(No Model.) 2 Sheets—Sheet 1.

J. H. WEBSTER.

METHOD OF AND APPARATUS FOR SHEATHING SUGAR FILTER BAGS.

No. 306,299. Patented Oct. 7, 1884.

Fig. 2.

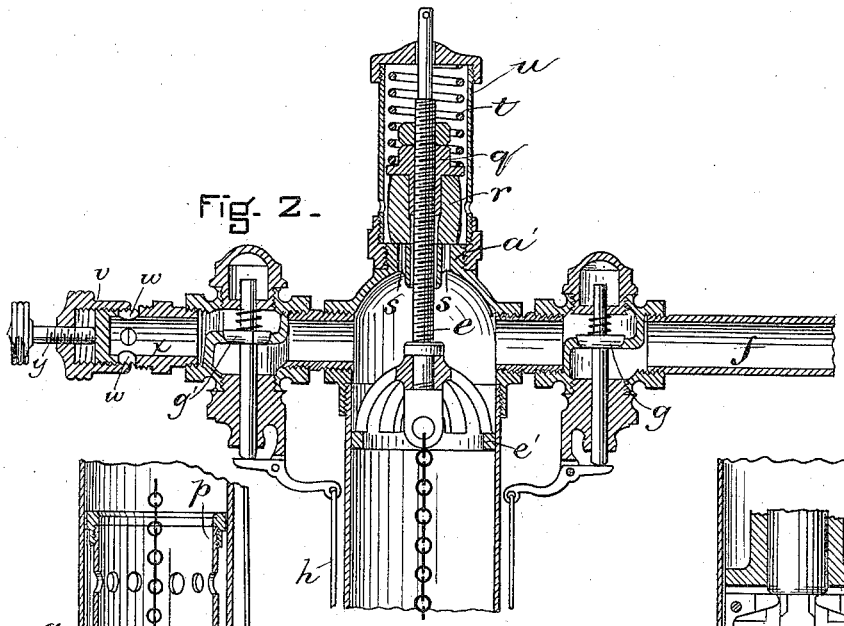
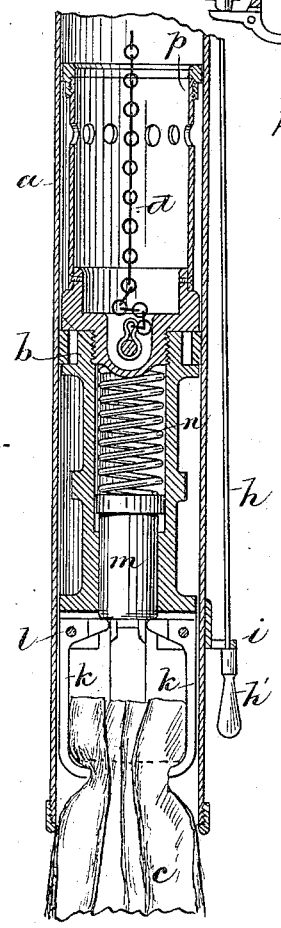


Fig. 3.



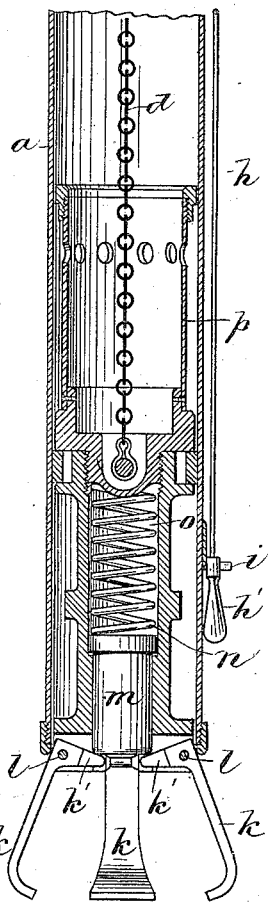
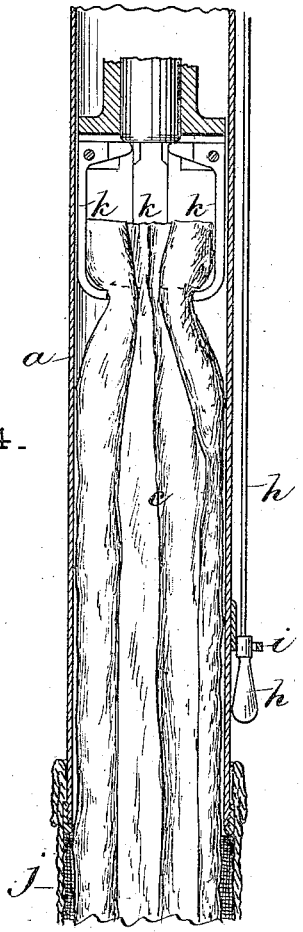


Fig. 4.



WITNESSES

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Attys.

(No Model.)

2 Sheets—Sheet 2.

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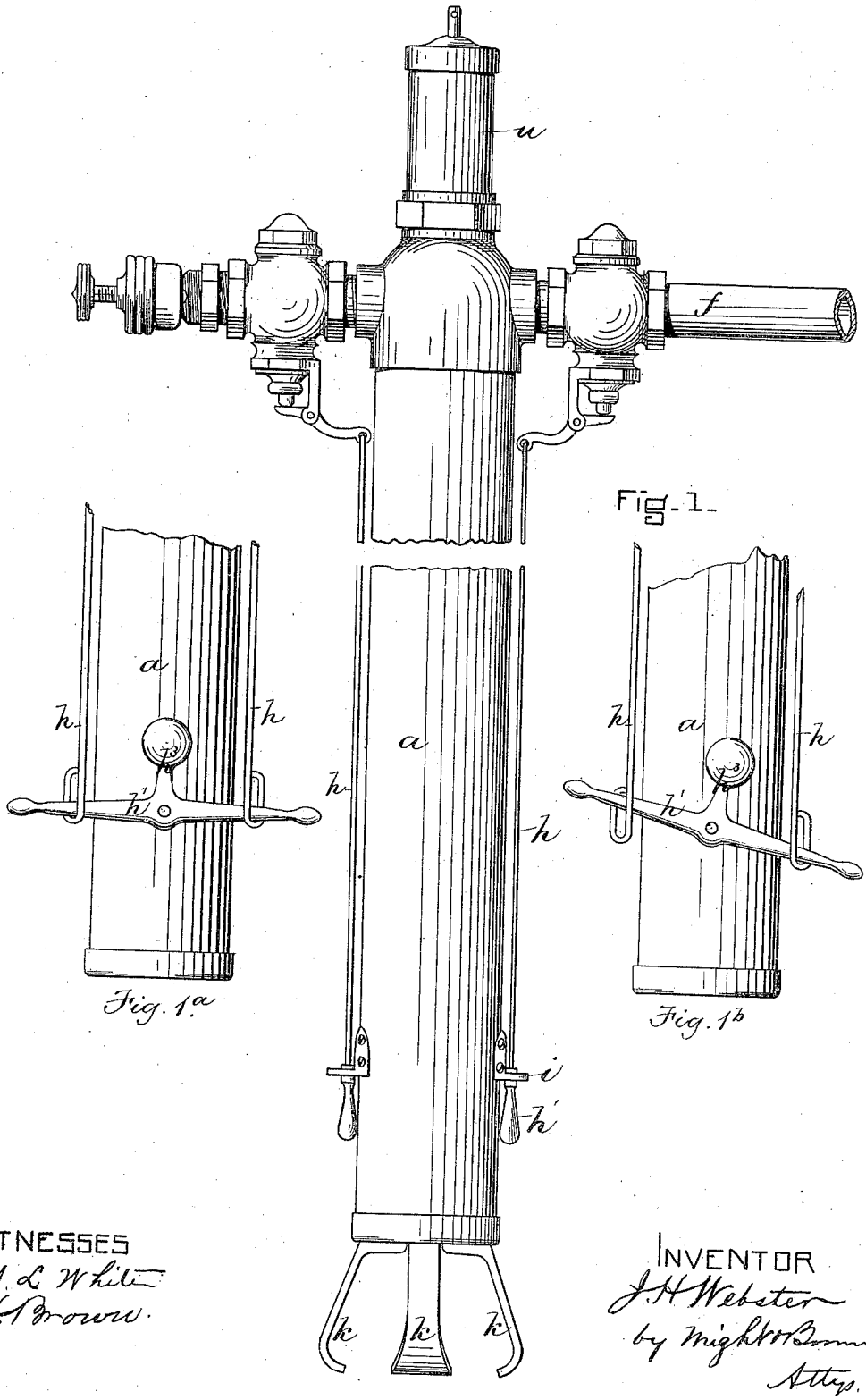

Fig. 1.

Fig. 1a

Fig. 1b

WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN H. WEBSTER, OF BOSTON, MASSACHUSETTS.

METHOD OF AND APPARATUS FOR SHEATHING SUGAR FILTER BAGS.

SPECIFICATION forming part of Letters Patent No. 306,299, dated October 7, 1884.

Application filed April 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. WEBSTER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Method of and Apparatus for Sheathing Sugar Filter Bags, of which the following is a specification.

This invention has for its object to provide an improved method of inserting the canvas bags used in sugar-refineries for filtering the sugar or liquor into the canvas sheaths or casings which contain said bags during the filtering operation.

The filter-bags are usually several feet in length, and when in use are suspended from nozzles in the bottom of a reservoir or tank containing the sugar-liquor, and receive the liquor which percolates through the meshes of the bags, leaving its impurities therein. After several hours' use the bags become so clogged or choked by the accumulated impurities that they have to be removed and washed. When the bags are in use, each is contained in a stout woven sheath of smaller diameter than the bag, the sheath preventing the pressure of the column of liquor from distending the bag and thus choking its meshes or pores. When the bags are washed, they have to be withdrawn from their sheaths and replaced therein after washing.

The operation of replacing the filter-bags in their sheaths is one of considerable magnitude in consideration of the large number employed and of the fact that the bags are larger than the sheaths and therefore have to be reduced to a compact form before they can enter the sheaths. In many refineries the bags are inserted in their sheaths by a workman who gathers the bag into longitudinal folds to make it compact, throws it over his shoulder, and then holding the sheath and manipulating the sheath and bag gradually work the latter into the former.

Other methods equally primitive and slow prevail at other refineries; but invariably, so far as I am aware, the method prior to my invention has been so slow and laborious that the need of a more rapid and effective method has long been felt.

My improved method consists in drawing the bag into a tubular receptacle, which gives the bag the desired compactness, and then ejecting the compacted bag into the sheath, the end of the latter being held over the mouth of the tube.

The invention also consists in the provision of means for alternately drawing the bag into and ejecting it from the tube by alternately exhausting the air from and admitting it to the interior of the tube, the latter being arranged vertically with its receiving end at the bottom, so that when the air is exhausted it will elevate a piston provided with clamps which grasp the upper end of the bag, and when the air is admitted the piston and bag will fall by gravitation, the bag being thus inserted in the sheath.

The invention also consists in certain details of construction, all of which I will now proceed to describe.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of an apparatus embodying my invention. Fig. 2 represents a vertical section of the same. Fig. 3 represents a vertical section of a portion of the apparatus, showing the bag at the commencement of its upward movement. Fig. 4 represents a vertical section showing the sheath applied to the lower end of the tube and the bag in its downward movement into the sheath. Figs. 1^a and 1^b represent modifications.

The same letters of reference indicate the same parts in all the figures.

In carrying out my invention I provide a tube, *a*, of suitable length to contain a filter-bag. Said tube is supported by any suitable means in a substantially vertical position, with an unobstructed vertical space below its lower end equal to the length of the filter-bag.

Within the tube *a* is a piston, *b*, which fits the interior of the tube somewhat closely, and is adapted to slide therein. The piston is provided with devices, hereinafter described, for grasping the upper end of a filter-bag, *c*, and is connected by a chain or other flexible device, *d*, with a support, *e*, at the upper end of the tube, the chain supporting the piston when it drops to the lower portion of the tube, as shown in Fig. 2. From the upper portion of the tube extends a pipe, *f*, through which the air may be exhausted from the tube. Said tube may communicate with any suitable exhausting apparatus—such as a steam ejector or injector,

or, if desired, an air-pump. I have employed a Korting exhauster with good results, the air being set in motion and exhausted from the tube by the motion of the steam through the exhauster, in a manner well known and understood. The pipe *f* is provided with a self-closing valve, *g*, which automatically shuts off the tube *a* from the air-exhausting apparatus, and is controlled by an operating-rod, *h*, adapted to be easily reached by the operator at the lower end of the tube.

In the operation of the apparatus the upper end of a filter-bag is grasped by the grasping devices of the piston, and the valve *g* is opened by the operator. The valve may be secured in an open position as long as the operator desires by the engagement of the handle *h'* of the operating-rod *h* with a slotted ear, *i*, on the side of the tube *a*, as shown in Fig. 3. The air is at once exhausted from the tube by the exhauster, which operates continuously. The partial vacuum thus produced raises the piston to the upper portion of the tube and holds it there as long as the valve *g* remains open. The bag *c* is thus drawn into the tube, and is compressed or folded into the desired compact form by the inner surface of the tube. While the bag is thus raised and held, the operator places a sheath, *j*, over the lower end of the tube *a*, as shown in Fig. 4, and then releases the operating-rod *h*, thus allowing the valve *g* to close. Air being then admitted into the tube above the piston, as hereinafter described, the piston is released and falls with the bag *c* until arrested by the chain *d*, the bag being thus inserted neatly and smoothly into the sheath.

The grasping devices with which the piston is provided are a series of fingers, *k*, pivoted at *l* to an extension of the piston *b*, and provided with short arms *k'* at their upper ends, against which bears a bolt or plunger, *m*, which is adapted to slide in a cavity, *o*, in the piston, and is pressed downwardly by a spring, *n*, in said cavity. The pressure of the plunger *m* on the arms *k'* throws the fingers *k* outwardly when they are below the lower end of the tube, as shown in Fig. 2. The fingers are thus in an open condition when the end of the bag is placed between them before it is drawn into the tube, and said fingers are forced inwardly and caused to grasp the bag by the inner surface of the tube when the piston commences its upward movement. When the piston drops, the fingers emerge from the lower end of the tube, and are caused by the spring *n* to release the bag when the latter is fully inserted in its sheath. The action of the fingers in grasping and releasing the bag is therefore automatic. The piston is provided with a shell or receptacle, *p*, at its upper end, which receives the chain *d* as the piston rises, and thus prevents the chain from rubbing against the inner surface of the tube. The support *e*, to which the upper end of the chain is attached, is a screw-threaded rod passing through a smooth-surfaced aperture or guide in the upper end or head *a'* of the tube *a*, and provided above said head with a nut, *q*, resting on a spring, *r*, which is interposed between the nut *q* and head *a'*. Said spring cushions the rod or support *e*, and prevents a shock or jar when the piston is arrested in its downward movement by the chain. The threaded rod *e* and its nut enable the chain to be adjusted so as to support the piston at any desired height when it is at rest. The head *a'* is provided with air-holes *s*, which are covered by the spring *r*, the latter being a block or ring of rubber. A spiral spring, *t*, located in a casing, *u*, presses downwardly on the nut *q*, and presses the spring *r* downwardly on the head *a*, the spring *r* serving as a valve covering the orifices *t*. The piston in its upward movement strikes an enlargement or spider, *e'*, on the rod *e*, and raises said rod with the valve or spring *r*, thereby uncovering the air-holes *s s*. Air is thus admitted, which breaks the vacuum and partially checks the upward movement of the piston. Said movement is additionally checked by the spiral spring *t*, which resists the upward movement of the rod *e*. These two instrumentalities cause the piston to stop quickly without any violent concussion. The spring *t* presses the valve or spring *r* against its seat when the upward movement of the piston is arrested, and thus closes the air-holes *s s*, so that the piston cannot drop until the air is admitted to the tube.

x represents a pipe adapted to admit air to the tube for the purpose of releasing the piston. Said pipe has a self-closing valve, *g'*, having operating devices similar to those provided for the valve *g*, the operator being thus enabled to open the valve and admit air to the upper portion of the tube when he is ready for the piston and compressed bag to drop into the sheath.

The rapidity of the downward movement of the piston may be regulated by means of an adjustable cap or nut, *v*, adapted to cover to any desired extent air-holes *w* in the outer portion of the tube *x*, the rapidity of the downward movement of the piston increasing in proportion to the extent to which said holes are uncovered. A binding screw or check *y* positively holds the cap *v* in any position to which it may be adjusted.

The described apparatus performs the operation of sheathing filter-bags much more rapidly than any means used heretofore.

I do not limit myself to the details of construction above described, nor to the employment of air-exhausting apparatus as a means for drawing the bag into the tube, as a mechanical device or plunger may be employed for the same purpose without departing from the spirit of my invention.

Figs. 1[a] and 1[b] show a lever, *h'*, pivoted to the tube *a* and engaged at opposite sides of the rods *h h*, by which the valves *g* and *g'* are opened. The operator, by depressing either

end of the lever h', causes that end to pull down the rod h engaged therewith, and thus open the valve to which said rod pertains. The lever h' has a weighted offset, h^2, which acts to hold the lever when it is inclined, and thus prevents the spring of the opened valve from acting to close the valve. When the lever is in a horizontal position, its weight has no effect.

The valve g' is not essential, and may be omitted. The apparatus will operate if air is admitted continuously through the holes w into the tube while the piston is being raised.

I claim—

1. The improved method of sheathing or incasing filter-bags, consisting in drawing the bag into a tube and thereby compressing it, and then ejecting the compressed bag from said tube into a sheath, as set forth.

2. A tube adapted to receive and compress a filter-bag, combined with means for inserting such bag into the tube and means for ejecting or discharging it therefrom into the sheath, as set forth.

3. A tube adapted to receive and compress a filter-bag, combined with a piston adapted to move in said tube, and provided with means for holding the bag and means for exhausting the air from the tube above the piston, as set forth.

4. The combination of a tube adapted to receive and compress a filter-bag and provided at its upper end with a pipe communicating with an air-exhausting apparatus, a valve whereby the tube may be put in communication with or shut off from the exhausting apparatus, and a piston adapted to slide in the tube and provided with bag-holding devices, as set forth.

5. The combination of a tube adapted to receive and compress a filter-bag and provided at its upper end with a pipe communicating with an air-exhausting apparatus, a self-closing valve for said pipe, an operating rod or device, whereby said valve may be opened, means whereby said valve may be held in an open position, and a piston adapted to move in said tube and provided with bag-holding devices, as set forth.

6. The tube and means for exhausting air therefrom, combined with the piston provided with bag-holding devices, and a chain or equivalent flexible device connecting the piston with a support at the upper portion of the tube, as set forth.

7. The tube and means for exhausting air therefrom, combined with the piston provided with bag-holding devices, a chain or equivalent flexible device connected to the piston, and a support for the upper end of said chain bearing on a spring or cushion, whereby the jar attending the fall of the piston is relieved, as set forth.

8. The combination of the tube, the supporting-chain, and the piston having a receptacle for said chain, as set forth.

9. The combination of the tube with the piston having the pivoted grasping-fingers normally thrown outwardly or separated by spring-pressure and adapted to be moved inwardly by contact with the tube when the piston is raised, as set forth.

10. The combination of the tube, the bag-raising piston, air-exhausting apparatus communicating with the tube, air-inlets at the upper portion of the tube, a valve adapted to normally cover the air-inlets and provided with a rod or stem adapted to be raised by the upward movement of the piston and thereby admit air to check said movement, and a spring, whereby the upward movement of the piston is additionally checked, as set forth.

11. The tube having the bag-raising piston, combined with air-exhausting apparatus, whereby the piston may be raised in the tube, and an adjustable air-inlet, whereby the rate of downward movement of the piston may be regulated, as set forth.

12. The combination of the tube, an air-exhausting apparatus therefor, the bag-raising piston, and an air-inlet pipe having a valve, whereby air may be admitted to the tube to release the raised piston, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of April, 1884.

JOHN H. WEBSTER.

Witnesses:
C. F. BROWN,
A. L. WHITE.