May 21, 1946. R. J. TAYLOR 2,400,787

STRETCHING DEVICE

Filed July 20, 1943

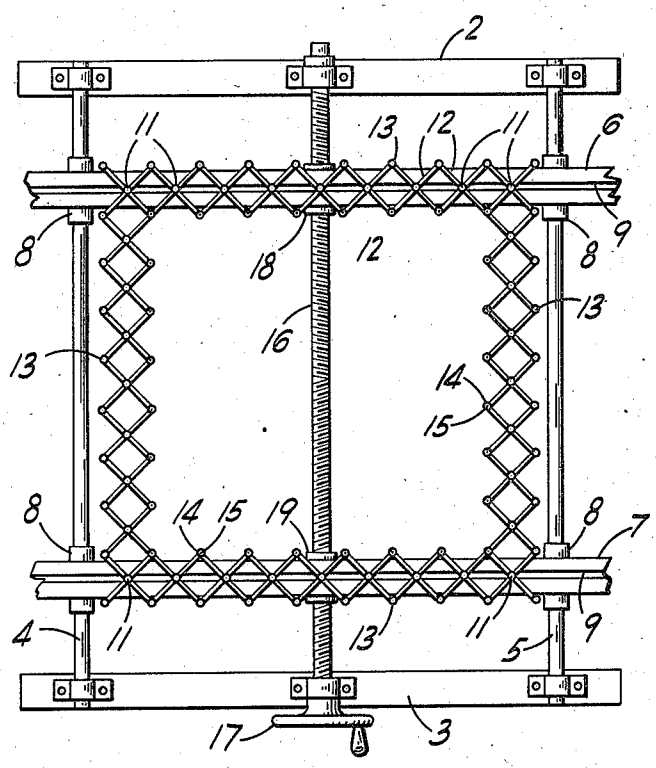


Fig-1-

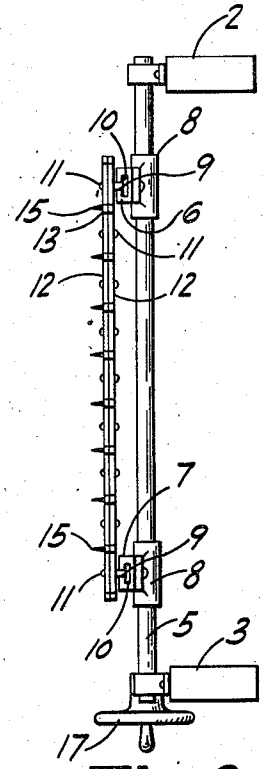


Fig-2-

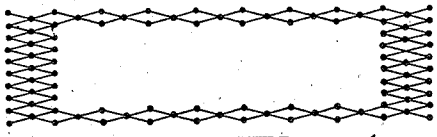


Fig-4-

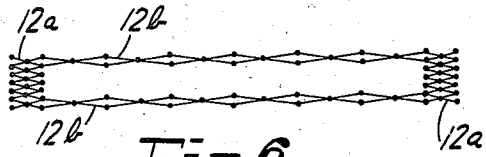


Fig-6-

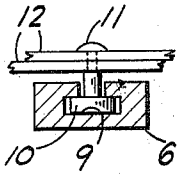


Fig-3-

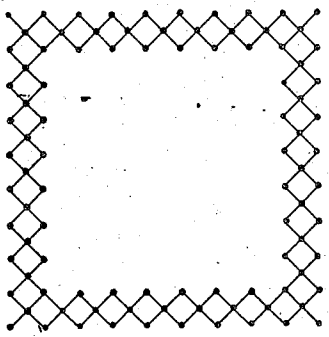


Fig-5-

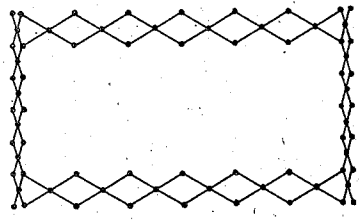


Fig-7-

INVENTOR.
ROBERT J. TAYLOR

BY Carl A. Castellan

ATTORNEY.

Patented May 21, 1946 2,400,787

UNITED STATES PATENT OFFICE

2,400,787

STRETCHING DEVICE

Robert J. Taylor, Claymont, Del., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application July 20, 1943, Serial No. 495,445

5 Claims. (Cl. 45—24)

This invention relates to improvements in stretching devices and is particularly concerned with devices which are suitable for expanding the bands of filamentary material which are produced in accordance with my copending United States Patent applications Serial No. 479,889, filed March 20, 1943; Serial No. 489,071, filed May 29, 1943; and Serial No. 490,009, filed June 8, 1943.

It is an object of this invention to provide an apparatus for stretching or expanding articles having at least two dimensions of substantial magnitude. It is a further object of this invention to provide a device in which expansion along at least one dimension is automatically accompanied by a reduction in size along at least one other dimension. It is a further object to provide such a device in which any predetermined ratio between the expansion along one dimension and the reduction along another dimension may be obtained. Further objects and advantages will be apparent from the drawing and the description thereof hereinafter.

In the drawing, illustrative of the invention,

Figure 1 is a plan view of one embodiment of the invention,

Figure 2 is an end view thereof,

Figure 3 is an enlarged view of a detail,

Figures 4 and 5 are diagrammatic views illustrating the simultaneous expansion and contraction of different dimensions by operation of the device of Figures 1 to 3,

Figures 6 and 7 are similar diagrammatic views showing the action of modification.

In Figures 1 to 3 the device is shown and comprises suitable supporting beams 2 and 3 carrying transverse rods 4 and 5 which in turn carry the parallel bars 6 and 7 slidable with respect thereto on suitable bearing sleeves 8. The bars 6 and 7 have undercut guideways 9 adapted to receive the guide-blocks 10 carried by the central pivot pins 11 of two opposite side components of a four-sided lazytongs frame. The cross-arms 12 of the lazytongs are simply linked for pivotal action, such as by pins or rivets, at their outer points of juncture 13 whereas the pivots at their inner points of juncture 14 are provided with the material fastening pins 15. Instead of pins, hooks or clamps may be supplied. It should be noted that each side component of the lazytongs frame is joined to each of the side components adjacent it at two points so that contraction and expansion of one side is positively transmitted as expansion or contraction respectively of the adjoining sides. A screw 16 having a right-hand thread along half its length and a left-hand thread along the other half is supported on the beams 2 and 3, is operable by the handwheel 17 and serves to move the bars 6 and 7 together or apart through the collars 18 and 19 provided with an appropriate internal thread for engaging the screw 16.

Figures 4 and 5 show an illustrative dimensional change that may be obtained. For example, the lazytongs at the two ends may be collapsed as in Figure 4 at the initial stage of operation. After securing the fibrous material, fabric or any stretchable sheet material such as a sheet of rubber or synthetic rubber, which it is desired to submit to dimensional change, to the pins, hooks or clamps at 15, the end lazytongs may be expanded, such as to the position in Figure 5. Such expansion effects a corresponding stretching of the material secured thereto and automatically reduces the other side dimensions.

The ratio of expansion along one dimension to contraction along the other depends upon the extent of expansion of the lazytongs along the ends and also upon the initial dimensional relationship of the frame. A wider range of ratios is obtainable when the cross-arms 12*a* (Figures 6 and 7) along the ends of the lazytongs frame are shorter than the cross-arms 12*b*. For example, assuming the material to be stretched is secured to the frame as shown in Figure 6, expansion of the frame to the position of Figure 7 causes an expansion of the width of the materials on the order of about eight to ten times and a contraction in the length of only about one-tenth, thus giving a ratio of about eighty to one hundred. Again, the ratio depends on the extent of expansion of the frame and the initial dimensional relationship of the frame.

The device constitutes a simple and effective means for expanding the wound bands of my copending applications mentioned above since the expansion of such bands in width (that is, transversely of the direction in which the filaments extend) is inherently accompanied by a reduction in length. The expansion device may readily be designed for any particular band of this character, to effect a predetermined expansion in width and to accompany such expansion with the exact reduction in length which the band inherently undergoes when thus expanded.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In a device for expanding a material, a framework the sides of which comprise lazytongs lever systems, means on the systems for securing the material thereto, the system of one side being connected to the system of each adjacent side by at least two separate pivotal connections whereby change in length of one side effects a change in length of the adjacent sides.

2. In a device for expanding a material, a framework the sides of which comprise lazytongs levers having two sets of cross-arms, the juncture between adjacent sides of the framework comprising two pivotal connections between different sets of cross-arms in the levers of the adjacent sides, and means on the levers for securing the material thereto.

3. In a device for expanding a material, a support, a framework carried by the support having sides of lazytongs levers, means for varying the distance between two opposite sides, adjacent sides being interconnected by at least two separate pivotal connections so that variation in length of one side effects on inverse variation in length of the adjacent sides, and means for securing the material at its edges to the levers.

4. In a device for expanding a material, a support, two parallel guideways carried by the support, means on the support for varying the distance between the guideways, a four-sided lazytongs framework, each lazytongs comprising two sets of pivotally joined cross-arms, slide means associated with the cross-arms of two opposite sides extending into cooperative engagement with the guideways, the juncture between adjacent sides of the framework comprising two pivotal connections between different sets of cross-arms in the lazytongs of the adjacent sides, and means on the lazytongs for securing the material thereto at its edges.

5. In a device for varying the dimensions of a material, a framework having four expansible and contractible side components, means carried by each side component uniformly spaced therealong for securing the material to the side components of the framework, two generally parallel rigid members having longitudinal guideways, guiding means on two opposite side components engaging the guideways, means for varying the distance between said rigid members to cause variation in the distance between said two opposite side components, each side component having at each end thereof two pivotally connected members common to the adjoining side component, the construction being such that when the distance between said two opposite side components is varied, the distance between the remaining two side components is simultaneously varied.

ROBERT J. TAYLOR.