

(No Model.)

F. S. BLACKMARR.
PNEUMATIC WASHER.

No. 580,758.

Patented Apr. 13, 1897.

Fig. 1.

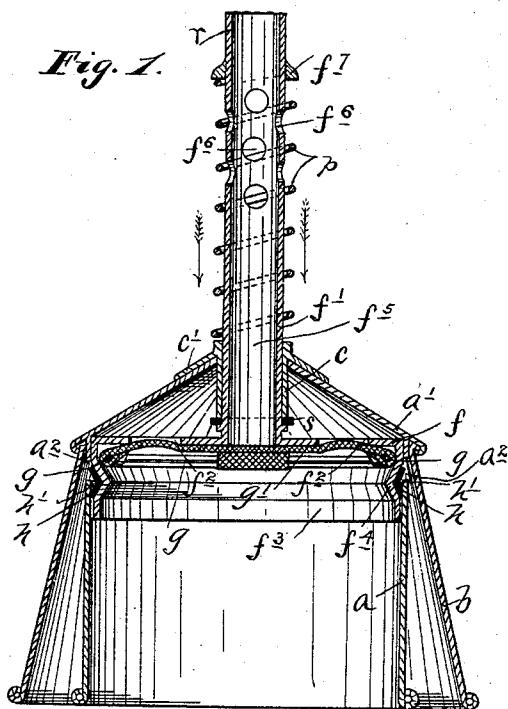


Fig. 2.

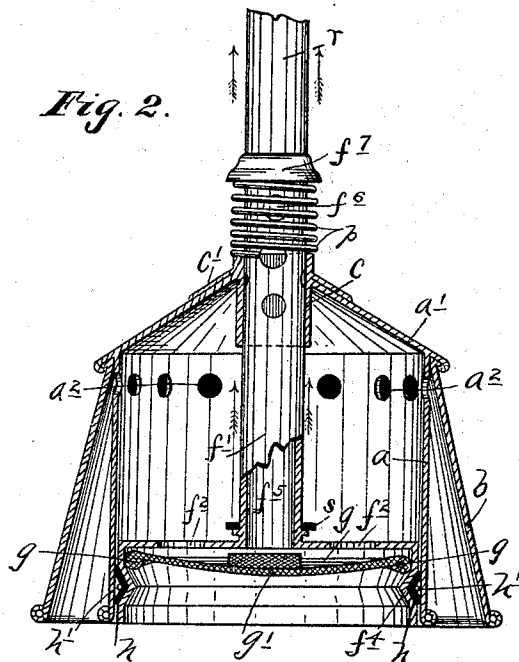


Fig. 3.

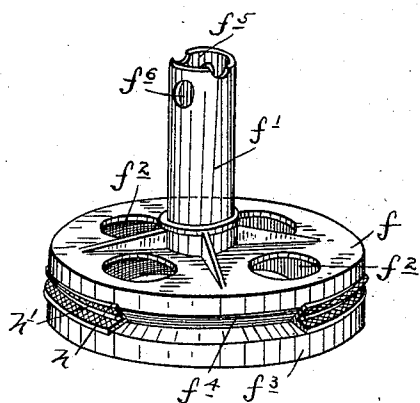
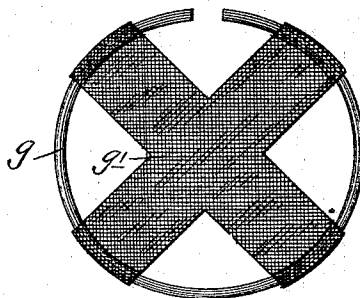


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

FREDERICK S. BLACKMARR, OF MINNEAPOLIS, MINNESOTA.

PNEUMATIC WASHER.

SPECIFICATION forming part of Letters Patent No. 580,758, dated April 13, 1897.

Application filed March 16, 1896. Serial No. 583,423. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK S. BLACKMARR, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Pneumatic Washers; 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.

My invention has for its object to provide a pneumatic washer of high efficiency for use in washing clothes or other articles.

To this end my invention comprises the novel devices and combinations of devices hereinafter described, and defined in the claims.

The preferred form of my invention is illustrated in the accompanying drawings, wherein, like letters referring to like parts throughout the several views—

Figure 1 is a vertical central section through my washer with the piston of the same shown in its uppermost or normal position. Fig. 2 is a similar view with the piston shown in its lowermost position. Fig. 3 is a perspective view of the piston detached with some parts broken away, and Fig. 4 is a plan view of the valve device detached which coöperates with the piston-passages.

As shown and preferred, the washer comprises a cylinder *a*, closed at its top by cap *a'*, but open at its lower end, an outside vessel *b*, in the form of a cone-frustum, having its upper end joined to the upper end of the cylinder *a* or the cap *a'*, and a plunger or piston *f* of special construction working within the cylinder *a*, with its hollow stem *f'* projecting through the cap *a'*, and provided with passages for air and water which are controlled by a valve device *g* of special construction.

The head or cap *a'* is preferably of conical form and is fitted at its center with a flanged bearing sleeve or collar *c* for the outward passage of the piston-stem *f'*. The cylinder *a* is provided, as shown, with a series of perforations *a²* near its upper end leading to the compartment formed between the inner and outer vessels *a* and *b*. The piston-head *f* is provided with a downturned annular flange

f³, containing a peripheral groove *f⁴*, impressed therein, which is preferably of V shape in cross-section for receiving a suitable packing-ring *h*, which is held in place by wire *h'* or other suitable binder. The piston-head *f* is provided with passages *f²*, and the stem *f'* is hollow, so as to afford a passage *f⁵* from the under side of the piston to the atmosphere through perforations *f⁶* in that part of the stem *f'* which never extends below the bearing-collar *c*. The passages *f²* and *f⁵* are controlled by the flexible valve *g'*, carried on the cut spring-ring *g*, seated within the piston-head. The valve proper, *g'*, may be of any suitable flexible material which is substantially impervious to air and water—such, for example, as heavy cloth, felt, rubber, or leather—and is preferably made cruciform with the outer ends of its radial arms strung or threaded on the spring-ring *g*. The said valve *g'* should be given sufficient slack to permit a limited vertical play of the body thereof in respect to the piston-head passages when the said valve device *g* is in working position. The said valve device is placed in position by simply forcing the ends of the divided ring *g* together until the ring will pass the inward bulge or corrugation caused in the piston-flange *f³* by making the impressed groove *f⁴*. When the valve device *g* is thus placed in working position within the piston-head, the body portion of the flexible valve *g'* will be in position to control the opening or passage *f⁵* through the piston-stem *f'*, and the radial arms of the said flexible valve *g'* will be in position to control the passages *f²* through the piston-head.

The piston-stem is shown as provided with a removable collar *f⁷*, having screw-threaded engagement with the upper end of the hollow stem, and between the said collar *f⁷* and the top of the bearing-collar *c* on the cap *a'* a spring *p* encircles the piston-stem *f'*, which tends to hold the piston in its uppermost or normal position, as shown in Fig. 1. This spring *p* may, however, be dispensed with, as will hereinafter more fully appear. The piston-stem *f'* is adapted to receive a handle *r* at its upper end, which may be removably held therein either by friction or by any suitable fastening device.

The piston-stem is shown as provided with a buffer *s*, of rubber or other suitable elastic material, directly above the piston-head, for cushioning the upstroke of the piston when intercepted by the lower end of the collar *c*.

Operation: The washer is applied to the clothes or other articles by partially or wholly submerging the vessels *a* and *b* in the water directly over the clothing and reciprocating the plunger. Under this action water and air will be forced together through the clothing with the effect of thoroughly washing or cleansing the same. Considering the action more in detail, assume the parts to be in the position shown in Fig. 1, when the washer is partially or wholly immersed in the water on top of the clothes. Then on the downward stroke of the plunger it is obvious that the flexible valve *g'* will close the lower end of the hollow piston-stem and the passages *f*² in the piston-head; or, otherwise stated, the said valve will be related to the said piston-stem and passages, as shown in Fig. 1, wherein the piston is assumed to be just starting downward. Hence on this downward stroke of the plunger a partial vacuum will be produced above the piston, with the effect of sucking the water upward in the chamber or compartment between the parts *a* and *b* and through the passages *a*³ into the interior of the inside vessel *a* above the piston-head. Then on the return or upward stroke of the plunger the flexible valve *g'* will assume the position shown in Fig. 2, thereby opening the passages *f*² and the lower end of the piston-stem. Hence under the upward stroke of the piston the water will be free to pass from the upper to the lower side of the piston through the passages *f*² in the piston-head and air will be admitted through the hollow piston-stem to a point below the piston. Then on the next downward stroke of the piston the air and water which may be within the cylinder or inside vessel *a* below the piston will be forced violently downward and outward through the clothing and a fresh supply of water will be sucked or pumped up into the cylinder *a* above the piston. In this way, under the reciprocations of the plunger, the air and the water are forced together through the clothing under pressure, which has a highly efficient effect in cleansing the clothing.

Inasmuch as on the upstroke air is freely admitted through the piston-stem to a point below the piston, the upstroke of said piston is easy and will be more or less automatic when the spring *p* is employed; but it is not necessary to employ the spring *p* in order to keep the vessels *a* and *b* from moving upward with the piston, inasmuch as the said vessels will be held downward by atmospheric pressure with sufficient force to permit the upward movement of the piston.

By actual usage I have demonstrated the efficiency of this washer for the purposes had in view, and on account of the way in which

air is forced thereby under pressure, together with the water, through the clothes I prefer to call the same a "pneumatic" washer.

It will be understood, of course, that the purpose of the outside vessel *b* in relation to the inside vessel *a* is to afford a circulating-passage for the water and air from under the vessel or in the tub to pass upward through the openings *a*² into the cylinder *a* above the piston, and hence it must be obvious that other forms of circulating connections might be substituted which would accomplish the same result. It will also be understood that some of the parts herein shown are capable of other uses than for washing—as, for example, the valve device *g g'*, which could obviously be made to work with the piston having passages therethrough regardless of the purpose to which the piston might be applied. It will also be understood that minor details might be changed without departing from the spirit of the invention.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. A pneumatic washer, comprising a cylinder closed above and open below, a piston in said cylinder, having valve-controlled passages for the flowage of water and the inlet of air, to the under side of the piston, on the upstroke of the same, and external circulating connections leading to the upper part of said cylinder, from a point under the water, when the washer is in working position, substantially as described.

2. A washer, comprising a pair of substantially concentric vessels with open lower ends and closed upper ends, one or more passages between the upper portions of said vessels, a piston with its head working in the central vessel and its stem working through the closed upper end thereof, and one or more valved passages in said piston-head, which valved passages are adapted to be closed on the downstroke and opened under the upstroke of said piston.

3. A pneumatic washer, comprising a pair of substantially concentric vessels with open lower ends and closed upper ends, one or more passages between the upper portions of said vessels, a piston in the central vessel with its stem working outward through the closed upper end thereof, one or more valved passages in said piston-head, and a valve-passage in said piston-stem, extending from the under side of the piston to the atmosphere, with said valve-passages arranged to be closed on the downstroke and opened under the upstroke of the piston, substantially as described.

4. In a pneumatic washer, the combination with the inner cylinder open below and closed above, of the outside conical vessel open below and closed above, passages between the upper portions of said two vessels, a piston in said cylinder, provided with a hollow stem extending outward through the closed top

thereof, and having one or more passages in its head, and a valve carried by said piston and arranged to close said passages, and the lower end of the piston-stem, on the down-
5 stroke of the piston, and to open the same on the upstroke of the piston, substantially as described.

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

FREDERICK S. BLACKMARR.

Witnesses:

JAS. F. WILLIAMSON,
E. F. ELMORE.