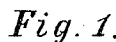
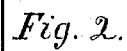


No. 147,550.

Patented Feb. 17, 1874.



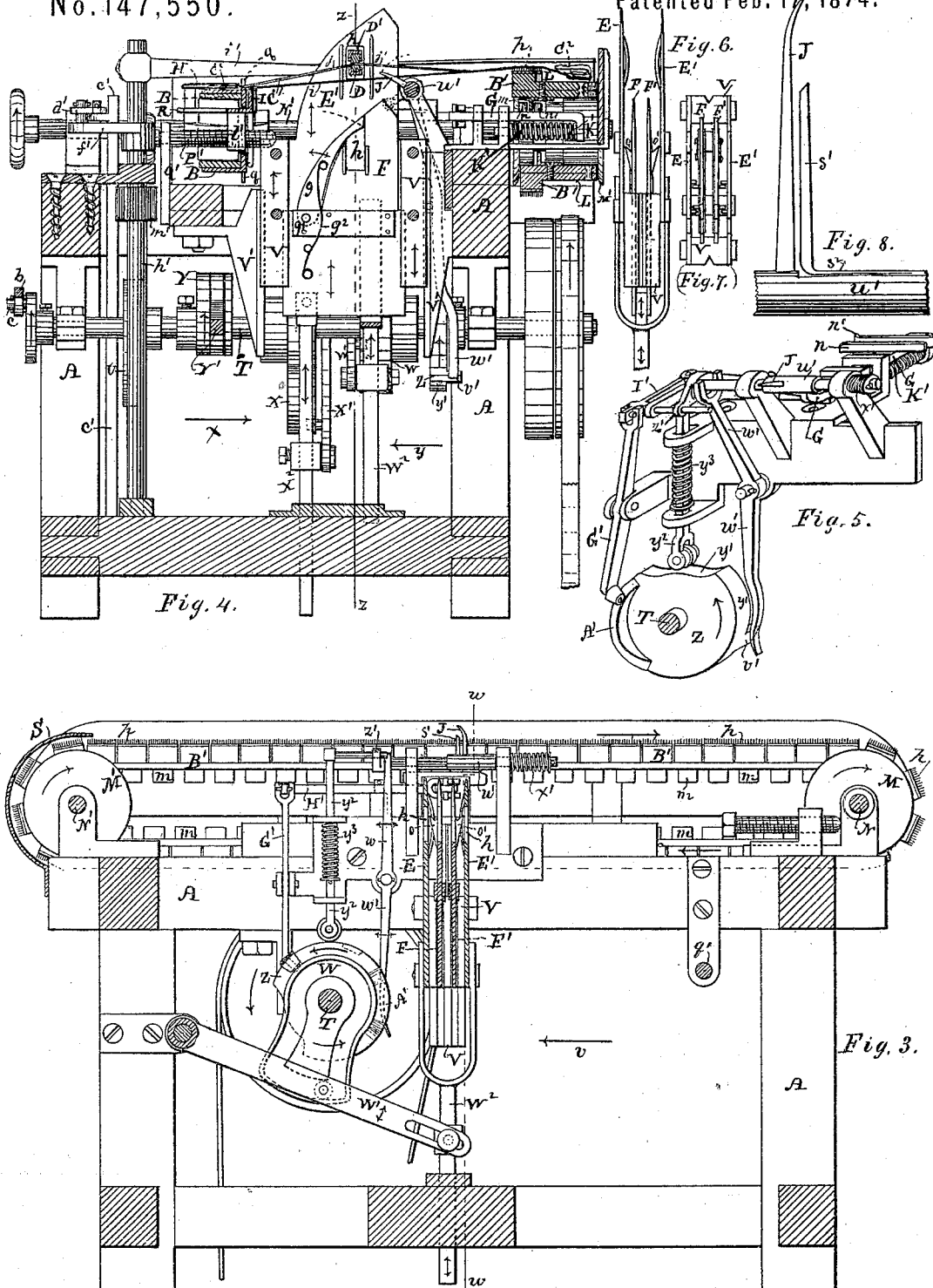
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Fringe-Twisting Machines.

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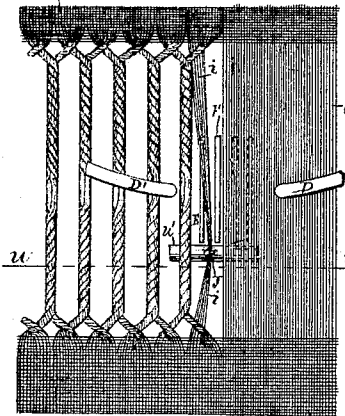


Fig. 9.

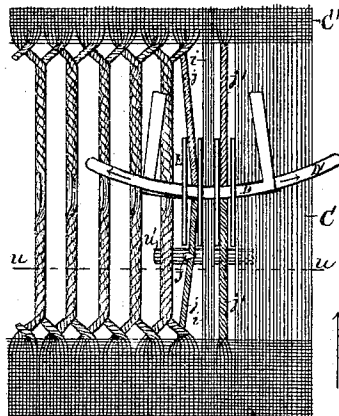


Fig. 10.

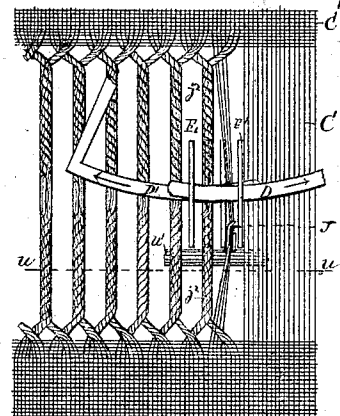


Fig. 11.

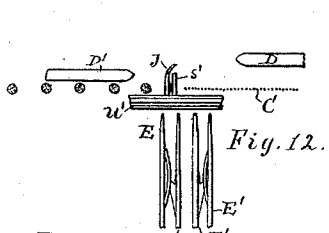


Fig. 12.

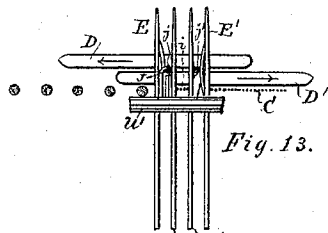


Fig. 13.

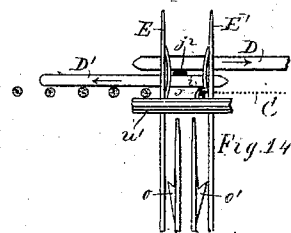


Fig. 14.

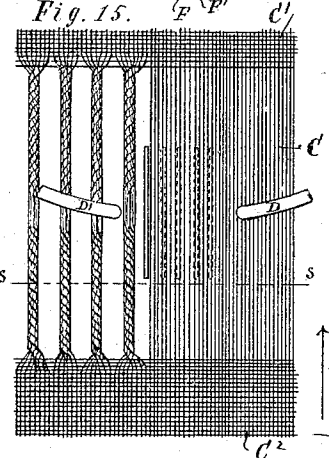


Fig. 15.

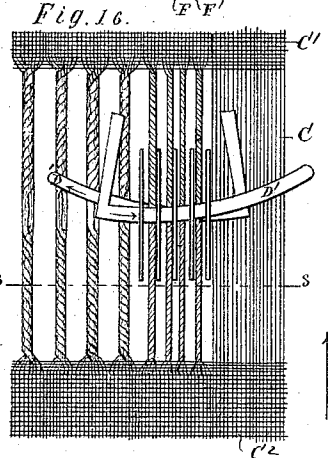


Fig. 16.

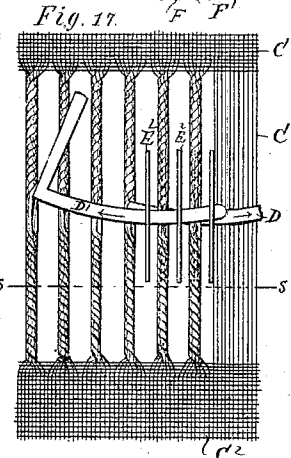


Fig. 17.

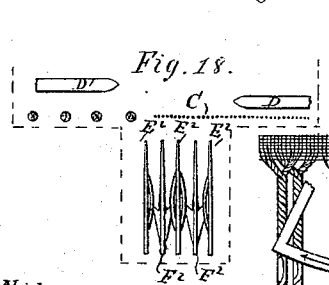


Fig. 18.

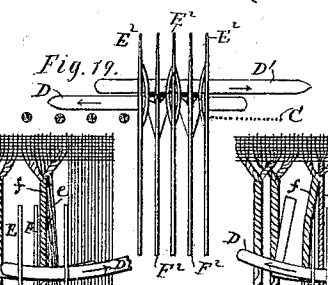


Fig. 19.

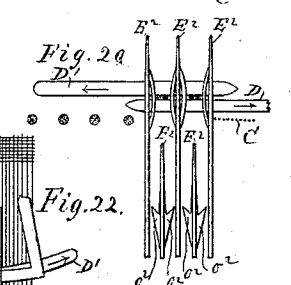


Fig. 20.

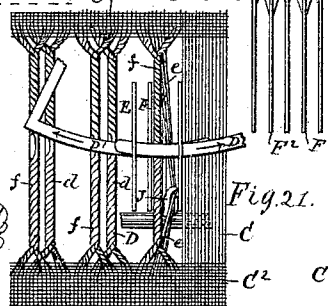


Fig. 21.

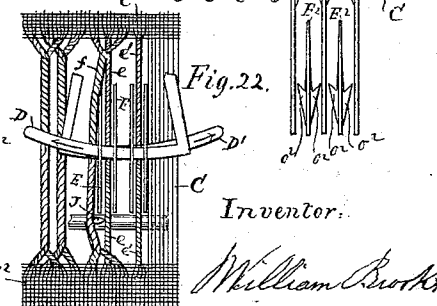


Fig. 22.

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UNITED STATES PATENT OFFICE.

WILLIAM BROOKS, OF BENNINGTON, VERMONT, ASSIGNOR OF ONE-HALF
HIS RIGHT TO THOMAS BROOKS, OF WATERFORD, NEW YORK.

IMPROVEMENT IN FRINGE-TWISTING MACHINES.

Specification forming part of Letters Patent No. **147,550**, dated February 17, 1874; application filed
May 29, 1873.

To all whom it may concern:

Be it known that I, WILLIAM BROOKS, of Bennington, in the county of Bennington and State of Vermont, have invented certain Improvements in Machines for Twisting Fringe on Shawls and other fabrics, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to machinery for twisting the fringes of shawls or other fabrics which are woven with the yarns of the warp or the woof, or the warp and woof extended from the edges of the fabric and united at their outer ends to other similar shawls or fabrics, or to woven waste fillets or selvage-strips.

In the machines in common use for twisting the fringes of shawls or fabrics thus woven, the border portion of the shawl or fabric is stretched and secured by teeth upon a rigid sliding frame, which is slid horizontally, step by step, past a combination of blades which slide up and down through the yarns for the fringe, and divide the yarns into proper quantities for strands, and separators which raise the middle portions of such strands above the other yarns, and twisting-fingers which vibrate in opposite directions, one over the other, and one above and the other below the raised strands, so as to first twist the strands separately, and then together. The action of such machines must be stopped at the end of each passage of said stretching and feeding frame, and the fringe-twisted portion of the shawl or fabric removed therefrom, and the frame slid back, and the border of another shawl or fabric, or a section thereof, stretched and secured on the frame before the fringe-twisting action of the machine can be renewed.

To overcome that defect is the principal object of one part of my invention, which consists in the combination, with the ordinary or other suitable dividing-blades, strand-lifters, and twisting-fingers, of turning endless feeding-belts, chains, or bands, one having comb-like teeth, to enter and engage with the fringe against the selvage, and the other furnished with card-like teeth to engage with the woven body of the shawl or fabric, so that, while the machine is in operation, a person can progressively stretch and secure the fringe-border, of

one edge only, of a series of the connected or separate shawls or fabrics upon the said endless chains, belts, or bands, and so that the fringes, along one edge only, of the series of shawls or fabrics will be then fed by the said chains, belts, or bands to and past, and acted upon by, the said dividing-blades, strand-lifters, and twisting-fingers progressively and continuously.

In using the ordinary machines, in which the fringe is stretched and fed to and past the twisting devices upon and by a rigid sliding frame, a person is often or generally required to loosen the tension of a part of the fringe by hand at one side of the feeding-frame, where and while each twisting operation is being performed, in order to prevent too great strain or tension on the strands while successively undergoing the twisting process. To avoid all necessity for having a person thus loosen up the successive twisting parts of the fringe by hand, is the principal object of another part of my invention, which consists in the combination, with the usual, or other suitable dividing-blades, strand-lifters, and twisting-fingers, of endless feeding-belts, chains, or bands, one being flexible or movable toward and from the other, and a device or devices by which the flexible or movable one of the said feeding-chains, bands, or belts is caused to approach toward, and recede from, the other at each twisting operation of the machine, and thereby automatically relieve the strands of the fringe from too great strain while successively undergoing the twisting process, and yet stretch the untwisted portion of the fringe sufficiently to cause it to be properly divided into strands by the blades at the successive insertions thereof through the yarns of the fringe next to the twisted strands. In the shawl-fringe twisters in common use, the dividing-blades, strand-lifters, twisting-fingers, and feeding-frame, are so constructed and combined that only the two next adjacent or consecutive strands of the fringe are twisted together in pairs after being first twisted separately; and another part of my invention consists in the combination of turning endless feeding-belts, chains, or bands, or a sliding feeding-frame, or other suitable feeding device,

and dividing-blades, strand-lifters, twisting-fingers, and a strand-guiding finger or fingers, essentially such as hereinafter described, or any equivalent therefor, whereby pairs of the fringe-strands which are not next to each other are first twisted separately and next twisted together, so as to be separated at their ends, and there crossed by one or more of the separately-twisted strands of another pair or pairs that are twisted together, substantially as hereinafter set forth.

Another part of my invention consists in the combination, with the endless feeding-belts, band, or chains, and the dividing-blades, strand-lifters, and twisting-fingers, or their equivalents, of a device, essentially such as hereinafter described, or its equivalent, for facilitating the automatic progressive discharge of the shawls or fabrics from the said toothed feeding-belts, chains, or bands, after and as fast as the fringe shall be twisted by the machine.

Another part consists in the combination of the dividing-blades, strand-lifters, and twisting-fingers, or their equivalents, and endless feeding-belts, chains, or bands, having a jointed or flexible platform which travels and turns with the said feeding-belts, bands, or chains, and which will support and progressively carry forward the bodies of a series of shawls or fabrics, as the twisting of the fringe thereon proceeds.

Another part consists in the combination, with the dividing-blades, strand-lifters, twisting-fingers, and endless feeding-belts, chains, or bands, of a device or devices, essentially such as hereinafter described, or any equivalent therefor, by which one or the other or both of the said feeding-belts, chains, or bands can be adjusted laterally to different distances from the said dividing-blades and twisting-fingers, so as to thereby render the mechanism suitable for twisting fringes of different widths.

In the aforesaid drawings, Figure 1 is a plan of a machine which embodies the distinguishing features of my invention. Fig. 2 is an elevation of a section of the same machine at or about the line *z z*, and viewed in the direction of the arrow *y* in Figs. 1 and 4. Fig. 3 is an elevation of a section of the same at or about the line *z z*, and viewed in the direction of the arrow *x* in Figs. 1 and 4. Fig. 4 is an elevation of a section at or about the line *w w*, and viewed in the direction of the arrow *v* in Figs. 1, 2, and 3. Fig. 5 is a detached view of parts which operate the strand-guiding finger, and the device which moves one belt of the fringe-feeder toward and from the other at each twisting operation, in the same machine. Fig. 6 is an edge elevation, and Fig. 7 a plan, of the dividing-blades and strand-lifters, and Fig. 8 an enlarged view of the strand-guiding fingers in the machine shown in Figs. 1, 2, 3, and 4. Figs. 9, 10, and 11 are top views of parts of a shawl-border, and of some parts of the machine, at different stages of the fringe-twisting operation, when each

pair of the fringe-strands that are twisted together are separated and crossed at their ends by two other strands; and Figs. 12, 13, and 14 are elevations of sections of the parts shown in Figs. 9, 10, and 11, respectively, at or about the lines *u u*, and viewed in the directions of the arrows *t*. Figs. 15, 16, and 17 are plans of a portion of a shawl-border and some parts of the machine, illustrating different steps in the operation of the machine, when the two next adjacent strands of the fringe are twisted together in pairs, without any intervening strand or strands; and Figs. 18, 19, and 20 are elevations of sections at or about the lines *s s* of the parts shown in Figs. 15, 16, and 17, respectively, viewed in the direction of the arrows *r*. Figs. 21 and 22 are plans of a part of a shawl-border and some portions of the machine at different periods in the twisting operation, when each pair of the fringe-strands that are twisted together are separated at their ends by one other fringe-strand only.

A is the stationary frame of the machine. B B' are two endless fringe-feeding belts, chains, or bands, which are turned together simultaneously and equally step by step. The belt B has pins or teeth *q*, to engage with the fringe-yarns C, Fig. 9, at the edge next to the selvage or waste fillet C', and the other band, B', has card-teeth *p*, to engage with the woven body C' of the shawl or other fabric. D D' are fringe-twisting fingers, arranged and operating essentially as in shawl-fringe twisters in common use. E E' and F F' are blades which slide up and down and divide the yarns of the fringe into strands as the blades slide upward. On the blades F F', Figs. 6 and 14, are projections *o o'*, which, as the blades ascend, lift the middle parts of the outer divided strands above the other portions of the fringe and thereby present such strands to the action of the twisting-fingers. In order to lessen the tension on the strands while undergoing the twisting operation, and to straighten the yarns while being divided into strands, one feed-band, B', is flexible sidewise, and the middle portion thereof is moved laterally toward and from the dividing-blades and twisting-fingers, at each twisting operation, by means of an intermittingly-reciprocating bar or slide, G, having ways *n n'*, Figs. 4 and 5, between which pass a series of inward projections, *m*, Figs. 3 and 4, fast on the feed-band B'. Stationary guards H and I, Figs. 1, 2, and 4, keep the flexible feed-band B in proper position. J is a finger which guides the intervening strand or strands of fringe when the two strands that are twisted together by the machine are separated at their ends by another strand or strands. K, Figs. 1 and 2, is a vibrating doffer, which discharges the twisted fringe from the teeth *q* of the belt B as fast as the fringe is fed forward. L, Figs. 1 and 4, is a flexible platform, which is secured to and moves with the belt B', and supports and carries forward the main body of the series of shawls or fabrics as the twisting of the fringe

thereof progresses. The feed-belt B' extends around, and is turned by drums or pulleys M M' on the rotary shafts N N'. The feed-belt B extends around and is turned by pulleys O O', which are turned by the shafts N N', and can be slid endwise thereon, so as to adjust the belt B to different distances from the belt B', twisting-fingers D D', and dividing and lifting blades E E' F F', by means of screws P P', which turn in fixed bearings Q Q', and engage with nuts l l', Fig. 2, that are fast on a bar, R, which is fastened to the guards H and I, and to yokes k k', which embrace the pulleys O O'. The arrows in the figures indicate directions in which contiguous parts move when the machine is running. When the machine is in operation, a person secures the border portion of the series of shawls or fabrics progressively upon the feeding-belts B and B', just forward of the guard S. When the machine is twisting together pairs of strands that are separated at their ends by two other strands, as represented in Figs. 9, 10, and 11, the belts B B' feed the fringe forward step by step a distance equal to the width of two single strands, just after each twisting operation, and while all the strand-dividing and lifting-blades E E' F F' are entirely below the plane of the fringe, as in Figs. 3 and 12, and so as to bring the fringe-yarns C over the blades, as indicated in Fig. 9. Then the blades E E' and F F' slide up together through the fringe, as indicated in Figs. 2 and 13, and thereby separate the yarns into three strands, of which the two outer ones, *j j'*, Fig. 10, are raised, by the parts *o o'*, above the middle one *i*, as in Figs. 4 and 13. Then the fingers D D' enter the apertures *h*, through the blades E E' F F', and in moving inward twist the elevated strands *j j'* separately, as indicated in Fig. 10, and the slide G moves the middle part of the feed band or belt B' toward the belt B so as to lessen the tension on the raised strands while being twisted. Then the blades F F', each of which has a part, *g*, Fig. 4, pivoted at *g'*, and furnished with a spring, *g''*, are dropped below the fringe, while the blades E E' remain elevated, as in Figs. 4 and 14; and then the finger J is turned below the strands *j j'*, as in Fig. 4, and the further inward movement of the fingers D D' brings the strands *j j'* together, and the finger J presses the strand *i* back of the united strands *j'*, as in Fig. 11, and is then turned up, as in Figs. 3, 12, and 13; and, as the fingers D D' turn outward, those two strands are twisted together, and as the fingers leave each other the united strands *j'* drop forward of the finger J and strand *i*, and the slide G moves the belt B' back farther from the other belt, B, to straighten the yarns of the fringe. Then the fingers D D' are withdrawn from the blades E E', and the latter are dropped or lowered below the fringe, and then the fringe is fed forward a step equal to the width of two single fringe-strands, and the finger J moves forward and holds the strand *i* over the space between the blades E and F, as indicated in Figs. 9 and

12. Then all the blades are raised together, and the strand *i* is lifted and becomes the strand *j*, in Fig. 10, and is guarded by the finger J, until it is twisted, and the operations are all repeated continuously while the machine runs and is supplied with the fringe to be twisted. The machine will twist shawl-fringe when each pair of the strands that are twisted together are separated at their ends by only one strand, as in Figs. 21 and 22, by causing the feeders B B' to move the fringe forward the width of three strands at one step and the width of only one strand at the next step, repeatedly; and in that case the twisting-fingers D D', blades E E' F F', finger J, and slide G, are all operated substantially as above specified, while twisting together two strands that are separated at their ends by two other strands. Just after each long feed step, the blades rise and do not lift the middle strand, but do elevate the outer strands, which are then twisted separately, and together, by the fingers D D' so as to form the double strand *f*, Fig. 21; and just after the descent of the blades F F', and before the twisting together of the outer strands is completed, the finger J moves and holds the middle strand *e*, Fig. 21, back of the united strands *f*, and when the twisting of the double strand *f* is completed, and the blades E E' are lowered, the fringe is fed forward a short step, equal to the width of one strand, and the finger J is moved forward so as to bring the double strand *f* forward of the blade E, and the strand *e* between the blades E and F, as shown in Fig. 22, and when the blades are then elevated, the strand *e* and the outer one, *e'*, between the blades F' E', will be raised, leaving a vacant space between them, as in Fig. 22, and will be twisted together, and will form the second double strand *d* of a pair, *f d*.

The machine shown by Figs. 1, 2, 3, and 4 can be changed so as to twist together only such strands as are next to each other, as shown in Figs. 15, 16, and 17, by detaching the finger J and changing the dividing-blades and strand-lifters for the kind that are in use in the common shawl-fringe twisters, or such as are represented in Figs. 18, 19, and 20, wherein the strand-dividing blades E² and F², with the strand-lifters *o*² thereon, are arranged for twisting together two pairs of strands at each twisting operation. Figs. 15 and 18 show the positions of the parts just before the dividers are elevated. Figs. 16 and 19 represent the positions of the parts after the dividers have been elevated and while the strands are being twisted separately. Figs. 17 and 20 show the positions of the parts after the descent of the blades F², and while the separately-twisted strands are being twisted together in two pairs. In this case the feeders B B' must move the fringe forward the width of four single strands for each twisting operation.

In carrying out my invention, I construct the aforesaid parts thereof in any suitable form and manner, and give all necessary automatic movements thereto by any suitable mechanical means.

The machine represented by Figs. 1, 2, 3, and 4 is operated by turning the shaft T. The step-by-step motion is given to the feed-bands B B' by a crank, *c*, Figs. 1 and 4, fast on the shaft T, connecting-rod *b*, lever *a*, pawl *a'*, Fig. 2, and ratchet-wheel *b'* fast on the shaft N. The connecting-rod *b* is jointed to the lever *a* in an adjustable manner, so that the length of the step-by-step movements of the fringe-feeder B B' can be thereby varied. By having the ratchet *b'* formed with two teeth, followed by a vacant space equal to that occupied by the two teeth, repeatedly, all around the ratchet, and then giving the pawl *a'* a movement slightly greater than the space for three teeth, the feeders B B' will then be moved forward one step of three teeth, and next a step of one tooth, repeatedly, as is required when the machine is used to twist together strands that are separated at their ends by only one other strand, as above specified, and represented in Figs. 21 and 22.

When the machine shall be used in twisting sufficiently-yielding fringe of the kind shown in Fig. 15 or in Fig. 9, the belts B B', instead of being turned step by step, may be automatically turned constantly by a belt running from a small pulley on the shaft T onto a suitable larger pulley on the shaft N, or by any other suitable means.

The twisting-fingers D D' are operated by a cam, U, fast on the shaft T, cam-following lever *c'*, link *d'*, and arm *f'* fast on the rock-shaft *h'*, which carries the finger D by the arm *i'*, and is geared at *m'* with the shaft *h''*, which carries the finger D' by the arm *i''*. The strand-dividers E E' are fast on a stock, V, which is slid up and down on ways V' by a cam, W, Fig. 3, fast on the shaft T, cam-following lever W¹, and sliding rod W² fast on the stock V. The strand-lifting dividers F F' are slid up and down in ways in the stock V by means of the cam X, Fig. 2, fast on the shaft T, cam-following lever X¹, and rod X² secured to the blades F F'. The strand-lifters *o o'* or their equivalents may be detached and operated separately from the dividers F F'; but I prefer to have the strand-lifters attached to and operated by those dividers. The doffer K is operated by an eccentric, Y, Fig. 4, on the shaft T, rod Y', arm *p'*, rock-shaft *q'*, and arm *r'*, which travels to and fro along the doffer. The finger J, preferably, has an auxiliary part, *s'*, Fig. 8, to assist in controlling the position of the middle strand *i*, Figs. 9, 10, and 11, or *e*, Fig. 21; and the part *s'* may be on a spring, *s''*, on the shaft *u'*, which carries the finger J. The shaft *u'* is moved to and fro endwise by means of a cam-projection, *v'*,

Figs. 4 and 5, on a hub, Z, fast on the shaft T, cam-lever *w'*, Figs. 3 and 5, and retracting-spring *x'*, Figs. 1 and 3, and the shaft *u'* is rocked to and fro with the finger J thereon by means of the peripheric cam-surface *y'*, Fig. 5, of the hub Z, and sliding follower *y''* having the depressing-spring *y'''*, and connected with the arm *z'* fast on the shaft *u'*. The slide G is moved endwise to and fro, so as to move the middle portion of the flexible feed-band B' toward and from the band B by means of the cam A', Fig. 5, on the hub Z, cam-lever G', link I', Fig. 1, lever H', and retracting-spring K', Fig. 4.

What I claim as my invention is—

1. The combination, in a fringe-twisting machine, of endless feeding-belts, chains, or bands, of which one has comb-like teeth and the other card-like clothing, strand-dividing blades and lifters, and twisting-fingers, substantially as described.

2. The combination of the strand-dividing blades and lifters, twisting-fingers, fringe-feeder having one feed-belt flexible and movable laterally, and a device or devices essentially such as herein described, or the equivalent thereof, by which the flexible or movable fringe-feeder belt is moved toward and from the other feed-belt at each twisting operation, substantially as described.

3. The combination of a fringe-feeder strand-dividing blades and lifters separated by a space for a strand, twisting-fingers, and strand-guiding finger or fingers or the equivalent thereof, whereby two strands of fringe separated at their ends by another strand or strands are twisted together, substantially as set forth.

4. In combination with the toothed endless feeder in a fringe-twisting machine, the vibrating doffer K or its equivalent, substantially as described.

5. In combination with the endless fringe-feeder in a fringe-twisting machine, a flexible endless platform, which moves with the feeder and supports, and carries along the bodies of the series of fabrics as the twisting of the fringe thereof progresses, as described.

6. The combination of the strand-dividing blades and lifters, twisting-fingers, endless feeding-belts, chains, or bands, and devices by which the said feeding bands, chains, or belts can be adjusted to different distances apart and in respect to the twisting devices, substantially as described.

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Witnesses:

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AUSTIN F. PARK.