

(No Model.)

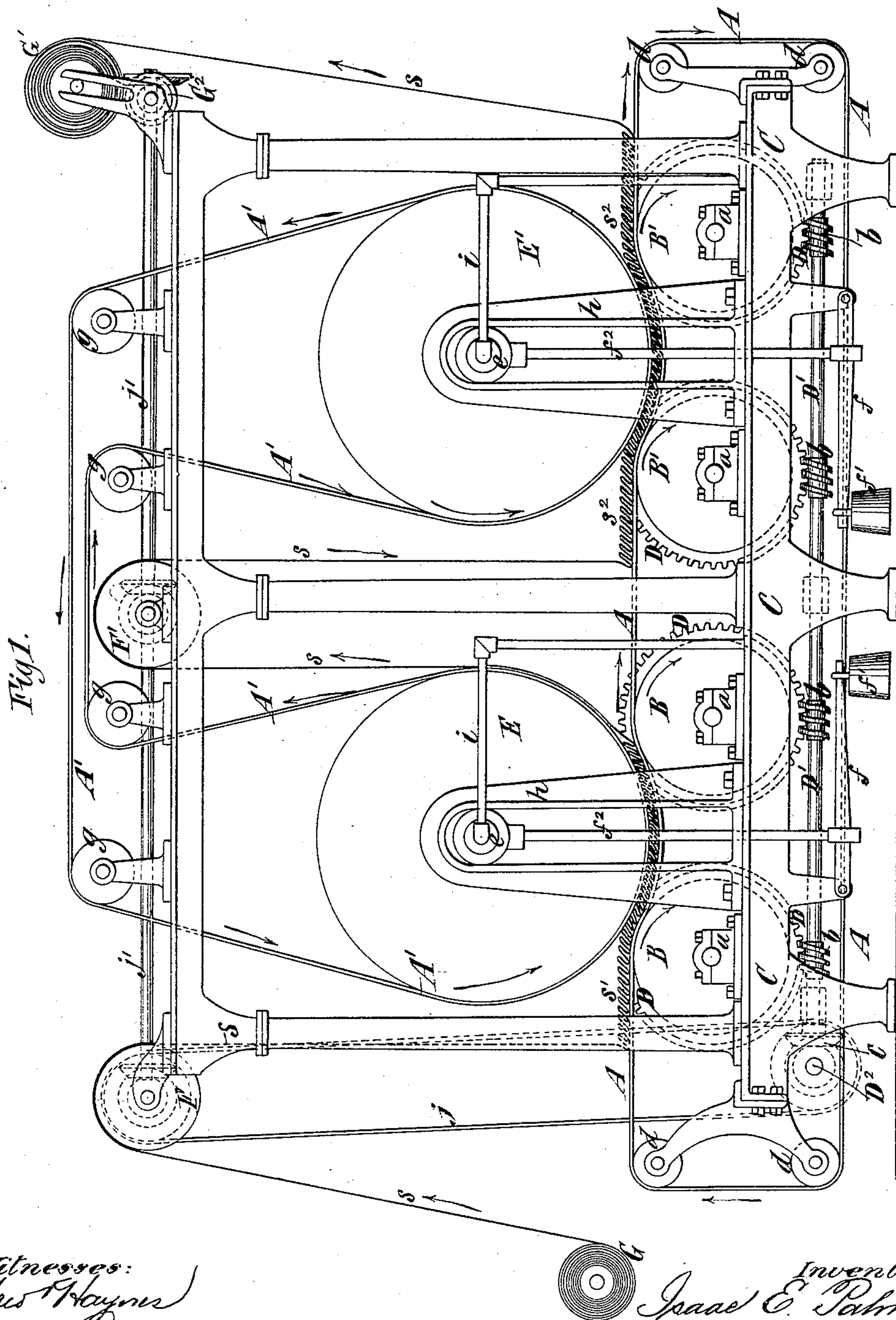
2 Sheets—Sheet 1.

I. E. PALMER.

PROCESS OF AND MACHINE FOR STARCH FILLING, &c.

No. 304,851.

Patented Sept. 9, 1884.



Witnesses:  
Jas Hayner  
Mat Pollock

Inventor:  
Isaac E. Palmer  
by his Attorneys  
Brown & Hall

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

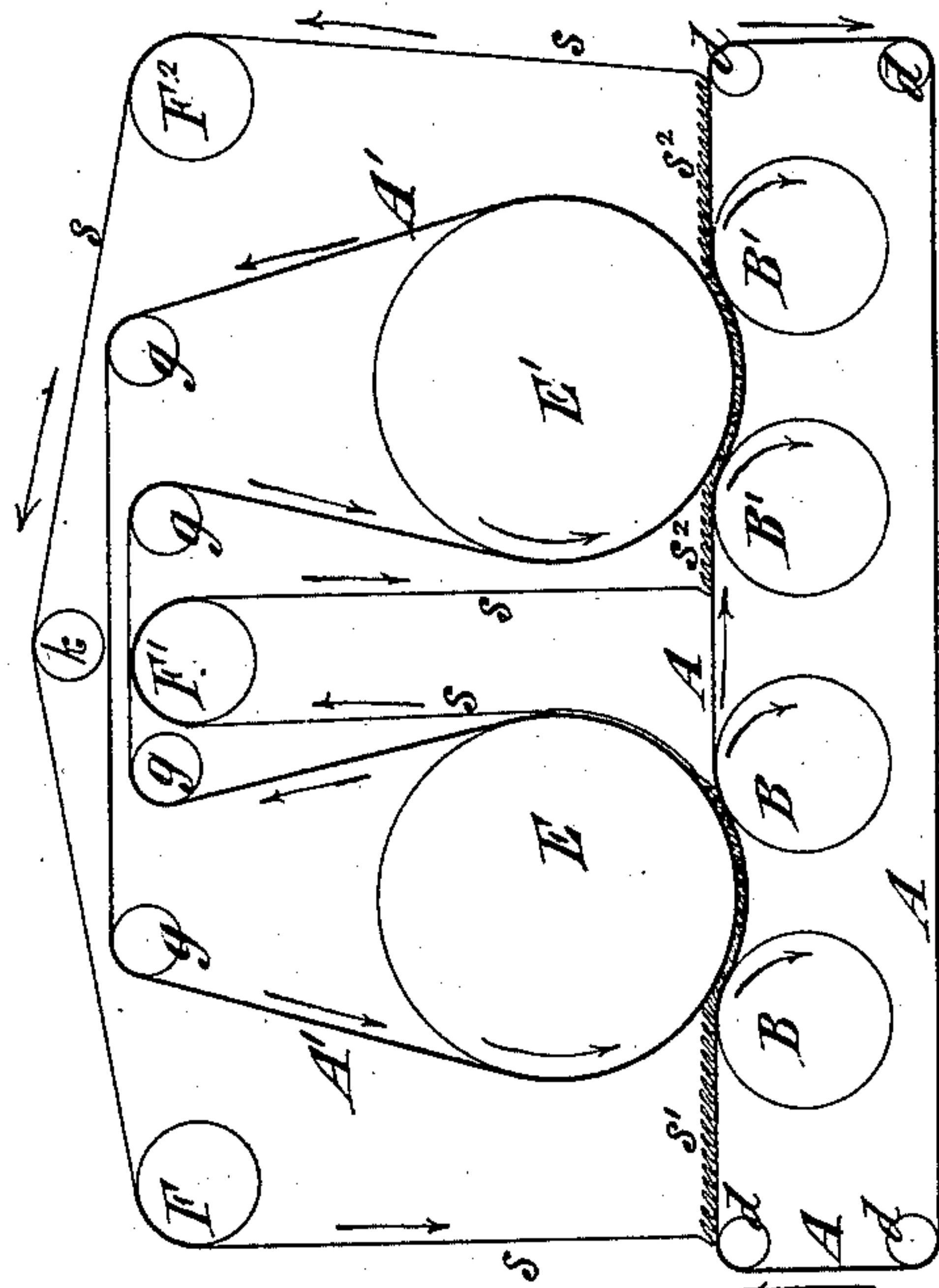
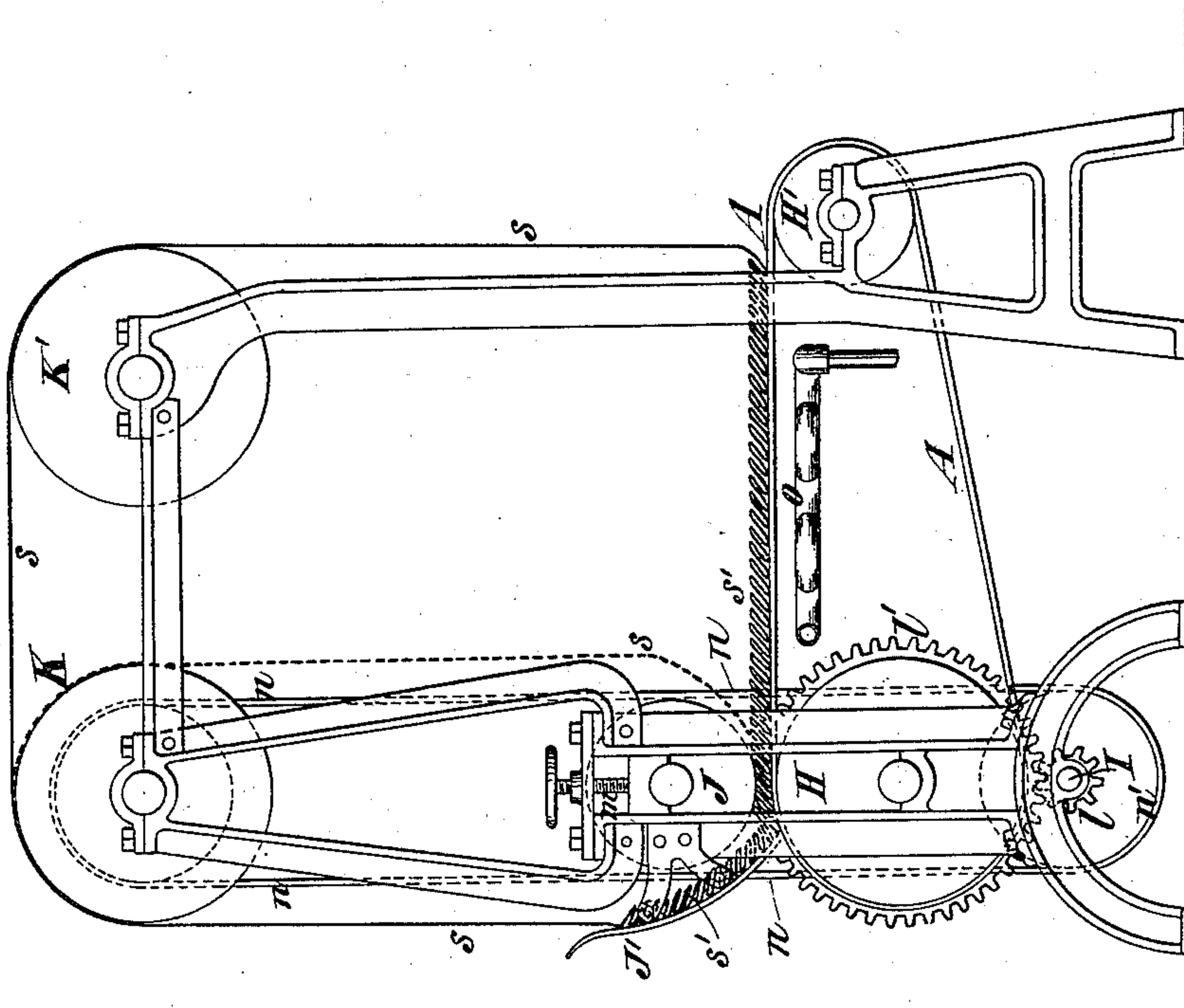


Fig. 3.



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# UNITED STATES PATENT OFFICE.

ISAAC E. PALMER, OF MIDDLETOWN, CONNECTICUT.

## PROCESS OF AND MACHINE FOR STARCH-FILLING, &c.

SPECIFICATION forming part of Letters Patent No. 304,851, dated September 9, 1884.

Application filed January 19, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC E. PALMER, of Middletown, in the county of Middlesex and State of Connecticut, have invented a new and  
5 Improved Process of and Machine for Starch-Filling, &c., of which the following is a specification.

The process and machine which form the subject of my invention are applicable for  
10 starch-filling, milling, mulling, starch-clearing, and evening of fabrics, and for conditioning starched fabrics for finishing—that is, putting them in a condition for finishing by any of the operations, tentering, drying, calender-  
15 ing, or other processes used for finishing starched fabrics. In starching fabrics the starch is never uniformly and evenly distributed throughout their whole extent, and some parts of the fabric will have an abundance or  
20 surplus of starch, while in other parts there will be a deficiency of starch. This unevenness in the distribution of starch throughout the fabric is not remedied in any of the ordinary processes employed in the manufacture or  
25 treatment of starched fabrics; and the object of my invention is to provide a treatment for the starched fabric which will be effective in working the starch into the threads or yarns of the fabric, and will at the same time be effective in working the starch out of any parts  
30 of the fabric where there is a surplus and into other parts where there is a deficiency of starch.

My invention includes both a process of treating starched fabrics and a machine for performing said process, whereby the desired result may be effectively accomplished.

The invention consists in a process of treating starched fabrics which involves the gathering or doubling of the fabric on itself, and  
40 the subjecting of the fabric while in a gathered condition to a rolling or pressing operation.

The invention also consists in a process of treating starched fabrics which involves the gathering of the fabric in the direction of its  
45 length and subjecting it while in a gathered condition to a rolling or pressing operation.

The invention also consists in a process of treating starched fabrics which involves the  
50 gathering of the starched fabric in the direction of its length, the subjecting of the fabric while in a gathered condition to a rolling or

pressing operation, the extending of the fabric, and the subsequently regathering of the fabric and subjecting it to a second rolling or  
55 pressing operation.

The invention also consists in various novel combinations of parts in a machine for carrying out my invention, which are hereinafter described and pointed out in the claims. 60

In the accompanying drawings, Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a diagram, hereinafter referred to; and Fig. 3 is a side elevation of a machine which may be employed in carrying  
65 out my invention.

Similar letters of reference designate corresponding parts in all figures.

Referring first to Fig. 1, A designates an endless belt or apron, which may be of canvas or other material, and which should be of  
70 about the same width, or at least as wide as the fabric to be operated upon. This belt or apron A is carried over pairs of cylinders or rolls, B B' B'', which are mounted in bearings *a* in the frame C of the machine, and to  
75 which a positive rotary motion in the directions indicated by the arrows is imparted by any suitable mechanism. In this example of my invention the cylinders or rolls B B' are provided with worm-wheels D, and all receive  
80 motion from worms or screws *b* on a shaft, D', extending lengthwise of the machine. The shaft D' is connected by bevel-gears *c* with a shaft, D<sup>2</sup>, which may constitute the driving-  
85 shaft of the machine. The belt or apron A is carried over guide-rollers or idlers *d*, and by the rotary movement of the cylinders or rolls B B' the belt or apron is moved continuously forward in the direction indicated by  
90 the arrows. Arranged above and intermediately between the cylinders or rolls B or B' of each pair are large cylinders or rotary drums E E', which are mounted in suitable bearings, *e*, and which are weighted by levers *f*, to which  
95 weights *f'* are hung. A second endless apron or belt, A', is passed around the drums or cylinders E E', and around suitable guide-rollers and idlers, *g*. This apron A' may be made of  
100 canvas or stout cloth, and keeps the starched goods out of direct contact with the cylinders E E'. The apron prevents any scorching or too intense heating of the goods by the cylinders in case the latter are overheated. The



weighted levers  $f$  are connected by rods  $f^2$  with the bearings  $e$ , and said bearings are guided by housings  $h$  in their rising and falling movements. I have here shown pipes  $i$  5 connected with the journals of the cylinders or drums  $E E'$ , whereby steam may be admitted for heating them, and any or all of the cylinders or rolls  $B B'$  may be heated, if desired, steam-pipes being introduced through 10 their journals in a well-understood manner. The apron or belt  $A'$  is not driven positively, but is moved continuously in the direction of the arrows by frictional contact with the goods on the belt or apron  $A$ .

15 At one end of the machine is a roll or cylinder,  $F$ , which is positively driven by a belt,  $j$ , from a pulley on the shaft  $D^2$ ; and  $F'$  designates a similar roll or cylinder mounted above and between the cylinders or drums  $E E'$ . Both 20 or either of the rolls or cylinders  $F$  and  $F'$  may be heated by steam, if desired. At the front end of the machine is arranged a roller,  $G$ , from which the fabric is taken, and at the other end of the machine is a roller,  $G'$ , on 25 which the fabric is wound after passing through the machine.

In order to drive the roller  $G'$  with a variable speed as the fabric is rolled upon it, I have represented a driving-roll,  $G^2$ , on which the 30 fabric-roller  $G'$  rests, and from which the fabric-roll derives motion in a well-understood manner.

The cylinder or roll  $F'$  and the roller  $G^2$ , for driving the fabric-roller  $G'$ , receives rotary 35 motion from the roll  $F$  through a shaft,  $j'$ , and gearing.

The fabric to be operated upon by the machine has been previously starched, and may be wound upon the roller  $G$  while wet, or may 40 be dried and again moistened before being brought to the machine. The fabric  $s$  is taken from the roller  $G$  up over the cylinder or roll  $F$ , and thence down, and the peripheral velocity of the roll  $F$  should be much faster than 45 the speed of the apron or belt  $A$ , so that the fabric will be deposited on the said apron or belt in folds, as shown at  $s'$ . In this way the fabric is gathered in the direction of its length and folded or doubled upon itself. In this 50 gathered condition the fabric is carried between the aprons  $A A'$ , and by the cylinders  $E B B'$  is subjected to rolling or pressing, which works together the folds or portions which are in contact. After passing the cylinders  $E B B'$ , 55 the fabric  $s$  is taken upward over the cylinder or roll  $F'$ , and thence downward again to the apron or belt  $A$ . The peripheral velocity of the cylinder-roll  $F'$  is so much faster than the speed of the apron or belt  $A$  that the fabric 60 will be extended to its full length and aired by its passage over the cylinder  $F'$ , and will be regathered upon the belt or apron, as shown at  $s^2$ . The fabric will not, however, be regathered in the same folds in which it was 65 first gathered, but other surfaces will be in contact, and by the passage of the regathered fabric between the cylinders  $E' B' B'$  the folds

will be again worked on each other by the rolling or pressing of the gathered fabric. By regathering and repressing the fabric one or 70 more times after it has been first gathered and subjected to rolling or pressing, every part of the fabric is brought into contact with and worked upon different other parts, and a repeated interchange of contact between differ- 75 ent parts of the fabric is effected. By such treatment of the fabric the surplus starch in one part of the fabric will be worked into other parts in which there is a deficiency of starch. The roller  $G'$  is driven at a speed 80 which will again extend and air the fabric  $s$  and wind or roll it up. If desired, the fabric might be taken direct from the apron or belt  $A$  of a tentering-machine. The fabric only passes once through the machine shown in 85 Fig. 1; but it may be gathered and regathered as many times as there are pairs of cylinders or rolls  $B$  or  $B'$ .

I may employ in a machine of this character three or more pairs of lower cylinders, 90 one for each pair. Only a single pair of cylinders or rolls,  $B B'$ , operating in conjunction with an upper cylinder,  $E$ , might be used in connection with a cylinder or roll,  $F$ , for delivering the fabric onto the belt or apron  $A$ , and 95 a roller,  $G'$ , for taking the fabric from said apron after it has been once gathered and subjected to one rolling and pressing operation. I may, if desired, connect the two ends of the fabric, so as to form an endless piece, which may be 100 passed repeatedly through the machine; and Fig. 2 is a diagram of the several cylinders or rolls and aprons or belts of such a machine. The course of the fabric is represented by arrows, and in lieu of the roller  $G'$ , (shown in 105 Fig. 1,) I employ a cylinder or roll,  $F^2$ , like the cylinders or rolls  $F F'$ , and an idler-roll,  $k$ , over which the fabric returns to the front of the machine.

In other features of its construction and in 110 its operation the machine is like that shown Fig. 1.

Fig. 3 also represents a machine for operating on a fabric having its ends connected. In said figure,  $H$  designates a cylinder, to 115 which a positive rotary motion is transmitted through a pinion,  $l$ , and wheel  $l'$ , from a driving-shaft,  $I$ . An endless belt or apron,  $A$ , passes around the cylinder  $H$  and around a drum,  $H'$ , arranged at a little distance there- 120 from. The cylinder  $H$  may be heated by steam introduced through the journal, if desired.

Above the cylinder  $H$  is a roll,  $J$ , which rotates by frictional contact with the goods on 125 the belt or apron  $A$ , and which may be pressed downward by screws  $m$  acting on its bearings in a well-understood manner.

In front of the roll  $J$  is a stationary inclined or curved support,  $J'$ , which, in connection 130 with the roll  $J$ , forms a hopper, into which the fabric  $s$  is delivered.

Above the roll  $J$  is a cylinder or roll,  $K$ , which may be heated by steam, if desired, and



to which a positive rotary motion is transmitted by a belt, *n*, from a pulley, *n'*, on the driving shaft I.

Behind the roll K is an idler-roll, K, over which the fabric *s* is carried. The roll K is geared to rotate at a speed which will give it a peripheral velocity much greater than the speed of the belt or apron A, and the fabric following the course indicated by the arrows 10 will be gathered at *s'* and subjected to the rolling and pressing action of the cylinder and roll H J, and will then be extended by the very action of the roll K and regathered at *s'*, to be again subjected to the action of the 15 rolls H J. This operation may be repeated as often as is deemed desirable. At each regathering different portions of the fabric will be brought into contact, and at each rolling and pressing operation different portions of 20 the fabric will be worked on each other. If desired, the fabric, after being subjected to rolling or pressing, and while on the apron or belt A, may be dried by steam passing through pipes *o*. If desired, the fabric *s* might be 25 taken from the delivery-point of the rolls H J directly upward to the cylinder or roll K, as shown by dotted lines, and in such case the apron or belt A might be dispensed with. By the gathering of the fabric and by the rolling 30 or pressing operation to which it is subjected in a gathered condition, its different portions are thoroughly worked on each other, and the starch is worked into the threads or yarns. The working upon each other of the gathered 35 portions of the fabric tends to work or transfer the starch from portions having a surplus of starch to other portions which have a deficiency or are "lean" in starch; and my process, especially when the gathering and rolling or pressing are repeatedly performed, tends 40 to even the starch and to produce a starched fabric in which all parts are of uniform stiffness and quality of finish.

Two or more fabrics laid one on another can 45 be together subjected to the operation of gathering and rolling or pressing.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process of treating starched fabrics, 50 which involves gathering or doubling the fabric on itself, and subjecting the fabric while in a gathered condition to a rolling or pressing operation, substantially as and for the purpose described.

2. The process of treating starched fabrics, 55 which involves gathering the fabric in the direction of its length, and subjecting the gathered fabric to a rolling or pressing operation, substantially as and for the purpose herein 60 described.

3. The process of treating starched fabrics,

which involves gathering the fabric in the direction of its length, subjecting the fabric while in a gathered condition to a rolling or pressing operation, extending the fabric, subsequently regathering the fabric, and again 65 subjecting it while in a gathered condition to a rolling or pressing operation, substantially as and for the purpose herein described.

4. In a machine for treating starched fabrics, 70 the combination of upper and lower cylinders, means for driving the lower cylinder or cylinders positively, a roll for delivering fabric to the said upper and lower cylinders, and means for driving said roll with a peripheral velocity much greater than that of said cylinders, 75 whereby the fabric will be gathered before it is subjected to the rolling or pressing action of said cylinders, substantially as and for the purpose herein described. 80

5. In a machine for treating starched fabrics, the combination of lower and upper cylinders, an endless apron or belt passing between said cylinders, means for imparting motion to said apron or belt, rolls for delivering the fabric 85 upon said apron in front of said cylinders and for taking the fabric from said apron in rear of said cylinders, and mechanism for driving said rolls with a peripheral velocity much greater than the speed of the said apron or 90 belt, substantially as and for the purpose described.

6. The combination, with two lower cylinders, B B, and an upper cylinder, E, of the belt or apron A, and idlers or guide-rollers 95 around which it is carried, mechanism for rotating said cylinders B B positively, a roll, F, and mechanism for driving it with a peripheral velocity greater than the speed of said belt or apron, and a roll for taking the fabric from 100 said apron or belt in rear of said cylinders, substantially as and for the purpose herein described.

7. The combination, with the two pairs of lower cylinders, B B B' B', mechanism for 105 driving them positively, the upper cylinders, E E', the lower endless apron or belt, A, passing over said lower cylinders, and guide-rollers or idlers *d* therefor, the upper endless apron or belt, A', wherein the cylinders E E' 110 are hung, and guide-rollers or idlers *g* therefor, the rollers F F', and mechanism for driving them positively with a peripheral velocity greater than the speed of the apron or belt A, and means for taking the fabric 115 from said apron or belt A in rear of the cylinders B' B' E', substantially as and for the purpose herein described.

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Witnesses:

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