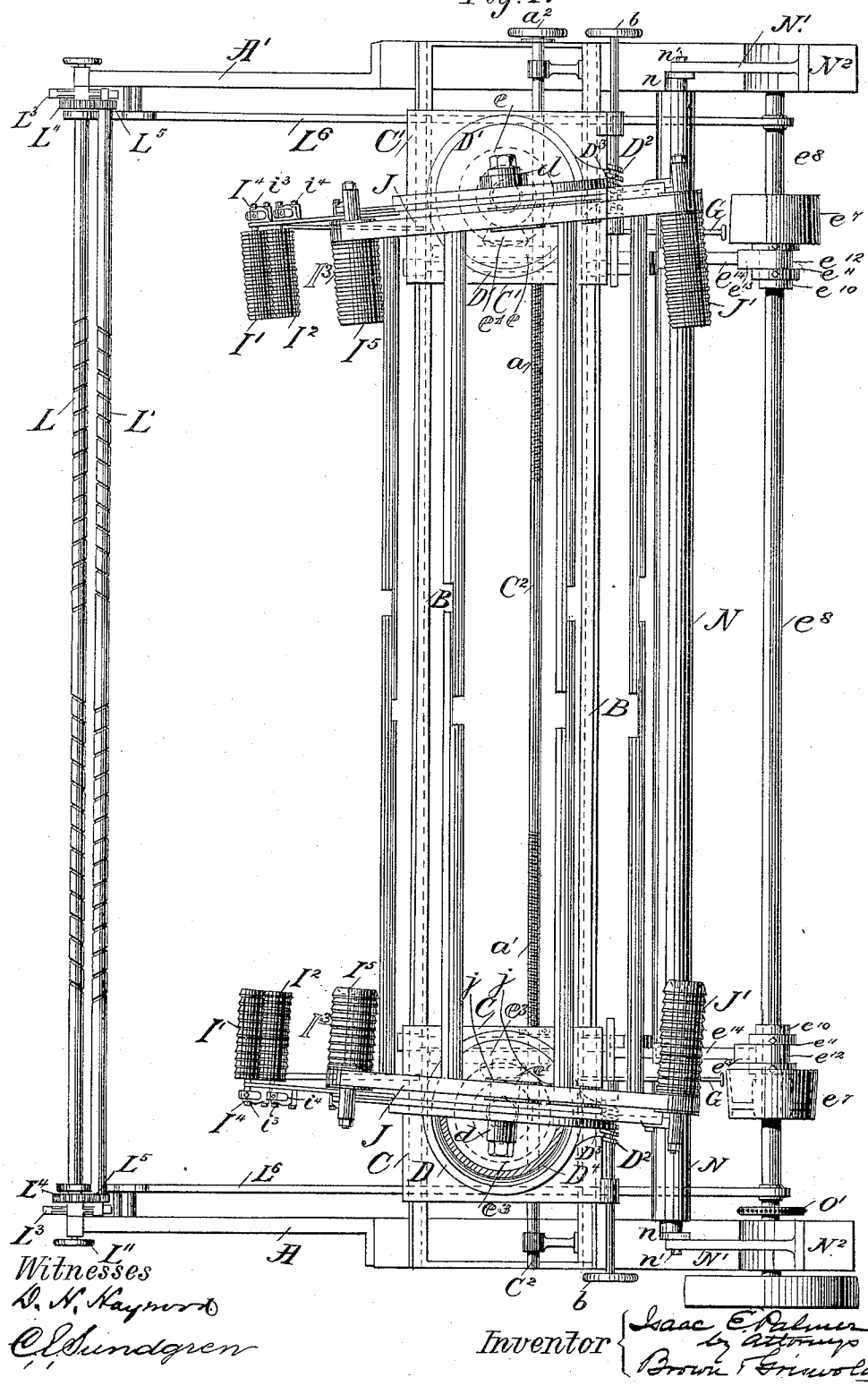
(No Model.) 3 Sheets—Sheet 1.

# I. E. PALMER.

## CLOTH TENTERING MACHINE.

No. 430,749. Patented June 24, 1890.

Fig. 1.




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# I. E. PALMER.

## CLOTH TENTERING MACHINE.

No. 430,749. Patented June 24, 1890.

*Fig. 2.*

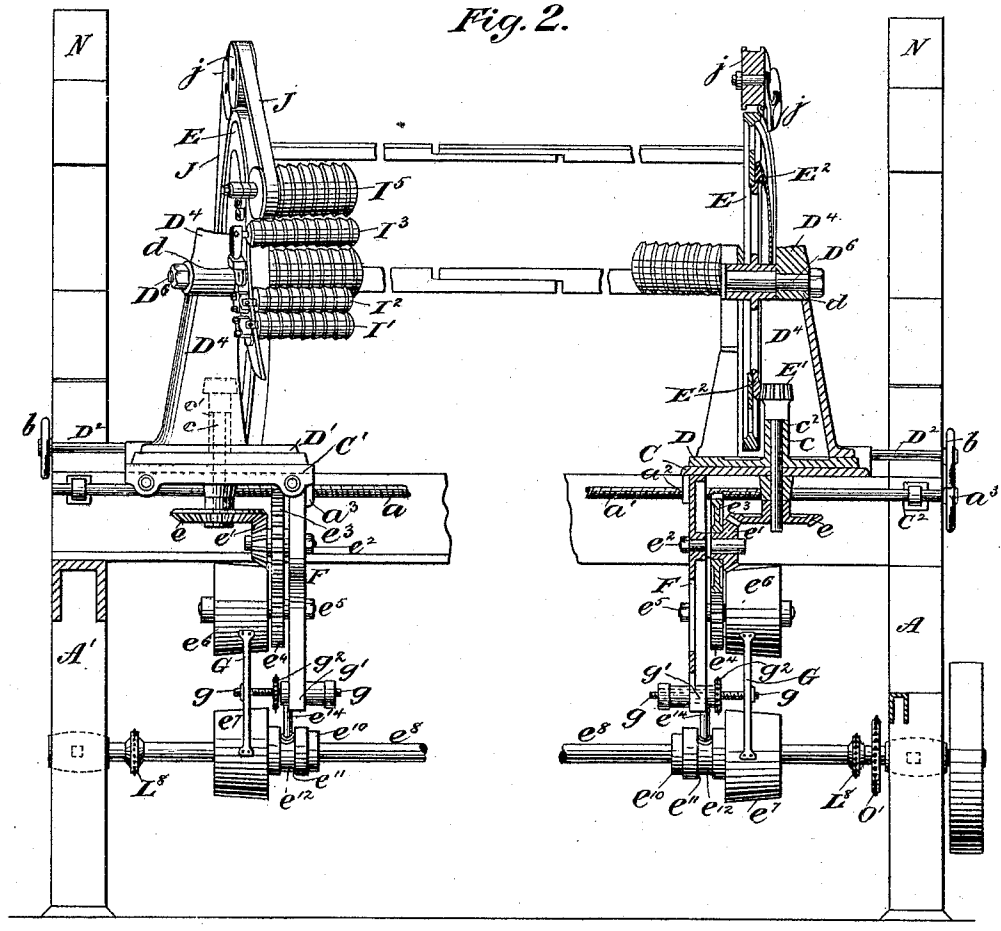
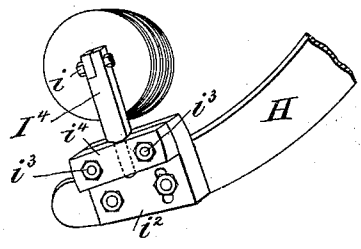



*Fig. 6.*




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(No Model.) 3 Sheets—Sheet 3.

# I. E. PALMER.

## CLOTH TENTERING MACHINE.

No. 430,749. Patented June 24, 1890.

Fig. 5.

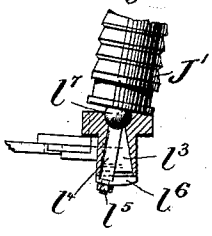
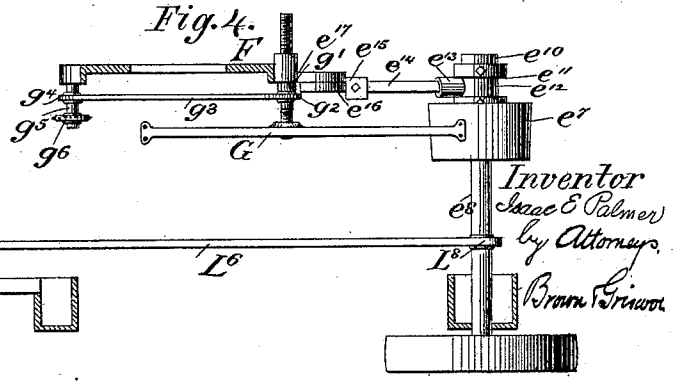


Fig. 3.



Fig. 4.



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# UNITED STATES PATENT OFFICE.

ISAAC E. PALMER, OF MIDDLETOWN, CONNECTICUT.

## CLOTH-TENTERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 430,749, dated June 24, 1890.

Application filed June 15, 1889. Serial No. 314,430. (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 certain new and useful Improvement in Cloth-Tentering Machines, of which the following is a specification.

My improvement relates to machines for tentering fabrics.

I will describe a machine embodying my improvement in detail, and then point out the novel features in claims.

In the accompanying drawings, Figure 1 is a plan or top view of a tentering-machine embodying my improvement. Fig. 2 is a front elevation of the same, partly in section and partly broken away to save space. Fig. 3 is an end view of the same. Fig. 4 is a horizontal section of a portion of the machine, taken on the plane of the line *x x*, Fig. 3, looking downwardly. Fig. 5 is a detail view of one of certain spreading-rollers employed and its connections. Fig. 6 is a detail view of another of certain spreader-rollers employed and its connections.

Similar letters of reference designate corresponding parts in all the figures.

A A′ designate the side frames of the machine.

B designates brace bars or rails extending between the side frames and uniting them together. The brace-bars B constitute slideways, upon which carriages C C′, mounted upon said brace bars or rails near opposite ends of the machine, may be slid to and fro toward and from each other. They are so moved by means of a screw-shaft $C^2$, which screw-shaft is provided with reversely-screw-threaded portions *a a′*, engaging nuts $a^2$ on the carriages C C′ and journaled in suitable bearings in the main frame. This shaft may be rotated by a hand-wheel $a^3$. When rotated, the reverse screw-threads on the shafts $C^2$ will cause the carriages to be moved toward or from each other, according to the direction in which the shaft is rotated.

Upon the carriages C C′ are mounted turn-tables D D′. Rotary motion is imparted to the turn-tables D D′ by worm-shafts $D^2$, engaging gear-segments $D^3$, extending from the sides of the turn-tables. The worm-shafts $D^2$ are mounted in suitable bearings on the carriages C C′ and receive rotary motion by means of hand-wheels *b*.

Upon upwardly-extending portions $D^4$ of the turn-tables D D′ are mounted supporting-frames $D^5$. The portions $D^4$ are provided with bearings *d*, through which extend loosely stub-shafts $D^6$.

Selvage-carriers E, provided with hubs $e^{13}$, are mounted upon the stub-shafts $D^6$. During the operation of the machine rotary motion is imparted to the selvage-carriers E. Such motion is imparted by means of gear-wheels E′, which gear-wheels gear into face-gears $E^2$, forming part of the selvage-carriers. The gear-wheels E′ are mounted upon the upper ends of vertically-extending shafts *c*, which shafts are journaled in suitable bearings $c′ c^2$ upon the turn-tables D D′ and the carriages C C′. The shafts *c* also constitute pivots, upon which the turn-tables D D′ may rotate. The object of rotating the turn-tables D D′ is to adjust the selvage-carriers and their accompanying devices at the desired angle relatively to each other for the purpose of stretching the fabric being tentered to the desired extent. I have shown the said parts arranged at angles to each other in Figs. 1 and 2. The object of bringing the carriages and the parts mounted upon them nearer to or farther from each other is to accommodate fabric of different widths. Rotary motion is imparted to the shafts *c* by means of gear-wheels *e*, mounted on said shafts and gearing with gear-wheels *e′*, mounted upon stub-shafts $e^2$, journaled in frames F, carried by the carriages C C′ and extending downwardly therefrom.

Rigidly mounted upon the hubs of the gear-wheels *e′* are other gear-wheels $e^3$, which gear-wheels mesh with gear-wheels $e^4$, mounted upon stub-shafts $e^5$, also journaled in the frames F. Upon the stub-shafts $e^5$ are keyed cone-pulleys $e^6$, which cone-pulleys derive motion from cone-pulleys $e^7$, mounted upon a main or driving shaft $e^8$, through the medium of belts $e^9$. The cone-pulleys $e^7$ have a sliding connection with the shaft $e^8$, such connection being formed by a groove upon one and a rib upon the other in a well-known manner, (see Fig. 3,) so that the said pulleys will rotate with the shaft, but are free to be moved along thereon. Said pulleys $e^7$

are provided with hubs $e^{10}$, having annular grooves $e^{11}$.

In the annular grooves $e^{11}$ are arranged collars $e^{12}$. As here shown, the collars $e^{12}$ are provided with sockets $e^{13}$, into which extend and are secured one of the ends of rods $e^{14}$. The rods $e^{14}$ are received and are secured at their other ends in sockets $e^{15}$, formed upon plates $e^{16}$. The plates $e^{16}$ are secured to correspondingly-formed plates $e^{17}$, secured to or forming a part of the frames F. They are so secured by means of bolts $e^{18}$. It will thus be seen that the pulleys $e^{7}$ have a positive connection with the frames F. Of course, said pulleys may rotate freely in the collars $e^{12}$.

It is often desirable to vary the speed of rotation of one of the selvage-carriers with reference to the other or to vary the speed of both of them, in order to increase or decrease the speed with which the fabric being tentered shall be carried along by the selvage-carrying devices. In order to accomplish this, one of the belts $e^{9}$ or both of them is or are shifted upon the cone-pulleys $e^{6}$ $e^{7}$.

I have shown means for shifting the belts, consisting in belt-shifters G, each of which belt-shifters is rigidly mounted upon one of the ends of screws $g$. The screws $g$ extend through nuts $g'$, which nuts are internally screw-threaded to engage the screws, and are journaled in bearings on the frame F, so that they may rotate therein. If the nuts $g'$ are rotated, longitudinal movement will be imparted to the screws $g$, and the belt-shifters will consequently be operated to shift the belts.

I have shown a convenient means for causing the rotation of the nuts $g'$, consisting in sprocket-wheels $g^{2}$, rigidly mounted upon the said nuts, and about which pass sprocket-chains $g^{3}$, also extending about sprocket-wheels $g^{4}$, mounted upon stub-shafts $g^{5}$, journaled in the frames F. Upon the stub-shafts $g^{5}$ are other sprocket-wheels $g^{6}$. About the sprocket-wheels $g^{6}$ extend sprocket-chains $g^{7}$, which chains extend upwardly and about other sprocket-wheels $g^{8}$ $g^{9}$, which sprocket-wheels are mounted upon arms H, extending from and secured to the frames $D^{5}$.

When the machine is in operation, operatives stand upon a platform S at the front of the machine and assist in feeding the fabric S′ onto the selvage-carriers E. The sprocket-chains $g^{7}$, at their upper parts, extend in close proximity to the hands of the operatives, who are thus feeding the fabric. If an operative desires to change the feed of that edge of the fabric which he is attending to, he has simply to grasp the chain $g^{7}$ and move it in a desired direction, thus causing the rotation of the nut $g'$ and the consequent shifting of the belt, as described. Of course, instead of using sprocket-chains and wheels for transmitting motion to the belt-shifter, belts and pulleys might be used.

I′ $I^{2}$ $I^{3}$ designate stretching and straightening rolls. These rolls are circumferentially ribbed or grooved, and are arranged, as here shown, upon the arms H. One of these rolls I have shown more clearly in Fig. 6. At their outer ends they have pivotal connections with posts or standards $I^{4}$. Such connections are formed by passing bolts $i$ through projections extending from the outer ends of the rolls and through the upper ends of the posts or standards $I^{4}$. The rolls may be therefore adjusted relatively to the posts or standards, so as to extend at various angles to the lengths of the posts or standards. By tightening the nuts on the bolts $i$ they may be secured in any position into which they may be adjusted.

The posts or standards $I^{4}$ have rounded lower portions and extend into sockets formed in plates $i^{2}$, which plates are secured upon the arms H. Combined with the plates $i^{2}$ and adapted to be secured thereto by bolts $i^{3}$, so as to clamp the posts or standards $I^{4}$, are other plates $i^{4}$. By loosening the plates $i^{4}$ the posts or standards may be adjusted rotarily, so as to adjust the rolls at any desired angle horizontally. The rolls therefore have two adjustments—one in a substantially vertical plane and the other in a substantially horizontal plane. By combining these adjustments in any desired manner the direction which will be given to the fabric being fed onto the machine and the amount of lateral stretching and straightening of the fabric which will be required are readily accomplished. The grooves upon the rolls operate to perform these operations upon the fabric. The fabric passes over roll I′, under roll $I^{2}$, and over roll $I^{3}$, and these rolls may be so adjusted relatively to each other that they will stretch and straighten the fabric alternately in somewhat different directions, thus causing all parts of the fabric to be operated upon by at least one set of the rolls in the manner necessary to effect its true straightening and stretching. Although I have shown but three pairs of these rolls, I may use any desired number. The fabric, having been operated upon by the upper of the rolls $I^{3}$, passes beneath rolls $I^{5}$, similar in construction to the rolls I′ $I^{2}$ $I^{3}$, but of larger diameter. These rolls are mounted on brackets $I^{6}$, which brackets are in turn mounted upon plates $I^{7}$, adapted to slide in slideways $I^{8}$, secured upon the frames $D^{5}$. By moving the plates $I^{7}$ inwardly or outwardly the rolls $I^{5}$ may be adjusted nearer to or farther from the selvage-carriers. The plates $I^{7}$ are provided with longitudinal slots, through which extend pins on slideways $I^{8}$, in order to admit of this adjustment. Nuts on said pins may be employed to clamp the plates $I^{7}$ in any position into which they may be adjusted.

J designates retaining devices, by which the fabric passing over the selvage-carriers is gripped at its selvages and held upon the selvage-carriers. These retaining devices as here shown consist of endless belts. Near their outer ends the rolls $I^{5}$ are circumferen-

tially grooved. The belts J extend through these grooves and also through similar grooves in rolls J′. (Shown more clearly in Fig. 5 and to be presently described.) The rolls J′ are arranged at the rear of the selvage-carriers. The belts J also pass over pulleys $j$, mounted upon brackets $j^2$, secured upon the frames $D^5$. The pulleys $j$ are arranged above the selvage-carriers and about midway between the rolls $I^5$ J′. The arrangement of the said rolls and pulleys is such that the belt J is caused to bind upon the peripheries of the selvage-carriers, and as the selvage-carriers rotate the belts are caused to travel with them. They grip the selvage of the fabric between them and the selvage-carriers. By swinging the rolls $I^5$ upon their brackets $I^6$ the belts J may be tightened or loosened, as required. The brackets $I^6$ are secured to the plates $I^7$ by nuts and bolts, and by tightening these nuts and bolts the rolls $I^5$ will be secured in a position into which they may be adjusted. The rolls J′ are mounted upon the frames $D^5$ in manner similar to the rolls $I^5$—that is to say, they are supported near their outer ends in brackets $l$, secured upon longitudinally-movable plates $l'$, sliding in slideways $l^2$.

I have shown means independent of the brackets $l$ and the plates $l'$ for adjusting the rolls J′, consisting in providing the said brackets, as is shown more clearly in Fig. 5, with hollow horizontally-extending portions $l^3$, through which the axles $l^4$ of the rolls extend. The openings through the portions $l^3$ extend from end to end thereof, and are considerably wider near their outer ends than the diameters of the axles $l^4$; but their thickness is but little greater than the diameter of said axles. The inner ends of said openings are contracted widthwise, and the surrounding metal is somewhat hollowed out to receive a rolling bearing $l^7$ upon the axles $l^4$, adjacent to the rolls J′. It will be seen, therefore, that the rolls J′ may be swung through the said openings in the arc of a circle, so as to adjust them at desired angles to the plane of feed of the fabric.

In order to secure the rolls in a desired position, into which they may be adjusted, I clamp the outer ends of the axles by means of nuts $l^5$, bearing against arc-shaped surfaces $l^6$ upon the outer extremities of the portions $l^3$. The rolls J′ are free to rotate upon the axles $l^4$.

It is to be observed that the selvage-carriers, the means for causing the rotation of the selvage-carriers, the belt-shifting mechanism, and the means for causing the movement of the cone-pulleys $e^7$ upon the shafts $e^8$ are all mounted upon and carried by the carriages C C′, so that when the carriages C C′ are moved toward or from each other they will carry with them all the parts previously referred to. The fabric, being fed to the selvage-carriers, first passes about spreading-rolls L L′. The roll L is journaled in standards $L^2$ upon the main frame. The roll L′ is journaled in segments $L^3$ loosely journaled upon the roll L. Gear-wheels $L^4$ upon the roll L gear with gear-wheels $L^5$ upon the roll L′, and thus transmit motion from the former to the latter. Motion is transmitted to the roll L by means of belts $L^6$, passing about pulleys L′ on said roll and also about pulleys $L^8$ upon the main shaft $e^8$.

Journaled in the standards $L^2$ are shafts $L^9$, upon which are keyed gear-wheels $L^{10}$, meshing with the segments $L^3$. By rotating hand-wheels $L^{11}$ upon the shafts $L^9$ rotary motion may be imparted to the segments $L^3$, and the position of the roll L′ relatively to the roll L may be varied, so as to produce any desired tension in the fabric passing over the rolls. The rolls L L′ are, as here shown, spirally grooved for a portion of their lengths; or, in other words, each of the rolls is provided with reversely-extending spiral grooves, and I prefer that the spirals upon one roll should extend in an opposite direction to those upon the other roll, where such spirals are opposite each other. This results in a very effective spreading of the fabrics preparatory to their being received upon the rolls I′ $I^2$. After leaving the rolls J′, the angular adjustment of which causes the maintenance of the stretched and straightened condition of the fabric, the latter passes beneath a bearing-roll N, extending widthwise of the machine and journaled in brackets N′, extending from uprights $N^2$, comprised in the main frame. The frictional contact which the fabric has upon the bearing-roll N still maintains it in a properly stretched and straightened condition, and in such condition it is delivered upon a drying-cylinder $N^3$, which cylinder is journaled on the frame $N^2$. From the cylinder $N^3$ the fabric passes over another drying-cylinder $N^4$, and from thence onto a drying-cylinder $N^5$ in a well-known manner, and so on over any desired number of drying-cylinders until sufficiently dried. The bearing-roll N is journaled in brackets $n$, which latter have a slotted connection with the brackets N′, so that they may be adjusted toward and from the selvage-carrying devices to vary the tension upon the fabric, as desired. They may be secured in any desired position by clamping-nuts $n'$.

The drying-cylinders are geared together in a well-known manner, and motion is transmitted thereto by means of a belt O, passing about a pulley O′ on the main shaft $e^8$. It will be observed that the cylinder $N^3$ is of less diameter than the cylinder $N^4$, from which latter it derives motion. It will be apparent, therefore, that the feed of the fabric over the cylinder $N^4$ and other cylinders in the series of the same diameter will sometimes be faster than the feed over the cylinder $N^3$. This might result in tearing the fabric or unduly stretching it lengthwise. In order to obviate this, I, as shown, mount the gear-wheel P loosely upon the shaft $t$ of the cylinder $N^3$.

This gear-wheel bears a pawl $t'$, which pawl engages a series of teeth $t^2$ upon the end of the cylinder $N^3$. Therefore, when the gear-wheel P is rotated by the cylinder $N^4$, the pawl $t'$ will operate through its engagement with the teeth $t^2$ to cause the rotation of the cylinder $N^3$. If there is sudden or undue strain brought upon the fabric passing over the cylinder, the teeth $t^2$ will slip beneath the pawl $t'$ to admit of a sufficient rotation of the cylinder $N^3$ to avoid the tearing or straining of the fabric. There is therefore a slipping clutch-connection between the gear-wheel P and the cylinder $N^3$.

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

1. In a machine for tentering fabric, the combination, with angularly-adjustable selvage-carriers, of mechanism, substantially such as described, for effecting the adjustment of said carriers, and angularly-arranged rolls operating upon the edge portions of the fabric to straighten and stretch the fabric while passing to the selvage-carriers, substantially as specified.

2. In a machine for tentering fabric, the combination, with angularly-adjustable selvage-carriers, of angularly-adjustable rolls operating upon the edge portions of the fabric to straighten and stretch the fabric while passing to the selvage-carriers, and mechanism, substantially such as described, whereby said selvage-carriers and rolls may be adjusted, substantially as specified.

3. In a machine for tentering fabric, the combination, with selvage-carriers, of circumferentially-grooved angularly-arranged rolls operating upon the edge portions of the fabric to straighten and stretch the fabric while passing to the selvage-carriers, substantially as specified.

4. In a machine for tentering fabric, the combination, with selvage-carriers, of angularly-adjustable rolls operating upon the edge portions of the fabric after the latter has left the selvage-carriers to maintain the fabric in a straightened or stretched condition, and mechanism, substantially such as described, whereby said rolls may be adjusted, substantially as specified.

5. In a machine for tentering fabric, the combination, with selvage-carriers, of angularly-adjustable rolls operating on the edge portions of the fabric after the latter has left the selvage-carriers, a bearing-roll about which the fabric passes from said first-named rolls, and mechanism, substantially such as described, whereby said first-named rolls may be adjusted, substantially as specified.

6. In a machine for tentering fabric, the combination, with selvage-carriers, of angularly-adjustable rolls operating on the edge portions of the fabric after the latter has left the selvage-carriers, a bearing-roll bodily adjustable toward and from the selvage-carriers and about which the fabric passes after leaving the rolls first named, and mechanism, substantially such as described, whereby said first-named rolls may be adjusted, substantially as specified.

7. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of carriages upon which said selvage-carriers are mounted and by which they may be moved toward and from each other, mechanism, substantially such as described, for imparting movement to said carriages, speed-changing devices, including belt-shifters, for varying the speed of rotation of said selvage-carriers, all carried by said carriages, and mechanism, substantially such as described, for imparting rotary motion to said selvage-carriers, substantially as specified.

8. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of carriages upon which said selvage-carriers are mounted and by which they may be moved toward and from each other, mechanism, substantially such as described, for imparting movement to said carriages, mechanism, substantially such as described, for imparting rotary motion to said selvage-carriers carried by said carriages, and speed-changing devices for varying the speed of such rotation, also carried by said carriages, substantially as specified.

9. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of carriages upon which said selvage-carriers are mounted and by which they may be moved toward and from each other, mechanism, substantially such as described, for imparting movement to said carriages, speed-changing devices for varying the speed of rotation of said selvage-carriers and comprising belts or chains extending into close proximity to the points of feed of the fabric onto the selvage-carriers, said speed-changing devices being carried by the said carriages, and mechanism, substantially such as described, for imparting rotary motion to said selvage-carriers, substantially as specified.

10. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of carriages upon which said selvage-carriers are mounted and by which they may be moved toward and from each other, mechanism, substantially such as described, for imparting movement to said carriages, mechanism, substantially such as described, carried by said carriages for imparting rotary motion to said selvage-carriers, speed-changing devices for varying the speed of such rotation, and stretching and straightening rolls for the fabric, said speed-changing devices and rolls being also carried by the carriages, substantially as specified.

11. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of carriages upon which said selvage-carriers are mounted and by which they may be moved toward and from each other, mechanism, substantially such as described, for imparting movement to said carriages, a driving-shaft,

speed-changing devices for varying the speed of rotation of the selvage-carriers, including cone-pulleys, certain of which have a sliding connection with said driving-shaft, a positive connection between the pulleys on the driving-shaft and said carriages, by which, when said carriages are moved, movement will be imparted to said pulleys along the shaft, and mechanism, substantially such as described, for imparting rotary motion to the selvage-carriers, substantially as specified.

12. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of a drying-cylinder, onto which fabric from the selvage-carriers is delivered, other drying-cylinders subsequently receiving the fabric and of greater diameter than the drying-cylinder first named, driving-gear for the cylinder first named, and a slipping clutch-connection between said driving-gear and the cylinder, substantially as specified.

13. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of separating-rolls for the fabric, each provided with reversely-extending spiral grooves, and intermediately-arranged rolls operating upon the edge portion of the fabric for straightening and stretching the same, substantially as specified.

14. In a machine for tentering fabric, the combination, with rotary selvage-carriers, of separating-rolls for the fabric, each provided with reversely-extending spiral grooves, one of said separating-rolls being vertically adjustable relatively to the other, mechanism, substantially such as described, whereby said roll may be adjusted, and intermediately-arranged rolls operating upon the edge portion of the fabric for straightening and stretching the same, substantially as specified.

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Witnesses:
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