

J. A. BOWDEN
FILTER.

No. 522,043.

Patented June 26, 1894.

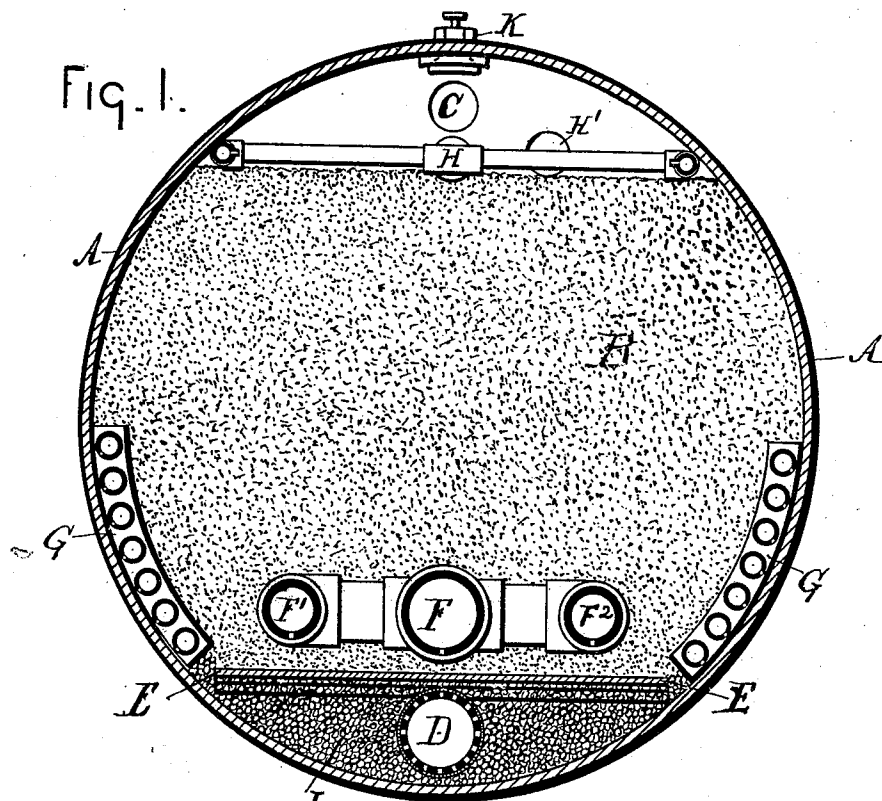


Fig. 2.

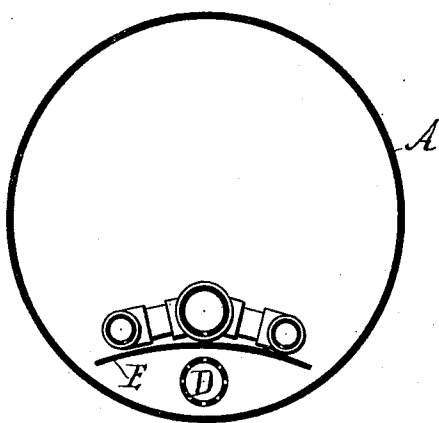
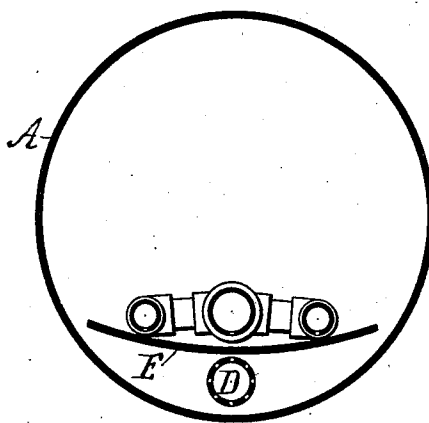


Fig. 3.



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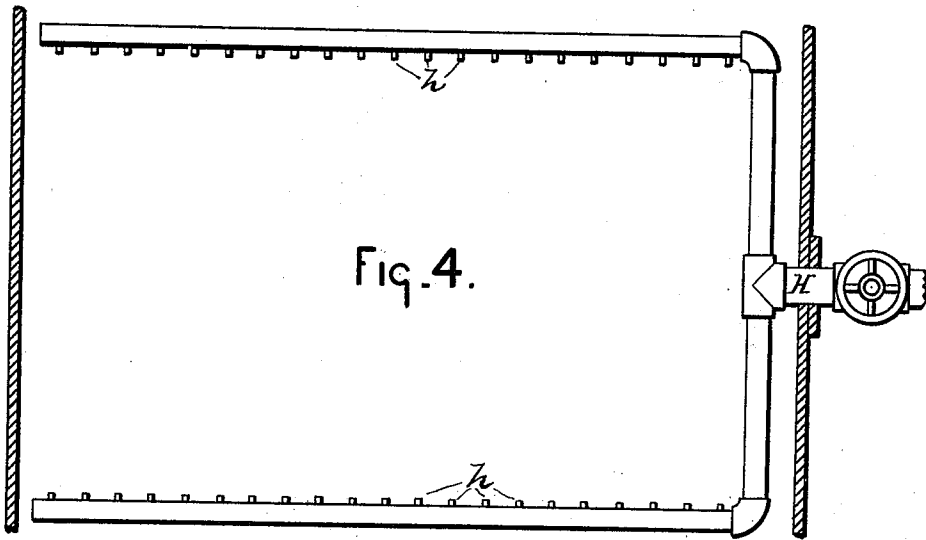


Fig. 4.

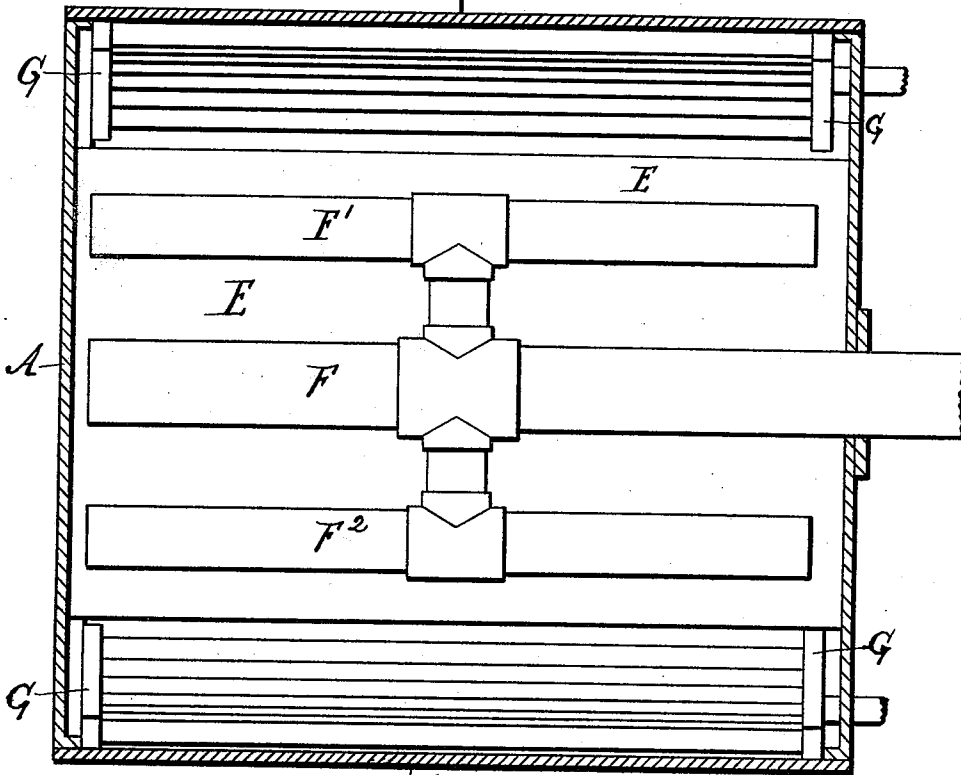


Fig. 5.

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FIG. 6.

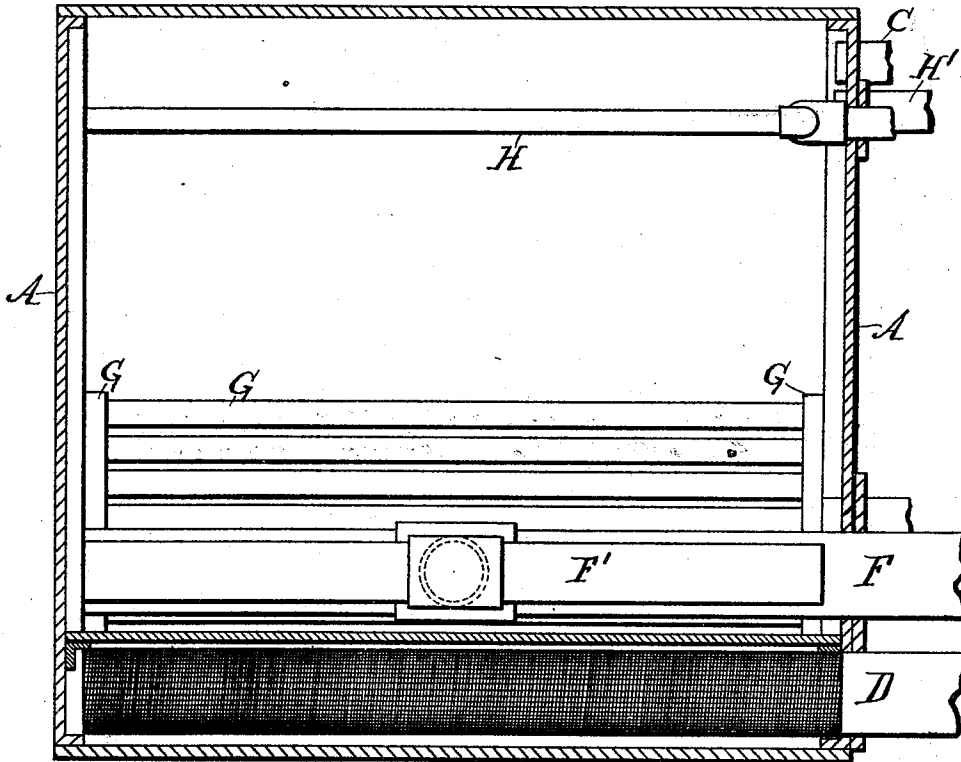
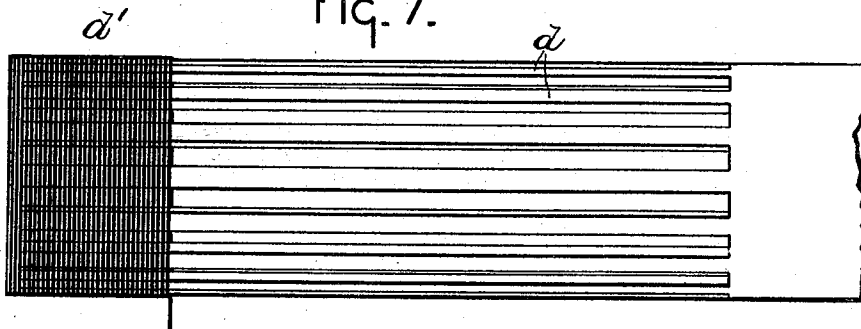


FIG. 7.



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(No Model.)

4 Sheets—Sheet 4.

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Fig. 8.

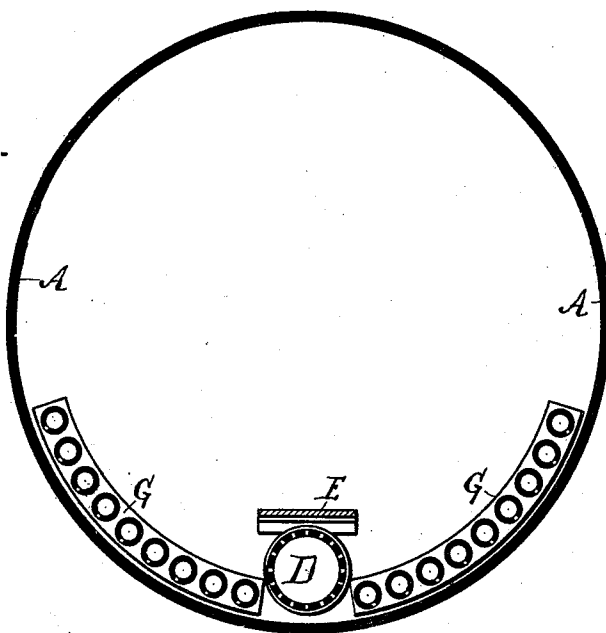
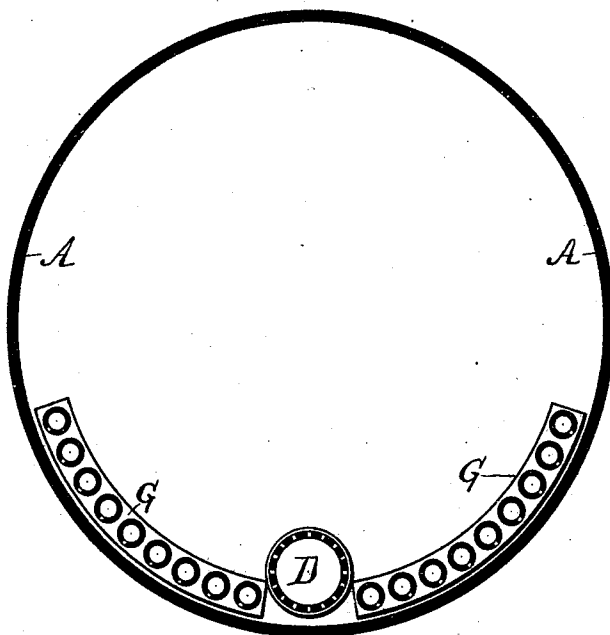


Fig. 9.



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UNITED STATES PATENT OFFICE.

JUNIUS A. BOWDEN, OF DETROIT, MICHIGAN.

FILTER.

SPECIFICATION forming part of Letters Patent No. 522,043, dated June 26, 1894.

Application filed February 13, 1890. Serial No. 340,316. (No model.) Patented in England June 3, 1890, No. 8,568.

To all whom it may concern:

Be it known that I, JUNIUS A. BOWDEN, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Filters, (for which I have obtained Letters Patent in Great Britain, No. 8,568, dated June 3, 1890;) and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In the drawings: Figure 1 is a vertical section through the body of my filter showing the internal construction. Figs. 2 and 3 illustrate variations of the same. Fig. 4 is a plan view illustrating the surface washer. Fig. 5 is a plan view of the body of the filter with the casing in section. Fig. 6 is a side elevation of the internal construction with the case in section. Fig. 7 is a detail view of the main pipe showing the construction of the pipe. Figs. 8 and 9 illustrate other variations of construction.

It is the purpose of my invention to embody in a filter several novel features of construction whereby the filtering of the water and the cleaning of the filter may be accomplished much more effectually than has heretofore been done. Among these novel features are the following:—First. The employment of a circular bottom such as illustrated in the drawings, instead of an upright circular body with a flat bottom as has heretofore been almost generally the case. Second. The provision above the main outlet pipe of the filter, of a suitable guard whereby the sand employed for filtering the water may be prevented from constantly wearing on the outlet pipe and thus causing it to become unserviceable much quicker than where the guard is employed, and by preventing the sand from packing around the outlet pipe and thus preventing the circulation of water into or from the pipe. Third. The provision of what may be termed washing pipes, located in the lower portion of the filter below the sand, with openings extending downward, and a plate beneath these openings against which the flush-

ing water may impinge and thus be spread over a much larger surface than where the washing pipes project the water upward and it is permitted to pass through the sand in a narrow stream. Fourth. The provision along the sides of the filter of a series of washing pipes with their nozzles so placed that the washing water will be projected against the side of the filter before it passes up through the sand. Fifth. The provision above the body of the sand of a series of nozzles or jets adapted to project the water onto the surface of the sand, and thus constitute what may be termed a surface washer, the water being drained from the surface without passing through the sand. Sixth. In the combination with a filter of the character shown, of drain pipes leading from a point just above the filter bed off on the same level or a lower level, and in connection therewith an air vent above the surface of the filter bed whereby all water with the impurities above the filter bed may be drained off to the level of the said bed. Seventh. In the provision in connection with the last named construction of a surface washer whereby when the water is drained off to the surface of the bed, a washing current may be directed across the surface, while the drain is maintained and said wash water prevented from filling the space above the bed. Eighth. In the provision of an air vent above the filter bed whereby air, as the filter is drained from the bottom, may be drawn down through the bed of filtering material, thereby aerating the mass; also in other novel features of construction hereinafter described and claimed.

In carrying out my invention, A represents the body or case of the filter; this body or case, instead of being what might be termed an upright, is a horizontal case, *i. e.*, the body is circular with the long dimension extending horizontally.

B represents the filtering material, preferably sand.

C represents a suitable inlet pipe whereby water may be introduced into the filter.

D is the outlet pipe; this pipe is located beneath the body of the sand and preferably placed above it is what may be termed a guard plate E; this guard plate may be any suitable

shape in cross section, as, for instance, it may be perfectly flat, as shown in Figs. 1 and 8, or it may be convex, as shown in Fig. 2, or it may be concave, as shown in Fig. 3, its purpose being to sustain the weight of the body of sand and prevent the latter from bearing directly on the outlet pipe and thus, during the operation of washing the sand when the latter is in circulation, from bearing and wearing on this pipe and thus incapacitating it for proper service.

F is what may be termed the main washing pipe, and is located in the bottom of the filter below the bed of sand; the openings from this pipe, and also the two auxiliary pipes with which it is connected F' — F^2 project downward, so that the water as it emerges from these openings impinges against the guard plate E and is spread out over a much greater surface than it would occupy if the openings projected the water directly upward into the bed of sand. Thus, by reversing the current and forcing water into the filter through the outlet pipe D and also from the washing pipes F — F' — F^2 , a thorough circulation of the filter bed is obtained and the sand thoroughly cleansed.

G is a manifold of pipes ranged along the sides of the case above the pipe D; they may be either located adjacent to the pipe, as in Figs. 8 and 9, or above the guard plate, as in Fig. 1; the openings in these pipes are toward the case and adjacent thereto, so that as the water emerges from the pipes it strikes the case and is spread in a similar manner to that from the pipes F — F' — F^2 .

H is the surface washer, and consists in two pipes extending along the sides of the filter at the surface of the sand and provided with nozzles h projecting in over the sand, so that water as it emerges from them is forced across the surface of the sand and washes away any sediment or dirt that has accumulated there during the process of filtering. In order that this cleansing water need not be carried through the bed I provide a drain pipe H' adjacent to the surface of the bed and arrange it as shown, to lead off on the same level or to a lower level, so that the water may be drained down to the level of the filter bed, then by opening the inlet from below and gradually forcing water up through the bed through the pipe D until the water rises to the surface of the sand, and then projecting the water from the surface washer across the surface, all sediment and refuse are carried off through this drain H' without passing through the bed. This it accomplishes with the aid of the air vent hereinafter mentioned, which relieves the vacuum which would otherwise act to hold the chamber above the bed full of water, and so permits it to drain off to the level of the filter bed.

Of course, if desired, additional inlet or outlet pipes may be provided, and suitable valves may be provided for controlling the

current of water and regulating it and causing it to travel in the direction desired.

In Fig. 7 is illustrated a novel construction of outlet pipe. The pipe is composed of a suitable frame work or ribs d , around which is wrapped closely the wire d' . Through the interstices between this wire wrapping the water may easily pass, but the sand of which the bed is composed can not easily pass through.

J represents a body of coarse gravel or other bed packed around the outlet pipe D.

By thus employing a rounded bottom for the filter, a rapid and thorough circulation of the sand during the process of washing is obtained, since as the water is forced there from the outlet pipe D and rises up around the edges of the guard plate, or as it is forced from the pipes F — F' — F^2 and rises from the guard plate, or as it is forced from the loosening pipes G and is deflected off into the bed, it loosens the sand in the bottom and carries it up with the current to the top, while the bottom being rounded on an incline, that sand adjacent thereto drops down toward the bottom, is picked up by the current and carried to the top so that the bed is thoroughly washed and circulated in a very short space of time.

K is a suitable vent located in the filter case above the surface of the bed, and adapted to be kept closed by the pressure of the water. When, however, the supply is cut off, and the operator wishes to use the surface washer, this check valve will open and permit the air to enter the case and fill the vacuum caused by the discharge of water through the drain H' .

Of course the number of washing pipes might be varied as for instance the pipes F' , F^2 , might be dispensed with and the pipe F be provided with small branches or the pipe F may be used alone and I would be so understood in my claims. It thus permits the water to lower and drain off down to the level of the filter bed, a feature that I do not know to have been embodied in any prior filter of this character; this concentrates all the animal life, animal matters and impurities at the surface of the filter bed, and compels it to pass off through the drain pipe. I am aware that drain pipes have been arranged above the surface of the filter bed to drain off impurities therefrom, but they have either tapped the space at or near the top of the said water chamber, or if they have been adjusted to draw from near the surface of the filter bed, the drain conduit has led off to a higher level than the top of said chamber, thus failing to accomplish a drainage of this chamber of all its contents down to a level with the filter bed. This chamber is usually well charged with animal matter, both alive and dead, such as fishes, crawfishes, dead fishes, lizards, water snakes, tadpoles, frogs, and the like, and in large filters frequently dead rats, mice, &c. It is apparent that where wash water is simply forced

into the chamber and out from an outlet pipe, still maintaining the chamber full of water, as, for instance, by the means above referred to, some of these impurities and animal matters may be caught up by the current and drifted out through such a discharge pipe. But live matter may still swim around in the chamber and not pass off; so also, dead and heavy matters cannot be thus floated and driven off because the chamber remains full of water which is simply caused to eddy about by reason of the incoming wash water and the open exit pipe. This condition, of the water chamber above the filter bed remaining full, necessarily exists where the drain pipe taps the chamber at the top or where it leads from the filter bed and then rises to a point above the top of the chamber; and would not exist even where it leads off on the level of the filter-bed or to a point below that level were it not for the air vent which permits air to enter and so breaks the vacuum which would otherwise act through the pressure of the atmosphere to hold the chamber full of water. So, again, by opening the vent and draining the water from the base of the filter, the air is caused to follow on after the water down through the filter bed, and so aerates it thoroughly. Moreover, being able to drain the water from the surface of the filter bed enables an examination to be made of the condition of this surface from time to time.

What I claim is—

1. In a filter, the combination with the filter bed and an outlet pipe located beneath the same, of a series of washing pipes located ad-

jacent to the bottom or sides of said filter, said pipes having their discharge nozzles so directed that the water discharged from the pipe will first impinge against the bottom or sides of the filter, substantially as described.

2. In a filter, the combination with the filter bed, the outlet pipe D located beneath the same, and the guard plate E located above the said pipe, of the flushing pipes F—F'—F², said pipes having their openings directed downward, whereby water as it issues from the flushing pipes would impinge against the guard plate E, substantially as described.

3. In a filter, the combination with a filter case, the filter bed, and the washing pipes H, located horizontally immediately above the surface of the filter bed and provided with horizontal nozzles *h*, to direct streams of water across the surface of the bed, of the drain pipe H' located adjacent to the surface of the filter bed, and the valve K, located in the case above the surface of the bed to admit air when water is being drained from the surface of the bed, substantially as described.

4. In a filter, the combination of the filter case, the filter bed, a horizontal outlet pipe located beneath the bed and composed of an open frame-work of ribs *d*, having a wire covering *d'*, and a guard plate located above said outlet pipe, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

JUNIUS A. BOWDEN.

Witnesses:

M. A. REEVE,

W. H. CHAMBERLIN.