(No Model.) 3 Sheets—Sheet 1.

# W. BIRCH.

## APPARATUS FOR STRETCHING WOVEN FABRICS.

No. 349,139. Patented Sept. 14, 1886.

FIG: 1.

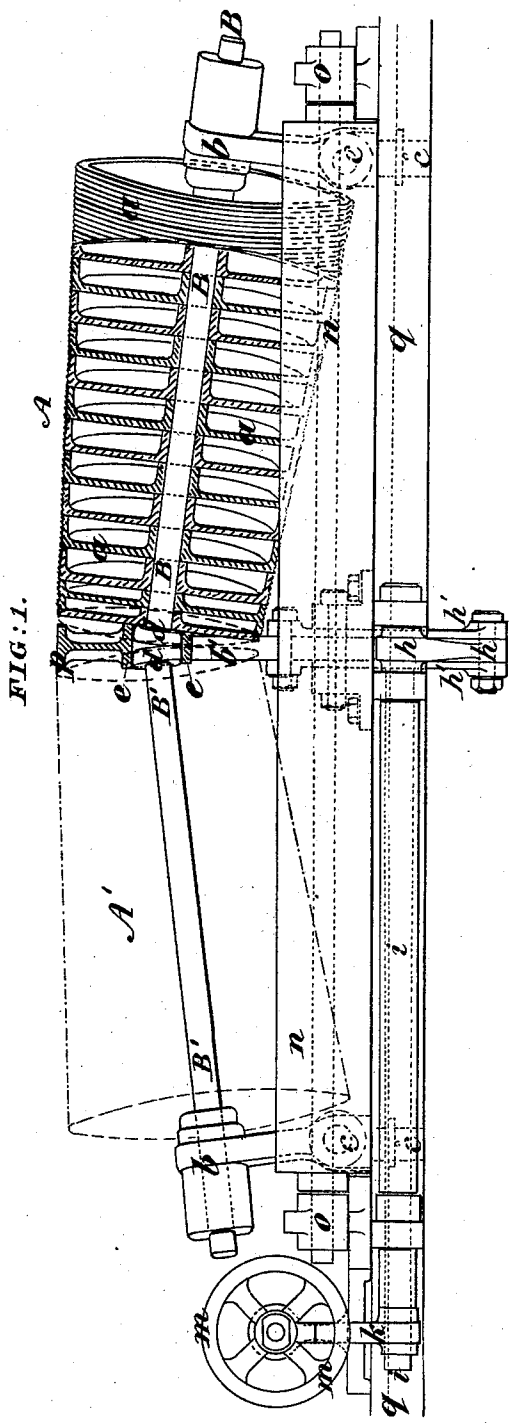
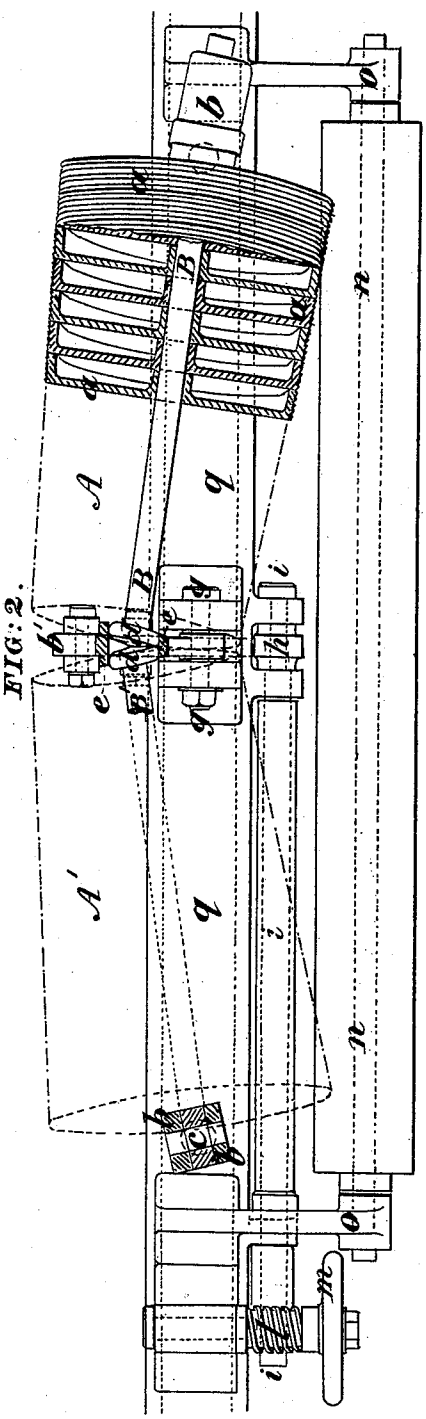


FIG: 2.



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## APPARATUS FOR STRETCHING WOVEN FABRICS.

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FIG: 3.

FIG: 5.

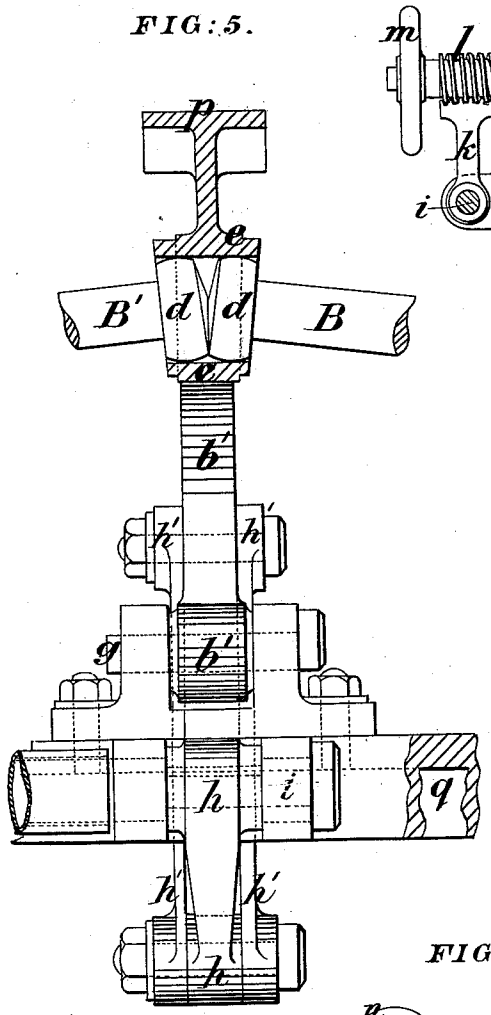






FIG: 6.

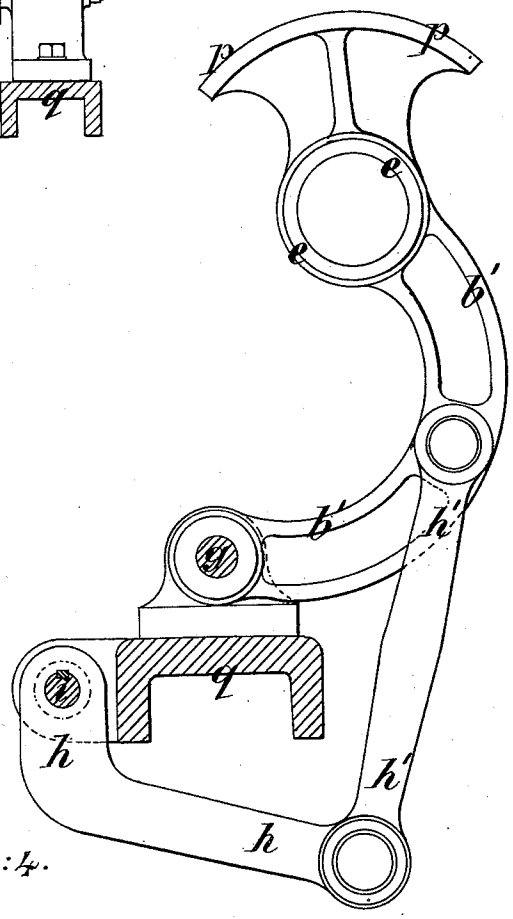
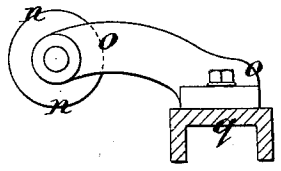



FIG: 4.




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(No Model.) 3 Sheets—Sheet 3.

# W. BIRCH.

## APPARATUS FOR STRETCHING WOVEN FABRICS.

No. 349,139. Patented Sept. 14, 1886.

*FIG: 7.*

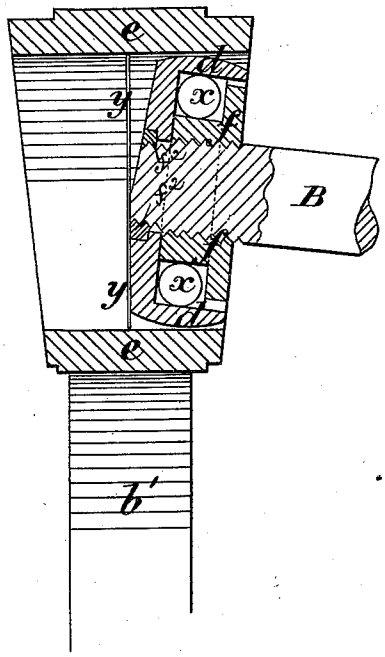
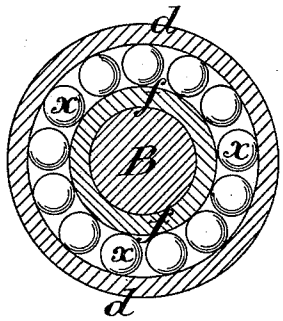



*FIG: 8.*




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# UNITED STATES PATENT OFFICE.

WILLIAM BIRCH, OF BROUGHTON, NEAR MANCHESTER, COUNTY OF LANCASTER, ENGLAND.

## APPARATUS FOR STRETCHING WOVEN FABRICS.

SPECIFICATION forming part of Letters Patent No. 349,139, dated September 14, 1886.

Application filed December 30, 1885. Serial No. 187,191. (No model.) Patented in England March 16, 1885, No. 3,360, and in France December 15, 1885, No. 172,938.

*To all whom it may concern:*

Be it known that I, WILLIAM BIRCH, a subject of the Queen of Great Britain and Ireland, and residing at Broughton, near Manchester, Lancaster county, England, have invented an Improved Apparatus for Stretching Woven Fabrics, (for which I have obtained a British patent, No. 3,360, dated March 16, 1885,) of which the following is a specification.

The main object of my invention is to so construct rollers for expanding or stretching woven fabrics to a greater width from selvage to selvage that there will be no uneven drag or pull; and this object I attain by combining with transverse axles a number of rings or disks, loose on the axle, to form stretching-cones, so that each section of the conical rollers thus formed can revolve separately and independently and travel at the same surface-speed as the cloth, as more fully described hereinafter.

In the accompanying drawings, Figure 1 is an elevation of my improved stretching apparatus, and Fig. 2 is a plan view of the same, certain portions of both figures being shown in section and other parts broken away for the more clear illustration of the invention; and Figs. 3, 4, 5, 6, and 7 are views drawn to enlarged scales of different parts of the apparatus, as more particularly referred to hereinafter.

In the devices heretofore constructed for stretching fabrics conical rollers have been used; but in such case, so far as I am aware, each conical roller has been solid, or, if made in sections, has been constructed to have all the sections revolve together at the same surface-speed. As the surface-speed of the outer or larger portion of the cones in such case is necessarily greater than that of the smaller portions, the tendency is to move along the selvages more rapidly than the center portion, and so produce an uneven drag upon the cloth.

I construct the conical stretching-rollers A A of a number of independent conical disks or sections, *a a*, each loosely mounted upon a central shaft or axis, B B′, so that each section of the conical rollers thus formed can rotate independently. The two shafts B B′ are mounted to turn in bearings in brackets *b* at their outer ends, while at their inner ends they are supported in a central bracket, *b′*. The outer brackets, *b*, are mounted on horizontal pivots on vertical pins *c*, free to turn on a bar, *q*, so that a universal joint is thus obtained at that point. The inner or adjustable ends of the shafts B B′ are provided with spherical heads *d*, fitting in a ring, *e*, carried by the central curved bracket, *b′*, so that the two shafts B B′ can be set or inclined at any desired angle to each other. It will be seen, therefore, that as the cloth passes over the rollers each section *a* of the cones can revolve at a different speed, so that the surface-speed of the whole length of both cones can correspond with the passage of the cloth, and as these sections revolve upon axes placed at angles more or less removed from right angles to the passage of the cloth, but inclining outward, it follows that the point of delivery of each section will be farther removed from the center line of the cloth than the point where it received the latter. As the conical sections *a* revolve, therefore, with the pull of the cloth, they will have the effect of expanding or stretching the latter equally, or nearly so, over the whole surface from the center to the selvages.

The amount of stretch given to the cloth can be varied by altering the angles of convergence of the two axes B B′, and this I prefer to accomplish by adjustment of the central bracket, *b′*. This curved bracket is mounted on a horizontal pivot, *g*, carried by the cross-bar *q*, and the bracket is connected by a link, *h′*, to a bent lever, *h*, which is keyed to a horizontal shaft, *i*. This shaft is mounted in suitable bearings in the bar *q*, and carries at its outer end an arm, *k*, Fig. 3, on which is formed a curved rack engaging with a worm, *l*. This worm forms part of a short shaft provided with a hand-wheel, *m*, so that by turning the latter the shaft *i* can throw the curved arm *h* upward or downward, to correspondingly raise or lower the bracket *b′* on its pivot *g* and give the required inclination to the axes of the sectional conical rollers.

The construction of the spherical heads *d* of the shafts B B′ is shown on enlarged scale in

Figs. 7 and 8. On the end of each shaft is screwed a flanged nut, *f*, and over this nut is fitted a loose cap or collar, *d*, leaving a cavity between them for the reception of a number of anti-friction balls, *x*. The cap is held in place by a screw-nut, $f^2$.

If preferred, a leather or other washer, *y*, Fig. 7, may be placed between the caps *d* of the two shafts B B′. I prefer to mount the shafts B B′ in their bearings so that they are free to turn more or less with the sections or disks *a*.

To prevent the cloth from bagging when it is supported between the inner ends of the two conical rollers, I fix at the top of the ring *e* on the bracket a curved bearing-piece, *p*, Figs. 1, 5, and 6. A guide-roller, *n*, for the cloth is supported in two brackets, *o*, Figs. 1, 2, and 4, on the bar or rail *q*, which supports the entire apparatus, and which is adapted to be bolted or otherwise secured to the frame of the machine to which the apparatus is to be applied.

The peripheries of the sections *a* of the rollers may be grooved circumferentially, as shown at the right-hand side of Figs. 1 and 2, or they may be corrugated or roughened or provided with pins, to give them a firm hold of the cloth.

I claim as my invention—

1. The herein-described apparatus for stretching cloth, consisting of inclined axes carrying conical rollers in sections, free to turn independently on the said axes, substantially as set forth.

2. The herein-described cloth-stretching apparatus, comprising inclined axes carrying rollers in independent sections, free to turn on the axes, jointed bearings for the outer ends of the axes, a movable bracket at the inner ends of the latter, and devices, substantially as set forth, for adjusting the bracket, to give different inclinations to the axes, all substantially as set forth.

3. The combination of the inclined axes carrying sectional stretching-rollers, and bearings for the outer ends of the axes, with a centrally-pivoted bracket supporting the inner ends of the axes, a shaft, *i*, carrying an arm, *h*, a link connecting the arm to the bracket, and devices, substantially as set forth, for turning said shaft, all substantially as specified.

4. The combination, substantially as described, of the inclined axes carrying sectional stretching-rollers having heads *d* with intermediate anti-friction rollers, an adjustable bracket for the said heads, and devices, substantially as set forth, for adjusting the bracket.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM BIRCH.

Witnesses:
GEORGE DAVIES,
CHARLES H. DAVIES.