

Sept. 4, 1928.

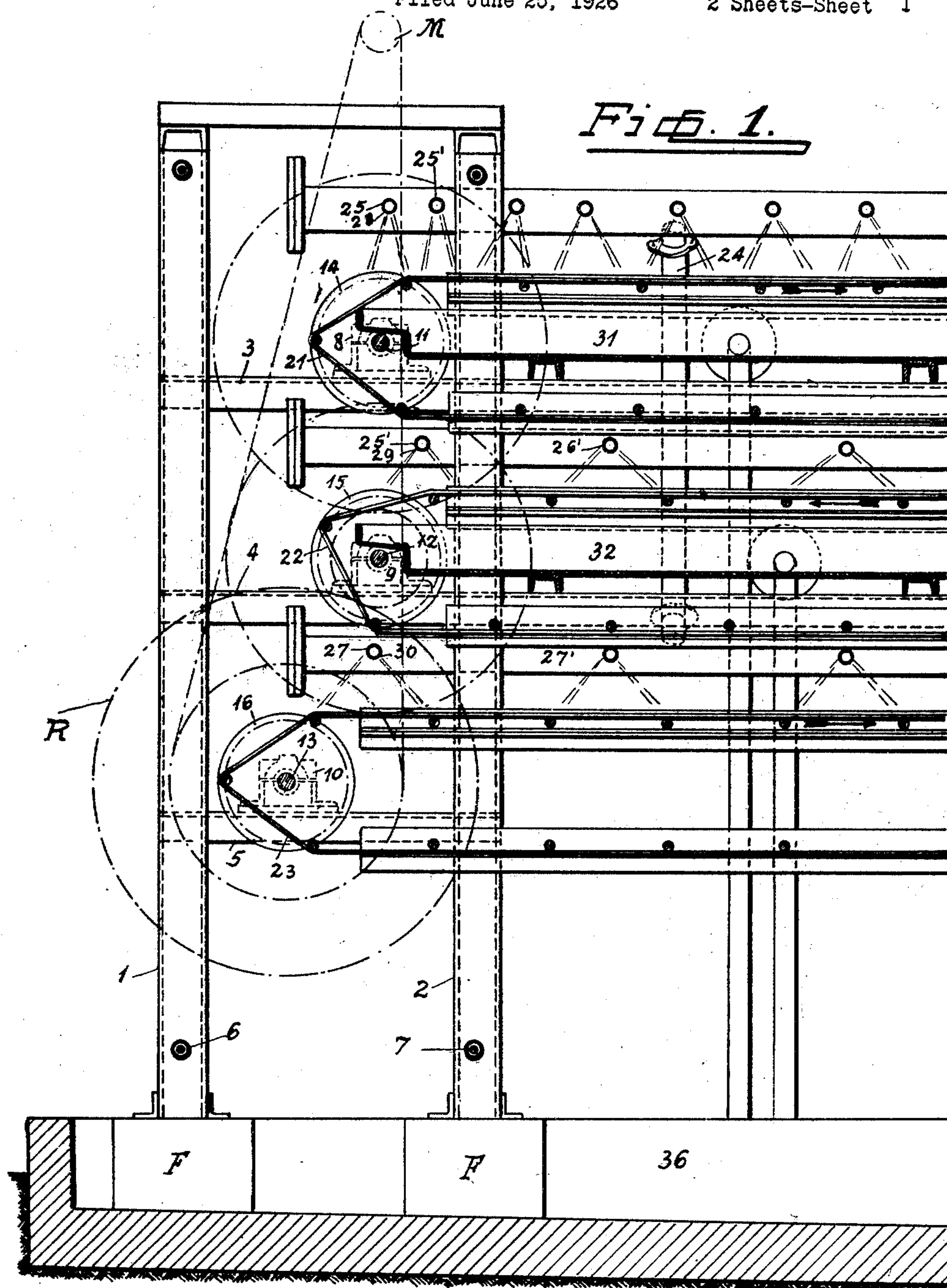
C. J. FRÜH

1,682,841

PROCESS OF AND APPARATUS FOR CLEANING TEXTILE GOODS

Filed June 25, 1926

2 Sheets-Sheet 1



Inventor: Conrad Fröh
by *Paul H. Kulling*
Attorney

Sept. 4, 1928.

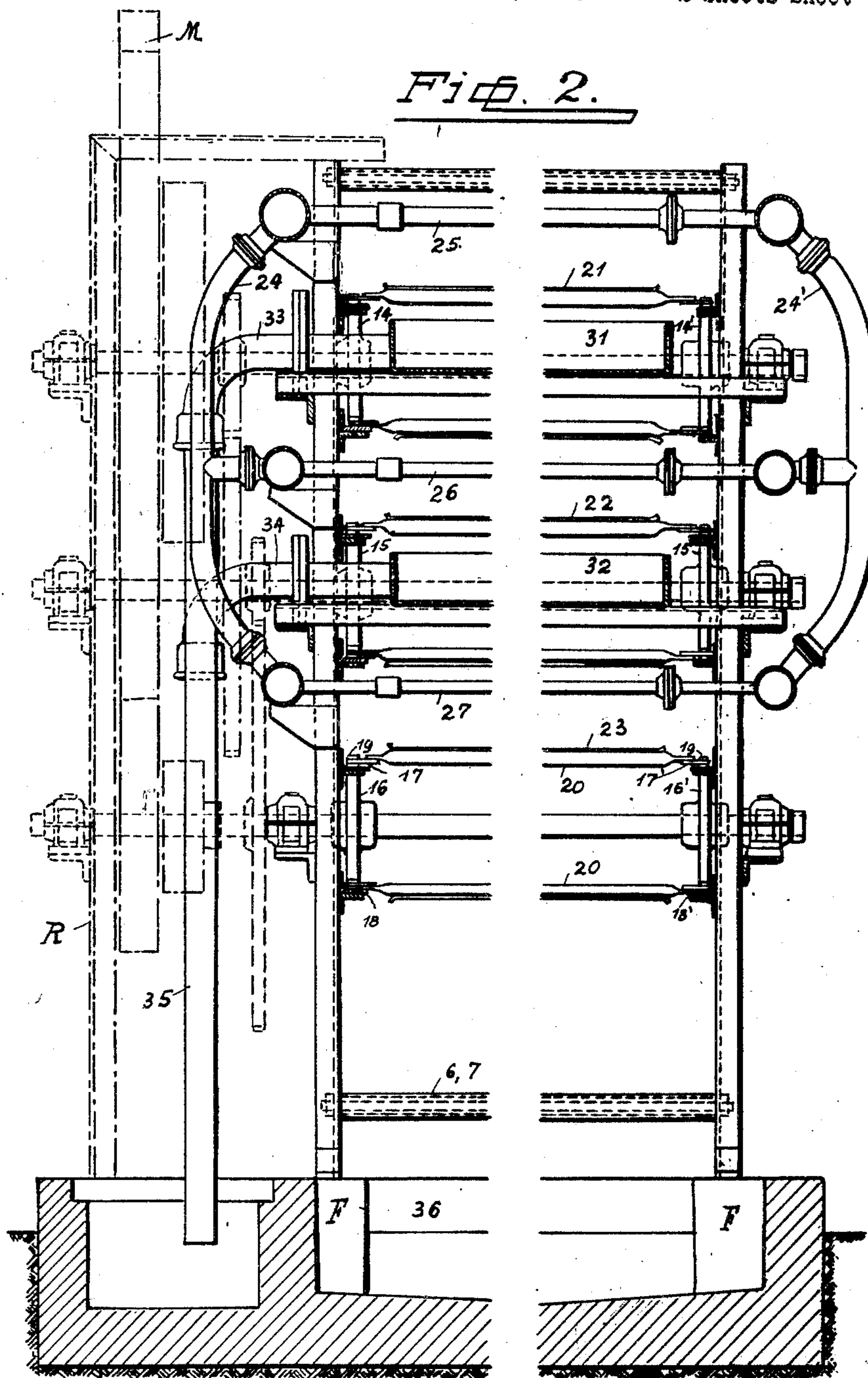
C. J. FRÜH

1,682,841

PROCESS OF AND APPARATUS FOR CLEANING TEXTILE GOODS

Filed June 25, 1926

2 Sheets-Sheet 2



Inventor: Conrad Fröh
by *Paul D. Schilling*
Attorney

UNITED STATES PATENT OFFICE.

CONRAD J. FRÜH, OF ZURICH, SWITZERLAND.

PROCESS OF AND APPARATUS FOR CLEANING TEXTILE GOODS.

Application filed June 25, 1926, Serial No. 118,832, and in Germany July 2, 1925.

The present invention relates to a process for wet-treatment, especially for washing textile goods in the form of fabrics and a machine for the working of the process.

5 The object of my invention is to provide a process and machine whereby the fabric may be conducted through a washing course in such manner that both sides of the fabric will be thoroughly and uniformly subjected
10 to the action of a cleansing liquid.

A further object of the invention is to provide a process and apparatus whereby the length of the working course and the length or height of the apparatus may be reduced
15 over present processes and apparatus with resultant advantages.

My invention will be best understood when described in connection with the accompanying drawing, in which Fig. 1 shows a partial
20 longitudinal section and Fig. 2 a partial cross section of the machine.

Upon foundations F a frame formed by the uprights 1, 2, the traverses 3, 4 and 5 and the stays 6, 7 is provided. The traverses 3, 4, 5
25 carry bearings 8, 9, 10 etc. in which shafts 11, 12, 13 are placed. The shafts 11, 12, 13 are rotated by means of a motor shown only by the letter M. Upon the shafts 11, 12, 13 chain-wheels 14, 14', 15, 15', 16, 16' (Fig. 2)
30 operated by a train of gears indicated by R are disposed driving the chains 19, 19' etc., resting upon guides 17, 17', 18, 18' etc. The disposition of the train of gears is such that the shaft 11 turns with the highest speed, the
35 shaft 12 with a smaller speed and the shaft 13 with a speed still smaller; of all the chains the chains driven by the shaft 13 have the smallest speed. To the chains, by means of rods 20, 20' etc. endless and porous bands 21,
40 22, 23 are attached guided upon cylinders in such a way that they are entrained by the motion of the chains, the band 23 of course having the smallest speed. At the sides of the frame along the machine liquid delivery
45 tubes 25, 25', 26, 26', 27, 27' etc. are provided, extending across the transport bands and having holes 28, 29, 30 etc. (Fig. 1). With the band 21 are shown more holes at the front end than at the rear end and the
50 holes may also be of different width in order to be able to place the most part of liquid upon the textile fabric at the beginning of the process. For the bands 22 and 23, i. e. for the second and third step the distance of

the holes is about the same for the whole
length of the machine. 55

In order to prevent the fabric from adhering or sticking to the band of an upper step when passing therefrom to the band of the next lower step, the first tube of the lower
60 step is arranged to act as a guide which is engaged by fabric in passing from the delivery end of the upper band to the receiving end of the lower band. The fabric is reversed—face for face—at this time, what
65 has been the lower face in the upper step becoming the upper face in the lower step. This face of the fabric tends to stick by suction to the upper band and cause the fabric to travel with the lower stretch of said
70 band. This is prevented by passage of the fabric around the first spray tube of the lower band whereby the portion of the fabric lying between the same and the delivery end of the upper band is pulled away from
75 and prevented from traveling with the lower stretch of the upper band. At the same time this intervening portion of the fabric forms a deflector guiding a jet of the liquid issuing from the tube upwardly into the angle be-
80 tween the fabric and lower stretch of the upper band, thus assisting in breaking the suction so that a quick release of the sticking fabric will be effected without injury thereto.

Since the liquid is not intended to remain
85 in the fabric, the bands are porous as already remarked and, in order to prevent the liquid from dropping from an upper upon a lower band, channels 31, 32 are disposed from which the liquid is drawn off by the tubes 33, 34 and
90 35. The liquid from the band 23 is taken up by the hollow 36 disposed at the bottom of the machine. According to the work, the liquid may be withdrawn entirely or collected and used again. The working of the machine
95 is as follows: The textile fabric is in the first step placed in a widely spread form upon the topmost band 21, having the greatest speed and sprinkled thoroughly with liquid. From the end of this band the fabric will drop on
100 the second band 22, a smaller speed, transporting the goods in the second step in opposite direction and getting sprinkled again whereby the sprinkling of the first tube of the second step prevents the fabric from adhering
105 or sticking to the band 21 of the first step. The same operation takes place from the second to the third step, so as to allow the fabric

to be sprinkled equally in every part and on both sides during its travel through the machine.

This process and apparatus may be employed with great advantage in the cleansing of fabrics in such a manner as to reduce the length of the cleansing source and the overall length or height of the cleansing machine. As an example, the process and apparatus may be employed in the washing of silk fabrics after they have been loaded with tin tetrachlorid and before dyeing, for the purpose of removing the free tin and acid. It is desirable and necessary in this operation that the fabric be initially subjected for a certain time period, while in a fully spread condition, to a thorough washing action in order to liberate and wash off all or the greater portion of the particles of free tin. I have discovered that this initial washing action may be carried out within a comparatively short period of time when the fully spread fabric is subjected to efficient washing treatment. This initial washing action should be followed by a washing action of longer duration in order to remove any residual free tin remaining and to wash out all the acid. I have also discovered that this may be carried out within a reasonable period of time if the fabric is exposed to washing treatment on both sides, notwithstanding the fact that, in order to reduce the length of the course, the fabric is permitted to pleat or fold upon itself during the acid removing stages of treatment. I take advantage of these discoveries in the provision of this improved process and machine. With the type of machine illustrated, in which the sinuous washing course is divided into three steps or stages, the fabric is reversed side for side in its travel from stage to stage so that a thorough washing action is obtained, and a time period of about two minutes is allowed for the travel of the fabric through this sinuous course. This is divided up into fifteen seconds for the first course, thirty seconds for the second course and ninety seconds for the third course. These time periods may be varied, of course, but will be found sufficient with this apparatus in the washing out of loaded silk fabrics. In the travel of the fabric along the first stage the fabric is fully outspread and the time period is sufficient for the washing out of all or a very high percentage of the free tin and in most cases a certain amount of the acid. In the travel of the fabric along the second stage, in which it is reversed so that its opposite side is exposed to the direct action of the washing fluid, any remaining free tin is removed and a portion of the acid is washed out. By reason of the reduced speed of travel of the fabric in the second stage with respect to the first stage, the fabric pleats or folds to a certain extent, but is subjected to washing treat-

ment for a long enough period to remove a substantial amount of the acid. In the travel of the fabric along the third stage, at a slower rate of speed than its travel through the second stage, and in which it is reversed to bring its original face, i. e., that exposed to the first washing action, to washing treatment, the fabric pleats or folds upon itself to a greater degree than on the second stage, but is subjected to a longer period of washing treatment so that at the end of the course all the acid will be washed out. The sprayers along the second and third stages may direct the washing liquid in such manner and with such force as to tend to lift the pleats or folds, thus agitating such portions of the fabric and allowing the liquid to reach all portions thereof and thereby increasing the efficiency of the washing action. By this manner of treatment a compact type of apparatus is produced which may be of much less length than a horizontal machine and much less height than a vertical machine operating to act on fabric traveling at a more or less uniform or constant speed. The compactness of the organization not only saves floor space but enables conveyors and conveyor chains or other working parts of less length to be employed, reducing liability of breakages or derangements causing more or less frequent stoppages and repairs.

What I claim is:

1. The method of treating a textile fabric to the action of a cleansing liquid, which consists in conveying the fabric through a plurality of courses at progressively decreasing speeds, and spraying the fabric with the liquid on each course.
2. The method of treating a textile fabric to the action of a cleansing liquid, which consists in conveying the fabric through a plurality of courses in a sinuous path at progressively decreasing speeds so as to progressively increase its time period of travel on successive courses, and spraying the fabric with the liquid on each course.
3. The method of treating a textile fabric to the action of a cleansing liquid, which consists in conveying the fabric in a zigzag path through a plurality of superposed courses at progressively decreasing speeds, whereby the fabric is reversed face to face on succeeding courses and its time period of travel progressively increased from course to course, and spraying the fabric with the liquid on each course.
4. An apparatus for treating textile fabrics to the action of a cleansing liquid, comprising means for conveying the fabric through a plurality of courses at progressively decreasing speeds, and means for spraying the fabric with the liquid on each course.
5. An apparatus for treating textile fabrics to the action of a cleansing liquid, com-

prising a series of superposed conveyors for conveying the fabric in a sinuous path through a plurality of courses at progressively decreasing speeds throughout the courses, and means for spraying the fabric with the liquid on each course.

6. An apparatus for treating textile fabrics to the action of a cleansing liquid, comprising a series of superposed conveyors for conveying the fabric in a sinuous path through a plurality of courses at progressively decreasing speeds throughout the

courses, and a series of sprayer tubes along each course for spraying the liquid upon the fabric.

7. Apparatus of the character set forth in claim 6 wherein the first sprayer tube of each lower course is arranged to spray the liquid between the fabric passing from the conveyor of the upper course to the conveyor of the lower course for the purpose set forth.

In testimony whereof I affix my signature.

Dr. C. J. FRÜH.