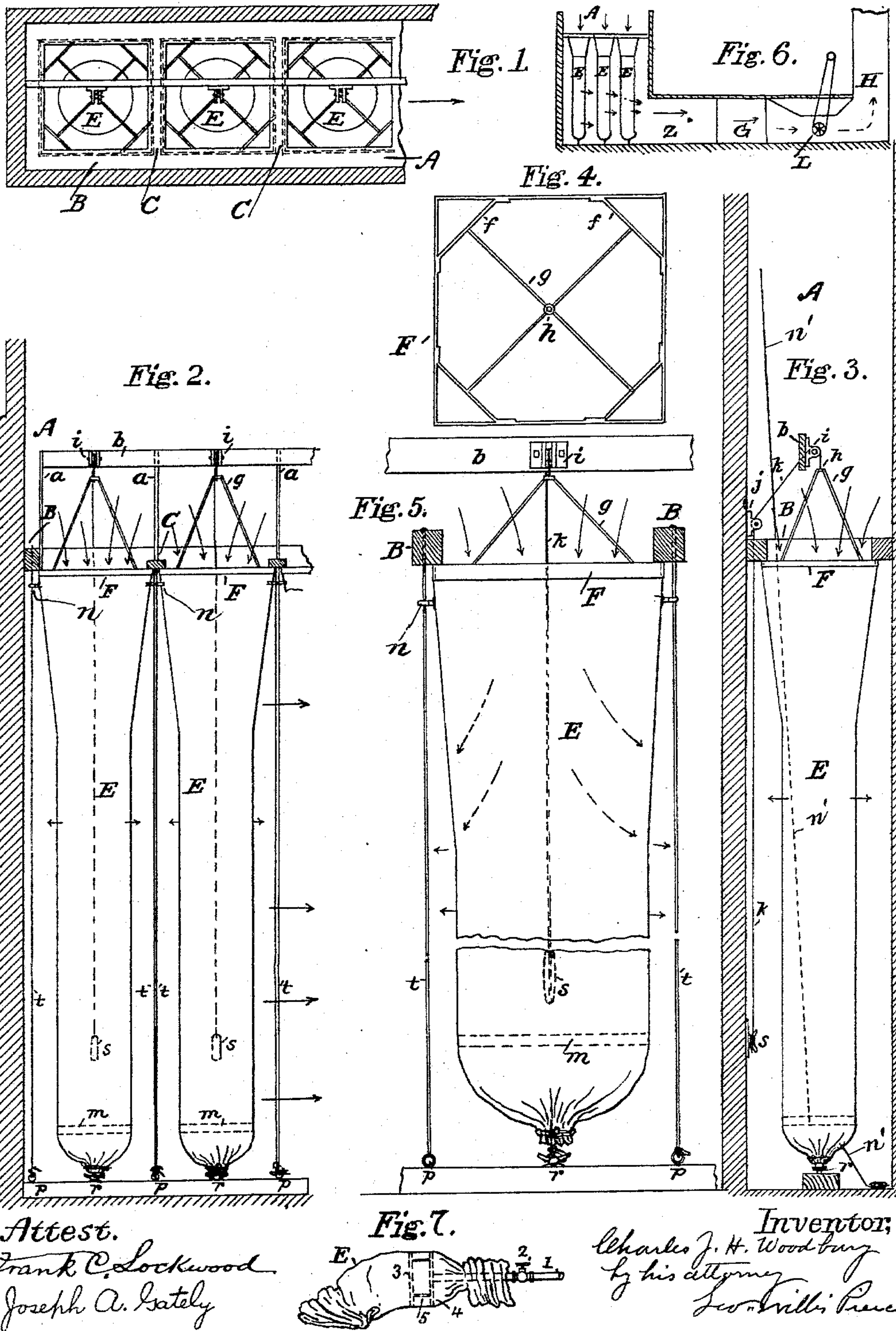


(No Model.)

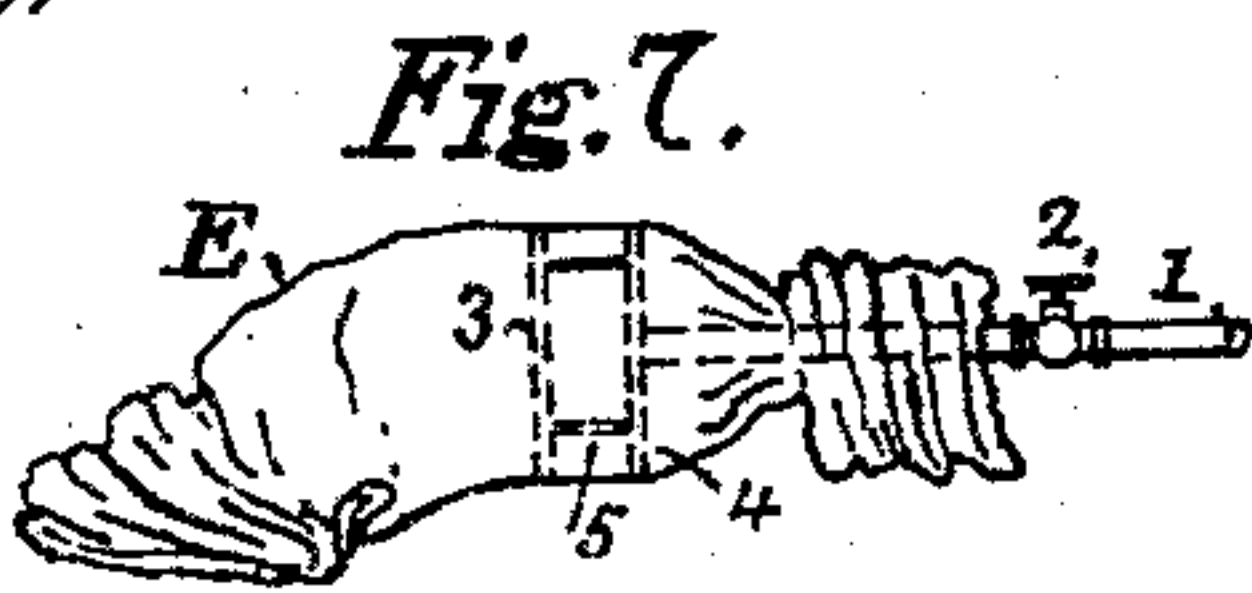
C. J. H. WOODBURY.
AIR PURIFYING APPARATUS.

No. 589,772.

Patented Sept. 7, 1897.



Attest.
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Joseph A. Gately



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Geo. Willis Pierce

UNITED STATES PATENT OFFICE.

CHARLES J. H. WOODBURY, OF LYNN, MASSACHUSETTS.

AIR-PURIFYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 589,772, dated September 7, 1897.

Application filed March 2, 1897. Serial No. 625,716. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. H. WOODBURY, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain Improvements in Means for Screening and Cleansing Air, of which the following is a specification.

The present invention relates to means for screening and cleansing the air supplied for the heating and ventilation of buildings by what is termed the "plenum" system. In such a system the external air is drawn into a flue by means of a blower to a box of heating-coils, and thence is forced through a hot-air shaft, from whence it is conveyed to the various rooms of the building.

The invention consists in an air-cleansing apparatus composed of one or more vertical portable tubes or bags having walls of a porous fabric located at the entrance of the air-flue, the upper end of each tube being open to the external air and the lower end being closed, so that the air will enter the tubes and pass through their walls into the flue. The upper end of each tube is distended by means of a frame of any suitable shape and held to the under side of a frame which is secured to the sides of the vertical portion of the flue. Each tube is distended near the lower end by a hoop, and the tube is maintained taut and steady by means of cords, which hold the tube to a cleat or ring at the bottom of the flue. I provide suitable means consisting of ropes and fixed pulleys where- by each tube can be quickly put in place, held securely, and a clean tube substituted when a soiled one is removed to be cleaned, thus rendering them extremely portable. When the air enters and passes down a tube, it, with any foreign substance—as dust, lint, or carbon particles from coal-smoke—strikes against the inner wall of the tube in a diagonal direction. The air passes through, while the foreign matter drops by its gravity to the bottom of the tube, if it is not of such a nature as to adhere to the surface thereof. I prefer to make the tubes or bags of unbleached cotton cloth and to make the main portion thereof mainly circular in cross-section as the preferable means for obtaining an

augmented air-filtering surface, all of which I will now proceed to describe, and point out in the appended claims.

Of the accompanying drawings, Figure 1 is a plan view of a flue showing the invention. Fig. 2 is a vertical longitudinal section, and Fig. 3 is a vertical cross-section of Fig. 1. Figs. 4 and 5 are respectively a plan and vertical enlarged view of the invention. Fig. 6 is a sectional diagram illustrative of the invention. Fig. 7 is a detail view representing the means for steam-cleaning the tubes or bags.

Referring to Fig. 6, A represents the vertical air-flue, which terminates in a horizontal flue Z. In the vertical flue I place the porous tubes or bags E E, into which the external air enters, as denoted by arrows. It passes through the walls of the tubes and along the flue Z, and, coming into contact with the box of heating-coils G, enters the shaft E, from whence it is distributed to the rooms in the building. L represents a blower which creates the draft.

Figs. 1 to 5 illustrate the screening apparatus, and reference is now had to them. I arrange at the upper part of the vertical flue a timber frame B, which is bolted to the walls thereof. Across the frame at suitable intervals are partitions C, which divide it into several openings. Above the frame B and to one side of its center is a bar *b*, supported from the frame by the studs *a a*. *t t* are guide or steady ropes which pass through the end pieces of the frame B and also the struts C and are secured in any suitable manner, and whose lower ends are fastened to rings or cleats *p p* at the bottom of the flue.

The screening tubes or bags are preferably made of cotton cloth and are mainly circular in cross-section. Those shown in the drawings are secured at their top or open ends to a square frame F, suitably braced and provided with two diagonal ropes *g*. With such a frame four gores are inserted in the upper end of the tube E to enlarge it to the size of the frame. The bottom of the tube E has rings sewed to its outside, through which is run a drawing-string, by means of which the tube is tightly closed. A hoop *m* on the inside near the bottom keeps the tube distended.

u u are rings or harness-snaps sewed to the opposite sides of the tube near the top, through which pass the ropes *t t*. Two long cords *n' n'*, (see Fig. 3,) one inside and one outside of the tube and secured to the tube at their ends, assist in turning the same inside out when desired.

k is a lifting-rope secured to the center of the crossed ropes *g* by suitable means, such as a spring-snap. It passes over the pulley *i*, fixed to the bar *b*, and over the pulley *j*, fixed to the wall of the flue, and extends downward and is fastened to the cleat *s*, fixed to the wall.

When a tube is to be put in place, the rings or snaps *u u* are placed around the guide-ropes *t t*, the rope *k* run over the pulleys and drawn, moving the frame *F* upward until it presses snugly against the under side of the frame *B*, when the rope *k* is fastened to the cleat *s*. The ropes *t t* and snaps *u u* guide the frame *F* to its seat. The tube is then drawn taut by securing its bottom to the cleat *r*, and steadied by said cleat and by the ropes or cords *t t*.

When the blower is in operation, external air is caused to rush into the open ends of the tubes *E*, as shown by the arrows. It passes through the walls of the tube at all points of its circumference and flows along the horizontal flue *Z* to the heat-coils. All foreign substances conveyed by the air strike against the inner walls of the tube in a diagonal direction, as shown by dotted arrows in Fig. 5, and if of a sticky or soft nature adhere thereto, but if heavy and hard they fall to the bottom of the tube.

It will be seen that the tubes are very portable. They can be removed in a few minutes and others inserted with equal facility. When removed, they are easily washed and laundered, can be readily turned inside out, and will last for a long time. The bags may be cleansed, as shown by Fig. 7, by turning them inside out and drawing them over a pair of disks 3 and 4, which are held apart by braces 5, between which steam issues at a high velocity from the steam-pipe 1, its pressure being regulated by the valve 2.

The important feature of using bags is that by amplifying the area it reduces the velocity of filtration per unit of surface. It is my practice to make the area of the bags about thirty times the area of the cross-section of the flue, and this requires that the velocity of the air through the fabric shall be but one-thirtieth of the velocity at which it passes downward into the flue. The use of long bags against the surface of which the air strikes diagonally is more efficient than similar screens across the flue, for, as has already been stated in the first instance, the foreign substances strike against the meshes of the cloth diagonally, and with screens across the flue the action of the air would be to de-

posit foreign substances against the cloth, to which they would adhere and block up the filter, or the tendency of the air-pressure would be to force the material through the interstices.

It is frequently desirable to remove the accumulations of cinders and other foreign matter which collect at the bottom of the bags without taking the bag down, and this is readily done by unfastening the drawing-string and opening the end of the bag, whereupon the objectionable matter can be easily shaken out and the end of the bag then closed and secured again.

Having now described the invention, I claim—

1. In combination with a flue for conveying external air to the interior of a building, a frame secured to the walls of the flue and provided with one or more openings, a screening apparatus consisting of one or more tubes or bags having porous sides or walls, the open end of each tube being opposite one of the said openings and having means for moving it toward and from said frame, and the other end being closed and provided with means for securing it to a fixed support.

2. In combination with a flue for conveying external air to the interior of a building, a frame secured to the walls of the flue at the upper part thereof and provided with one or more openings; a portable screening apparatus consisting of one or more vertical tubes or bags located under the said frame and having porous sides or walls, the upper open end of each tube being opposite one of the said openings and thereby in communication with the external air, and the lower ends closed, each tube or bag being provided with means substantially as described whereby the lower end is secured in fixed position and the upper end raised, guided and supported to its position and removed therefrom, as set forth.

3. In combination with a flue for conveying external air to the interior of a building, a frame secured to the walls of the flue at the upper part thereof provided with one or more openings, a screening apparatus consisting of one or more tubes or bags of cotton cloth made open at each end with a distending and supporting frame at one end, means at the other end for distending and also for tightly closing the same, and means for moving the ends away from each other and holding them to secure each tube or bag in taut position under one of said openings, as set forth.

4. A screening tube or bag of porous material held open at one end by a frame which is provided with a crossed rope to which is attached a raising and lowering rope, means as a hoop near the other end for holding the bag distended, and means for tightly closing the same, consisting of a drawing-cord, and means as cords for assisting in turning the bag inside out and back again.

5. Means for cleaning air-screening bags
consisting of a steam-pipe supporting on its
open end two disks which are held at a suit-
able distance apart, over which the bag can
5 be drawn, as set forth.

In testimony whereof I have signed my
name to this specification, in the presence of

two subscribing witnesses, this 26th day of
February, 1897.

CHARLES J. H. WOODBURY.

Witnesses:

BERNARD W. TRAFFORD,
GEO. WILLIS PIERCE.