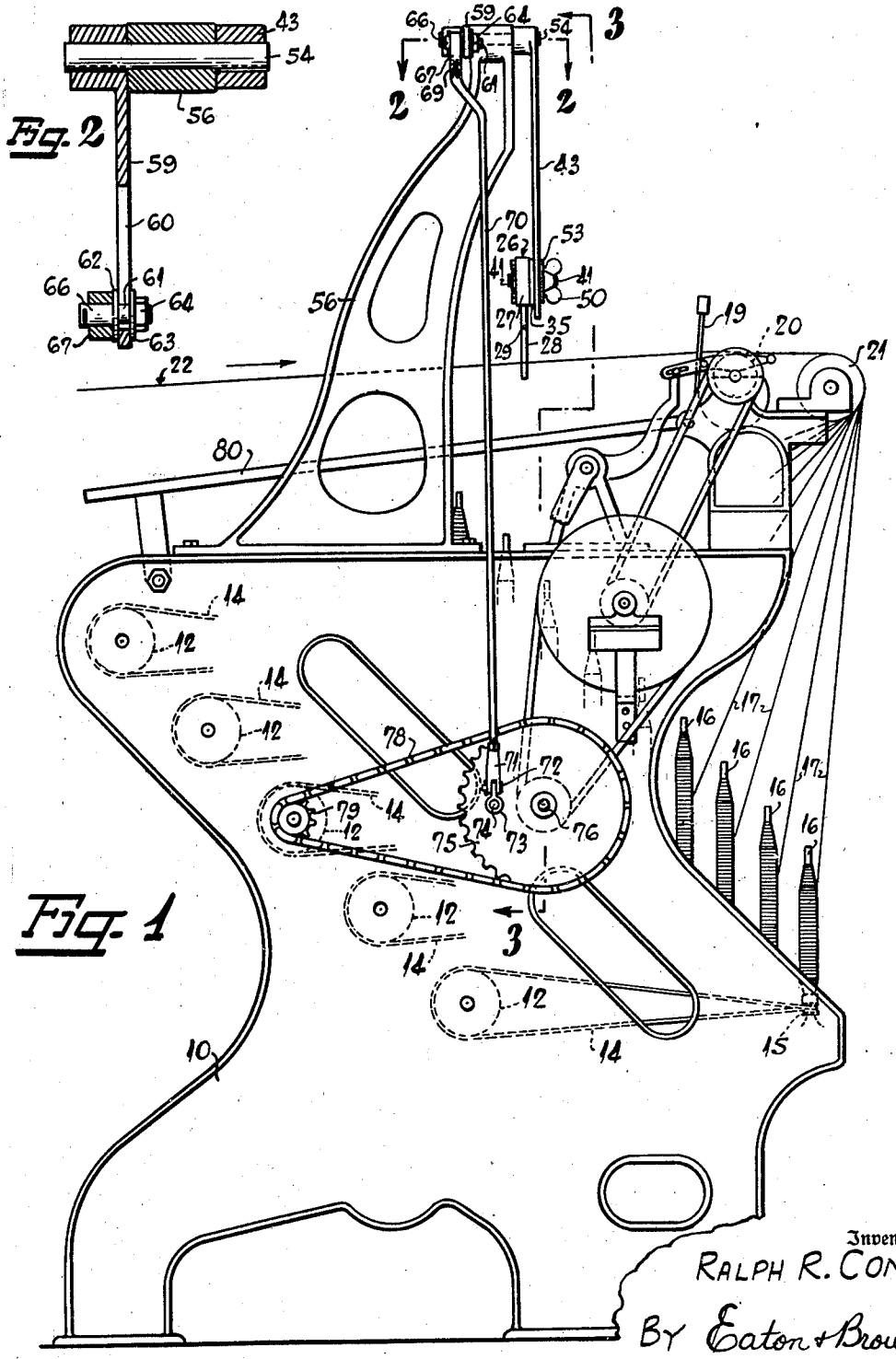
May 18, 1943 R. R. CONE 2,319,491

SHEET WARP VIBRATOR

Filed July 9, 1942 2 Sheets-Sheet 1



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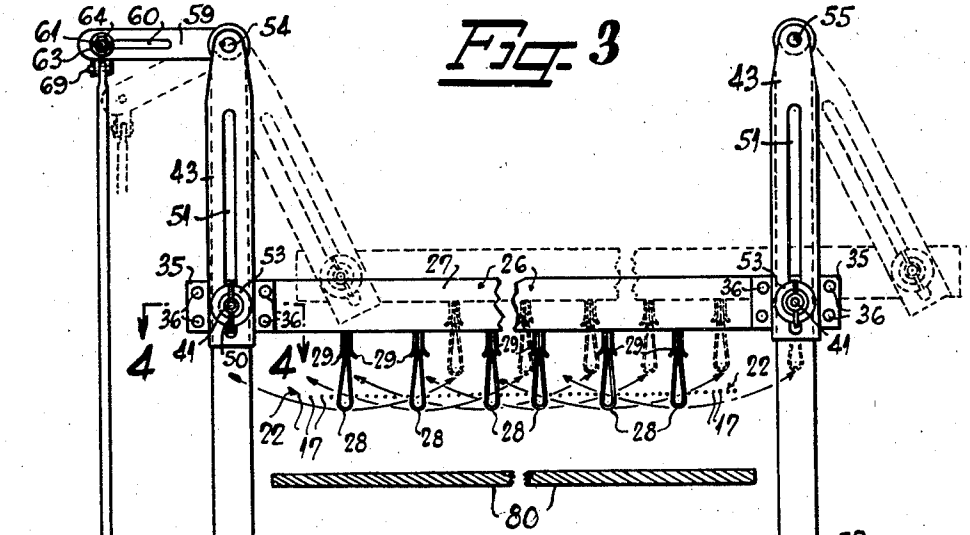


Fig. 3

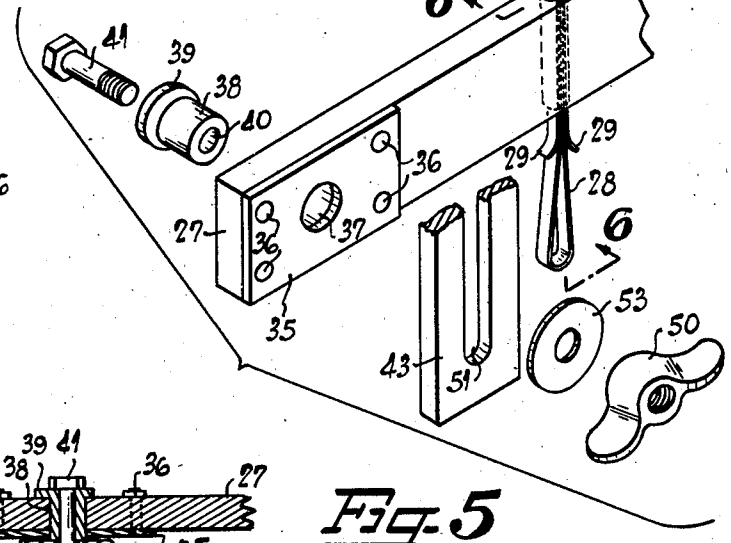


Fig. 5

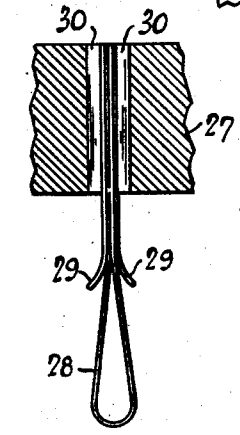


Fig. 6

Fig. 4

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2,319,491

SHEET WARP VIBRATOR

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Application July 9, 1942, Serial No. 450,296

2 Claims. (Cl. 28—22)

This invention relates to the treatment of warp yarn and more especially to an apparatus wherein the individual ends of the warp are maintained in a separated position while the same are traveling from one point to another.

During processing, cotton yarns pass through various solutions and are subject to many treatments which tend to cause the adjacent ends in the warp to stick or adhere to each other. As a means for separating these ends, it is a conventional practice to pass the warp through a reed, which reed comprises a plurality of spaced splits between which the ends travel. When adjacent yarn ends are adhesively secured together for a considerable distance and are caused to pass on opposed sides of a split in a reed, the ends will often break before becoming separated, and thereby make it necessary to repair the broken ends.

As another example of the conventional practice, let us consider the processing of yarn for thread. In this process the gassing, mercerizing, dyeing, drying, glazing, and waxing are all handled in warp form. In many instances each warp has 378 ends, and each end is 6,000 yards long. After the mercerizing, drying, dyeing, glazing, and waxing are completed, it is usually necessary to perform a quilling operation which separates the ends of the warp by a reed and winds each individual end on a separate package.

Sometimes, as heretofore stated, difficulties are encountered in this quilling operation because the above-mentioned operations tend to cause the yarn ends to stick together so that they do not easily separate when passing through the reed. Heretofore, in order to overcome this sticking or adhering of the adjacent ends, the operator or quiller has been accustomed to rake or vibrate the warp ahead of the reed by taking an empty quill or stick and moving the same, back and forth, transversely of the moving warp. Usually this warp is about 12 feet in width, and consequently, it is impossible for one operator to rake the entire width of the warp. As a result, some of the adhered ends break while passing through the reed.

It is an object of this invention to provide an automatic warp vibrator for separating the individual yarn ends prior to the same passing through the reed.

It is another object of this invention to provide a transverse rake having a plurality of flexible teeth therein, which teeth are adapted to be disposed adjacent the moving warp and which, when moved transversely thereof, will tend to vibrate the individual ends and maintain them in a separated state.

It is another object of this invention to provide a toothed rake of the class described, with means for swinging the rake in an arc so that the individual teeth will penetrate the warp at a constantly varying depth. During this penetration, the ends of the teeth move from a position completely above the warp to the point of maximum penetration. Therefore, each tooth strums the individual ends, releasing the same approximately one at a time as it moves upwardly from its lowermost position to its uppermost position.

It is another object of this invention to provide a yarn vibrating means of the class described having means for adjusting the height of the vibrating means relative to the warp, and also having means for adjusting the amount of transverse arcuate travel of the vibrating means.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings in which:

Figure 1 is a side elevation of a textile quiller with my improved warp vibrating apparatus associated therewith;

Figure 2 is an enlarged sectional detail view taken along the line 2—2 in Figure 1 illustrating the stroke adjustment feature;

Figure 3 is a transverse vertical sectional view taken along the line 3—3 in Figure 1, showing the rake or yarn vibrating means in lowermost bold line position and uppermost dotted line position;

Figure 4 is a sectional view taken along the line 4—4 in Figure 3 showing a detail of the connection between the rake and its supporting means;

Figure 5 is an exploded isometric view of one end of the rake and the supporting means therefor;

Figure 6 is a sectional view taken along the line 6—6 in Figure 5, showing the means employed for mounting each of the flexible yarn fingers in the rake.

Referring more particularly to the drawings, the numerals 10 and 11 denote the side frames of a quiller, which quiller has conventional drums 12, drive belts 14, whorls 15, and quills 16, said quills being adapted to have yarn ends 17 wound thereon. This quiller also has a conventional reed 19, a waxing roller 20, and a guide roller 21.

In the processing of yarn it is usually in a warp form prior to passing through this machine. For the sake of clearness, this warp will be broadly designated by the reference character 22. As the

warp moves from left to right in the direction of the arrow in Figure 1, it passes through reed 19, over waxing roll 20, over a guide roll 21, and then downwardly onto quills 16. When the warp leaves the guide roller, the ends 17 follow a divergent path to individual quills 16. As the drums 12 are rotated, the individual yarn quills 16 are likewise rotated through the medium of belts 14 and whorls 15 to thereby wind the individual ends 17 there around.

Very often, the ends 17 of the warp 22 become adhered to each other and are not easily separated by the splits in the reed 19. For this reason it is necessary to constantly strum or vibrate the individual ends 17 of the moving warp so that the same will be maintained in a separated position, thus permitting the ends to easily pass through the reed 19. Figure 3 shows the position of the individual ends 17 in warp 22 prior to the same reaching the reed 19. This warp will vary in width, and is usually too wide for one operator to manually vibrate all of the ends and prevent some of the adhered ends from reaching the reed 19 in an unseparated condition.

In order to insure that all of the ends 17 in the warp 22 will be constantly vibrated, uniformly and automatically, a transversely disposed rake, broadly designated by the reference character 26, has been provided. This rake 26 comprises a horizontally disposed bar 27, which bar is rectangular in cross-section and has its lower edge disposed substantially in parallel relation to the warp 22. Also this bar is positioned transversely of the warp and has a plurality of flexible loop teeth 28 projecting downwardly from the lower edge thereof. In the present instance, the teeth are formed from material such as a three-eighths inch wide band saw steel of a twenty-six gauge. This metal is bent upon itself in a looped form and has the upper ends thereof disposed face to face and penetrating the bar 27. It is to be understood, however, that other types of flexible teeth may be employed without departing from the spirit of this invention.

Adjacent the outer flat sides of the finger or tooth 28 are suitable flat flexible band supports 29, there being a support 29 adjacent each side of the finger or tooth 28 for the purpose of supporting that portion of the finger immediately below bar 27 while the finger is deflected during its movement across the warp. The doubled ends of the finger 28, together with the two associated reinforcing supports 29, are secured in the bar 27 by any suitable means such as semi-circular dowel pins 30. (See Figures 5 and 6.) The supports 29 are extended downwardly for a substantial distance below the bar 27 alongside the opposed sides of the looped finger 28 and consequently, as the finger 28 is deflected, first in one direction and then in another as it moves transversely of the warp, the finger will be caused to bend about a longer radius and therefore, will not become fatigued as quickly as would be the case were the reinforcing splints 29 not provided.

It can be seen by observing Figure 3 that these fingers are spaced along the bar 27 so that the lower ends thereof will penetrate the warp at varying depths while being moved from bold to dotted line positions. It is to be understood that the dotted line position of the rake 26 illustrates the position at one end of the rake swing, whereas the bold line position illustrates its midway position relative to the warp between the ends of the swing. The rake will swing as far to the left of the warp 22 in Figure 3 when it oscillates to the left as the rake is shown in dotted line position to the right.

Each end of the bar 27 has a metallic plate 35 secured thereto by any suitable means such as bolts 26. The plate 35 and the end of the bar 27 have a hole 37 therein, which hole is penetrated by a collar 38, said collar having integral therewith a flange 39. The collar 38 is provided with a hole 40 which receives a bolt 41 when the parts are in an erected position. By observing Figure 4 it can be seen that the restricted portion of collar 38 extends the entire length of hole 37 and thus penetrates the bar 27 and the plate 35. The small end of collar 38 is adapted to fit against a hanger 43, and is held in position by means of bolt 41, wing nut 50 and a washer 53, said bolt being adapted to penetrate a slot 51 in the hanger 43. This type of construction permits each end of the bar 27 to be pivotally secured to the lower ends of hangers 43 without any binding between the face of the hangers and the face of plates 35, or without any binding between the flange portions 39 and the faces of the bar 27.

This construction also permits the elevation of the rake 26 to be varied to suit operating conditions. For example, if it is desired that the fingers 28 penetrate the warp 22 a very slight amount, the wing nut 50 may be loosened and the rake 26 raised accordingly; or if desired to entirely lift the rake out of contact with the warp to a non-obstructing position, this may be done also by manipulating the wing nut and moving the rake 26 to the upper extremities of slots 51.

The upper ends of hangers 43 are pivotally secured as at 54 and 55 to brackets 56 and 57 respectively, said brackets 56 and 57 being supported by quiller frames 10 and 11. In order to cause the hangers 43 to oscillate about pivots 54 and 55, it is necessary to provide some suitable means such as shown in Figures 2 and 3. The shaft of pivot 54 extends through the upper end of bracket 56, and the projecting end of this shaft has a laterally extending lever 59 keyed thereon.

Lever 59 has a slot 60 therein which is penetrated by a bolt 61, said bolt having a head portion 62 abutting one face of the lever 59 and a washer 63 abutting the opposite face. A nut 64 is threadably secured upon the end of the bolt 61 which projects beyond the washer, and thus the bolt is adjustably secured in the slot 61.

Bolt 61 also has a larger projecting portion 66 extending from the head portion 62 and away from the lever 59. Around this portion 66 a fitting 67 is mounted, said fitting extending downwardly and having pivotally secured thereto as at 69 the upper end of a link 70. It is seen that the longitudinal axis of portion 66 is disposed substantially at right angles to the longitudinal axis of pivot 69, and therefore, a universal connection is provided between lever 59 and link 70.

The lower end of link 70 has a fitting 71 secured thereto. Pivotally secured to this link 71 as at 72 is a second fitting 73, said fitting 73 being pivoted as at 74 to a sprocket wheel 75. Likewise, the longitudinal axes of pivots 72 and 74 are disposed substantially at right angles to each other, thereby providing a second universal connection. Especial attention is called to the fact that the pivot 74 is eccentrically located relative to the stud shaft 76, which shaft serves as an axis of rotation for sprocket 75. Figure 3 shows the manner in which stud shaft 76 is attached to the quiller frame 10.

Sprocket 75 has a chain 78 mounted thereon, and this chain is mounted upon another sprocket

79 which is driven by one of the drums 12 of the quilling machine. When the machine is in operation, the drums 12 are driven by any suitable source of power, not shown, to cause the quills 16 to rotate, and thus draw the warp ends 17 of warp 22 downwardly onto individual packages. During this winding the warp 22 is passing eneath the transversely disposed rake 26, through reed 19, over waxing roll 20, and over guide roll 21. The rotation of sprocket 79 will, in turn, impart rotation to sprocket 75 through the medium of chain 78. It is therefore seen that as sprocket 75 rotates, the link 70 will be reciprocated up and down, thereby causing the hangers 43 to oscillate about pivots 54 and 55. This oscillation of hangers 43 will cause the rake 26 to swing back and forth and thus cause the fingers 28 to strum or vibrate the individual yarn ends 17 to separate any ends 17 which may be stuck together.

Figure 3 clearly illustrates by arrows the approximate path of travel of the lower ends of fingers 28. In the bold line positions, the fingers 28 are penetrating the warp 22, the maximum amount for this particular adjustment of the rake. When the rake swings to right-hand dotted line position, it follows the arcuate path of the arrows and, at the same time, gradually rises out of the warp, releasing the warp ends one at a time. When the rake reaches the end of its stroke, all of the ends have been released by each tooth 28, at which time the lower end of each tooth is disposed above the warp. During the swing in the opposite direction, the teeth gradually move downwardly to bold line position through the warp 22, and then the teeth again gradually rise until they assume an elevation at the left of the warp substantially the same as shown in dotted lines to the right.

It is therefore seen that I have provided a simple and efficient automatic means for maintaining the ends of yarn in separated or unattached positions. Also means have been provided whereby the length of the stroke and the amount of penetration of the warp can be regulated as desired. By providing these flexible fingers 28, the vibration of the warp can be effected without any material damage thereto.

A suitable board or cover 80 is provided directly beneath the warp 22 and rake 26 so that the packages of yarn therebeneath will be shielded from dirt, dust, and lint which falls from the warp.

In the drawings and specification, there has been set forth a preferred embodiment of the invention and although specific terms are employed, they are used in a generic and descriptive sense only and not for the purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Apparatus for separating the ends of a sheet of moving warp comprising a framework, a transversely disposed rake having teeth therein for penetrating said warp, a pair of spaced levers pivotally secured to said rake, said levers being pivotally secured to said framework, means for adjusting the positions of said rake pivots on said levers to thereby vary the amount of warp penetration by said teeth, means connected to one of the levers for oscillating said levers about the framework pivots to thereby cause each tooth in said rake to follow an arcuate path as it oscillates transversely of the warp and thus penetrate the warp at constantly varying depths, and means for varying the length of stroke of said lever oscillating means.

2. Apparatus for vibrating or strumming the ends of a sheet of moving warp to separate the ends from each other, comprising a framework, a bar disposed above the sheet of warp and having a plurality of warp engaging elements therein, a pair of links having their upper ends pivoted in the framework and having their lower ends connected to the bar for swingably supporting the same, means imparting swinging movement to one of the links for simultaneously moving the bar transversely and vertically of the warp to cause the elements to depress and move the ends laterally and to release the ends, each of said elements having a rounded end portion to cause the ends to roll over and past the elements as the elements move transversely and vertically of the ends.

RALPH R. CONE.