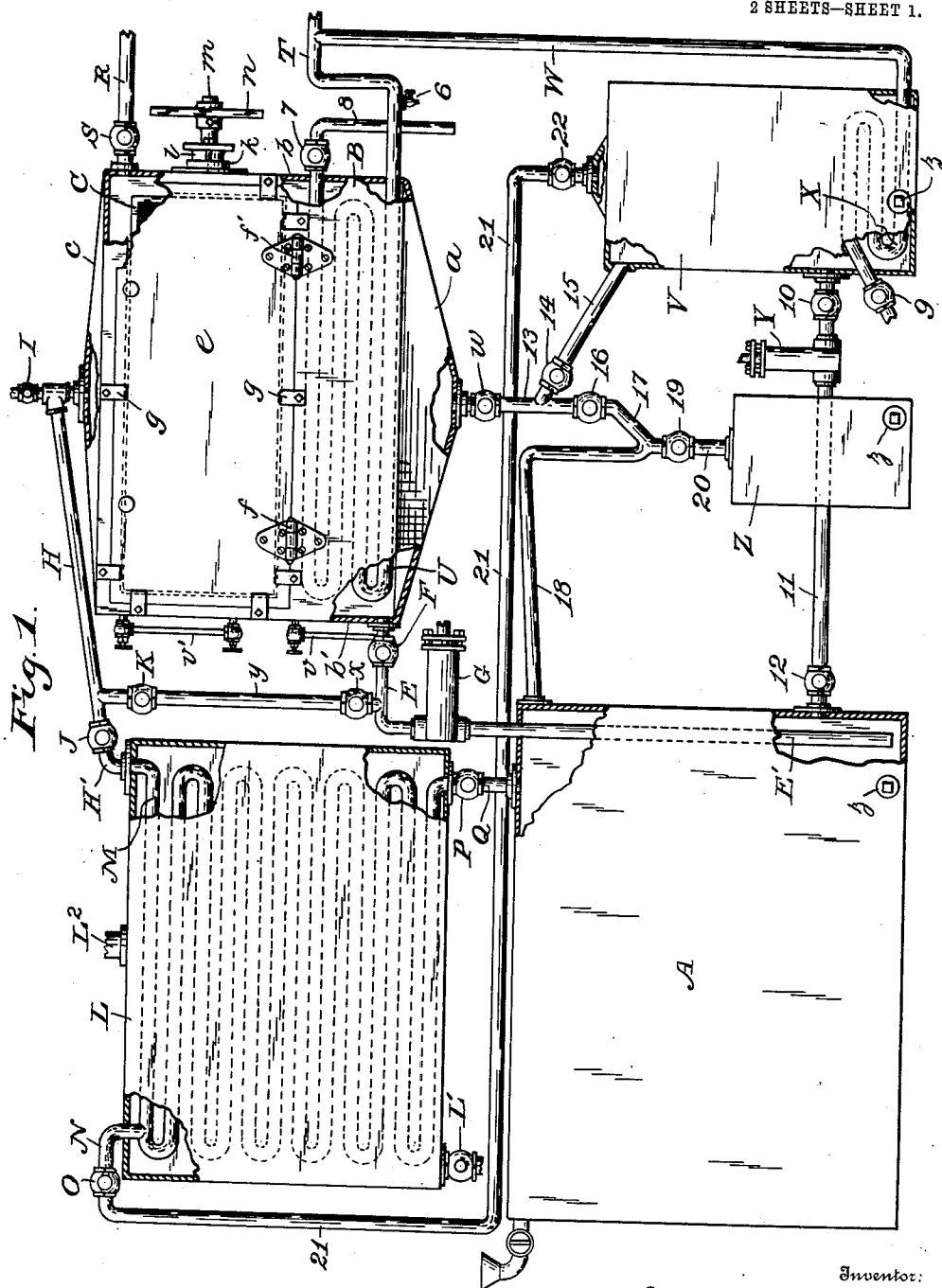


No. 890,568.

PATENTED JUNE 9, 1908.

H. MAINE.
FABRIC CLEANING APPARATUS.
APPLICATION FILED JAN. 20, 1906.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2.

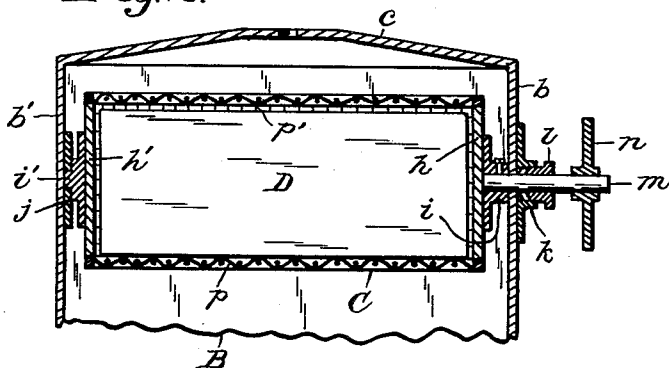


Fig. 3.

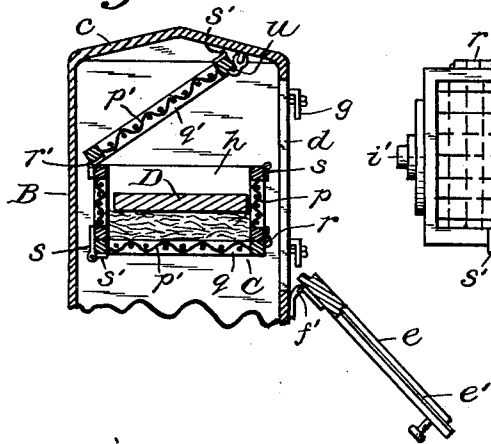


Fig. 4.

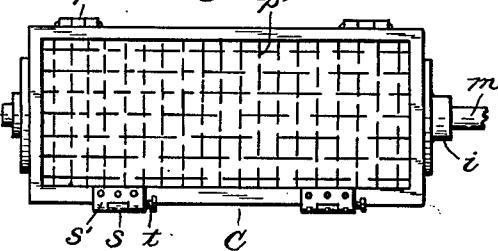
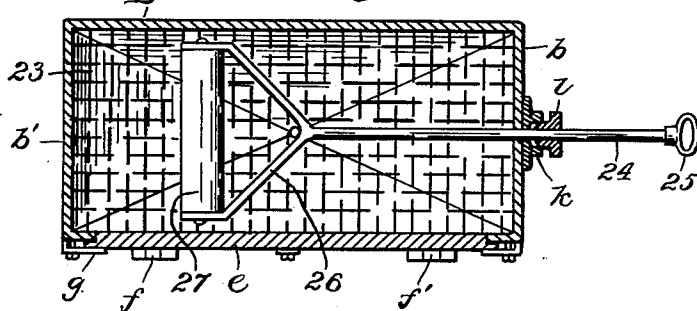


Fig. 5.



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UNITED STATES PATENT OFFICE.

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FABRIC-CLEANING APPARATUS.

No. 890,568.

Specification of Letters Patent.

Patented June 9, 1908.

Application filed January 20, 1906. Serial No. 296,951.

To all whom it may concern:

Be it known that I, HIRAM MAINE, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Fabric-Cleaning Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus comprised in a system for cleansing fabrics of various kinds, especially those of delicate types, by the use of volatile detergent liquids, the invention having reference particularly to apparatus whereby the volatile liquids may be used safely and without waste of the liquids, either in laundries or other establishments, and be adapted for using other than volatile detergent liquids.

Objects of the invention are, first, to provide fabric-cleaning apparatus whereby inflammable volatile liquids, recognized in many cases as superior detergent agents, may be employed without danger of explosion and without waste of the liquids; second, to provide apparatus whereby the most delicate fabrics may be cleaned without injury thereto by the use of any suitable detergent liquids or vapors, either hot or cold; and, third, to provide apparatus whereby the cleansing of fabrics, such as carpets, rugs, clothing, blankets, laces, ribbons or other articles, may be accomplished without requiring laborious manual effort in the process.

With the above-mentioned and minor objects in view the invention consists in fabric-cleaning apparatus comprising a renovator consisting of a tightly closed vessel, in which the operation of cleansing may be performed, provided with means for pressing or squeezing or otherwise manipulating the fabrics, a closed reservoir for the volatile detergent liquid, a pump for supplying the renovator vessel with liquid from the reservoir, a condenser for reducing the gaseous fluid from the renovator to a liquid state to be returned to the reservoir, and settling tanks wherein the volatile liquid may be separated from foreign matter resulting from the cleansing operations to be returned to the reservoir. And the invention consists further in the novel parts, and in the combinations and

arrangements of parts as hereinafter particularly described and claimed.

Referring to the drawings, Figure 1 is a diagrammatic view showing the different elements of the invention in side elevation and connected together in operative arrangement; Fig. 2, a fragmentary vertical longitudinal sectional view of the renovator showing particularly one form of means therein for squeezing or pressing the fabrics; Fig. 3, a fragmentary transverse vertical sectional view of the renovator and the pressing apparatus; Fig. 4, a top plan view of the pressing apparatus detached from the renovator vessel; and, Fig. 5, a horizontal sectional view of the renovator vessel and a modified form of pressing apparatus therein.

Similar reference characters in the different figures of the drawings designate corresponding elements or features.

In a practical embodiment of the invention a closed reservoir A is provided and placed in any suitable convenient situation, for holding volatile liquid, such as gasoline or the like, to be drawn out as may be required, the reservoir being preferably at a relatively low level so that the liquid must be pumped therefrom.

A renovator comprises essentially a closed vessel B together with suitable means therein for holding the fabrics and for squeezing them in the detergent liquid as part of the cleaning operations. The vessel may be of any suitable size and shape, and it has a dished bottom *a*, the ends *b* and *b'* of the vessel being designed to support the squeezing apparatus, and the top *c* being preferably crowning in form. One side of the vessel has a doorway or opening *d* normally closed by a door *e* having packing *e'* and hung on hinges *f* and *f'*, suitable fasteners *g* being provided for securing the door tightly to the body of the vessel when closed.

The squeezing apparatus may be variously constructed, the preferred form thereof comprising a fabric-holder C having a suitable frame including substantial ends *h* and *h'*, the end *h* being provided with a hub *i*, and the end *h'* provided with a journal *i'* mounted in a journal-box *j* that is secured to the inner side of the end *b'* of the vessel. The end *b* of the vessel is provided with a packing-box *k* and gland *l* that serve together as a journal-bearing for a rotative shaft or axle *m* that extends through the packing-box and is de-

tachably secured to the hub *i* for turning the fabric-holder C over and over, the shaft being provided with a handle *n* for its control and operation. The fabric-holder has wire-netting sides *p* and is provided with doors *q* and *q'* at opposite sides thereof having netting or apertured panels *p'*, one door being connected to the frame of the fabric-holder by hinges *r* and the other door being connected to the frame by hinges *r'*. Each door is attachable at its free edge to the frame by suitable clasps or fasteners, each of which may comprise a hinge-part *s* attached to the frame, and a companion hinge-part *s'* attached to the door, there being a pin *t* for connecting the two hinge-parts together, to be withdrawn for releasing the door. A hook or holder *u* is mounted in the vessel B, preferably under the top *c* thereof for holding open either the door *q* or the door *q'* when placing articles into the fabric-holder or removing articles therefrom, the holder being designed to also prevent accidental rotation of the fabric-holder. The vessel B is preferably placed at a greater elevation than the reservoir A, and at any suitable distance therefrom.

A suitable slab D, composed preferably of marble or similar stone, is placed in the fabric-holder C for pressing the liquid and dirty matter in solution out of the fabric while the fabric rests on either the door *q* or the door *q'* as illustrated in Fig. 3, but in some cases the slab may be omitted when from the peculiar nature or condition of the fabric the slab may not be desirable.

A supply-pipe E having a stop-valve F is connected to the vessel B and also to a convenient type of pump G suitably located, there being a suction-pipe E' extending from the pump nearly to the bottom of the reservoir A, for transferring the detergent liquid from the reservoir to the renovator vessel, in such quantity as may be desired, the vessel being provided with gages *v* and *v'*, for indicating the volume of liquid therein. A pipe H is connected to the top *c* of the vessel B and is provided with an outlet valve I through which air may escape from the vessel, or through which air may enter to the vessel as occasion may require. The bottom *a* of the vessel is provided with a stop valve *w* through which liquid and refuse matter may be drawn from the vessel. The pipe H is provided with a stop valve J and between the valve and the vessel it is connected by a cross-over pipe *y* having connection with the pipe E, the pipe *y* being provided with a stop valve *x* near the pipe E and also with a valve K near the pipe H although in some cases either one of the valves *x* or K may be dispensed with. The pipe *y* may be used if it be desired to pump liquid into the top of the vessel B.

A condenser is provided which comprises

a suitable vessel L for holding cooling liquid, and a coil M arranged in the vessel, there being a pipe II' connecting the coil with the valve J. The vessel L is provided with a valve I' through which cold water may be admitted to and held in the vessel, and an outlet connection L² is provided at the top of the vessel for the escape of water which may become warm and rise in the vessel. A pipe N is connected to the upper part of the coil M and is provided with a stop valve O. The lower end of the coil is provided with a stop valve P, and a pipe Q of suitable length extends from the valve to the reservoir A. The vessel L is situated at greater elevation than the reservoir, so that there may be gravity flow from the coil to the reservoir.

A pipe R, provided with a stop valve S is connected to the vessel B through which water, either hot or cold, may be conducted to the vessel from any suitable source. Also a pipe T, having a drain cock 6 enters the lower part of the vessel B and is connected to a radiating coil U that is arranged in the vessel, so that steam or hot water may be introduced into the coil from a suitable source through the pipe T, the end of the coil having a stop valve 7 from which extends a blow-off pipe 8.

A separating tank V is provided and arranged in a suitable position below the plane of the bottom of the vessel B. A pipe W extends from the pipe T into the lower part of the tank V and is connected to a heating coil X that is arranged in the tank, the end of the coil having a blow-off valve 9. The tank V is provided with an outlet valve 10 with which a suitable pump Y is connected, there being a pipe 11 extending from the pump to the reservoir A and having a valve 12 therein. A pipe 13 is connected to the valve *w* and has a lateral branch provided with a valve 14 to which a pipe 15 is connected that extends to the tank V. A valve 16 is connected to the pipe 13 and has a Y-shape pipe 17 connected thereto to which is connected a pipe 18 extending to and connected with the reservoir A. A valve 19 is connected to the lower end or stem of the pipe 17, and a pipe 20 extends from the valve to a settling tank Z that is provided and suitably situated so that liquid may flow thereto from the vessel B. A pipe 21 is connected to the valve O and extends to the tank V, being connected to the top thereof and provided with a valve 22 near the top; although the valve may in some cases be dispensed with.

The separating tank V is adapted to be used for separating the lighter refuse matter from the volatile liquid by heating the liquid so that it may pass off as gaseous vapor, the pump Y to be used for removing any liquid that may remain in the tank after the refuse

matter settles away from the liquid. The settling tank is adapted to receive the heavier refuse matter from the vessel B to permit the matter to settle down from the liquid, the heavier matter to be drawn off from the vessel before drawing the lighter matter into the separating tank V. The reservoir A and the tanks V and Z are provided with suitable wash-out plugs *z* which may be removed for draining the vessels.

In lieu of the squeezing or pressing apparatus heretofore described, the journal-box *i* may be omitted from the vessel B, and a wire-netting fabric-holder 23 may be suitably supported horizontally in the vessel B below the plane of the packing-box *k*. A rod 24 is extended through the packing-box and the gland *l* and is provided with a handle 25 at the outer end thereof, the inner end of the rod having a frame 26 attached thereto in which a roller 27 is journaled so as to roll on the holder 23 or over fabric that may be placed upon the holder. Various other specific forms of devices may be employed for the purpose of pressing the detergent liquid from the fabrics during the cleaning operations.

In practical use the process of cleaning may vary somewhat, in some cases it being unnecessary to use volatile liquid. When alkaline detergents may be satisfactory they may be supplied directly to the vessel B through the doorway *d* or through the pipe R, or, if desired, such liquid may be kept in the reservoir A in lieu of the volatile liquid which the reservoir is designed to hold. When it is desired to charge the renovator the door *e* should be opened, then by means of the handle *n* the fabric-holder C should be turned so as to be horizontal, then the uppermost door thereof should be opened and secured, as in Fig. 3 when a quantity of fabric may be placed upon the slab D, after which the door of the fabric-holder should be closed and secured. Then the fabric-holder should be turned over so as to be inverted and the other door thereof opened, when the fabric will be under the slab, as indicated in Fig. 3, and then other fabrics may be placed upon the slab and the door closed, after which the door *e* may be closed tightly. Now the detergent liquid may be supplied in suitable quantity to the vessel B, by either means above mentioned after which the liquid may be heated by means of heated liquid or fluid introduced into the coil U, and while the detergent liquid saturates the fabrics the fabric-holder may be turned over again and again so that the slab will squeeze the liquid repeatedly out of the fabric and thereby wash out the dirty matter from the fabrics.

After carrying out the operation sufficiently with the use of volatile liquid the gaseous fluid or vapor from the liquid may be permitted to pass off through the pipe H and

be condensed in the coil M to pass as liquid to the reservoir A. Also the remaining volatile liquid may be run off in the same manner if sufficient water be admitted into the vessel B through the valve S to float the volatile liquid to the top *c*; or, the remaining liquid and especially that containing the dirty matter in suspension, may be drawn off into either the tank V or the tank Z, and after drawing off the heavier portion of the liquid, the valves 14 and 19 may be closed so that the purer or cleaner liquid may pass through the pipe 18 to the reservoir A. That which may be admitted to the tank Z may settle and the liquid may be allowed to return as gaseous fluid into the vessel B when empty and closed or to the reservoir A. The liquid that may be admitted to the tank V may be heated and vaporized, and the vapor conducted through the pipes 21 and N to the condenser to return to the reservoir A as liquid. Any clear liquid remaining in the tank V may be transferred therefrom by the pump Y and the pipe 11 to the reservoir A, it being understood that the pipe 11 has no connection with the tank Z.

When the modified form of squeezing apparatus shown in Fig. 5 is provided, the fabrics are to be placed upon the netting 23, and the rod 24 should be operated longitudinally, thus causing the roller 27 to pass to and fro upon the fabrics, thereby repeatedly squeezing the detergent liquid therefrom. Other operations and results will be understood, when not obvious, from the foregoing description.

Having thus described the invention, what is claimed as new is—

1. Fabric-cleaning apparatus including a closed reservoir for holding volatile detergent liquid, a closed renovator vessel in which to cleanse fabrics by means of the liquid, means for conveying the liquid under control from the reservoir to the renovator vessel, means for returning liquid under control from the renovator vessel to the reservoir, means for conveying gaseous vapor from the renovator vessel under control, means for converting the vapor to liquid, and means for conveying the liquid when produced from vapor to the reservoir.

2. Fabric-cleaning apparatus including a closed reservoir for holding volatile liquid, a closed renovator vessel in which to cleanse fabrics by means of the liquid, means for conveying the liquid under control from the reservoir to the renovator vessel, means in the renovator vessel for repeatedly displacing quantities of the liquid in the fabrics, a condenser connected with the renovator vessel and also with the reservoir, and a separator connected with the renovating vessel and the reservoir and also with the condenser.

3. Fabric-cleaning apparatus including a tightly-closed vessel for holding detergent

liquid, a fabric-holder in the vessel for supporting fabrics in the liquid, means for repeatedly displacing quantities of the liquid in the fabrics, a reservoir for the detergent
 5 liquid, a duct between the reservoir and the vessel having a valve therein, a heating-coil in the vessel, and a vent-valve for the vessel.

4. Fabric-cleaning apparatus including a tightly-closed vessel provided with an opening having a closure therefor, the vessel being provided also with a packing-box and gland, fabric-pressing apparatus in the vessel and provided with an operating-shaft extending through the packing-box and gland,
 10 a reservoir, a duct between the reservoir and the vessel having a valve therein, a condenser having communication with the vessel and the reservoir, a heating-coil in the vessel, and a drain-pipe connected with the
 15 vessel provided with a valve.

5. Fabric-cleaning apparatus including a closed renovator vessel, a fabric-holder mounted rotatively in the vessel and provided with a pair of doors at opposite sides
 25 thereof, a slab movable in the fabric-holder, means exterior to the vessel for rotating the fabric-holder, a reservoir, and a duct between the reservoir and the vessel having a valve therein.

6. Fabric-cleaning apparatus including a renovator, a reservoir, a duct between the reservoir and the renovator having a valve therein, a condenser having communication with the renovator and the reservoir, a separating tank having communication with the
 35 condenser, and a duct between the renovator and the separating tank having a valve therein.

7. Fabric-cleaning apparatus including a
 40 renovator, a reservoir, a duct between the

reservoir and the renovator having a valve therein, a condenser having communication with the renovator and the reservoir, a separating tank having communication with the condenser, a duct between the renovator and the separating tank having a valve therein,
 45 and a duct between the separating tank and the reservoir having a valve therein.

8. Fabric-cleaning apparatus including a renovator, a reservoir, a duct connected with the renovator, a pump connected with the
 50 duct, a duct between the pump and the reservoir, a condenser having communication with the renovator and the reservoir, a separating tank having communication with the condenser, a duct between the renovator and the separating tank having a valve therein,
 55 and a pump having connection with the separating tank and the reservoir.

9. Fabric-cleaning apparatus comprising a renovator having a heating-coil therein, a
 60 reservoir, a condenser, a settling tank, a separating tank having a heating-coil therein, a duct between the reservoir and the renovator, a duct between the renovator and the condenser, a duct between the condenser and the reservoir, a duct between the renovator and the settling tank, a duct between the settling tank and the reservoir, a duct between the renovator and the separating tank,
 65 a duct between the separating tank and the condenser, a duct between the separating tank and the reservoir, and a water-supply pipe connected to the renovator.

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

HIRAM MAINE.

Witnesses:

WM. H. PAYNE,
 E. T. SILVIUS.