(No Model.)

J. M. SMALES.

FILTERING MACHINERY.

No. 512,231. Patented Jan. 2, 1894.

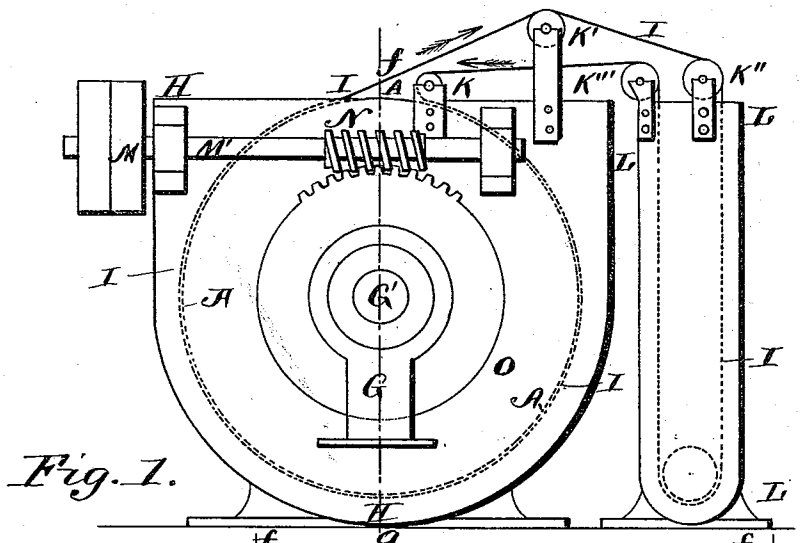

Fig. 1.

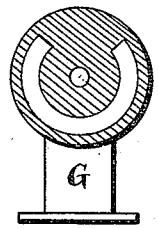

Fig. 5.

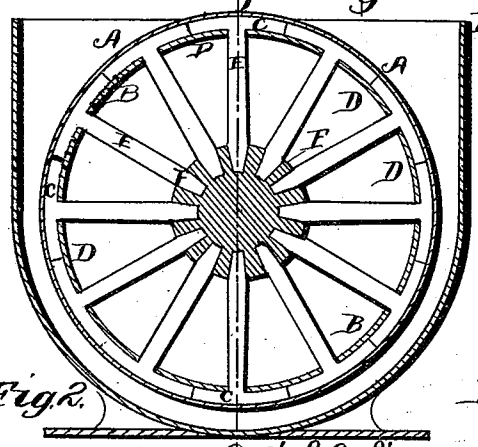

Fig. 2.

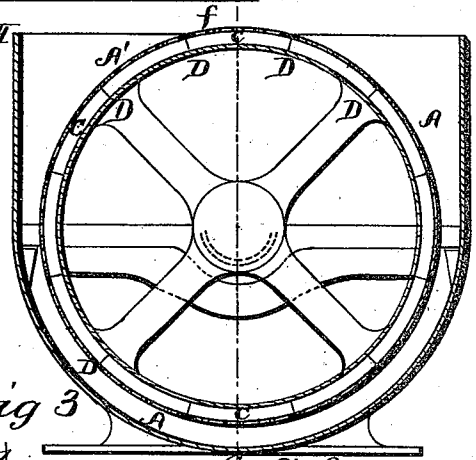

Fig 3

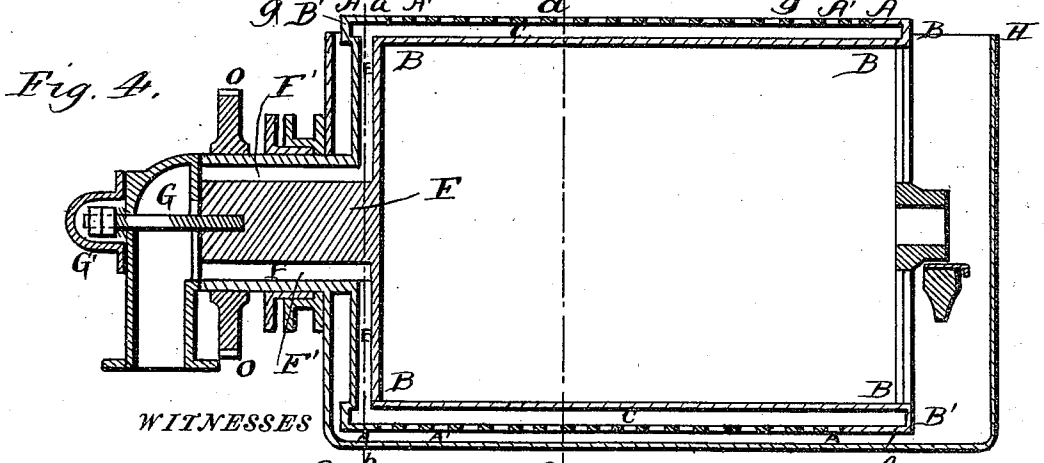

Fig. 4.

WITNESSES

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FILTERING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 512,231, dated January 2, 1894.

Application filed March 7, 1892. Serial No. 424,106. (No model.) Patented in England February 7, 1891, No. 2,257.

To all whom it may concern:

Be it known that I, JOHN MOTTRAM SMALES, a subject of the Queen of Great Britain, residing at Leavesden, near King's Langley, Hertfordshire, England, have invented a new and useful Filtering-Machine, (for which I have a patent in Great Britain, No. 2,257, bearing date February 7, 1891,) of which the following is a specification.

This invention consists of a double cylinder that is to say one cylinder within another leaving an annular space which is closed at each end. The periphery of the outer cylinder is plain or solid for a short distance against each end, the intervening distance being for the most part freely perforated or formed in any manner that will act as a support for a filtering material but allow the filtered liquid to pass to the annular space. The said annular space is divided into any desired number of separate longitudinal compartments and where the material forming the divisions comes in contact with the periphery of the outer cylinder there are no perforations. The double cylinder is intended to revolve and has a hollow axle at one end of which there is the same number of compartments radiating from the center that there are longitudinal compartments in the double cylinder. Each longitudinal compartment is connected by a tube or any convenient form of conduit to a corresponding compartment in the axle and may be compared to hollow spokes of a wheel. The axle and the double cylinder therefore necessarily revolve together. The axle is constructed with a series of separate horizontal compartments each one being connected to a corresponding longitudinal compartment by means of a tube in the manner already described. The axle terminates with a vertical face so formed as to present a separate outlet or port for each horizontal compartment the said ports radiating from the center. The receiving face of the axle forms a water tight joint and blocks or shuts off one or more of the ports which are at or near the top of the axle but leaves the rest open. The above described arrangement has the effect of automatically shutting off communication between the receiving pipe and one or more of the longitudinal compartments in the double cylinder which happen to be at or near the top as it is revolving so that more or less vacuum can be maintained in the remaining ones. The object is by means of the vacuum to bring pressure to bear upon the filtering material which surrounds the periphery of the outer cylinder and thus obtain a larger flow of filtered liquid than would be the case without the aid of a vacuum. The double cylinder with the tubes connecting the longitudinal compartments with the compartments in the axle, form a filter which is placed and revolves in a cistern or other receptacle for the liquid to be filtered. The axle can be extended so as to pass through a stuffing box fitted to the cistern and then be attached to the receiving pipe or this may be effected inside the cistern and the stuffing box dispensed with. An endless band of filtering material of the same or nearly the same width as that of the double cylinder, but of greater length than the circumference, nearly surrounds it and by means of rollers is so arranged that it does not meet at the top but is led off for the purpose of being cleaned and then returns close to that point at which it was led off. As the double cylinder or its equivalent revolves the filtering material travels with it. The "water-line" or highest point that the liquid to be filtered can reach, is kept below that portion of the periphery of the double cylinder which is not covered by the filtering material. The liquid filters through the material into all those compartments in the double cylinder which are under the liquid, passes through the tubes to the corresponding compartments in the axle and through those ports which are open, into the receiving pipe. By the arrangement herein described communication between the receiving pipe and the compartment or compartments in that portion of the annular space which is above the level of the unfiltered liquid is shut off and more or less vacuum can be maintained in the remaining compartments so as to draw more water

through the filtering material than could be obtained without the aid of a vacuum.

In the drawings, Figure 1 is a front elevation of a filter constructed in accordance with my invention mounted in a cistern, a portion of the endless band of filtering material being led off to an adjoining washing machine which it passes through for the purpose of being cleaned. In all the remaining drawings the endless band of filtering material is omitted. Fig. 2 is a vertical cross section on line *a b* Fig. 4 showing the arrangement of tubes or conduits between the double cylinder and the axle and also showing the compartments in the latter radiating from the center. Fig. 3 is a vertical cross section on line *d e* of Fig. 4 showing one cylinder within another with the divisions which form the longitudinal compartments. This drawing also shows that where the dividing pieces D come in contact with the outer cylinder the latter is not perforated, but is so at the intervening parts. Fig. 4 is a longitudinal section on line *f*, *g*, of Figs. 1, 2, and 3, showing the general arrangement of the double cylinder, two of the tubes or conduits which communicate with the axle, the horizontal compartments in the latter terminating at the vertical face which works against the face of the receiving pipe. Fig. 5 is an elevation of the face of the receiving pipe which works against the vertical face of the axle, and showing the solid part at the top which blocks or shuts off one or more of those ports which happen to be at or near the top.

Similar letters of reference denote similar or corresponding parts in each figure.

A is a cylinder which is plain or solid for a short distance against each end but the intervening distance from A′ to A′ (Fig. 4) is freely perforated so as to support the filtering material but allows the filtered liquid to pass through. B is a second cylinder within the aforesaid cylinder A and is not perforated. The ends B′ B′ are closed thus forming an annular space C for the reception of the filtered liquid. The annular space C is divided into any desired number of separate longitudinal compartments by the dividing pieces D, and where these come in contact with the cylinder A it is not perforated, but the intervening space is as shown in Fig. 3. The filtered liquid is withdrawn from the longitudinal compartments by the tubes or conduits E which are connected to the axle F each tube discharging into a separate compartment F′ (Figs. 2 and 4) the latter discharging through the port in the vertical face of the axle into the receiving pipe G. The double cylinder A, B, the tubes E and axle F form a filter which may be placed in a cistern A the axle passing through a stuffing box. Figs. 1, 2, 3, 4 and 5 show such an arrangement, the vertical face of the axle F working against the vertical face of the receiving pipe G. The upper part of this pipe is solid as shown in Fig. 5 so as to block or shut off certain ports at or near the top of the axle. The said pipe is stationary but the face is held against the face of the axle with sufficient force to allow the latter to revolve at the same time that the two faces form a water tight joint. This may be effected in various ways a convenient form being shown in Fig. 4 which consists of a stud secured to the center of the axle and extending through the receiving pipe and fitted at the end with a spring and nut and lock nut, these being inclosed by a small chamber G′.

The general working of this filter is as follows: An endless band of filtering material I of the same width as the cylinder A but of greater length than the circumference is caused to pass on to the cylinder by the roller K, travels with the cylinder until nearing the highest part when it is led off as shown in Fig. 1 by the roller K′. It continues to travel and passing over roller K″ descends into any convenient washing machine L. It travels through this, emerging in a clean state and passing over the roller K‴ is conducted to the roller K where it started. The double cylinder A, B, with the tubes E and axle F are always revolving and the endless band of filtering material I travels with the cylinder A. The liquid to be filtered is contained in the cistern H and filters through that portion of the endless band of filtering material which is surrounding the cylinder A while they are traveling together. The speed may be so regulated that the filtering material is practically choked with matter arrested during the time that is occupied by a given point of the cloth being led on to the cylinder by the roller K and leaving it when coming again near the top as shown in Fig. 1. By this arrangement filtering and cleaning are always proceeding without interruption. The requisite motion is imparted by gearing. A convenient arrangement is shown in Fig. 1 in which pulleys M are mounted on a shaft M′. This actuates a worm N which gears into a spur wheel O which is secured to the axle F.

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

1. In a filtering apparatus a cistern for containing the liquid to be filtered a revoluble double metal cylinder the outer one of which is perforated and the annular space of which is divided into longitudinal compartments in combination with a series of tubes connected with said compartments, an axle provided with a series of compartments or passages connected with said tubes and a stationary receiving pipe cooperating with said passages, substantially as described.

2. In a filtering apparatus, a cistern for containing the liquid to be filtered, a revoluble double metal cylinder the outer one of which

is perforated and the annular space of which is divided into longitudinal compartments in combination with a series of tubes connected with said compartments, an axle revolving with said cylinder and provided with a series of longitudinal compartments or passages, and a stationary receiving pipe constructed to close the said passages when at or near the top of the axle in the revolution thereof, substantially as described.

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Witnesses:
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