(Model.)

J. W. SEE.

FILTERING AND EXTRACTING MACHINE.

No. 267,024. Patented Nov. 7, 1882.

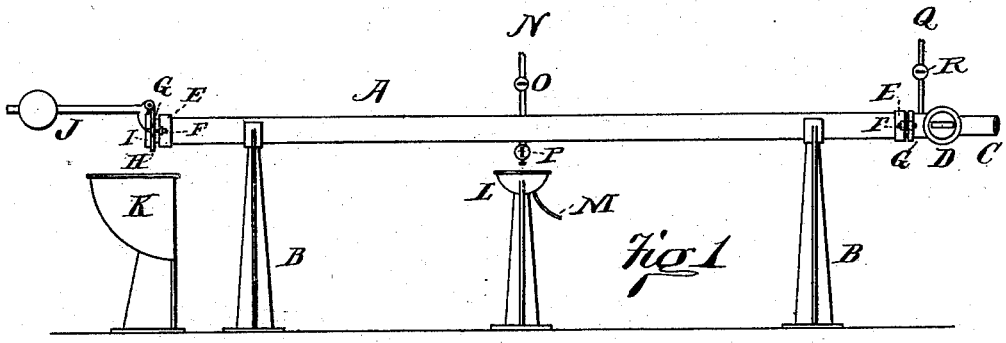

Fig 1

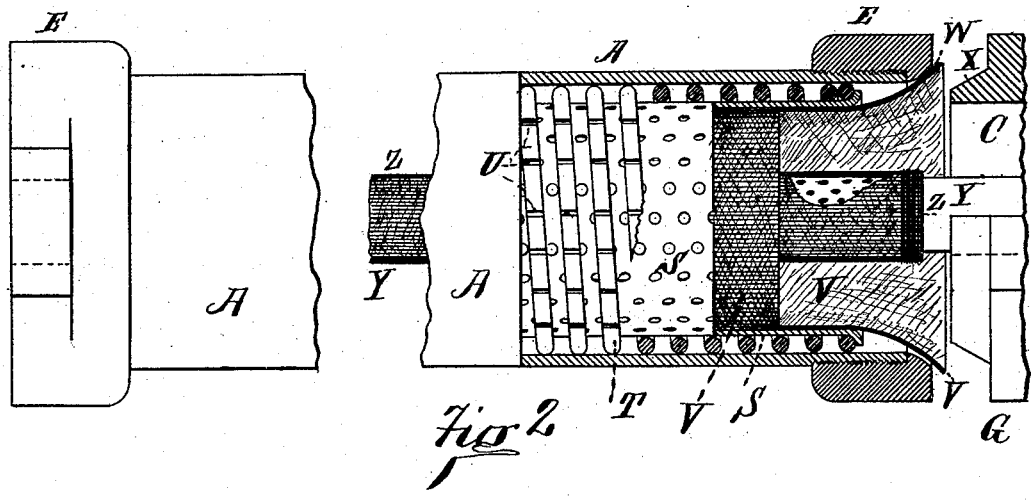

Fig 2

WITNESSES:

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FILTERING AND EXTRACTING MACHINE

SPECIFICATION forming part of Letters Patent No. 267,024, dated November 7, 1882.

Application filed May 3, 1881. (Model.)

To all whom it may concern:

Be it known that I, JAMES W. SEE, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Filtering and Extracting Machines, of which the following is a specification.

This invention relates to machines for separating from a liquid the solid matter held in suspension, and for sundry processes of filtration, percolation, lixiviation, refining, &c.

In general principle of action this machine is analogous to other filtering-machines in which the substance to be manipulated is pressed into a chamber whose walls are of proper filtering medium, and the operation may be carried on in connection with an internal heating, if desired.

The main points of merit in my device are its remarkable simplicity and cheapness of construction, its power of enlargement or addition, and its facility for cleaning.

In the accompanying drawings, Figure 1 is a side elevation of my machine; and Fig. 2 is a shortened side view of the filter-tube, partly in section, showing all the features of its internal construction.

In Fig. 1, A is a tubular filter-chamber, having within it a second tube, formed of proper filtering material, as will be explained hereinafter. There is an annular space between the tubes. C is the main inlet, having cock D. The inlet is to be connected with a force-pump or pressure-column or other means for forcing material into the machine. Upon the ends of the tube A end fittings, E, are screwed, to permit joint-bolts F to attach sundry devices to the tube. I J H is a loaded valve, closing the end of the inner tube. This loaded valve forms, when needed, a contracted outlet for the filtrate, and the amount of its opening will obviously be automatically regulated by the relation between the pressure in the tube and the load upon the valve. K is a catch-basin to receive the discharge from this loaded valve. P is a cock screwed into the outer tube and communicating with the annular space around the inner tube. N is a pipe arranged the same as the cock P, and having a cock, O. Q is a pipe leading from a source of pressure to a tube formed of filtering material inside the filter-tube. As this machine operates by means of internal pressure applied through the inlet, and as all the product should be uniform, it is essential to perfect work that the chamber be placed horizontally in order that the pressure may be uniform its entire length. If placed vertically, the pressure will be excessive at the lower end, and a coarser product will issue from that end, due to gravity of the substance within the chamber.

In Fig. 2, A is the outer tube, and E the end fittings for the joint-bolts. V is the filter-tube, formed of canvas or other suitable material. The tube may be woven seamless or sewed up, or formed by simply winding up the proper material. It may be in a single length or it may be formed of short sections having lapping splices. The tube need not be very strong, as there is but little tensile strain upon it. The end of the tube A is belled at the ends, as at W, and any connecting-piece which is to be attached to the tube is to be furnished with the beveled nozzle X, which, being drawn by the joint-bolts solidly into the expanded canvas tube, forms a tight inlet-joint between the piece attached and the inside of the canvas tube. A canvas tube thus forms its own end gasket; but a tube of wire cloth, if used, would probably require the addition of a soft gasket to make the joint tight. The joint arrangement shown permits any device to be put into neat connection with the inside of the canvas tube. Thus in Fig. 1 an inlet-cock is fixed to one end of the tube and an outlet-valve to the other end. In a similar manner unions, couplings, elbows, returns, manifolds, &c., may be used, and many tubes may be joined up into banks or batteries. In practice, a large machine would be composed of many tubes joined by a system of manifold connections. The outer tube, A, should be made of three or four inch boiler-tubing. S is a tube formed of perforated sheet metal. It goes outside of and forms the backing for the canvas tube. It is wrapped coarsely with wire, as at T, to keep it away from the outer tube. Notches U are cut in the wire, so as to allow the spaces between the coils to communicate. The perforated tube S, with its wrapping-wire, may be of a single piece, or it may be in several short lengths. The wire should be soldered or otherwise secured to the tube S so as to form a part of it,

and it should slip freely within the outer tube, A. If in short sections, they do not need to be connected with each other. The tube S may be of wire-cloth, if desired, and in some cases the wire T will not be needed. The structure will be governed largely by the class of work the machine is to be used for, and in some cases no surrounding whatever is needed for a plain filtering-tube of canvas or wire-cloth; and, again, the wire coils around the canvas tube will answer without the perforated tube. Y is the innermost central tube, before referred to as being connected to pipe Q of Fig. 1. This tube is perforated, as shown, and covered with canvas Z. The end opposite the inlet should be closed.

In order clearly to trace the functions of the parts, several operations will now be described under separate heads.

1. *Plain filtering.*—Given a muddy sirup to be cleared of all suspended foreign matter: Valve I is properly loaded, cock P opened, cock R closed, and cock D open. The sirup is forced, under proper pressure, through the inlet C, and thence into the canvas tube V till full. Under continued pressure the clear sirup passes through the canvas V, through the perforated tube S, into the spaces between the coils of wire, and finally out of the apparatus by the cock P into receiver L; thence away by pipe M. If thick matter issues from the cock P, it shows that the pressure is excessive and should be lessened. Finally, the canvas tube becomes filled with the sediment, which must be removed. To do this the valve I is opened wide, thus giving an opening equal in area to the canvas tube, and water is forced in at C, the cock P being closed. The sediment is thus quickly expelled at I, and the canvas and other parts nicely washed. For such use as just described the internal pipe, Y, is not needed.

2. *Plain filtering with heat.*—Given a sirup needing the aid of heat to cause quick separation: Internal pipe, Y, should not be perforated or covered with canvas, and its inlet-pipe Q should have steam-connection. Operation same as before, with the addition of steam in the central tube, Y.

3. *Drying a filtrate.*—Given a scum yeast from which it is desired to express the liquid: Operation same as case 1, the expressed liquid being allowed to run to waste at cock P, and the solidified yeast in the tube being removed through valve I by means of rammer inserted at the inlet end, the connection being previously broken at the inlet end. For such work a special arrangement of convenient opening may be fixed at the inlet end for ramming out the contents of the tube without breaking the joint. In most every other form of filter-press the whole machine must be taken to pieces to remove solid contents. The substance in the tube may be pressed nearly dry. Pipe Y not needed.

4. *Continuous half-filtering.*—Given white lead to be separated from its liquid: Valve I to be loaded so as to maintain just the proper pressure in the tube. Operation as in case 1, the liquid passing out at cock P and the white lead, properly dried, issuing continuously at the loaded valve I. Pipe Y not needed.

5. *Washing a filtrate.*—Given a precipitate to be washed clear of acids: Valve I to be closed and loaded; precipitate to be mixed with water and pumped into machine till tube is full; cock D then to be closed; cock R opened, and clear water forced into pipe Q. This water enters tube Y, passes through the perforations in pipe Y, through the canvas Z, then, with an even pressure, through the filtrate in the canvas tube V, then through this tube, &c., and out at cock P. The operation is continued till desired neutrality is obtained, after which precipitate is removed, as in case 3.

6. *Extraction, percolation, lixiviation.*—Given a mass and wanted a tincture from the mass: Mass to be powdered or ground, mixed with liquid, and pumped into the machine, as in case 5; proper menstruum then forced through tube Y, same as washing water in case 5; operation continued with same liquid till proper strength is obtained; inert mass removed from machine, as usual.

7. *Washing outer surface of filter-cloth.*—Given a case where the expressed liquid forms a coating on outside of tube V, dried hard by long standing: Close cock P and flood machine with proper liquid, by means of pipe N or open cock P, and wash by means of the flooding-liquid.

The parts of the machine are to be constructed of such material as is best adapted to the work. The peculiarly simple form of the parts permits material to be used which could not be formed into the parts of ordinary filtering-machines. The form also permits ready plating, coating, lining, &c., of the parts formed of an objectionable base material with a thin layer of suitable material.

It will be noticed that the central tube, Y, aside from any of its functions as a conduit, serves, by its simple presence as a core, to reduce the area of the filter-tube without reducing the actual filtering-surface of the tube. A proper proportion between bulk of stuff and area of filter can thus be secured by altering the size of the internal core.

I claim as my invention—

1. The combination, with a filter-tube and detachable end connections therefor, of a bell-shaped piece surrounding the end of said tube, a beveled nozzle upon said end connection, and joint-bolts or equivalent means for drawing the parts together, substantially as and for the purpose specified.

2. The combination of a chamber having filtering-walls, an inlet for the material to be filtered, and a self-acting loaded outlet-valve for the filtrate, substantially as and for the purpose specified.

3. The combination of a casing-tube, a cloth tube therein, a perforated tube next outside the cloth tube, and a spiral wire jacket surrounding and fastened to said perforated tube, substantially as and for the purpose specified.

4. The combination, with spiral wire in a filter-tube, of notches U across said wire, substantially as and for the purpose specified.

5. The combination of a filtering-tube, an inlet therefor, an outlet therefor, and an internal tube having an inlet independent of said inlet, substantially as and for the purpose specified.

6. The combination of a casing-tube, a cloth tube therein, a cleaning-pipe connecting through the casing directly with the space between the casing and cloth, and an outlet for draining said space, substantially as and for the purpose specified.

7. The combination, with a filtering-tube having an inlet and an outlet, of an internal core independent of the inlet, and forming an annular space, into one end of which the substance to be filtered is admitted, substantially as and for the purpose specified.

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Witnesses:
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