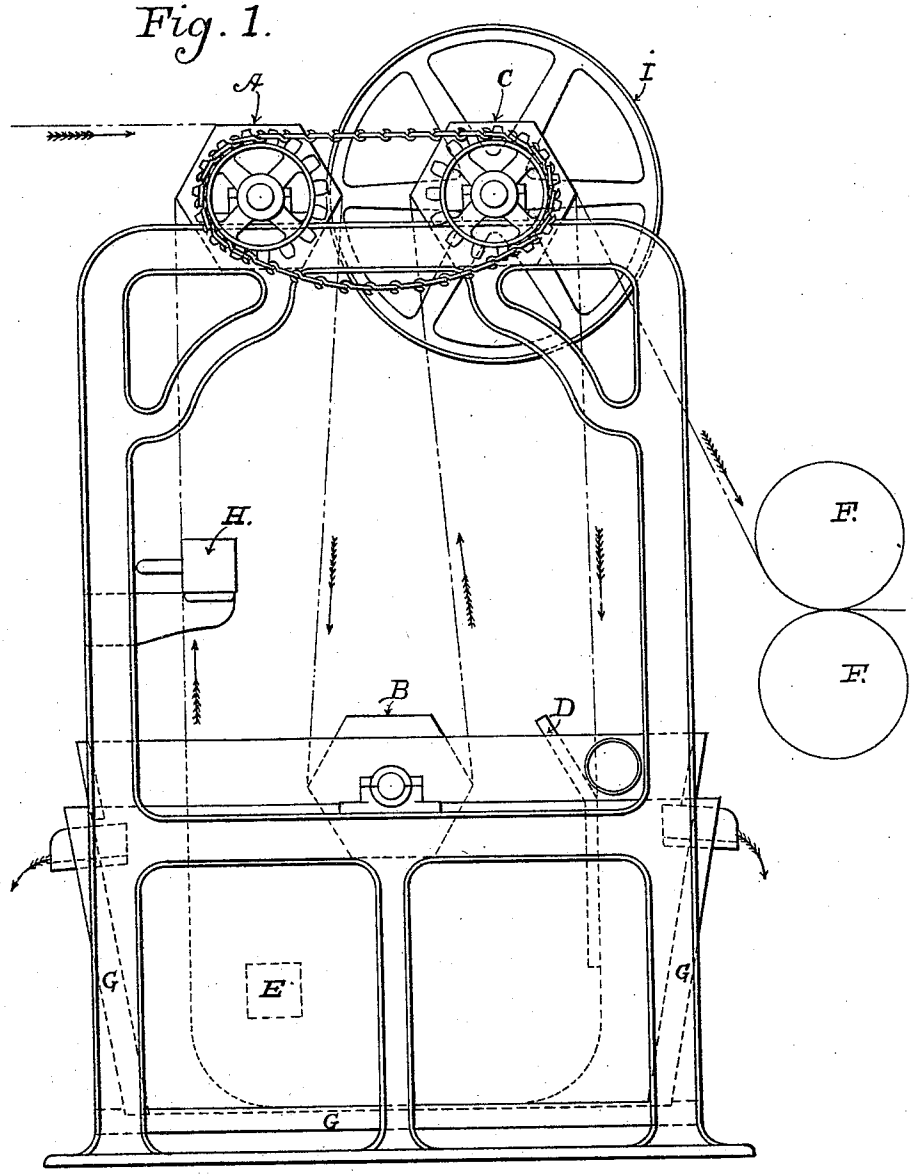
(No Model.) 3 Sheets—Sheet 1.

H. N. F. SCHAEFFER.

CLOTH WASHING MACHINE.

No. 574,944. Patented Jan. 12, 1897.

Fig. 1.



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CLOTH WASHING MACHINE.

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Fig. 2.

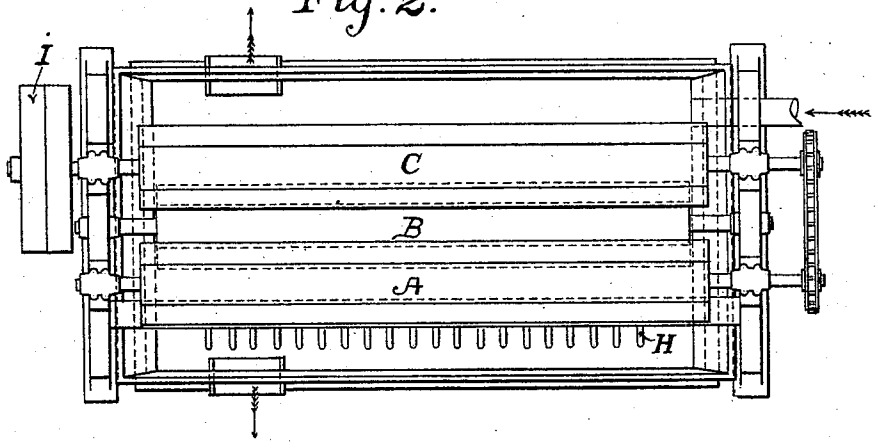
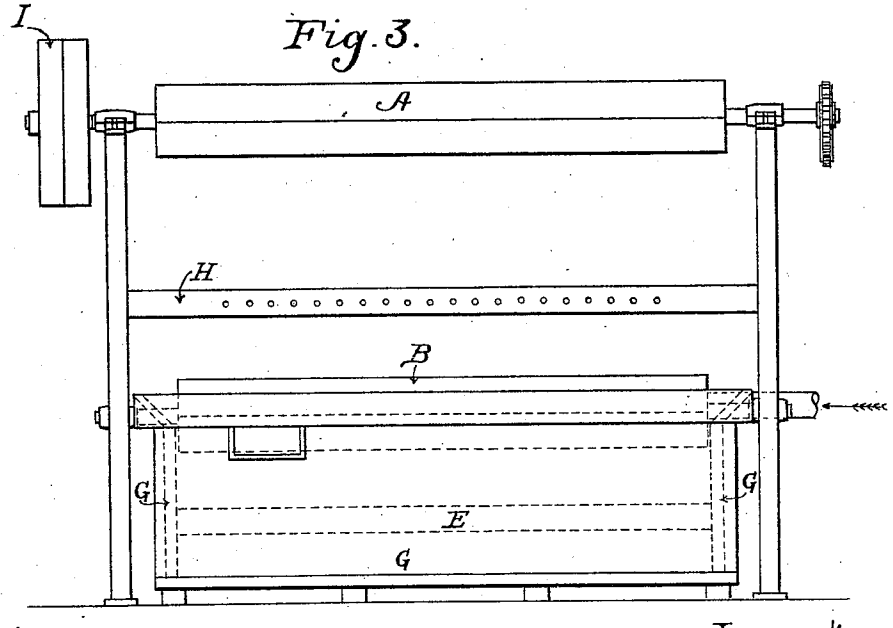


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

H. N. F. SCHAEFFER.

CLOTH WASHING MACHINE.

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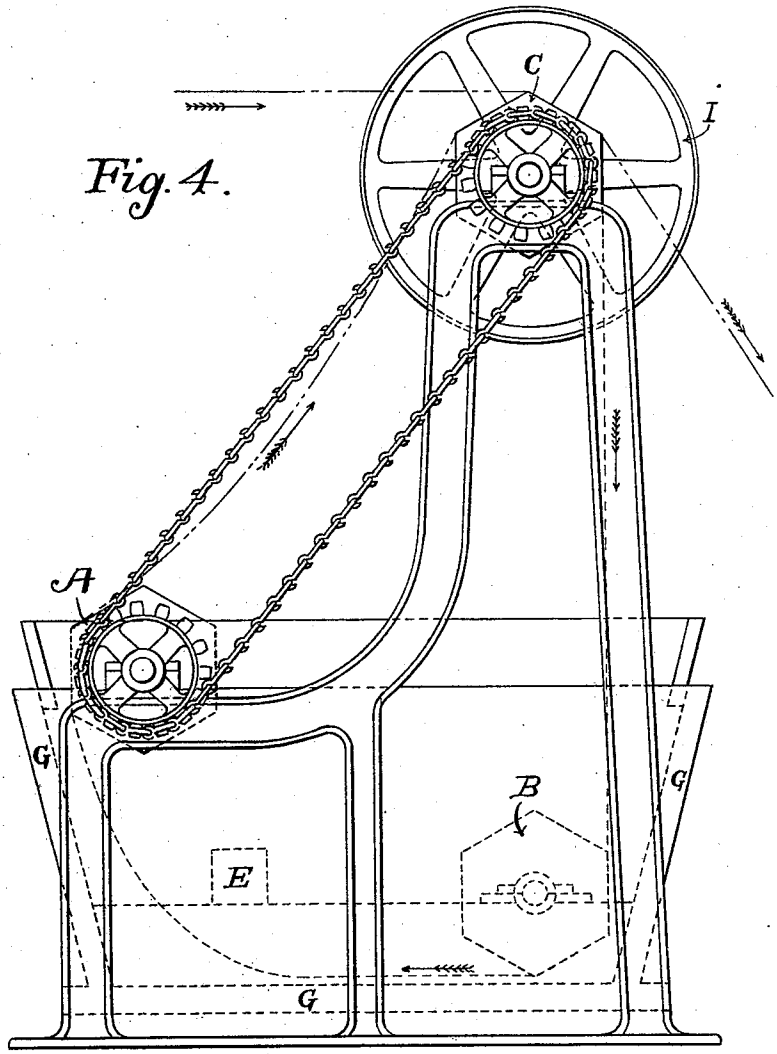
Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRI N. F. SCHAEFFER, OF LOWELL, MASSACHUSETTS.

CLOTH-WASHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 574,944, dated January 12, 1897.

Application filed April 13, 1894. Serial No. 507,381. (No model.)

To all whom it may concern:

Be it known that I, HENRI N. F. SCHAEFFER, a citizen of France, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented a new and useful Machine for the Washing of Cloth or other Fabrics, of which the following is a specification.

My invention relates to that class of washing-machines largely used in dye-works and bleacheries for washing cloth, after it has been treated with various chemicals and dyestuffs used in the processes, in continuous strips, one piece sewed to the end of another, the cloth being generally gathered by a pot-eye into a rope form.

In the machines heretofore more commonly used, after being thus gathered into rope form, the cloth passes in between two nip-rolls at one end thereof, and after passing out and through the water contained in a tank below passes back between the rolls at the side of the place where it first passed in, and continuing in this way out and through the water and back through the rolls is finally delivered from them at the end of the rolls opposite to that at which it entered. The cloth is kept in proper position in passing between the rolls by passing between pins fixed to a rack to guide it as it comes up in its various turns from the tank below, and at times two pieces or strands of cloth are threaded together through the same machine, passing through it in either the same or opposite directions. In this form of machine some considerable tension is required to be put upon the cloth to keep it in its proper position and from overlapping as it passes between the two rolls. This tension thus put upon the cloth is in many instances a very great defect in the machine and a serious injury to the cloth, particularly in light goods, such as fine lawns and mosquito-nettings, and in very heavy goods, as quilts or bedspreads, since it has a tendency to pull the weft-threads out of position, thus giving the cloth a very imperfect appearance; and since in the ordinary processes of bleaching and dyeing the cloth is repeatedly washed and passed through this machine this result becomes almost unavoidable, and once effected it is remedied with great difficulty, if it can be at all. Again, the only opportunity the water gets in this class of machines to effect the washing of the cloth is as it passes quietly through the water under tension, which is taken up by it and is squeezed into and out of it as it passes between the rolls.

A second class of machines, represented by numerous patents, both English and American, is used in dye-works and bleacheries. In these machines the cloth passes loosely through the water in the tank below and over one or more rolls variously placed in different constructions, the rolls generally being also so shaped as to beat the cloth more or less as it passes over them. In these machines the cloth is never under tension at all. They are more generally employed for dyeing, where the object is to thoroughly impregnate the cloth with a foreign substance, rather than for washing, where the object is to remove the foreign substances from the cloth. For the latter purpose there is sometimes inserted a set of nip-rolls, among the others used in the machine, for the purpose of pressing out the water, so that it may carry with it the dirt or other foreign substance; and when this is done the machine embodies, of course, all the imperfections and difficulties of any machine using nip-rolls.

The features of each class of machine are valuable in obtaining a thorough washing of the cloth in as short a time as possible. Two things are requisite in an effective washing-machine—first, that the cloth take up as much water as possible, and, second, that the water pass through the meshes and out of the cloth, taking the foreign substances with it. It is very evident to any one at all acquainted with the subject that it is not sufficient that the water remain in the cloth after it is once taken up, as may be readily permitted in dyeing, for if, in washing, the water remains the dirt and other foreign substance also remain. The difficulty with the machines in more common use is that the tension necessarily given the cloth to keep it from overlapping and thereby being cut in the nip-rolls does not permit it to take up sufficient water, and the difficulty with those machines which are constructed to take up sufficient water without nip-rolls is that there are no sufficient means to get the water through and out of the cloth to remove the foreign substances. My inven-

tion accomplishes both these results, as will appear by the following description.

Referring to the annexed drawing, hereby made a part of this specification, the cloth passes in the ordinary rope form over the roll A to and around the auxiliary roll B in the direction indicated by the arrows, back over the roll C, and thence down, free from the rolls, through the tank G below, and back again over the rolls, repeating the process as in the ordinary machines, and when desired two strands of cloth may be threaded through this machine, as in others. These rolls A, B, and C, however, do not come in contact one with the other, their relative position and arrangement giving a sufficient amount of surface in contact with the cloth to draw it through the machine. I prefer and have in practice placed the rolls A and C some distance above the tank G, generally at an elevation above it of about six or seven feet.

For the purpose of giving the cloth a considerable degree of agitation as it passes through the machine one or more of the rolls is made of a shape other than round. I have ordinarily made them with their cross-sections hexagonal in form, as shown in the drawing, but they may be square, oval, or of any number of sides desired.

The two rolls A and C are preferably connected, so as to run together at the same speed, by a chain running over sprocket-wheels. The roll B may be placed either in or out of the water, or partly in and partly out, as desired. As the cloth falls from the roll C into the tank G below, it falls loosely without tension, and it is carried up, after passing through the tank, by the roll A, likewise without tension; but as it passes from roll A around roll B till it reaches roll C it runs tight and under some tension. Since rolls A and C, however, run at the same speed, there is not sufficient tension to displace the weaving, but it is still sufficient to throw out the water accumulated in the cloth in passing loosely through the tank and carried in it over the roll A.

To keep the cloth in its proper position in passing through the tank G, guide bars or rolls D and E may be advantageously used; and to keep the various ropes of cloth in their proper position upon the surface of the roll A the same frame and pins H as commonly employed are also employed here. As the cloth finally passes from the roll C it passes between a pair of ordinary squeeze-rolls F F to press the remaining water from it. These squeeze-rolls are run in perfect unison with the main rolls of the machine, being driven from one of them by any of the ordinary means for this purpose, as by belt and pulleys, as is customary with such rolls. They may be preferably furnished with an expansion driving-pulley or other similar means, so that they may be readily brought into such unison. In this way no further tension is exerted upon the cloth in passing through them than that due to its own weight, and passing once through these rolls has little tendency to displace the weft of the cloth.

The machine is operated by driving one of the rolls, as C, by any of the ordinary means, as by a belt running over the pulley I. Where it is desired to vary the speed of the machine, as it may sometimes be advantageous to do with cloths of different weights, cone-pulleys or other similar means may be inserted in the mechanism used in driving it. The cloth should be supplied to the machine without any drag or tension to it, and is then led through it in the direction indicated by the arrows, preferably being permitted to remain a short space of time loosely upon the bottom of the tank before passing back over the rolls. In this manner I am enabled to obtain a sufficient drawing power upon the cloth to carry it through the machine without the use of nip-rolls for the purpose, there being no evil results, as from cutting the cloth, should it at times accidentally overlap itself in passing over these rolls, a result especially likely to happen when the common machine is run fast or when threaded with more than one strand.

The machine is preferably run at a high speed, experience having shown me that a speed much higher than that of the ordinary cloth-washing machine gives better results in the thoroughness as well as in the quantity of the work accomplished.

In the actual working of the machine the cloth in passing through the tank in each of its turns from the roll C back to the roll A is loose and practically without tension where the machine is in proper working condition, and thus takes up a large amount of water, some of which runs back to the tank as the cloth goes up from it; but after leaving the roll A in each of its turns through the machine and in passing around the roll B and until it reaches the roll C it is under some considerable tension, as above stated, though not sufficient to displace the weaving, which tension tends to throw the large amount of water previously taken up out of the cloth, the water taking with it, of course, a certain amount of the foreign substances to be removed. This is the main and effectual feature of the machine. The making of the rolls octagonal or hexagonal in cross-section, which I also prefer to do, assists the action of the machine by keeping up a constant agitation of the cloth and thus assisting to shake out the water; but this latter feature alone would not accomplish the same results. The relative position of the rolls, which serves to give the cloth alternately the looseness or freedom from tension while passing through the water and then subjecting it to tension in order to shake out the water previously taken up, is an essential feature in accomplishing these results; but it is probable that the position as well as the number of the rolls may be varied more or less and still accomplish the same end.

In whatever relative position and whatever the number of rolls employed, it would, however, appear always to be necessary, in order to give sufficient tension to accomplish the result, that the cloth should always, after leaving each roll of the series for the next roll, travel back in substantially the opposite direction to that in which it was traveling before it reached that roll, as it is shown that it does in leaving each of the rolls A, B, and C of the drawing. If this is done, it is immaterial whether the rolls be arranged so that the cloth will travel perpendicularly in passing from one to another, as shown in the drawing, or be made to travel horizontally or in any other direction by a suitable placing of the rolls. Still other relative arrangements of the rolls to give this alternate looseness and tension may very likely be possible. It is, however, believed to be impossible to give the cloth this essential feature of my invention by merely passing the cloth around a series of three or four rolls in more or less of a circle, nor unless the cloth doubles back upon itself, substantially as described, in traveling from one to another of the rolls. The machine shown in the drawing will give this essential alternate tension and looseness to the cloth, together with a severe agitation of it; but for the reasons pointed out I do not confine myself absolutely to the arrangement therein shown.

The roll B may be made round where too much agitation is found to be given to the cloth by making it of another shape; and, in fact, it is not at all unlikely that at times, in washing very thin goods, for example, the alternate looseness and tension of the goods will prove sufficient without any agitation, and that, therefore, both or either of the rolls A and C may also be round. I do not therefore mean to confine myself to polygonal or angular rolls. Again, although I have heretofore run the rolls A and C at the same speed, preferably by means of a chain and sprocket-wheels in place of belts, belts may be used at times for that purpose, and it is possible that with some classes of goods and some shape of rolls the machine may be advantageously used without direct driving connection between these rolls. On the other hand, though not always necessary, it may at times prove advantageous to drive roll B as well as the others. These various modifications I also regard as within my invention.

What I claim is—

1. A washing-machine consisting of a series of rolls not in contact with each other and so located relative to one another that the cloth in passing from each roll to the next will travel back in essentially the opposite direction from that in which it was traveling before reaching that roll, and a tank so located with respect to the series of rolls that the cloth will pass alternately around the series of rolls and loosely free of said rolls through said tank, substantially as and for the purpose described.

2. A washing-machine consisting of a series of rolls not in contact with each other and one or more of which rolls is of a cross-section other than round, so located relative to one another that the cloth in passing from each roll to the next will travel back in essentially the opposite direction from that in which it was traveling before reaching that roll, and a tank so located with respect to the series of rolls that the cloth will pass alternately around the series of rolls and loosely free of said rolls through said tank, substantially as and for the purpose described.

3. A washing-machine consisting of a series of rolls not in contact with each other and one or more of which rolls is of a cross-section other than round, so located relative to one another that the cloth in passing from each roll to the next will travel back in essentially the opposite direction from that in which it was traveling before reaching that roll, mechanism by which two of said rolls are caused to run at the same surface speed, and a tank so located with respect to the series of rolls that the cloth will pass alternately around the series of rolls and loosely free of said rolls through said tank, substantially as and for the purpose described.

4. A washing-machine consisting of a series of rolls not in contact with each other and one or more of which rolls is of a cross-section other than round, so located relative to one another that the cloth in passing from each roll to the next will travel back in essentially the opposite direction from that in which it was traveling before reaching that roll, sprocket-wheels and chain connecting two of said rolls whereby those rolls will be caused to run at the same surface speed, and a tank so located with respect to the series of rolls that the cloth will pass alternately around the series of rolls and loosely free of said rolls through said tank, substantially as and for the purpose described.

HENRI N. F. SCHAEFFER.

Witnesses:
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