Feb. 20, 1940. S. COHN 2,190,860

FABRIC FEEDING SYSTEM

Filed Sept. 13, 1938 2 Sheets-Sheet 1

Fig. 1.

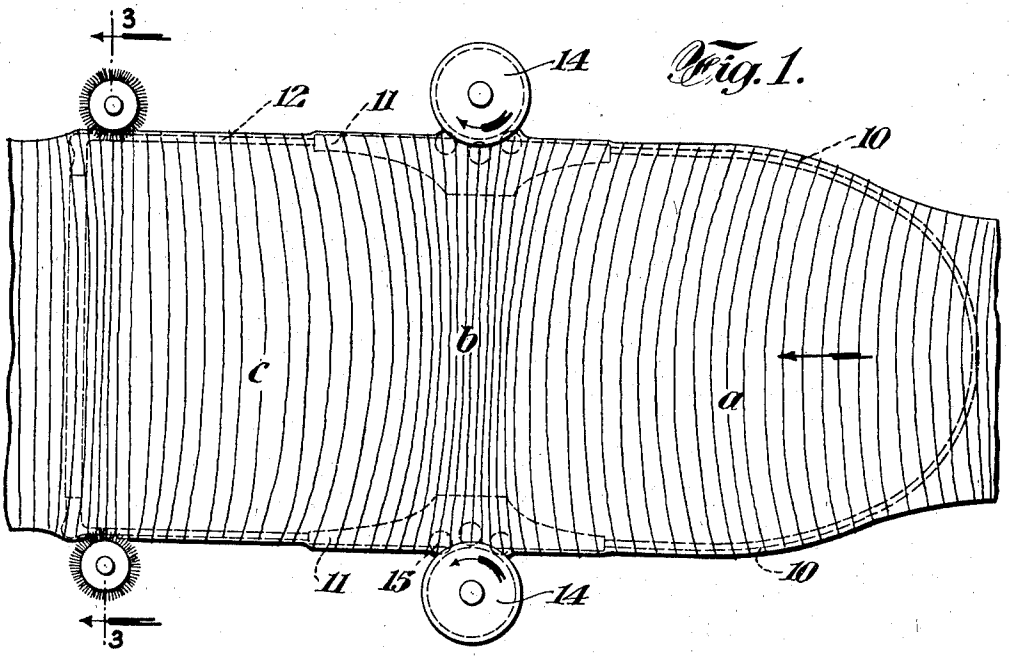
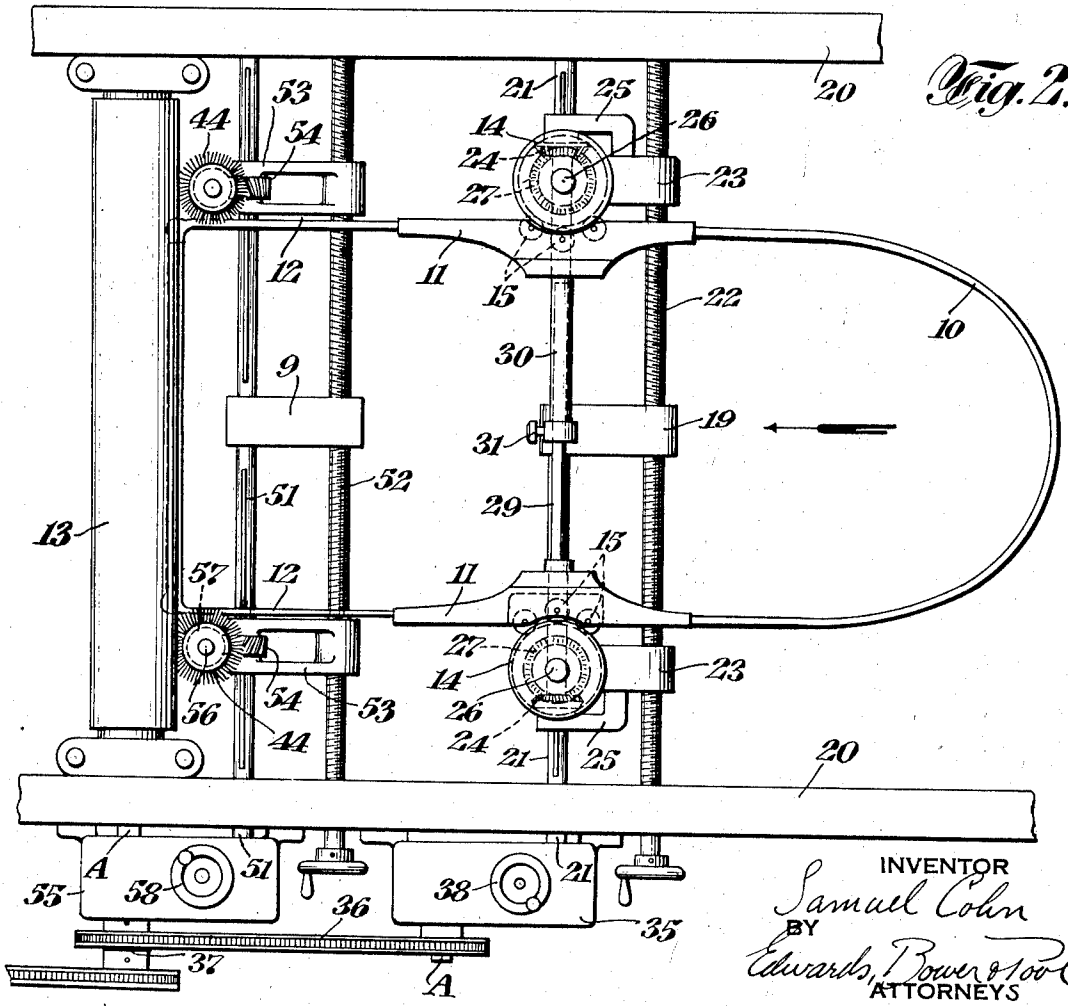


Fig. 2.



INVENTOR
Samuel Cohn
BY
Edwards, Bower & Poole
ATTORNEYS

Feb. 20, 1940. S. COHN 2,190,860

FABRIC FEEDING SYSTEM

Filed Sept. 13, 1938 2 Sheets-Sheet 2

Fig. 3.

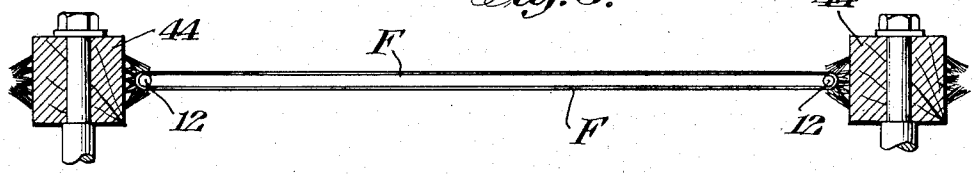
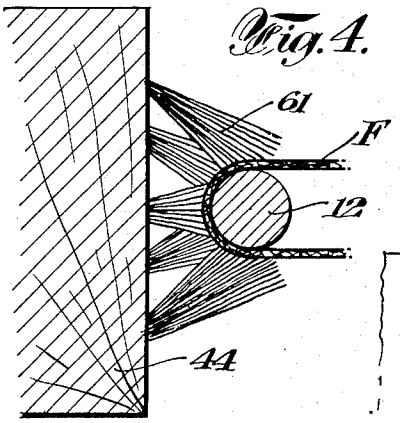


Fig. 4.



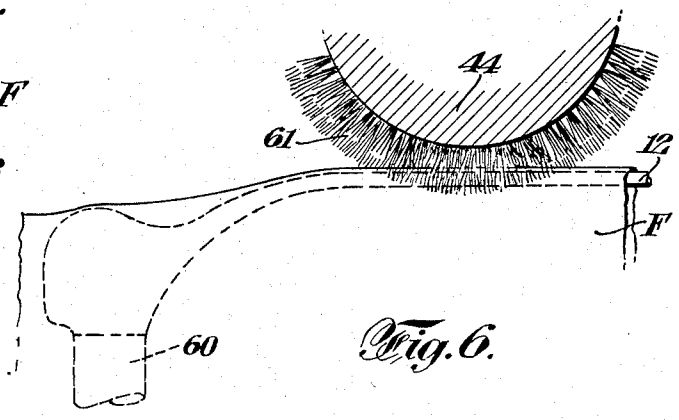


Fig. 6.

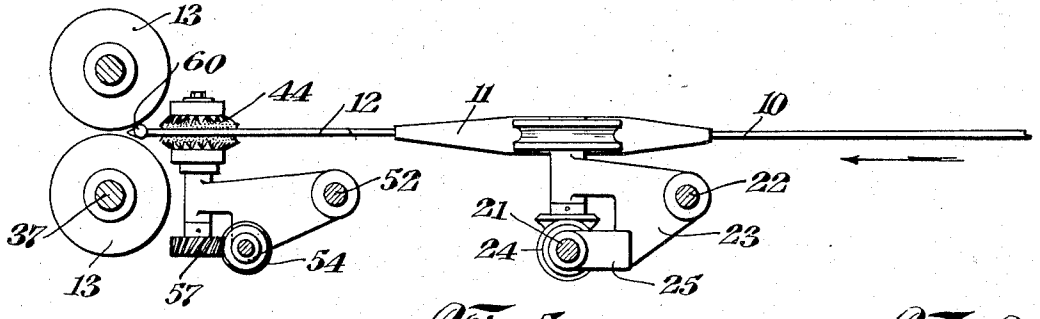
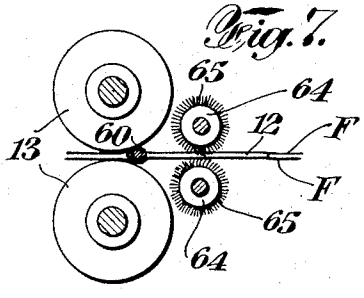


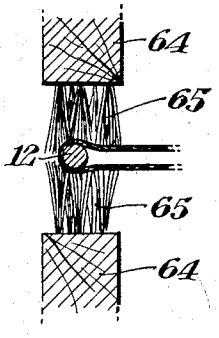
Fig. 5.

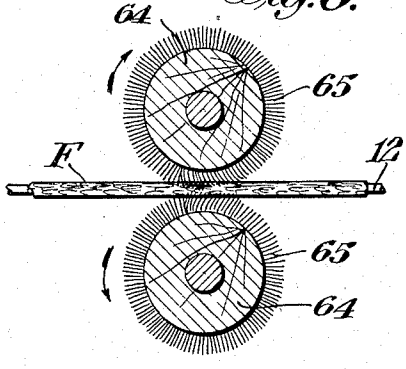
Fig. 8.

Fig. 9.

Fig. 7.







INVENTOR
Samuel Cohn
BY
Edwards, Bower & Cook
ATTORNEYS

Patented Feb. 20, 1940 2,190,860

UNITED STATES PATENT OFFICE

2,190,860

FABRIC FEEDING SYSTEM

Samuel Cohn, New York, N. Y., assignor to Samcoe Holding Corporation, New York, N. Y., a corporation of New York

Application September 13, 1938, Serial No. 229,667

3 Claims. (Cl. 26—55)

This invention relates to the handling of tubular fabrics, and particularly to the feeding of tubular knitted fabrics to the rolls or other handling means of wringers, driers, finishers and the like, and is a continuation-in-part of my copending application, Serial No. 17,934, filed April 24, 1935, for Fabric feeding system, Patent No. 2,130,118.

Such mechanisms may be used at various stages in treatment of the cloth, and it is vital in the operation of the apparatus closely to predetermine the condition of the fabric as it enters the treatment step. Any slightest irregularity at this point is likely to be exaggerated and set beyond recovery.

Many attempts have been made to carefully guide and constrain the material, and evenly stretch it crosswise as it progresses toward feed rolls over a preliminary stretching means, the purpose being to establish the transverse lines of the material precisely straight and parallel and carry it into the rolls in this condition. I have found that tubular goods, and particularly knitted material, does not lend itself to handling in this manner because it is impossible to maintain the handling conditions constant from point to point, and any slightest change is immediately met by a corresponding shift of the fabric, the very nature of which causes it to respond by a redistribution of its loop structure.

To overcome this and to avoid the consequent distortion in the cloth, the object of this invention is to provide a spreading, guiding and feeding control which will utilize the responsive character of the knitted material itself to present it to the subsequent feeding or treating means with the fabric smooth and unwrinkled, and with its transverse lines accurately conditioned for entry into the rolls.

I have found that this knitted material in its tendency to warp its structure uniformly toward a point of tension will on reversal of the direction of the stress gradually pass through intermediate conditions which may be controlled to give the desired formation of the material at the entrance to the rolls. The tendency of the tension of the rolls on tubular fabric is to draw it lengthwise and to narrow it, and when this narrowing is resisted, I have discovered that the resulting response of the fabric tends to draw the center portions ahead faster than the side edges. A transversely alined condition of the fabric sufficiently in advance of the rolls will, therefore, automatically destroy itself as the fabric is drawn into the bite.

In the system of this invention the guiding and feeding of the material is such as to permit the center portions of the flattened fabric to be drawn ahead at a faster rate while the friction at the edges retards the side portions and to apply a special corrective adjustment of the edges of the fabric just before it is received between the rolls. Just previous to the entry of the material into the rolls the advance of the center portions of the fabric is balanced by the compensating forward feeding of the side edges at entry to the rolls. In this way the transverse lines of the material pass into the bite of the rolls in the exact condition required for proper gripping of the fabric and accurate control of the transverse alinement.

A further object of the invention is to combine with this edge adjustment a preliminary feed at a point remote from the rolls tending to advance the edge portions relative to the center of the fabric in predetermined manner so that the final transverse alinement is attained by the cooperation of a leading control moving the side edges ahead of the center, a control by the feed rolls tending to over-advance the center portions and a side edge control moving the edges forward with respect to the center as the fabric enters the rolls.

In the accompanying drawings illustrating the invention

Fig. 1 is a plan view of the fabric on the stretching means as it passes toward the rolls,

Fig. 2 is a view of the supporting and driving mechanism for the rolls and the stretcher and combination preliminary feed,

Fig. 3 is a transverse section on line 3—3 of Fig. 1,

Fig. 4 is a detail sectional view on enlarged scale showing the brushing action between the fabric and the side edge feeding means,

Fig. 5 is a side view of the rolls and the preliminary feeding and stretching means,

Fig. 6 is a plan view on enlarged scale of the engagement between the edge feed roll and the fabric,

Fig. 7 is a side elevation of a modified form in which the side edge rolls have horizontal axes,

Fig. 8 is a detail sectional view on enlarged scale illustrating the action of the rolls shown in Fig. 7, and

Fig. 9 is a similar view at right angles to the showing of Fig. 8.

In the specific embodiment shown in Figs. 1, 2 and 5, the tubular knit fabric F is stretched over the front spreader and passed over the

propeller castings 11, 11 on each side and then along the rear spreader bars 12 to the rolls 13. The spreader as a whole is supported by the driven rolls 14, 14 grooved to fit the propeller rollers 15, 15 mounted in castings 11. Each set of three rollers 15 on each side has the axes of its rollers set on the arc of a circle concentric with the corresponding roll 14, and the peripheries of the rollers 15 are convex to fit the groove of the mating roll 14 though, of course, the convexity and concavity may be reversed. The side frames 20 support the rotatable transverse drive shaft 21 and the adjusting screw rod 22 connected at their center portions by bridge block 19 with relation to which they are freely rotatable. Supporting brackets 23 slide freely on shaft 21 and are threaded to rod 22 and carry the bevel gears 24 slidably keyed to shaft 21 and held to the brackets by the side arms 25. The rolls 14 have their shafts 26 journaled in the upper arms of brackets 23, and at their lower ends these shafts 26 carry the bevel gears 27 meshing with the bevel gears 24. The brackets 23 are thus transversely adjustable and rotatably carry the driven rolls 14 with them, and these rolls in turn support the spreader castings 11 which may be correspondingly adjusted to different widths. Castings 11 of the spreader carry the front spreader 10 and the rear spreader rods 12 and are connected transversely by the crossbar 29 and tube 30, and are held rigid in adjusted relation by the set screw 31.

The rolls 14 are driven in predetermined timed relation to rolls 13 by bevel gears 24, 27, and shaft 21 driven in turn from variable speed drive 35 driven by chain 36 from a shaft 37 of one of the rolls 13. The variable speed drive 35 continuously varies the relative speed of shaft 21 as the hand wheel 38 is turned and shaft 21 and rolls 14 may thus be run at any desired speed with relation to rolls 13.

As shown in Fig. 1 the tubular fabric may be first put under a transverse stretching tension by the front spreader 10. This imposes a side drag on the edge portions and leaves the center free, and since the feeding tension is distributed over the width of the fabric the center portions will lead and cause the transverse lines *a* of the fabric to arc convexly toward the rolls 13. This condition maintains until the side rolls 14 are reached. These rolls 14 have their peripheries set in corresponding concavities in the spreader castings 11 so as to contact with the fabric. The vertical thickness of the spreader is also increased at this point to cooperate in providing a large area of contact of the side edges of the fabric with the peripheries of the rolls 14. Anti-friction rollers 15 are also preferably provided reducing the drag or resistance of the stationary spreader parts at this point.

The side edges of the fabric are thus made to conform in shape and rate of progress to the roll peripheries. These side edges up to this point have progressively fallen further and further behind the center portions so that the convexities of transverse lines *a* have tended to increase. Now, however, under the system of this invention the side portions may be gripped and set forward at an increased rate, the increase being determined by variable speed drive 35 to not only bring the side portions up with the corresponding center portions of the fabric but to carry them ahead to provide a predetermined lead *b* of the side portions as the fabric proceeds toward the rolls 13. The transverse lines designated *c* of the fabric between rolls 14 and 13 are, therefore, concave toward the rolls 13 and by controlling and progressively modifying this concavity the transverse lines are more and more straightened out as they move toward the rolls 13.

The fabric on its way from rolls 14 to the rolls 13 is subjected to a side drag of the spreader castings 11 and rods 12, and at the same time is pulled forward by rolls 13 with a distributed tension which due to the inherent characteristics of the knitted cloth tends to make the fabric feed ahead at the center portions. Both of these influences act gradually to lessen the concavity of the transverse lines *c*, and these lines progressively tend to move forward more rapidly at the center portions as above explained.

The side edges may therefore tend to lag behind at the entrance to the rolls with a positive preliminary feed as shown in Figs. 1, 2 and 5, including the side rolls 14; or where the spreader rods 12 are those of a simpler form of spreader not involving such side roll drive, the edge friction will develop this lag at the side portions. The brush rolls 44 are therefore provided positioned close to the feed rolls 13 to yieldingly engage the fabric at the edges around the spreader rods 12 and feed these side edges forward into the bite of rolls 13. These brush rolls 44 are carried by brackets 53 slidably mounted on transverse drive shaft 51 and having threaded connection with the threaded adjusting rod 52. Each bracket 53 also carries the meshing spiral gears 54, 57, the former having a sliding spline connection with drive shaft 51 and the latter mounted on shaft 56 of brush roll 44. Drive shaft 51 is driven from shaft 37 by the variable speed drive 55 and has its speed varied with respect to rolls 13 by the hand wheel 58 of said drive. Normally the speed of shaft 51 will be such as to give a peripheral speed of the brush rolls 44 greater than the peripheral speed of rolls 13, the amount of the excess being that required to bring the transverse fabric lines in proper alinement for entry into the rolls 13.

As shown in the figures of the drawings the brush rolls 44 are considerably broader than the spreader rods 12 and the bristles 61 of the brushes surround and overhang the edges of the fabric so as to have a large area of contact with the fabric both at the edges and above and below. The bristles at the edges overhang and extend along the fabric and the intermediate bristles are preferably trimmed to a length engaging the fabric with little deflection so that there is an intimate resilient surface gripping of the fabric by the tips of the bristles to positively push or slide it along the rods 12 at a rate corresponding to the speed of the rolls 44. The action may be likened to the teeth of a gear engaging a rack.

The brushes 44 are set close to the bite of the feed rolls 13 and engage the fabric at an area of the rods 12 near to the dead bar 60 connecting the ends of these rods and riding in the bite of the rolls.

The rolls 44 may be set to any desired speed depending upon the nature of the fabric and the speed of the operation and the relative lag developed between the center portions of the fabric and the edges. This final edge sliding of the fabric will give a corrective adjustment of the transverse alinement within the control of the operator and acting to condition the fabric directly previous to its entry into the bite of the feed rolls 13.

As illustrated in the modified system illus-

trated in Figs. 7, 8 and 9 the brush rolls 64 may have their axes parallel to the plane of the fabric, a pair of these rolls being used at each side edge and with their bristles engaging the fabric around and within the spreader rod 12 on each side or entirely within the spreader and without touching the rods. The yielding gripping action of the bristles of these rolls 64 is very similar to those of rolls 44 and these modified rolls are particularly useful where it is desired to extend the area of engagement between the rolls and the fabric well around the spreader member, such as the rod 12.

The device takes wet or dry material in rope form and straightens it out while continuously feeding it over the interior mandrel structure which gives it the precisely desired distention. The side grooved rolls 14 both support the fabric being propelled and provide the propulsion, the interior mandrel structure freely floating in the grooves of these rolls.

The feed of this invention is widely adaptable to finishing, wringing, drying, pressing and other treating operations, and may be inserted at any intermediate stage of the handling of the tubular goods wherever accurate control of the material is desired. The space between the edge drive such as rolls 14 and the subsequent feeding mechanism such as transverse rolls 13 may be widely varied but preferably sufficient distance between these is maintained to allow the fabric to have at least a slight lead at the sides and to modify this by the center pull before the later stage is reached. Other preliminary rolls than those shown at 14 may be used in advance of the brush rolls and more than one set of brush rolls may be employed.

The apparatus is simple and inexpensive concentrating the control at the edge portions and leaving substantially the entire fabric surface free for treatment and observation. Very precise regulation may be maintained enabling the cloth to enter the transverse rolls 13 without the slightest distortion and thus setting the loop structure evenly and with all portions of the fabric in correct relation to each other. The mechanism is widely variable for different treatments and different conditions of the cloth including the entire range from dry cloth offering little resistance and feeding easily over the spreader to steamed or heavily wetted fabrics imposing considerably more resistance and having a much greater tendency to drag and distort.

While the invention has been illustrated in connection with specific embodiments it is not confined thereto but is intended to include all modifications falling within the scope of the appended claims. In particular, the spreader 10 may be modified or omitted altogether and also the preliminary drive, dependence being then on the rolls 44 or 64 or the like for the adjustment of the fabric as it reaches the feed rolls 13. The brush rolls may also be replaced by rolls of any material giving the yielding, gripping action herein described.

I claim:

1. Apparatus for treating tubular fabric in combination with a pair of feed rolls adapted to grip the fabric in flat form between them, a horizontal U-shaped spreader in advance of said rolls fitting within and laterally distending the fabric and concentrating the frictional drag to the edges of the fabric, a supporting means engaging the fabric at a point intermediate the ends of said spreader, driven rolls at each edge of said spreader and closely adjacent said feed rolls adapted yieldably to engage the outer surface of the fabric above and below at the edges, said driven rolls acting to counteract said frictional drag and delivering the fabric in flat form to said feed rolls with the transverse lines of the fabric in accurate alignment as it is engaged by said feed rolls.

2. Apparatus as set forth in claim 1 in which the driven rolls are resilient surfaced rolls having axes parallel to the plane of the fabric and bristles engaging the fabric at each edge surface on opposite sides.

3. Apparatus as set forth in claim 1 in which the driven rolls are brush rolls having axes perpendicular to the plane of the fabric and bristles engaging the fabric at the edges and adjacent flat surfaces above and below the edges and to bend or flex during engagement.

SAMUEL COHN.