

(No Model.)

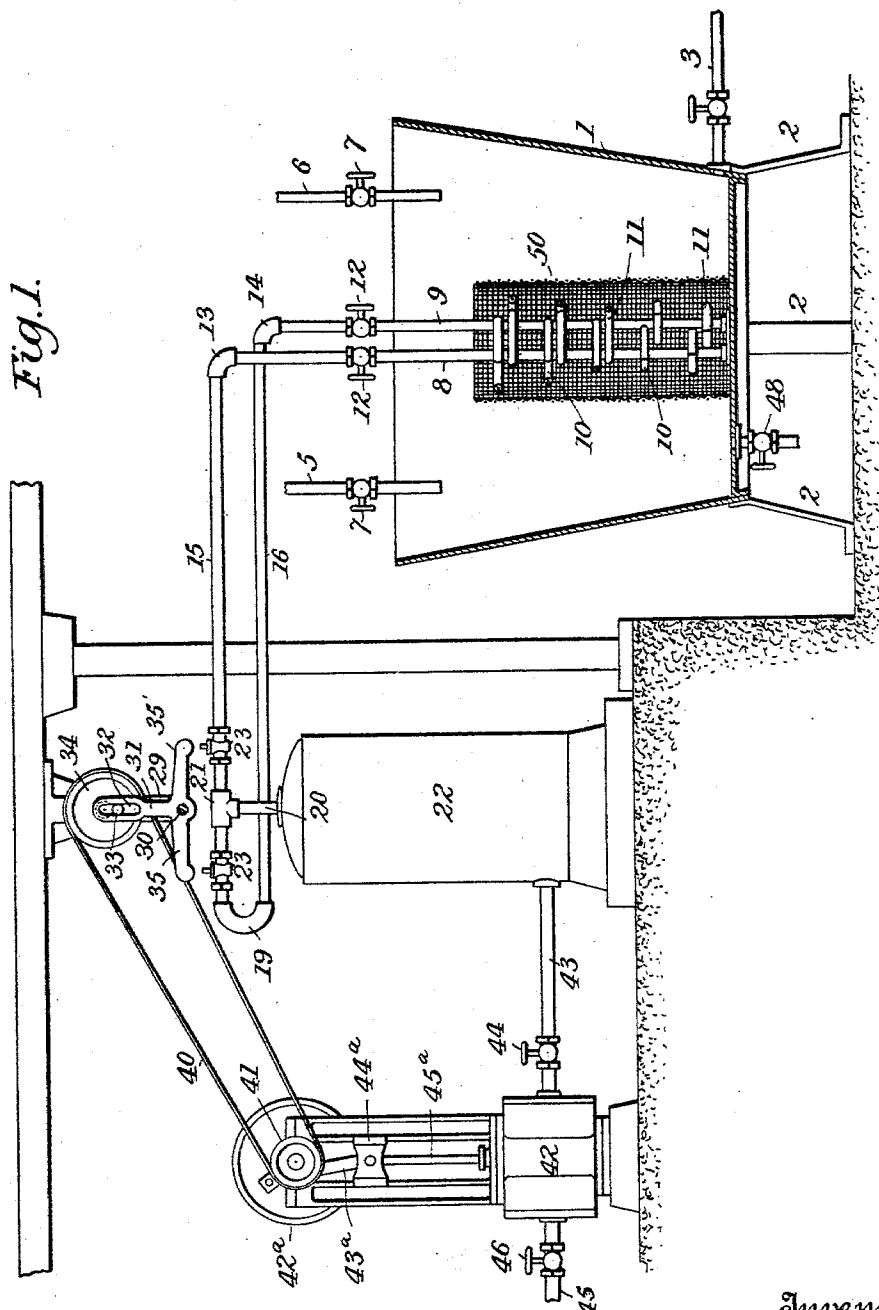
2 Sheets—Sheet 1.

W. S. FOSTER.
WASHING MACHINE.

No. 571,758.

Patented Nov. 24, 1896.

Fig. 1.



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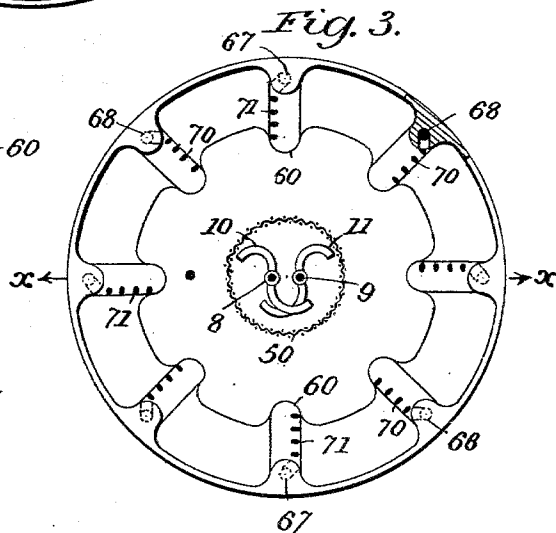
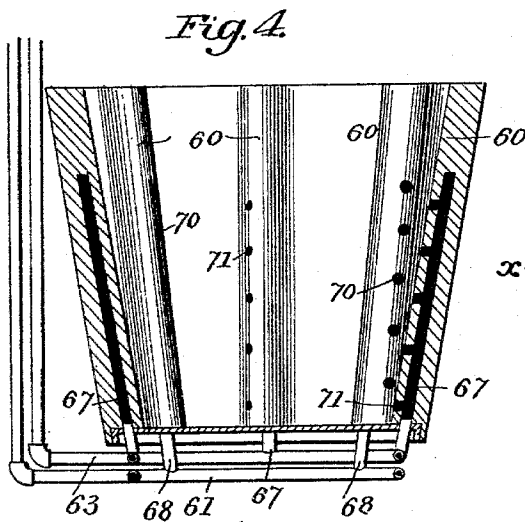
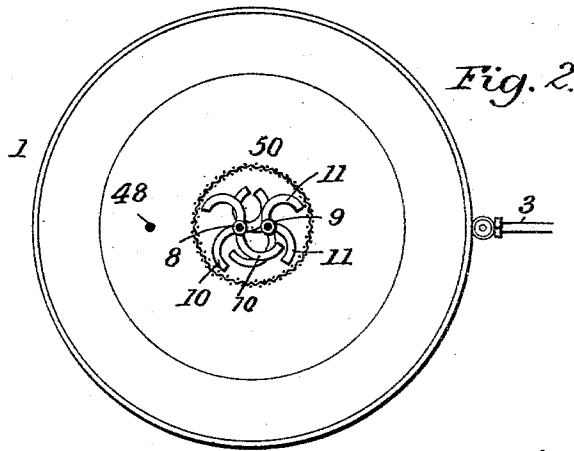
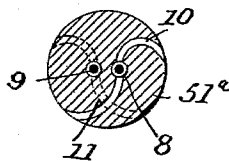


Fig. 5



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UNITED STATES PATENT OFFICE.

WHILLDIN S. FOSTER, OF PHILADELPHIA, PENNSYLVANIA.

WASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 571,758, dated November 24, 1896.

Application filed November 22, 1895. Serial No. 569,849. (No model.)

To all whom it may concern:

Be it known that I, WHILLDIN S. FOSTER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Washing-Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in washing-machines; and it has for its object the cleansing or washing of clothes in the most effective and rapid manner as well as by the simplest and most economical means, substantially as will hereinafter be more particularly described.

The invention consists, broadly, in the combination, with the washing-tank of a washing-machine, of means for introducing air under pressure into the tank, and means for alternately reversing the course or direction of the air within the tank, substantially as will hereinafter more fully appear when taken in connection with the accompanying drawings, wherein—

Figure 1 is a side elevation, in part section, of one form or embodiment of apparatus by which my invention may be carried into effect. Fig. 2 is a top or plan view of the washing-tank, as shown in Fig. 1, and indicating more clearly the disposition or arrangement of the tank devices, through the medium of which the alternately-reversed current effects are produced. Fig. 3 is a similar view to Fig. 2 and represents a modification in the arrangement of the tank devices which are employed for producing the reversed current effects. Fig. 4 is a vertical sectional elevation of Fig. 3, taken about centrally and representing more clearly the devices which are sometimes employed at the sides of the tank for producing the desired reversal in the direction or course of the air which is introduced within the tank. Fig. 5 is a sectional modification of the housing or guard employed for the centrally-arranged devices through the medium of which the reversed current effects are had within the tank.

I propose in practice to employ an ordinary form of washing-tank, which is preferably stationary and the axis of which is preferably vertical, and into this tank the air is introduced under pressure in first one direction

and then the other, or, more properly, in reverse or opposite directions alternately, whereby the clothes or other garments while being subjected to the most effective washing operation are also agitated or swirled around bodily in opposite directions and subjected to a pounding action which results from the sudden reversal of the course or direction of the air under pressure, which is effected by any suitable means for the purpose.

It will be understood that the air introduced into the tank is always under control and can be made to enter the tank at any desired degree of pressure as well as for any required period of time. In carrying my invention into effect I preferably resort to either one of the apparatus substantially such as I have herein shown, and wherein the numeral 1 indicates an ordinary open washing-tank, preferably stationary and mounted or held upon suitable supports 2. The said tank is preferably conical in shape; but it of course could be made straight-sided or of equal diameter throughout, and at the bottom thereof at one side is a pipe 3 for the purpose of admitting steam into the bottom of the tank, so as to boil the clothes or garments while they are being washed or treated in the manner to be hereinafter described. This steam-pipe is supplied with a plug or cock which may be readily operated to turn on or shut off the steam at will.

Extending into the tank for a short distance and leading from any suitable source of supply is a pipe 5 for introducing hot water into the tank and a pipe 6 for introducing cold water, each of said pipes being provided with a valve or cut-off 7, so as to regulate the supply to the tank in an obvious manner.

It is at the time the garments are properly submerged in the washing-water of the tank that the air under pressure is introduced for both pounding the garments or clothes as well as agitating the same and producing a swirling or gyrating action of the washing-water. While this combined effect may be carried out in a great many different ways, as hereinbefore stated, I prefer the devices herein shown. Thus in Fig. 1, 8 and 9 represent two vertical pipes having cut-offs 12, and which are properly supported within the tank 1 and preferably at the center of said tank, and each

of said pipes has a valve or cut-off 12. The pipe 8 is provided with a series of substantially **S**-shaped pipes 10, horizontally arranged, and being at equal or unequal distances apart, the said pipes all communicating with the pipe 8, so that when the air under pressure enters the latter pipe it will be forced out of both ends of the said horizontally-arranged **S**-shaped pipes 10, the air of course taking the same course or direction in the tank from both ends of the pipes. Similarly arranged on the vertical pipe 9 is a series of corresponding **S**-shaped pipes 11, the disposition of which is the reverse to that of the pipes 10, but they are in like manner open at both ends, so as to cause the air when it enters the pipe 9 under pressure to pass out of the ends of the said pipes 11, but reversely to the course or direction given to the air when it issues from the ends of the set of **S**-shaped pipes 10 first described. These series of pipes 10 and 11 preferably alternate with each other in their vertical arrangement; but it will be understood that I am not limited to any particular arrangement as long as I obtain the reversal of the course or direction of the air which is forced through the same under pressure. I have found from experience that the arrangement shown in Fig. 1 gives good results; but from the modifications hereinafter more specifically referred to it will be seen that I am enabled to get the same results in slightly-different ways from the manner proposed by the reverse arrangement of the **S**-shaped pipes above described. Various means could be resorted to for supplying the said pipes 10 and 11 with air under pressure; but I prefer in one instance, as shown in Fig. 1, to couple or connect with the pipes 8 and 9, respectively, the horizontally-arranged pipes or conduits 15 and 16, these latter being joined at one end to the pipes 8 and 9 by the couplings 13 and 14, while at their opposite ends they are united or joined by curved or other suitable coupling 19. The said horizontally-arranged pipes 15 and 16 may be supported in any suitable manner, but as herein shown the pipe 15 is supported by the upper end of a pipe 20, projecting from the top of an air-tank 22 and having a **T**-coupling 21, substantially as shown. To either side of the pipe 20 is arranged some sort of automatic valve 23, such, for instance, as an ordinary puppet-valve, both of said valves normally being closed.

It will thus be seen that when the valve on the right is open communication is had between the air-tank and **S**-shaped pipes 10 and that when the said valve is closed and the valve on the left is opened communication will then be had between the **S**-shaped pipes 11 and the air-tank, and in this way the air under pressure will be forced alternately through the pipes 10 and 11 and in reverse or opposite directions.

When the air is following one direction, the clothes or garments will be carried around

therewith, and then when the said air is cut off from one set of **S**-shaped pipes and transferred to or forced through the other set of said pipes the effect will be sudden and the action producing a most effective pounding of the garments, while at the same time they are being agitated within the tank. Of course to obtain the desired alternating action and reversal in the direction of the air some simple arrangement of automatic devices must be employed to operate the valves 23 alternately, and while various devices could be resorted to for this purpose I prefer such as are shown in Fig. 1. In said figure 29 represents a three-armed lever pivoted or loosely supported at 30 and having its vertical arm 31 provided with a slot 32, receiving a pin or projection 33 on the side of a pulley 34, the construction and arrangement being such that as the said pulley is rotated an oscillating movement will be imparted to the lever 29, so as to cause the horizontal arms 35 and 35' of the lever to alternately open the valves 23, thus at regular alternate intervals permitting compressed air to pass into the pipes or conduits 15 and 16 from the air-tank 22. For instance, as the lever is oscillated by the means described the arm 35' thereof will depress the valve 23 at the right, and then as soon as pressure on this valve is relieved by the upward movement of said arm this valve will automatically close and the valve 23 at the left will be correspondingly operated by the horizontal arm 35 of said lever. In this way the action or operation is an alternate one, and it will be of course understood that the devices can be so regulated as to raise or lower the pressure of the air in the tank and that they may be also provided with means by which to enable the valves to be kept open for a longer or a shorter period of time; but inasmuch as various means for this purpose could be used I have not seen fit to illustrate any such herein.

Any suitable means may be employed for imparting motion to the eccentric or pulley 34, but I prefer to provide said pulley with a driving belt or band, or in some cases a chain 40, passing around another pulley 41, attached to the side of a drive-pulley 42^a, and the said chain or band 40 may either be operated through the medium of suitable connections with the force-pump 42, which supplies air to the tank 22, or else independent motive power may be employed. I prefer the first construction explained, and it will be seen from Fig. 1 in what manner the operation takes place, a simple connection 43^a being attached to a slide 44^a, operated by the piston 45^a of the said pump. The pump has an air-inlet 45, provided with a shut-off valve 46, and it also has a pipe 43, leading to the tank 22, and also having a valve or cut-off 44.

The devices may be made to operate either fast or slow, and it is obvious from the general construction and arrangement of parts shown and described that the most perfect

and complete results are obtained. It should have been remarked that the bottom of the washing-tank 1 is provided with an outlet 48 for the water which is employed to effect the washing of the clothes.

In order to prevent the clothes or garments from being torn by catching onto the projecting ends of the horizontally-arranged S-shaped pipes 10 and 11, some means must be provided, and to this end I inclose the double series of pipes within a guard or housing 50, preferably of either a perforated or slatted material, so as not to interfere with the proper agitation of the garments. Other devices than the form of housing or guard shown in Figs. 1, 2, and 3 could be employed, and consequently it will be understood that I do not limit myself to this form. For instance, as shown in Fig. 5, the said guard or housing is constructed of a solid block or body 51^a, having suitable openings formed therein for the passage of the pipes 10 and 11 and leaving only the open ends of the said pipes exposed. In this way the clothes or garments are also prevented from catching onto the ends of the said S-shaped pipes, while at the same time this particular form of guard has the function of decreasing the amount of water, proportionately, which would need to be agitated. The housing or guard preferably projects somewhat above the S-shaped pipes, and it should be remarked at this point that the arrangement or disposition of the latter is such as to carry the clothes around bodily and in a manner not to trail behind and interfere with the operation, as would be apt to be the case if the two series of S-shaped pipes were arranged at only a limited height upon their respective supply-pipes 8 and 9. It will be further understood that the said S-shaped pipes of each series need not of necessity be in perfect alignment one above the other, but they could be arranged around the pipes 8 and 9 in a spiral direction and still produce the same important results.

In addition to introducing the air under pressure centrally of the tank I have found in some instances that it is desirable to also introduce air at the inner sides of the tank alternately in reverse directions, or else I may in some instances do away with the centrally-arranged devices and employ the side devices alone, it being understood, however, that the central arrangement of the reversely-arranged S-shaped pipes is the preferred form. Thus in Figs. 3 and 4 the washing-tank is formed on its inner side with an equal number of vertically-disposed ribs 60. Located at the bottom of the tank 1 on the outer side is a coiled or curved pipe 61, one end of which leads upward and is in connection with pipe 15 of Fig. 1. Similarly arranged beneath the bottom of the tank is another curved or coiled pipe 63, one terminal of which also leads upwardly and is connected with pipe 16 of Fig. 1, it being understood that the proper con-

nections are made by means of couplings or other suitable devices.

Leading upwardly from the curved pipe 61 is a number of pipes 67, passing through alternate ribs of the tank 1, and each of said pipes being provided with a number of nozzles or tips projecting through openings in the same or corresponding sides of the said alternating ribs 60. In like manner an equal number of vertical pipes 68 extend upwardly from the curved or coiled pipe 63 and pass alternately through the remaining ribs of said tank, and they are also provided with nozzles or tips extending correspondingly through openings in the sides of their respective ribs in an opposite direction to the nozzles or tips of the vertical pipes 67, above mentioned, the said separate nozzles or tips being represented at 70 and 71, respectively. It will thus be seen that through the medium of the operating devices shown in Fig. 1 the air under pressure may be introduced into the tank at the sides, first in one direction and then the other, and that the results will be substantially the same as in the first instance described.

To employ both sets of air-introducing devices, it is obvious that a simple connection only is required between the terminals of the curved pipes herein referred to and which it has not been thought necessary to illustrate herein.

Without limiting myself to the precise construction and arrangement herein shown and described, I claim as my invention—

1. The combination in a washing-machine, with a washing-tank, of means for introducing air under pressure into the tank in alternating reverse currents, substantially as described.

2. The combination in a washing-machine, with a washing-tank, of means for introducing air under pressure into the tank in alternating reverse currents, and an air-pressure supply, substantially as described.

3. The combination in a washing-machine, with a washing-tank, of separate series of reversely-arranged horizontal S-shaped pipes within the tank, a separate supply for each series, and means for forcing air under pressure first through one series and then through the other, substantially as shown and for the purpose described.

4. The combination in a washing-machine, with a washing-tank, of separate series of vertically-arranged horizontal S-shaped pipes arranged within the tank, a separate supply for each series of pipes, an automatic valve for each of said series, means for alternately opening and closing the said valves automatically, and an air-pressure-supply tank, substantially as described.

5. The combination in a washing-machine, of the washing-tank, the double series of reversely-arranged S-shaped pipes, the vertical pipes by which the two series are supported,

the horizontal pipes or conduits connecting said vertical pipes, valves alternately admitting air to each of said conduits and thence to the S-shaped pipes, an air-pressure-supply tank, and means for automatically operating the said valves, substantially as described.

6. The combination in a washing-machine, of the washing-tank, means for introducing air under pressure into the washing-tank, an air-pressure supply and intermediate pipe connections provided with the valves 23, and the oscillating lever for operating said valves, and means for operating said lever, substantially as described.

7. The combination in a washing-machine, of the washing-tank, the horizontally-disposed S-shaped pipes reversely arranged within the tank and supported in position by air-supply pipes, an air-pressure tank, and a pump therefor, pipe connections between the S-shaped pipes provided with suitable valves and communicating with the air-tank, the three-armed lever operating said valves, and means for oscillating said lever through the medium of devices connected with the pump, substantially as described.

8. The combination in a washing-machine, of the washing-tank, the reversely-arranged horizontal S-shaped pipes within the tank, an air supply for said pipes, and a shield or guard inclosing the pipes, substantially as described.

9. The combination in a washing-machine, of the washing-tank, the reversely-arranged horizontal S-shaped pipes within the tank, an air supply for the pipes, and a shield or guard constructed of a solid block inclosing said pipes and provided with openings for the escape of the air, substantially as described.

10. The combination in a washing-machine, of a washing-tank, and an air-pressure-supply tank, separate series of horizontal S-shaped pipes, their supporting and connecting pipes, the latter provided with automatic valves and being in communication with the air-pressure tank, the pivoted three-armed lever having its vertical arm slotted, the pulley having the pin working in said slot, a pump, and means for operating said pulley from said pump, substantially as described.

11. The combination in a washing-machine, of the washing-tank, the reversely-arranged and horizontally-disposed S-shaped pipes within the washing-tank, an air-pressure tank, and a pump supplying the same with air, separate supplies for the separate series of S-shaped pipes, and an automatic valve controlling each supply, a connection between the supply-pipes and air-pressure tank, and means for alternately opening and closing the valves in the supply-pipes, substantially as shown and for the purpose described.

12. The combination in a washing-machine, of the washing-tank, means for introducing air under pressure into the washing-tank at the middle portion of the latter, means for also introducing air under pressure into the tank at the sides thereof, and means for alternately reversing the courses or directions of the air, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WHILLDIN S. FOSTER.

Witnesses:

WHILLDIN FOSTER,
MAURICE H. JONES.