

No. 891,914.

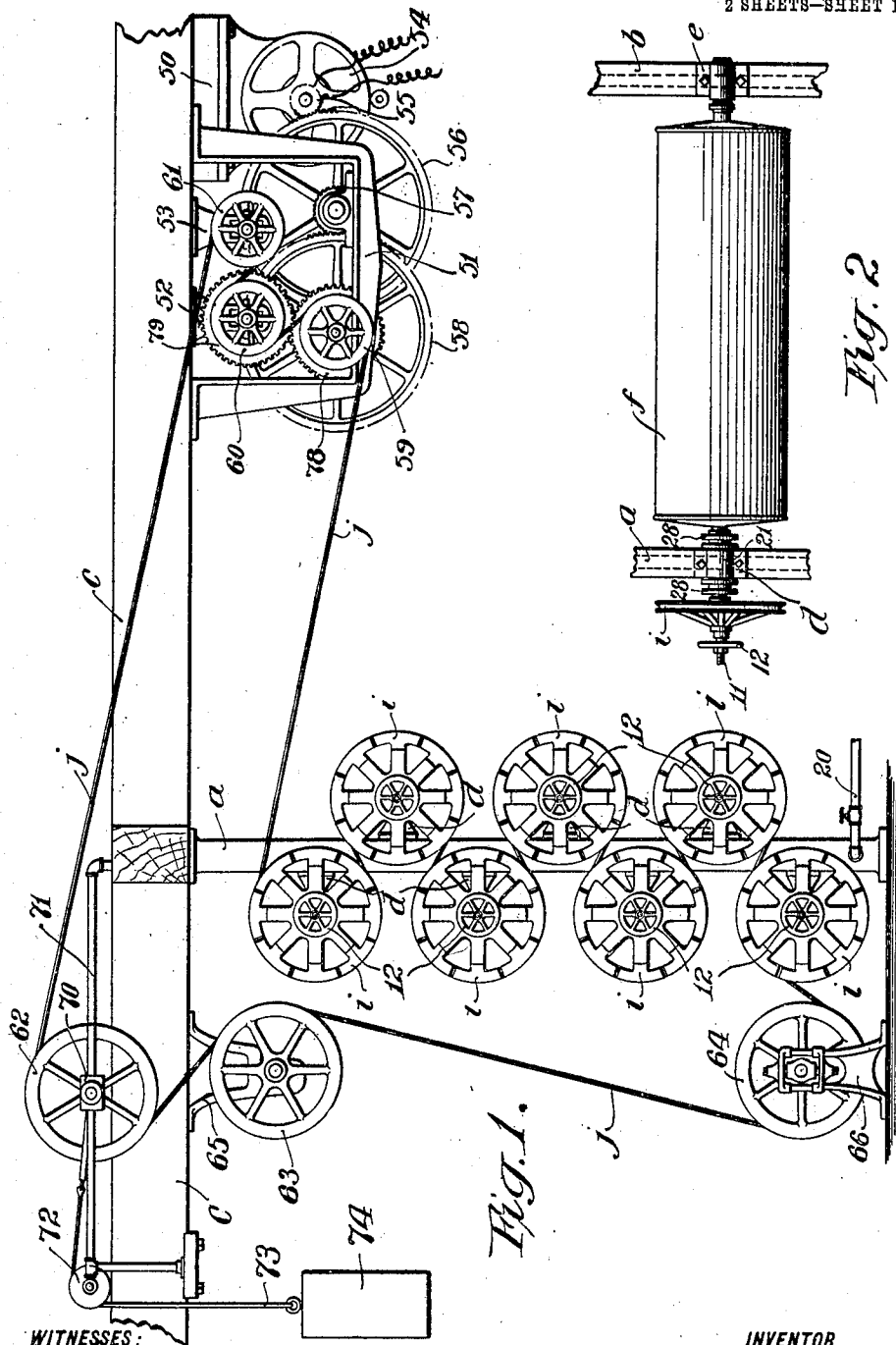
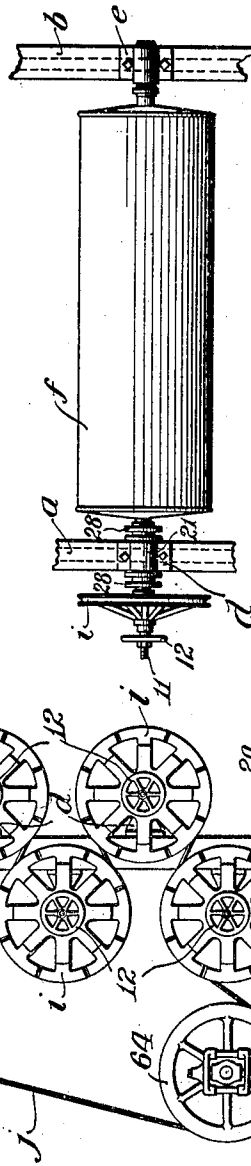
PATENTED JUNE 30, 1908.

G. S. COX.

DRYING AND FINISHING MACHINE FOR TEXTILE FABRICS.

APPLICATION FILED JUNE 21, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

M. M. Hamilton
J. B. Wood

INVENTOR

George C. Cox
BY

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ATTORNEYS

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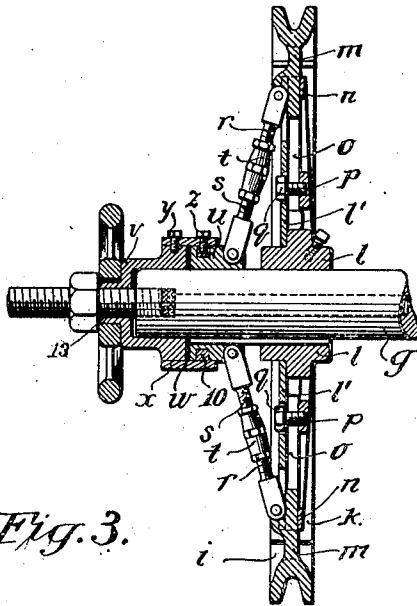


Fig. 3.

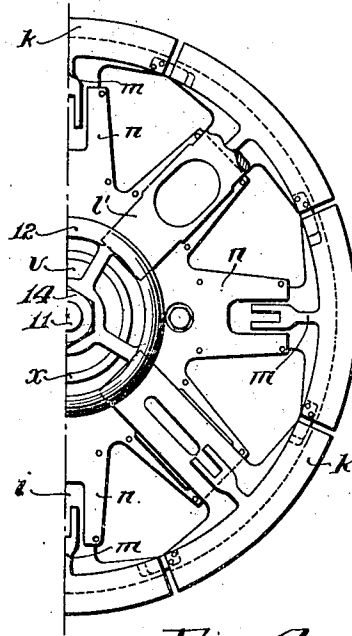


Fig. 4.

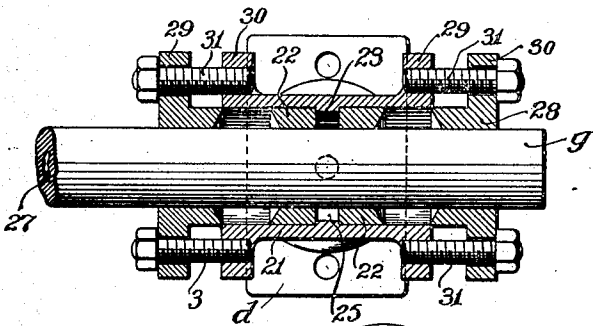


Fig. 5.

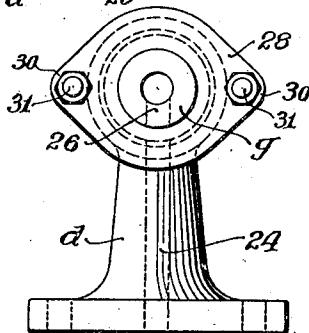


Fig. 6.

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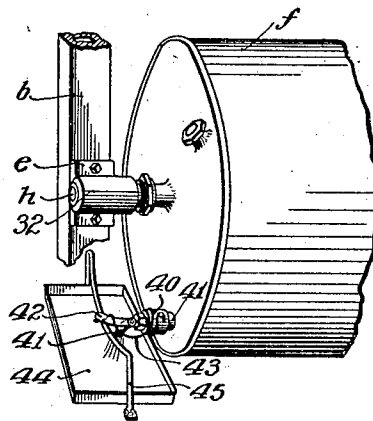


Fig. 7.

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UNITED STATES PATENT OFFICE.

GEORGE S. COX, OF FITZWATERTOWN, PENNSYLVANIA, ASSIGNOR TO HIMSELF, AND
WALTER S. COX, TRADING AS GEORGE S. COX AND BROTHER, OF PHILADELPHIA,
PENNSYLVANIA.

DRYING AND FINISHING MACHINE FOR TEXTILE FABRICS.

No. 891,914.

Specification of Letters Patent.

Patented June 30, 1908.

Application filed June 21, 1905. Serial No. 266,228.

To all whom it may concern:

Be it known that I, GEORGE S. COX, a citizen of the United States, residing at Fitzwatertown, county of Montgomery, and State of Pennsylvania, have invented a new and useful Improvement in Drying and Finishing Machines for Textile Fabrics, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The object of my invention is to provide a drying or finishing machine for textile fabrics in which the goods may be stretched or shrunk as desired and to a predetermined amount.

The invention is particularly designed for hair cloth, although applicable to any woven goods that must be subjected to a finishing or drying operation, or which, for any other reason, it may be desirable to stretch or shrink.

The invention is also applicable in the sizing or dressing of warps preparatory to weaving.

Hair cloth goods, after being woven, are dyed and sized, the sizing being composed of water and starch, or other materials which will add stiffness and finish to the goods. After sizing they are dried.

The drying machine consists of a series of drums or cylinders, known in the art as "cans", to the interiors of which steam is admitted. About these cans, the goods are caused to travel, and are thus thoroughly dried.

The goods are usually used by garment manufacturers, who cut up the cloth and use it as a lining for imparting stiffness to particular parts of the garment. Before cutting up and using the cloth, however, the goods must be shrunk by the user, as otherwise they would shrink after being applied to the garment, thus distorting the garment and rendering it unsalable. To shrink the goods, they are usually immersed in water and hung up to dry. This method of shrinking causes the goods to finally assume a more or less uneven or pimply appearance. Moreover the user is put to considerable trouble and expense.

With a drying machine constructed in accordance with my invention, the goods, after being dyed and sized, may be dried on the cans and at the same time shrunk so as to be

in condition for use by the garment manufacturer without the necessity of being put through the shrinking process described.

I will first describe the construction of the machine and then describe the manner of its use:

Figure 1 is a view, in side elevation, of the finishing machine; Fig. 2 is a front view of one of the cans and its means of support; Fig. 3 is a sectional view of one of the pulleys and the expanding means therefor; Fig. 4 is a front view of one half of one of the pulleys; Fig. 5 is a sectional view of one of the shaft bearings; Fig. 6 is an end view of Fig. 5; Fig. 7 is a perspective view of the automatic means for relieving a can from the water of condensation.

a, b are hollow posts or columns extending from the floor to the over-head beam *c*.

d are brackets secured to post *a*, and *e* are brackets secured to post *b*.

f are the drums, cylinders, or "cans", about which the cloth to be finished travels as the cans rotate.

Each can is provided with hollow shafts *g*, at each end on the line of the axis. The shafts *g* are hung in the brackets *d* and the shafts *h* in brackets *e*, as will be hereinafter more fully described.

On the end of each shaft *g* that projects beyond its supporting bracket is keyed an expansible pulley *i*.

j is a rope, driven and guided as herein-after described, which passes around the several pulleys *i* successively. When the rope is caused to travel, it rotates the several pulleys, thereby rotating the several cans *f*.

Each pulley *i* is constructed as follows:—Extending radially inward from the sectional rim *k* are arms *m* slidable in guides in arms *n* projecting radially outward from the hub *l*. The rim arms *m* are provided with radial slots *o*. *p* are plates secured to the hub *l* and fitting over the rim arms *m*. *p* are tap bolts extending through the slots *o* and engaging bolt holes in the hub arms *n*. *q* are nuts on the ends of bolts *p*. By tightening the nuts they are caused to bind firmly against the rim arms *m*, thereby securing the rim arms *m* and hub arms *n* together in their adjusted positions. By loosening the nuts, the rim arms with their rim sections may be moved radially inwardly from the expanded position shown, thereby contracting the pulley.

The rim sections and rim arms may be moved radially by hand, but to secure nice adjustments I prefer to employ the following mechanism: *u* is a sleeve keyed on stud *g*.
 5 Pivoted at one end to the rim arms *m* and at the other end to the sleeve *u* are links each composed of the sections *r*, *s*, screw threaded at their inner ends and connected together by means of a threaded sleeve *t*, thereby enabling the length of the link to be varied.
 10 Loose on the shaft *g* is a cap *v*, the sleeved portion of which is separated from the sleeve *u* by a washer *w*. *x* is a collar overlapping and encircling both sleeve *u* and cap *v*. *y* is a bolt by means of which collar *w* is secured to cap *v*. 10 is a block or ring extending into an annular groove in sleeve *u*. *z* is a bolt by means of which collar *w* is secured to ring 10. 11 is a threaded shaft secured in the end of shaft *g* on the line of the latter's axis. 12 is a hand wheel keyed on the neck 13 of cap *v*.

By turning the hand-wheel 12 the cap *v* is rotated and at the same time fed forwardly or backwardly on the threaded shaft 11 and shaft *g*. This necessarily imparts a corresponding advancing or receding motion to the sleeve *u*, but without turning the same, ring 10 merely turning in its groove. This movement of sleeve *u*, through links *r s t*, move the rim sections outwardly or inwardly, thereby expanding or contracting the pulley *i*. Prior to this operation, the nuts *q* of the tap bolts are of course loosened, and subsequently tightened to hold the rim sections and rim arms in their adjusted positions.

In order to hold the foregoing parts stationary relatively to each other during the operation of the machine, a nut 14 on the threaded shaft 13 is tightened against the hand wheel 12.

As is usual in drying machines of this class, the interior of the cans is supplied with steam during the drying operation. To effect this I provide the following construction: The posts *a* and *b* are made hollow and to one of them, say the post *a*, is connected a steam inlet pipe 20. The outer or bearing end 21 of each bracket *d* encircles the shaft *g* and is provided with an internal annular ridge 23. 22, 22, are bushings, one on each side of the ridge 23 and confined between the shaft *g* and bearing 21. This leaves an annular passage 25 surrounding the shaft *g* and surrounded by the ridge 23 and bounded by the walls of the bushings 22, 22. 24 is a passage formed in the bracket, the passage communicating at one end with the hollow post and at the other end with the annular passage 25.
 27 is a passage formed in the shaft *g* and opening into the hollow interior of the can. 26 is a part connecting the annular passage 25 with the passage 27. The stuffing boxes are formed by means of the sleeves 28 which surround the shaft *g* and extend between the

shaft and the bearing 21. The bearing 21 and sleeves 28 are provided with flanges 29 and 30 respectively. By means of bolts 31 engaging flanges 29 and 30 the sleeves may be adjusted axially of the shaft *g*.

The shaft *h* is hung from the bracket *e* in the usual manner, the end of the shaft extending through the stuffing box 32 into the bearing formed on the bracket *e*, there being the usual passages in the shaft *h* and bracket *e* to establish communication between the interior of the can and the hollow post *b*.

I have provided the following means for automatically relieving the cans of the water of condensation. Ordinarily these means will be applied to the lower can only of the series, as it is this can which initially receives the wet goods and in which, consequently there is by far the greatest condensation of steam. Extending from the head of the can, near its periphery is a pipe 40 having a nozzle 41 the opening and closing of which is controlled by a valve lever 42, which is normally held in a closed position by means of a spring 43, one end of which is secured to the pipe 40 while the other end engages the valve lever. 44 is a pan to receive the water as it is ejected. 45 is a cam above the pan 44 and in line of travel of the valve lever as it rotates. When the valve lever reaches the cam 45, the valve lever is operated by the cam to open the valve and permit the water to flow thereout during the passage of the nozzle over the pan.

The following means are provided to drive the pulleys *i*: 54 is a motor suspended from a bracket 50. On the shaft of the motor is a pinion 55 that drives a gear wheel 56, the shaft of which is supported in bearings on the large U-shaped bracket 51. On the shaft of gear wheel 56 is a pinion 57 that drives a gear wheel 58 whose shaft is also supported in bearings on the bracket 51. 59 is the drive pulley on the shaft of gear wheel 58. 60 is a pulley supported from bracket 52 and 61 a pulley supported from bracket 53. 62 is a pulley supported on block 70 slidable on the guide 72. 63 is a pulley supported on the bracket 65. All of said brackets are suspended from the beam *c* and the guide 71 is also secured to the beam. 64 is a pulley on the bracket 66 secured to the floor.

The motor 54, through the chain of gears 55, 56, 57 and 58 drives the pulley 59. The endless drive rope *j* extends successively around pulleys 59, 60, 61, 62, 63 and 64, the several pulleys *i* and thence back to the drive pulley 59.

To produce the necessary tension on the drive-rope, a weight 74 is connected with the block 70 by means of a rope or flexible connection 73 extending partially around the pulley 72. The block 70 supporting the pulley 62 is slidable on the guide 71, as before

stated, so that any stretch of the rope will be taken up by means of the weight moving the pulley 62 along the guide 71.

The shafts of the pulleys 59 and 60 are preferably geared together by means of the gears 78 and 79, this being practically necessary to give the required frictional driving contact between the pulleys and the rope.

Having now described the construction of the machine, I will describe the manner in which it is used in drying and shrinking hair cloth.

The cloth is introduced first to the lowermost of the pulleys *i* and thence caused to travel successively around the remaining pulleys. The lowermost pulley is expanded little if at all. The second pulley is somewhat more expanded, the third pulley still more expanded, and so on, the upper and last pulley being expanded to the greatest extent. It will be understood that, as all the pulleys are driven by the same rope, the circumferential speed of the pulleys must be the same, and that therefore a relatively expanded pulley will make fewer rotations than a relatively contracted pulley. As the cans are all of the same diameter, the circumferential speed of a can driven by a relatively expanded pulley will be less than the circumferential speed of a can driven by a relatively contracted pulley. Consequently, with the pulleys expanded relatively in the way above described, the circumferential speed of the first or bottom can will be the greatest, the circumferential speeds of the cans progressively diminishing from the first or bottom can to the last or top can. It is found that, as the cloth travels through the machine, its speed of travel must progressively lessen as it passes from one can to another, and that the effect of this operation is to shrink the goods in the actual process of drying them. It will, of course, be understood that the same result could be produced by using solid pulleys of different permanent diameters. The disadvantage of using solid pulleys is that the difference in speed of the cans is an invariable factor, while with expansible pulleys the difference in speeds may be varied to suit different conditions and different varieties of cloth. Instead of pulleys of different diameters, intermeshing gear wheels of different diameters may be used.

It is also obvious that the machine may be used to stretch goods a determinate amount as well as to shrink them. To stretch the goods, the lower pulleys are expanded more than the upper pulleys, thus causing the circumferential speed of travel of the upper cans to exceed that of the lower cans, thereby causing the speed of travel of the goods to be progressively accelerated as they pass from can to can. It will be understood, also that the same result can be attained by having the circumferential speeds of the dif-

ferent pulleys, gears, or other driving means, and the angular rotary speeds of the cans, uniform, and varying the diameters of the cans themselves, thereby causing their circumferential speeds to vary.

I have not herein claimed the construction of the expansible pulley, which forms the subject of a separate application filed November 28th, 1905, Serial No. 289,407, the same being a division of this application.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:—

1. In a drying machine, in combination, a series of cans about which the goods to be dried and shrunk successively pass, means to introduce a heating medium into the interior of the cans, and means driving said cans at circumferential speeds of rotation substantially progressively decreasing from the first to the last can of the series.

2. In a drying machine, in combination, a series of cans about which the goods to be dried and shrunk successively pass, means to introduce a heating medium into the interior of the cans, and means driving the first can of the series at a relatively high circumferential speed, the last can of the series at a relatively low circumferential speed and intermediate cans at intermediate circumferential speeds.

3. In a drying machine, in combination, a series of cans about which the goods to be dried and shrunk successively pass, means to introduce a heating medium into the interior of the can, a pulley by which each can is driven, and a rope by which the several pulleys are driven, the diameters of the several pulleys increasing substantially progressively from the first to the last can of the series.

4. In a drying machine, in combination, a series of drying cans about which the goods to be dried successively pass, means to introduce a heating medium into the interior of the cans, a pulley by which each can is driven, and a rope by which the several pulleys are driven, the diameters of the several pulleys varying substantially progressively from the first to the last pulley of the series.

5. In a drying machine, in combination, a series of drying cans about which the goods to be dried successively pass, means by which the cans are driven, and speed-regulating devices one for each can of the series by means of which the speed of any can of the series may be independently varied relatively to the other cans of the series.

6. In a drying machine, in combination, a series of drying cans about which the goods to be dried successively pass, a pulley by which each can is driven, a rope by which the several pulleys are driven, and means to expand and contract the pulleys.

7. In a drying machine, the combination,
with the can, of a pipe leading therefrom, a
valve on said pipe, a spring normally holding
said valve closed, and a cam adapted in the
5 rotation of the can to open said valve against
the action of said spring.

8. In a drying machine, the combination,
with the can, of a pipe leading therefrom, a
valve lever, a spring engaging the valve lever
10 and normally holding the valve closed, and a
cam in line of travel of said valve lever and

adapted to engage and move the latter,
against the action of its spring, to open the
valve.

In testimony of which invention, I have 15
hereunto set my hand, at Philadelphia, on
this 14th day of June, 1905.

GEORGE S. COX.

Witnesses:

M. M. HAMILTON,
T. B. WOOD.