(No Model.)

B. T. LOOMIS.

Filter.

No. 232,735. Patented Sept. 28, 1880.

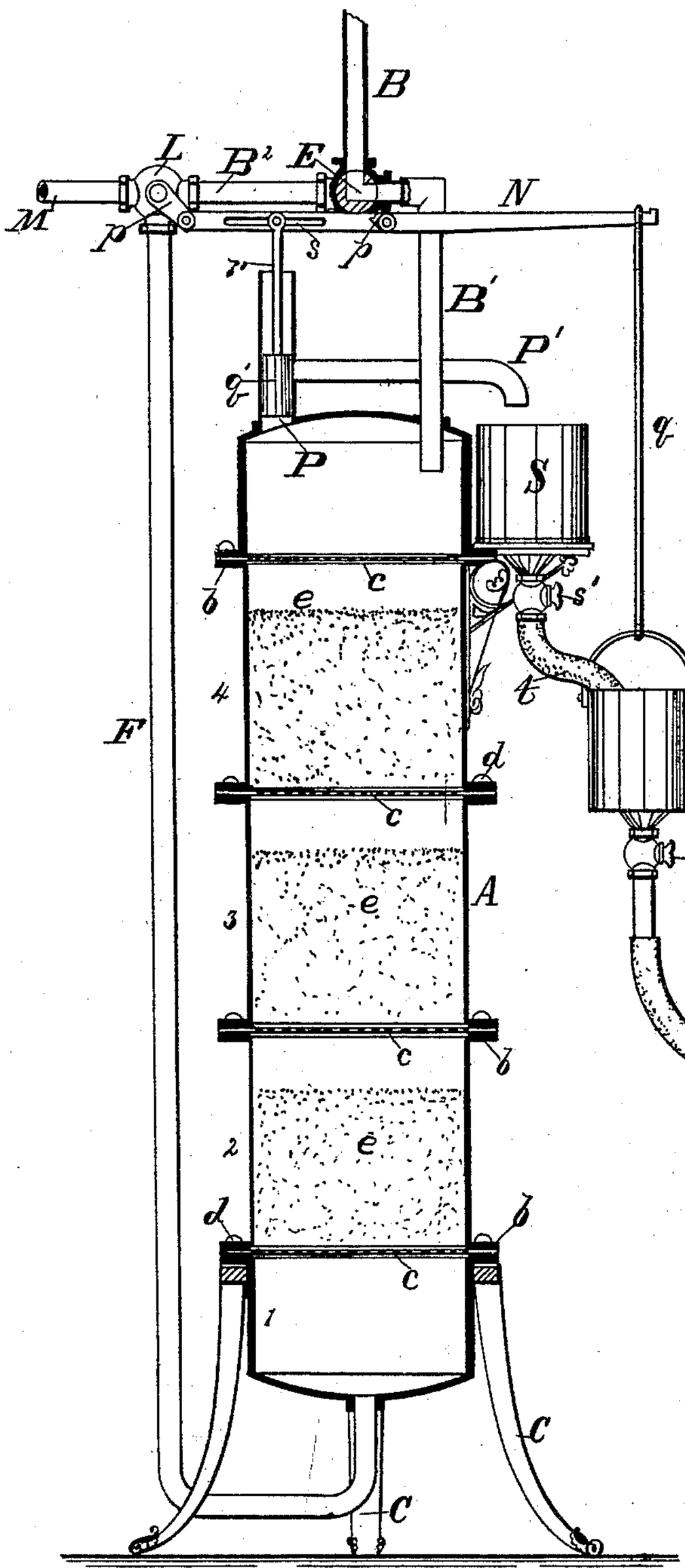

Fig. 1.

Witnesses:
Geo. A. Boyden
A. C. Eader

Inventor:
Benjamin T. Loomis
By his Atty
Chas B. Mann

UNITED STATES PATENT OFFICE.

BENJAMIN T. LOOMIS, OF BALTIMORE, MARYLAND.

FILTER.

SPECIFICATION forming part of Letters Patent No. 232,735, dated September 28, 1880.

Application filed June 15, 1880. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN T. LOOMIS, a citizen of the United States, residing at the city of Baltimore, and State of Maryland, have invented certain new and useful Improvements in Self-Cleaning Filters; and I do hereby 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 appertains to make and use the same, reference being had to the accompanying drawing, and to letters or figures of reference marked thereon, which forms a part of this specification.

My invention relates to the construction of a filter, and to certain means whereby the filter is made to automatically cleanse itself of the accumulated impurities.

The drawing herewith clearly illustrates my invention.

The letter A designates the case or cylinder, (shown in vertical section,) and supported on legs C or other suitable means. It is composed of two or more sections, 1, 2, 3, &c., each having a flange, *b*, for joinder to the others. On the flange of the lowermost or No. 1 section a suitable gasket is first placed, on which a perforated diaphragm or filter-plate, *c*, rests. Then another gasket is placed above the filter-plate and the lower flange of No. 2 section rests on this gasket. The flanges of the two sections are now secured together by bolts *d* or other means. In the same manner the other sections are secured, each having a stationary filter-plate, *c*, dividing it from the others. The filtering material *e* is placed in each section on the filter-plates before the adjoining sections are secured together; but it will be observed the sections are not entirely filled with material. The object of this construction is to permit different kinds of filtering material to be used in one filter-case, so that each kind may be kept in a separate compartment, or, whether different kinds or but one kind of material is employed, to have it placed in several independent compartments, so that the material in each one will be supported wholly by the perforated plate on which it rests, and not cause pressure on the material in the compartment below it, this condition being important to facilitate the method hereinafter described of cleaning the filter. Also, by this construction and the plan upon which the filter is designed to be operated the quantity of filter material in each compartment may be limited so that a space will be left above the surface of the filter material when the latter is in a compressed condition, as it is while the filtering operation downward is going on, for the purpose hereinafter set forth, and to have the case arranged in sections, so that any one compartment may be unpacked without disturbing the others; and if it be desired additional compartments may at any time be added.

The letter B designates the supply-pipe, and E a two-way cock, by which the supply may be turned into the inlet-pipe B′, which enters the upper head of the cylinder, or into the pipe B^2, and thence into pipe F, which connects with the lower head of the cylinder. A two-way cock, L, is at the point of junction of pipes B^2 and F, and is adapted to turn the fluid either from pipe B^2 into F or from pipe F into the discharge-pipe M. A lever, *p*, is attached to cock L, and a similar one to cock E, and a bar, N, connects the two levers. An outlet-pipe, P, enters the upper head of the filter and has a valve-plunger, *q*′, which opens and closes connection with the outlet or waste pipe P′. A rod or stem, *r*, connects the valve-plunger *q*′ with the bar N in such manner that the upward movement of the plunger raises the bar, which, being connected with the levers *p*, turns the cocks E and L and reverses the inlet-current from the top to the bottom of the case or cylinder.

A fluid-receptacle, S, is supported on one side of the cylinder, near its top, by any suitable means, so as to remain stationary, and receives the impure water or other fluid that discharges from the outlet-pipe P′. A valve or cock, *s*′, in the bottom of this receptacle regulates the outflow therefrom of the fluid. A flexible pipe, *t*, leads from the cock *s*′ to and discharges into a second fluid-receptacle, T, which is suspended at the end of a hanger or rod, *q*, from the projecting end of movable bar N. The construction and size of this second receptacle must be such that when all the water-cocks in the house are closed the pressure of the water from the street-main or supply-pipe, acting on the valve-plunger *q*′, will

overcome the weight of the receptacle when it is empty and raise it. It will be seen that the fluid which is discharged from the receptacle S into receptacle T will act as a weight to draw down the bar, and thereby direct the inlet-current into the upper head of the cylinder. A valve or cock, t', in the bottom of receptacle T regulates the outflow therefrom of the fluid, and a flexible pipe, u, leads from this cock to the pipe v, which connects with the sewer-pipe.

The operation of the filter is as follows: First, the cock s' must be adjusted to discharge the contents of the receptacle S when filled in a given time—say, in one hour, or in two hours, or any other period of time, as the case may be; and cock t' should be similarly adjusted to discharge the contents of receptacle T. The water entering from pipe B′ is filtered, and the filtering will continue as fast as the fluid is drawn off from pipe M, until the settling or packing of the filter material or the accumulation of impurities causes a resistance to the passage downward of the fluid that is greater than that caused by the weight of the receptacle T and bar N on the valve-plunger q', when the pressure of fluid from the source of supply will force the plunger q' up, opening the connection to the waste-pipe P′, and at the same time turns the cocks E and L, thereby directing the inlet-current to the bottom of the case or cylinder. The fluid entering below under pressure forces its way up through the filter material in each compartment, thereby relieving it from its packed and settled condition, and a continuance of the upward pressure serves to raise the material and thoroughly loosens it throughout, and in this very loose condition the liquid passes up freely, and the impurities which have accumulated are promptly purged, finding escape through pipes P and P′ into receptacle S. The cock s' permits the dirty fluid to escape slowly into receptacle T, where the additional weight of the fluid operates to draw down the bar N, and changes the cocks so as to let the fluid enter from pipe B′. When all the dirty fluid has escaped from both receptacles the pressure within the cylinder from the source of supply will force the plunger q' up again, as just described.

The difficulty heretofore experienced in freeing filters of the impurities which accumulate in the filtering material has been owing to the fact that the filtering-material compartment, formed by a perforated plate above and below, has been packed full, no space being left between the filtering material and the perforated plate above it to admit of the raising, separating, and thorough loosening up of the filtering material. As a consequence, the reversal of the fluid-current cárries off only the impurities which are collected upon the surface of the mass of filtering material; but such impurities as have penetrated into the body of the filtering material are not purged.

My combination, in a compartment having a perforated plate above and below of loose material in the compartment with a space over the material separating it and the perforated plate above, accomplishes the desired end—namely, allows for the raising, separating, and thorough loosening up of the filter material and the washing out of the impurities, but prevents the escape of the filter material.

I do not herein claim a filter-case composed of two or more sections, as I am aware such has been made or shown before my invention herein described.

Having described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination, substantially as set forth, of an upright filter case or cylinder, a pipe attached to the upper and lower end of the case, one or more compartments within the case or cylinder, each formed by two stationary perforated plates or strainers, one above and the other below, and loose filtering material in the compartment, with a space separating the surface of the filtering material and the perforated plate or strainer above it sufficient to allow the filter material in bulk to be raised and thoroughly loosened up, whereby when an upward current of fluid is entered into the case the loosened-up material will be freed of impurities without allowing any of the filtering material to escape.

2. The combination, substantially as set forth, of an upright filter case or cylinder, an inlet-pipe, an outlet-pipe for the escape of impurities when both pipes are independently connected to the upper end of the filter-case, so as to be capable of operation at the same time, a valve to open and close the outlet-pipe, a movable bar, a rod or stem having one end attached to the valve and the other end to the bar, and a fluid-receptacle suspended from the bar in position to receive the fluid discharged from the outlet-pipe.

3. The within-described means for automatically relieving the filter of an accumulation of impurities, consisting in the combination of an inlet-pipe, an outlet-pipe for the escape of impurities when both pipes are independently connected to the upper end of the filter-case, so as to be capable of operation at the same time, a valve to open or close the outlet-pipe, a bar to which pressure may be applied, and a rod or stem having one end attached to the valve and the other end to the bar, substantially as set forth.

4. The combination, with the case or cylinder, substantially as set forth, of an outlet-pipe provided with a valve, a stationary fluid-receptacle to receive the discharges from the outlet-pipe, and provided in the bottom with an opening for the outflow of the fluid, a movable bar, having an end projecting horizontally, and connected with the valve, a fluid-recepta-

cle suspended from the bar and below the receptacle first named to receive the fluid discharged therefrom.

5. The combination, substantially as set forth, of a filter case or cylinder, a pipe which enters one end and a pipe which enters the opposite end, a cock in each pipe to regulate the inlet of fluid, a lever, *p*, attached to each cock, a bar, N, which connects the two levers, an outlet-pipe, P, connected to the case or cylinder, a valve to open and close the outlet-pipe, and a rod to connect the valve and bar.

In testimony whereof I affix my signature in presence of two witnesses.

BENJAMIN T. LOOMIS.

Witnesses:

JNO. T. MADDOX,

CHAS. B. MANN.