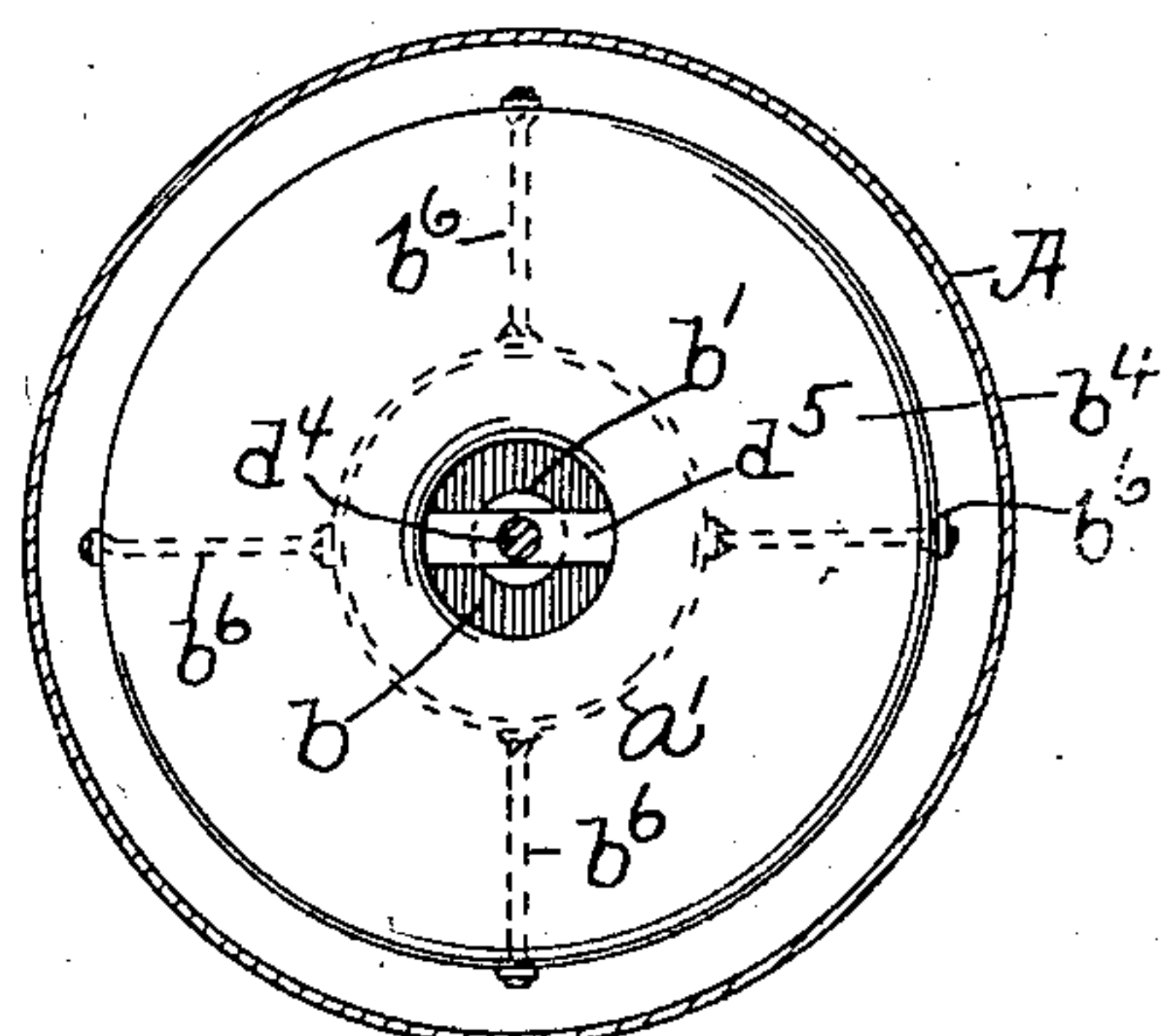


Fig. 3.

WITNESSES.

Matthew M. Blunt.  
J. Murphy.

INVENTOR

Walter B. Nye

By Jas. H. Churchill

ATTY



# UNITED STATES PATENT OFFICE.

WALTER B. NYE, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NEW YORK FILTER MANUFACTURING COMPANY, OF NEW JERSEY.

## AUTOMATIC REGULATING-WEIR FOR FILTERS.

SPECIFICATION forming part of Letters Patent No. 617,860, dated January 17, 1899.

Application filed January 27, 1898. Serial No. 668,223. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER B. NYE, a citizen of the United States, residing in Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Automatic Regulating-Weirs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to an automatic regulating-weir especially designed and adapted, among other uses, to be employed in connection with mechanical filters to secure a constant rate of discharge of filtered water from the weir tank or chamber irrespective of the height of the water column in said weir-tank and irrespective of the condition of the filter-bed.

Another feature of this invention consists in providing an alarm which is operated when the water in the weir-tank has been lowered to a predetermined point, thereby giving notice of the condition of the filter, as will be described.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a vertical section of one form of a mechanical filter provided with an automatic regulating-weir embodying this invention; Fig. 2, a similar view with the weir at a lower level in the weir tank or vessel; Fig. 3, a detail of the weir-tank and weir on an enlarged scale; and Fig. 4, a sectional detail on the line 4 4, Fig. 3.

The automatic regulating-weir forming the subject of this invention may and preferably will be made as herein shown; and it consists, essentially, of a tank or vessel A, provided within it with a telescopic discharge or outlet pipe A', composed, as shown in the present instance, of a rigid upright section *a* and a movable section *a'*, the section *a* being suitably connected to the tank or vessel A and communicating with a port or opening *a*<sup>2</sup> near the bottom thereof, and with which also communicates a pipe *a*<sup>3</sup>, located outside the said tank and forming a continuation of

the outlet or discharge pipe A'. The movable section *a'* is adapted to slide upon the section *a*, and in the present instance is fitted over the section *a* and rendered liquid-tight by a packing-ring *a*<sup>4</sup>.

The movable section *a'* is provided at its upper end with a weir, preferably made as herein shown and consisting of a diaphragm, disk, or plate *b*, having one or more openings *b'* in it, through which the water or other fluid passes into the discharge or outlet pipe A'. The diaphragm *b* in the present instance is shown as provided with one substantially large central opening, and the said diaphragm may be detachably secured to the movable pipe or section *a'* in any suitable manner, as by screws *b*<sup>3</sup>. (See Fig. 3.) The movable section *a'* of the outlet-pipe has connected to it a float, preferably of the construction herein shown, it consisting of a hollow air-tight casing *b*<sup>4</sup>, preferably of cylindrical shape and having a central opening *b*<sup>5</sup>, substantially in line with the opening *b'* in the diaphragm *b*. The hollow casing or float *b*<sup>4</sup>, as herein shown, is of greater diameter than the movable section *a'* of the outlet-pipe and is supported above the diaphragm *b* in any suitable manner—as, for instance, by arms *b*<sup>6</sup>. The float *b*<sup>4</sup> is supported above the diaphragm *b*, so as to obtain a constant head of water above the diaphragm irrespective of the position of the weir in the tank or vessel A, which results in the water in the weir-tank being discharged therefrom at a constant rate irrespective of the condition of the filter-bed *c* in the filter-tank *c'*. The filter-tank *c'* herein shown is provided with a central well having two chambers *c*<sup>2</sup> *c*<sup>3</sup>, and the said well extends above the surface of the filter-bed *c* and below the bottom of the filter-tank *c'*. The chamber *c*<sup>2</sup> is connected by the pipe *c*<sup>4</sup> to the weir-tank near its bottom, as herein shown, and the said chamber *c*<sup>3</sup> has connected to it the supply-pipe *c*<sup>5</sup> for the unfiltered water. The pipes *c*<sup>4</sup> *c*<sup>5</sup> are provided with valves *c*<sup>6</sup> *c*<sup>7</sup> and have connected to them branch pipes *c*<sup>8</sup> *c*<sup>9</sup>, provided with valves *c*<sup>10</sup> *c*<sup>11</sup>. The branch pipe *c*<sup>8</sup> is connected to a supply of filtered water, which is used to wash the filter-bed, and



the branch pipe  $c^9$  is connected to the sewer, into which the wash-water is discharged. The filter-bed  $c$ , as herein shown, rests upon a perforated bottom  $d$ , resting upon collecting pans or trays  $d'$ , which communicate with the chamber  $c^2$  of the central well. The particular construction of filter herein shown is not herein claimed, as it forms the subject-matter of another application, Serial No. 664,899, filed by myself and Franklin Agge December 31, 1897.

In operation the unfiltered water in the filter-tank  $c'$ , the level of which is indicated by the dotted line  $c^{100}$ , passes through the filter-bed into the chamber  $c^2$ , and thence through the pipe  $c^4$  into the weir-tank A, which it fills up to the level indicated by the dotted line  $c^{120}$ . At the beginning of the filtering process the filter-bed is clean and the process of filtration is comparatively rapid and the column of filtered water in the weir-tank is highest at that time and the movable section  $a'$  of the discharge or outlet pipe is lifted into substantially the position shown in Fig. 1. As the process of filtration proceeds the filter-bed becomes gradually clogged by the arrested matter and the filtered water flows into the weir-tank at a gradually-decreasing rate, so that the height of the column of water in the weir-tank diminishes, and as it diminishes the float  $b^4$  descends, thereby lowering the movable section of the outlet or discharge pipe to adapt the latter to the height of the column of filtered water, and thereby obtain a constant rate of discharge of filtered water irrespective of the condition of the filter-bed. By means of the diaphragm or weir  $b$  on the upper end of the outlet-pipe section  $a'$ , which practically closes said end except as to the orifice  $b'$ , and by means of the float supported above the end of said pipe-section a constant head of water is obtained above the opening in the weir, which insures the water being under a constant pressure or head irrespective of the height of the column of water in the weir-tank, and consequently insures a uniform discharge of filtered water from said weir-tank. The area of the opening  $b'$  in the diaphragm  $b$  may be increased or decreased, as desired, to control the volume and rate of discharge of the filtered water. By making the diaphragm or weir  $b$  detachable from the pipe  $a'$  any desired rate of discharge of water may be obtained by substituting for one having an opening of a given discharging capacity a second diaphragm having an opening or openings of different discharging capacity. The diaphragm or weir  $b$  closes the upper end of the pipe  $a'$ , except as to the openings  $b'$  in it. When the column of water in the weir-tank has been lowered to a predetermined point, it is desirable that notice of this fact should be given, as at that time the filter-bed should be washed, and to obtain this notice I prefer to employ an alarm which is operated automatically by the movable section of the outlet-pipe or by the float, as shown in

the present instance. The alarm referred to is represented as an electrically-operated gong or bell  $d$ , included in a normally open circuit containing a battery  $d'$  and provided with a fixed line-terminal  $d^2$  and a movable line-terminal  $d^3$ , which is shown as secured to a rod  $d^4$ , fastened to a cross-bar  $d^5$ , attached to the float  $b^4$  within the opening  $b^5$ .

Under normal conditions the circuit of the bell  $d$  is open, as shown in Fig. 1, but when the level of the water in the weir-tank has been lowered to a predetermined point indicated by the dotted line  $d^3$ , Fig. 2, the circuit of said bell will be closed, as indicated in Fig. 2, and notice will thereby be given that the filter-bed  $c$  should be washed.

I have herein shown one form of mechanical filter with which my invention may be used; but I do not desire to limit myself in this respect, as it may be used with other forms of filter.

I claim—

1. The combination of the following instrumentalities, viz:—a filter provided with an outlet for the filtered liquid, a weir tank or vessel connected to said filter for the admission of filtered liquid, an outlet-pipe for said weir-tank having a movable inlet-section provided with a diaphragm having an orifice, and a float connected to said inlet-section to raise and lower the same as the column of liquid in the weir-tank varies, for the purpose specified.

2. An automatic regulating-weir comprising a tank or vessel provided with an outlet-pipe extended up within it and having a movable upper section, a diaphragm attached to the upper end of said movable section of the outlet-pipe and provided with an orifice for the passage of the liquid into said outlet-pipe, and a float supported above and connected to said movable section of the outlet-pipe, for the purpose specified.

3. An automatic regulating-weir comprising a tank or vessel provided with an outlet-pipe extended up within it and having a movable upper section, a diaphragm detachably attached to the upper end of said movable section of the outlet-pipe and provided with an orifice for the passage of the liquid into said outlet-pipe, and a float supported above and connected to said movable section of the outlet-pipe, for the purpose specified.

4. An automatic regulating-weir comprising a tank or vessel having a liquid-inlet near its bottom, and a liquid-outlet pipe connected to said vessel at its lower end or bottom and extended up within said tank or vessel and provided with a movable upper section, a removable diaphragm provided with an orifice of predetermined discharging capacity and attached to the movable section of said outlet-pipe, and a float connected to said movable section and supported above said diaphragm, substantially as and for the purpose specified.

5. The combination of the following instrumentalities, viz:—a filter, an automatic regu-



lating-weir connected therewith for the admission of filtered liquid and comprising a tank or vessel having an outlet-pipe provided with a movable section, a float attached to  
5 said movable section, and an alarm mechanism governed by said float or movable section and rendered active when the column of liquid in the said tank reaches a predetermined point, substantially as described.

10 6. An automatic regulating-weir comprising a tank or vessel provided with an outlet-pipe extended up within it and having a movable upper section, a transverse disk, plate or diaphragm attached to the upper end of

said movable section of the outlet-pipe and 15 provided with an orifice for the passage of the liquid into said outlet-pipe of less area than the area of said outlet-pipe, and a float attached to said movable section of the outlet-pipe, substantially as described. 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER B. NYE,

Witnesses:

JAS. H. CHURCHILL,

J. MURPHY.