

E. & G. E. SUTCLIFFE.

APPARATUS FOR WASHING, DYEING, AND TREATING TEXTILE MATERIALS.

No. 463,846.

Patented Nov. 24, 1891.

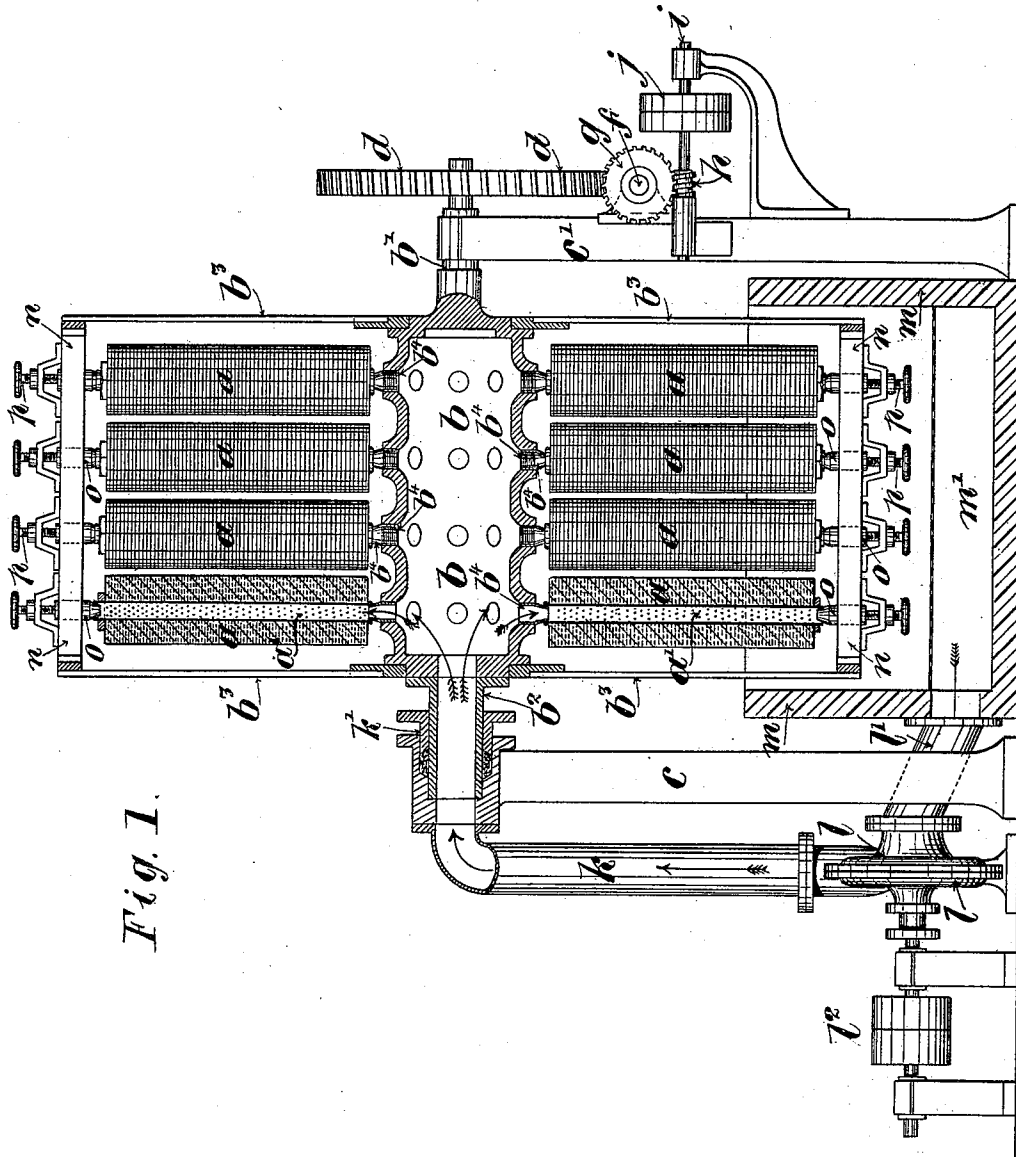


Fig. 1.

Witnesses.

L. M. Low

E. K. Sturtevant

INVENTORS

Ely Sutcliffe

George Edward Sutcliffe

By their Atty's Richards & Co.

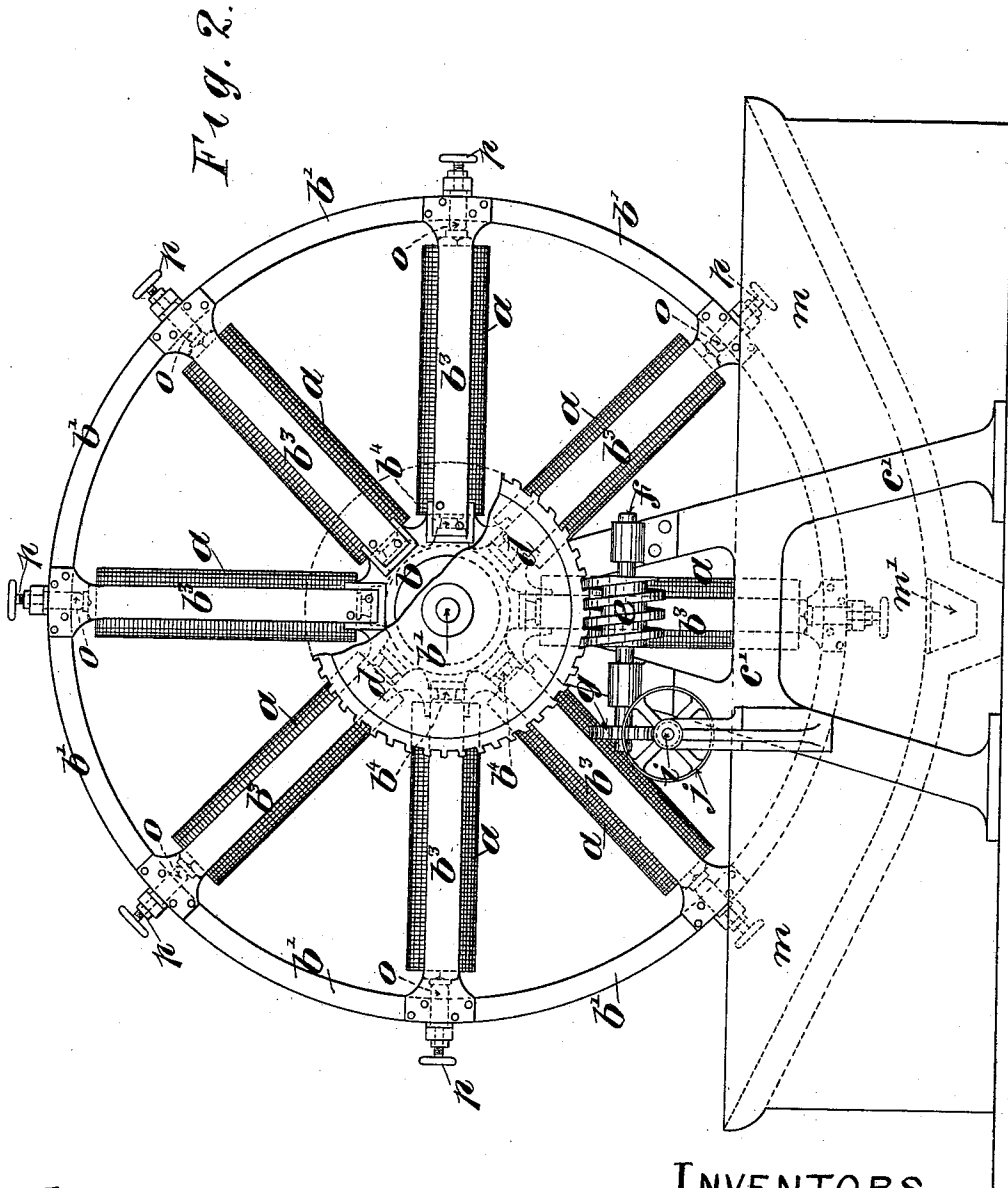
(No Model.)

3 Sheets—Sheet 2.

E. & G. E. SUTCLIFFE.
APPARATUS FOR WASHING, DYEING, AND TREATING TEXTILE MATERIALS.

No. 463,846.

Patented Nov. 24, 1891.



Witnesses.

L. M. Low

E. H. Sturtevant

INVENTORS.

Ely Sutcliffe.

George Edward Sutcliffe

By their Atty. Richards & Co.

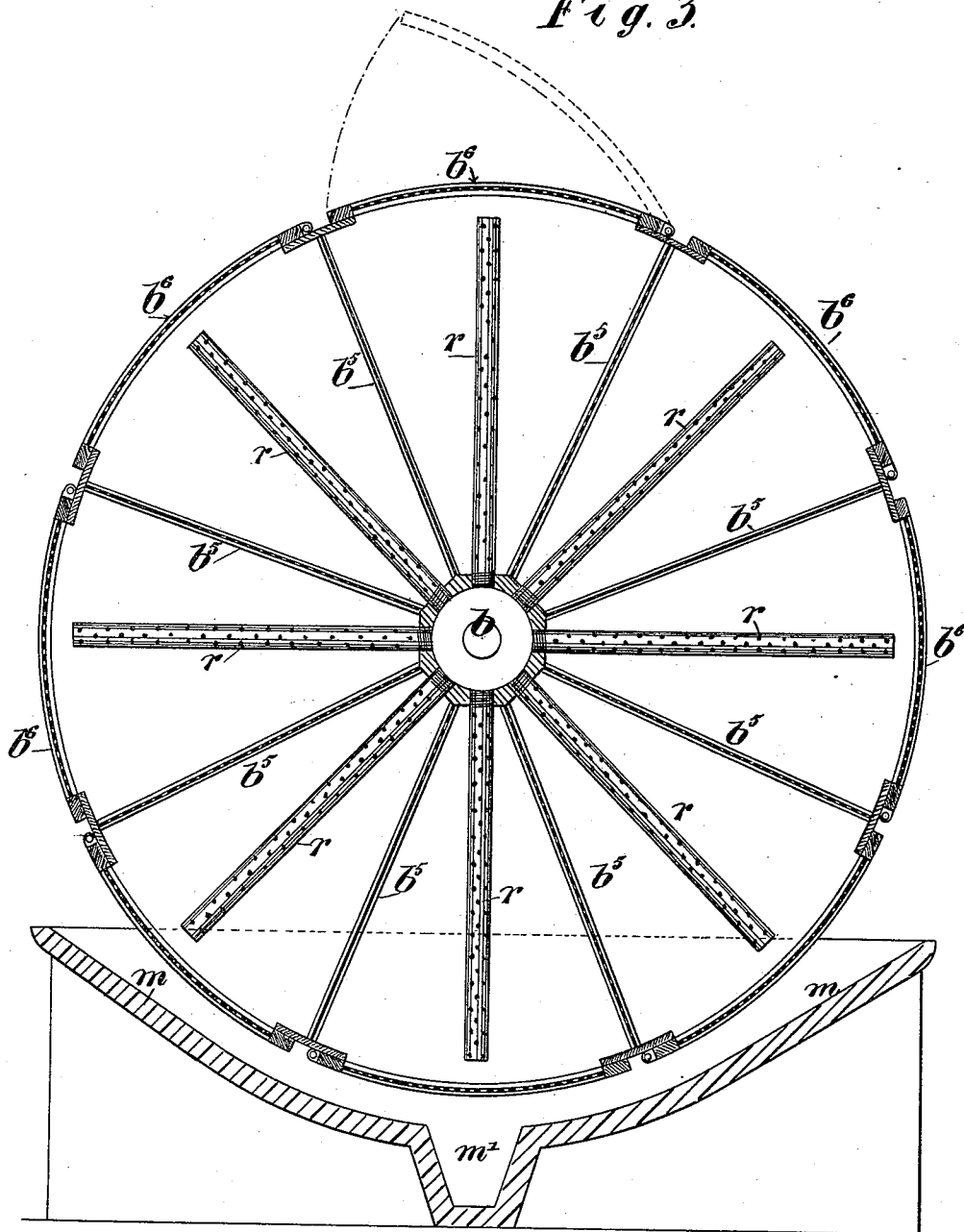
E. & G. E. SUTCLIFFE.

APPARATUS FOR WASHING, DYEING, AND TREATING TEXTILE MATERIALS.

No. 463,846.

Patented Nov. 24, 1891.

Fig. 3.



Witnesses:-

L. M. Low
E. K. Sturtevant.

Inventors,

Ely Sutcliffe,
George Edward Sutcliffe
by their attys Richards & Co.

UNITED STATES PATENT OFFICE.

ELY SUTCLIFFE AND GEORGE EDWARD SUTCLIFFE, OF MIRFIELD,
ENGLAND.

APPARATUS FOR WASHING, DYEING, AND TREATING TEXTILE MATERIALS.

SPECIFICATION forming part of Letters Patent No. 463,846, dated November 24, 1891.

Application filed January 14, 1891. Serial No. 377,775. (No model.)

To all whom it may concern:

Be it known that we, ELY SUTCLIFFE and GEORGE EDWARD SUTCLIFFE, cotton-spinners, subjects of the Queen of Great Britain and Ireland, of the Britannia Mill, Mirfield, in the county of York, England, have invented an Improvement in Apparatus for Washing, Dyeing, and Treating Textile Materials, of which the following is a specification.

Our invention relates to the treatment of cotton and wool sliver or warps, wool tops, raw cotton, and other textile materials, and has for its object to obtain a regular and complete penetration of the liquors throughout the masses of materials under treatment. We apply the materials in masses around a hollow revolving shaft and we discharge the dyeing or treating liquors into and from the interior of this shaft through perforated pipes into the said masses. While the liquor is thus forced through the materials the shaft carrying the masses is caused to revolve, which has the effect of constantly changing the directions in which the liquor tends to flow.

Our invention can be best described with reference to the accompanying drawings.

Figure 1 of the drawings is a sectional front elevation of a machine specially adapted for the dyeing of sliver. Fig. 2 is a side elevation of the same machine. Fig. 3 illustrates a modification whereby the machine is adapted for the treatment of raw cotton or other raw or loose textile materials.

In Figs. 1 and 2, a are the masses of sliver, and b is the hollow shaft. The masses a are preferably formed by coiling the sliver upon a perforated tube, which is placed in an upright position in the center of the coiler-can, in accordance with a patent issued to us on May 14, 1889, and numbered 403,304. When so formed, each mass of sliver contains a perforated tube a' , which extends from end to end, the sliver being kept on the tube by means of metal end plates. The hollow shaft b is formed with gudgeons b' b^2 , which are adapted to revolve in bearings carried by standards c c' . Upon the gudgeon b' is fixed a worm-wheel d , and with this gears a worm

e , which is fixed upon a cross-shaft f , which is mounted to revolve in bearings carried by the standard c' . Upon the shaft f is fixed a second worm-wheel g , and with this gears a worm h , which is fixed upon the driving-shaft i , which receives a revolving motion by means of a belt pulley or rigger j . By means of this gearing a slow revolving motion can be imparted to the shaft b . The gudgeon b^2 is hollow and works in a gland k' , which is formed at the upper part of the standard c , and communicates with a pipe l , which is the discharge-pipe of a centrifugal pump l . The suction-pipe l' of this pump communicates with a well m' , which is formed in a trough or cistern m , which is fixed below the shaft b . The shaft of the pump is driven by means of a belt, which acts upon the belt-pulley p . Upon the shaft b are secured two polygonal frames b^3 b^3 , which carry eight cross-bars n , or disks or close end plates, which take the places of these frames. The shaft b is formed with eight rows of hollow paps, in which are fixed hollow cones or discharge-plugs o . Each of the cross-bars n is provided with four solid or closed cones or plugs o , which are fitted to slide in and fro in bored recesses formed in the cross-bar. Each of these cones o can be slid in and out by turning a screw p . The cross-bars n and o are adapted to enter the ends of the perforated tubes a' in the masses of sliver. When a coil or mass of sliver is placed in position with one end of its inner tube placed upon a cone b^4 , the corresponding cone o is forced up by turning its screw so that the cone is forced into the end of the tube, the tube being at the same time forced upon the cone b^4 , so as to make sufficiently liquor-tight connections. It will be seen that thirty-two masses of sliver can thus be mounted around the central shaft b . As each row of four masses is secured the shaft b is rotated about one-eighth of a revolution and another set of four masses is applied, and so on until the thirty-two masses are in position.

The trough m is charged with dye-liquor or with water or lye, or with the liquor which is to be used in the treatment of the sliver. For

convenience of description we will suppose the machine to be used in dyeing the sliver. To facilitate the penetration of the dye it is preferable that the masses of sliver should be damped or soaked in water until thoroughly wet through before being mounted in the machine. If this has not been done, we supply the trough with water in the first instance and heat the water by injecting steam into it, and we operate the machine in the manner hereinafter set forth with reference to the use of dye. The trough having been charged with dye-liquor, we set the driving-shaft *i* and the pump in motion. Liquor will then be withdrawn from the trough and be forced into the hollow shaft *b*, whence it passes through the hollow cones *b*⁴ into the perforated tubes *a*' in the masses of sliver and permeates said masses escaping in streams issuing in all directions from the same. There is naturally a tendency for liquor to flow downward, so that if the masses were stationary the lower masses would be more acted upon by the dye than the upper, and the lower ends of some masses and the under sides of others would be more acted upon than the other parts, so that there would be an irregularity in the result. This is prevented by the rotation of the shaft *b* and of the masses around the common center—that is to say, the axis of such shaft—whereby the relative positions of the masses are being constantly changed, each mass being turned completely over during each revolution of the shaft with its added masses. It will thus be seen that the directions in which the liquor will tend to flow will be constantly changing, so that great regularity in the effect is produced. This rotating movement of the masses also enables us to use a lower fluid-pressure. If the masses were stationary, it would be necessary to force the liquor through at high pressure in order to compel it to flow upward; but the result would not be satisfactory, as the high pressure would cause the liquor to force its way out in large streams through parts offering the least resistance and the sliver would be damaged and regularity of effect would not be obtained.

In our machine we do not require a high pressure of liquor, and a centrifugal circulating-pump answers the requirements. It will be seen that in the case of each mass the two sides which are upon a horizontal line are not reversed, and it may be supposed that there will be less liquor flowing through these sides. Complete regularity of effect might be obtained by causing each mass to revolve upon its axis as it was being carried around the common center; but this would greatly complicate the machine and we have not found it necessary, for the reason that if the desired regularity is not obtained it is only necessary to stop the machine at intervals and to turn each mass about a quarter round.

There may be less or more than four masses in each row and less or more than eight rows arranged around the common center. Any suitable gearing may take the place of the worm-gearing for actuating the shaft *b*.

In Fig. 3 the frame *b*³ is made in the form of a wheel, which is divided by radial partitions *b*⁵ into compartments which are provided with perforated doors *b*⁶. The sides *b*³ of the wheel and the partitions *b*⁵ may or may not be perforated. The perforated pipes *r* are in this case attached by one end to the central hollow shaft *b*, and may be round or flat in cross-section or be of a suitable section. The compartments are to be filled with the raw cotton or material to be treated, the doors being then closed and secured. The operation of the machine would then be the same as that of the machine first described, with the exception that in place of stopping the machine at intervals to turn the masses round it might be admirable to stop at intervals to rearrange the material within the compartments. An important advantage arising out of the working of our machine is that we can work with a small quantity of dyeing-liquor, as the materials have not to be immersed, so that there is a great saving in dyeing materials, especially in the cases wherein the dye-bath is liable to rapid deterioration.

What we claim is—

1. The machine for dyeing or treating with liquors textile materials in the form of sliver, consisting of a hollow shaft *b*, provided with delivery-orifices at *b*⁴, frames *b*³, standards *c* *c*', cross-bars *n*, cone-plugs *o*, screws *p*, driving-gearing *d*, *e*, *f*, *g*, *h*, *i*, and *j*, a pump *l* for forcing liquor into said hollow shaft with driving-pulleys *l*², suction-pipe *l*¹, and discharge-pipe *k* with its connection *k*' with the interior of the shaft *b*, substantially as set forth.

2. In a machine for dyeing or treating with liquor coiled sliver, the hollow shaft *b*, having a fluid-tight connection with the discharge-pipe *k* of a circulating-pump *l* for forcing liquor into said hollow shaft, the discharge-cones *b*⁴, the frames *b*³, the cross-bars *n*, the cone-plugs *o*, the setting-up screws *p*, and the trough *m*, opening into the suction-pipe *l*¹ of the pump, in combination with gearing for rotating the said shaft and for driving the circulating-pump, substantially as set forth.

3. In a machine for dyeing or treating with liquors coiled sliver, the revoluble frame *b*³ with its central hollow shaft *b* and cross-bars *n*, the hollow discharge-plugs *b*⁴, and the hollow neck *b*², working in a gland in the fixed framing, in combination with a circulating-pump for forcing liquor into said hollow shaft and with gearing for revolving the said revoluble frame, substantially as set forth.

4. In a machine used in dyeing coiled

70

75

80

85

90

95

100

105

110

115

120

125

130

sliver, the revoluble frame b^3 with its hollow shaft b b' b^2 and cross-bars n , the hollow discharge-plugs b^4 , the adjustable plugs o , and the screws p , in combination with the perforated pipes a' and with a circulating-pump for forcing liquor into said hollow shaft and with gearing for revolving the said frame, substantially as set forth.

In witness whereof we have hereunto set our hands in presence of two witnesses.

ELY SUTCLIFFE.
GEORGE EDWARD SUTCLIFFE.

Witnesses:

WILLIAM WADDINGTON,
HAROLD BREARLEY.