Feb. 20, 1951 A. L. LE FEBVRE ET AL 2,542,687

BRUSH MAKING MACHINE

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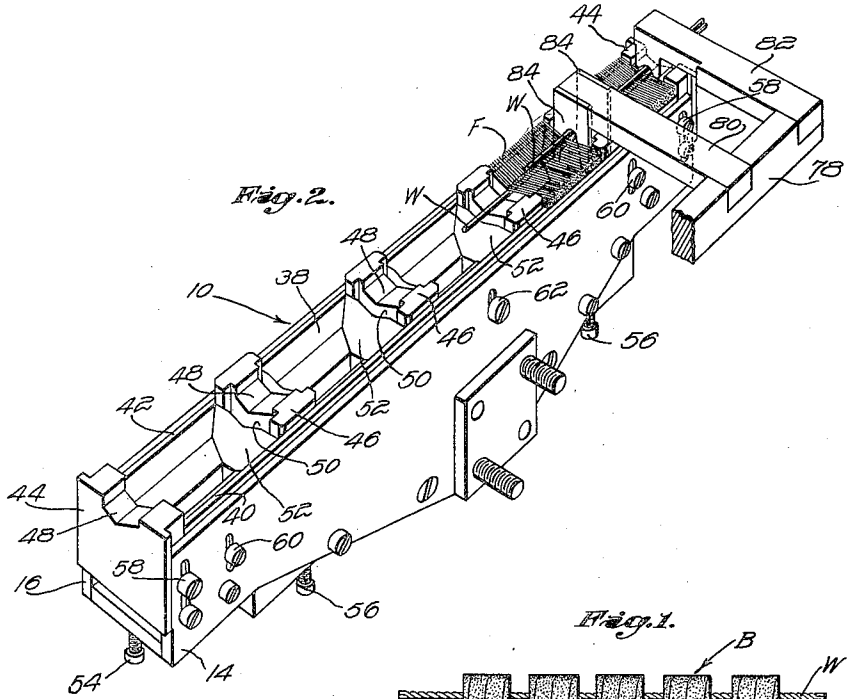


Fig. 2.

Fig. 1.

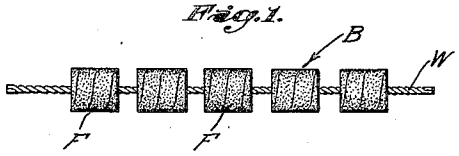


Fig. 3.

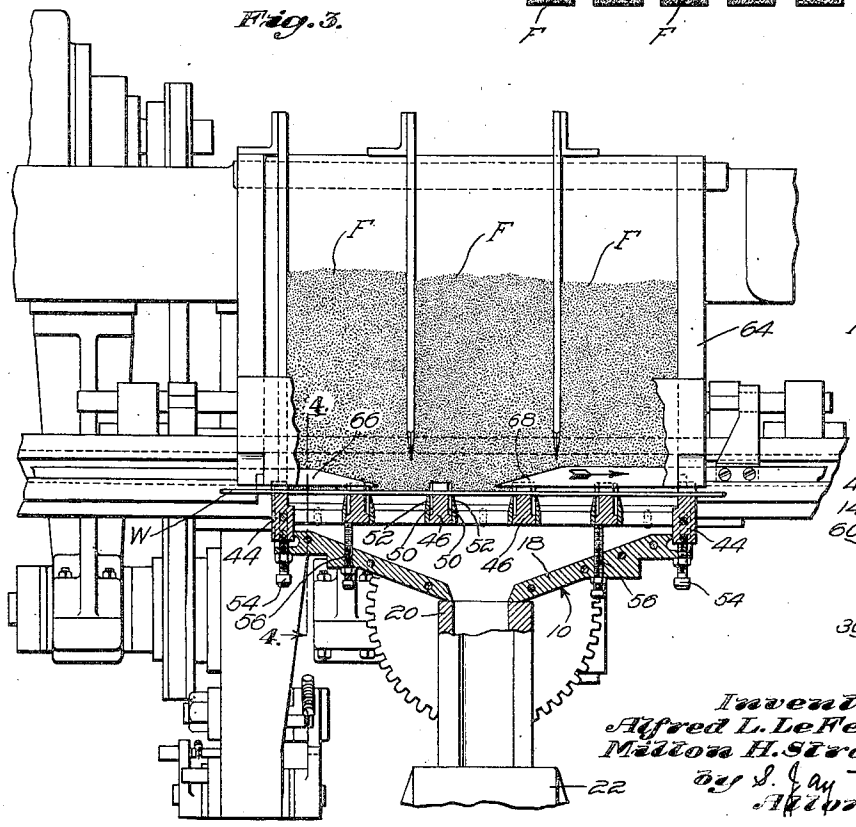
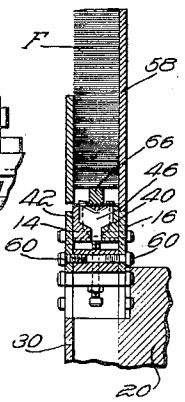


Fig. 4.



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Fig. 5.

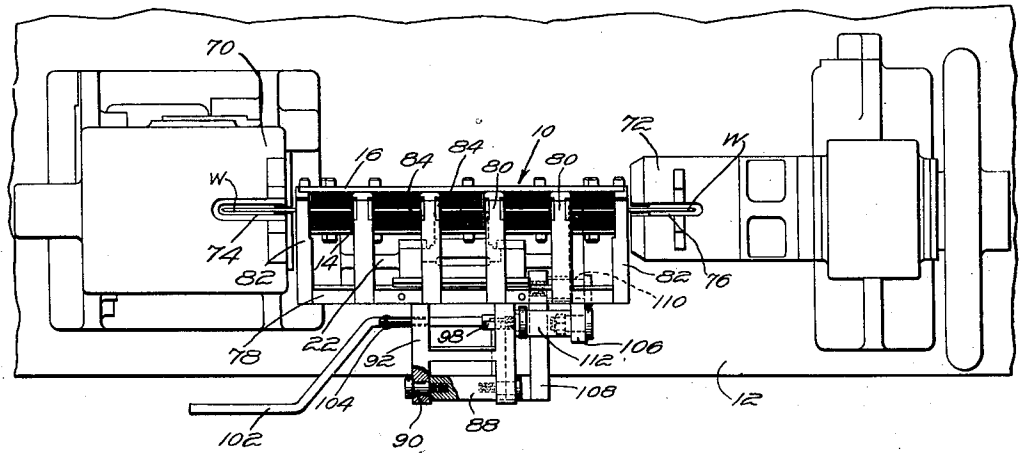
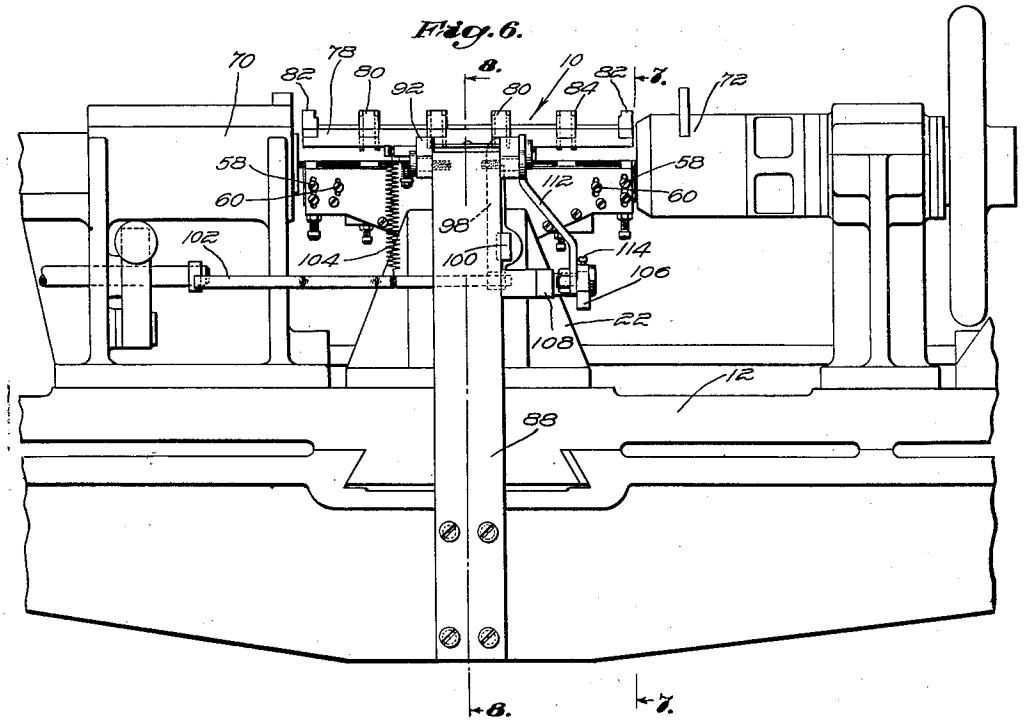


Fig. 6.



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Fig. 5.

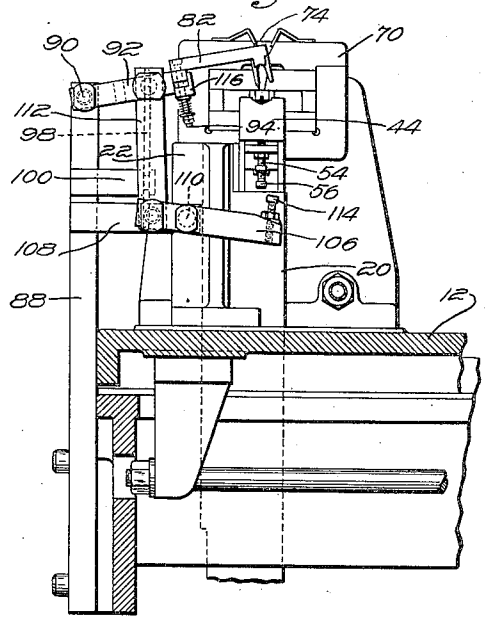


Fig. 6.

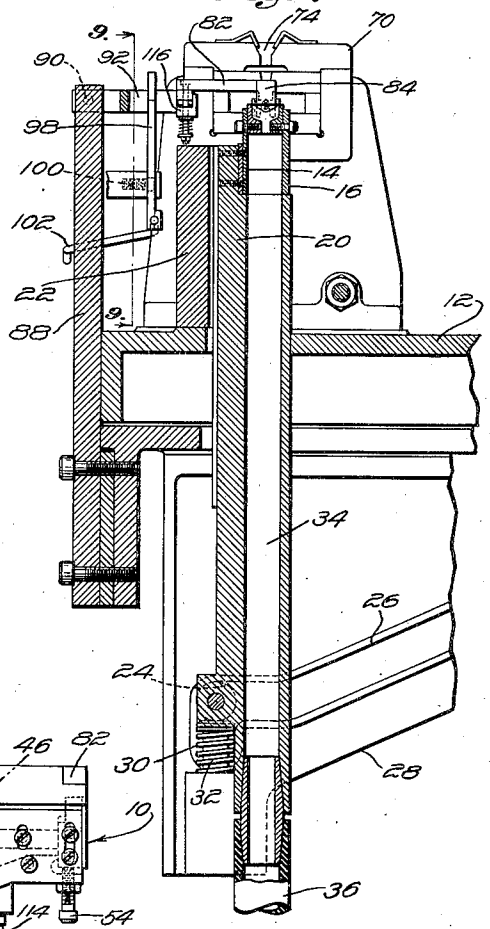


Fig. 9.

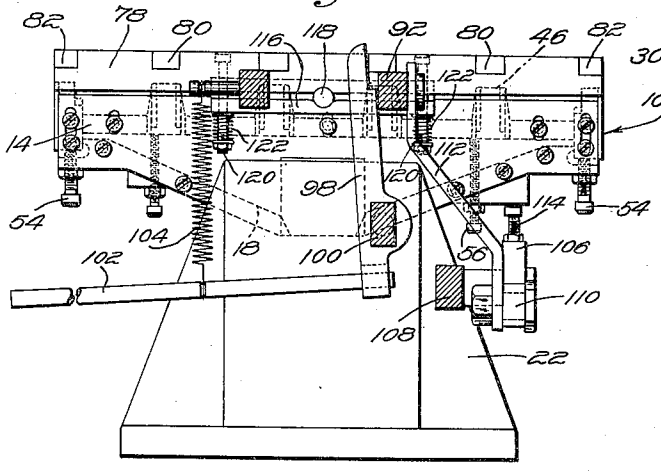


Fig. 10.

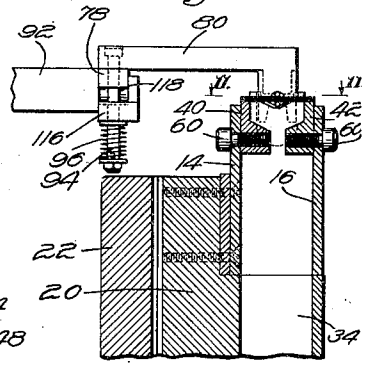
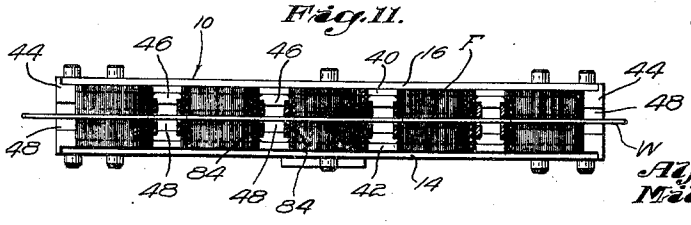


Fig. 11.



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UNITED STATES PATENT OFFICE

2,542,687

BRUSHMAKING MACHINE

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Application December 23, 1947, Serial No. 793,402

13 Claims. (Cl. 300—2)

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A mechanism embodying the present invention is particularly adapted for use as a part of a brush making machine of the type disclosed in the application of Alfred L. Le Febvre for Brush Making Machine, Serial No. 666,735, filed May 2, 1946. Reference is made to the said application for various features of the machine not herein fully shown and described.

A machine of the type referred to includes a fiber magazine carrying a mass of transversely arranged fibers, and includes a twisting mechanism spaced from the magazine, being preferably forwardly spaced. Associated with the fiber magazine and with the twisting mechanism is a movable carrier which is reciprocated between a magazine station adjacent the magazine and a twisting station adjacent the twisting mechanism. As the carrier is moved to the magazine station a longitudinal wire is placed thereon, and at the magazine station a layer of transverse fibers is transferred from the magazine and placed on the carrier above the said wire. As the carrier is moved to the twisting station a second wire is placed thereon above the layer of fibers, and in the twisting station the two wires are engaged by gripping devices, one of which is rotatable. The rotation of the rotatable gripping device twists the wires so as to grip the layer of fibers between them and a brush of the twisted wire type is formed.

The general object of the present invention is to provide a machine of the type referred to wherein two or more longitudinally separated layers of fibers are placed on the carrier instead of one continuous layer, so that when twisting takes place a brush is formed having two or more longitudinally separated groups of fibers held between the same two twisted wires. The wires of such a brush may be subsequently cut between the groups of fibers so as to form two or more shorter brushes.

A more specific object of the invention is to provide various structural features and arrangements of parts for attaining the above stated general object.

Further objects of the invention will be apparent from the drawings and from the following specification and claims.

The drawings show in detail a preferred embodiment of the invention, but it will be understood that various changes may be made from the construction shown, and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

Fig. 1 is a side view of a brush of the type which a machine embodying the invention is adapted to make.

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Fig. 2 is a perspective view of the carrier constituting a part of a machine embodying the invention.

Fig. 3 is a front view showing the fiber magazine of the machine and showing the carrier as illustrated in Fig. 2 associated with the magazine, the said carrier appearing in vertical section.

Fig. 4 is a fragmentary vertical sectional view taken along the line 4—4 of Fig. 3.

Fig. 5 is a plan view of the twisting mechanism of the machine, the carrier as illustrated in Fig. 2 being shown in association with the twisting mechanism.

Fig. 6 is a front view of the parts shown in Fig. 5.

Fig. 7 is an enlarged fragmentary vertical transverse sectional view taken along the line 7—7 of Fig. 6.

Fig. 8 is an enlarged fragmentary vertical transverse sectional view taken along the line 8—8 of Fig. 6.

Fig. 9 is a fragmentary longitudinal sectional view taken along the line 9—9 of Fig. 8.

Fig. 10 is an enlarged vertical sectional view similar to a portion of Fig. 8.

Fig. 11 is a fragmentary plan and sectional view taken along the line 11—11 of Fig. 10.

Referring to the drawings, Fig. 1 shows a brush B having several spaced groups of fibers F gripped by two twisted wires W. Five groups of fibers are shown but the number may be varied. It will be understood that, after the brush B has been made, the wires W may be cut between the groups of fibers to form five separate relatively short brushes.

Fig. 2 shows a carrier 10 which is reciprocated between a magazine station wherein it is associated with a fiber magazine as shown in Fig. 3, and a twisting station wherein it is associated with a twisting mechanism as shown in Figs. 5 and 6. The twisting mechanism has an operative position at the said twisting station which operative position is spaced from the magazine in a direction perpendicular to the longitudinal lines of the magazine. Preferably, the magazine station is at the rear and the twisting station is at the front, the spacing being in a transverse direction. As explained in detail in the said copending application, the carrier 10 is supported on a transversely reciprocable slide 12. In addition to being reciprocated horizontally with the slide 12, the carrier may also be reciprocated vertically to properly cooperate with the fiber magazine and with the twisting mechanism. When the carrier is at the rear it is in a relatively elevated position and when it is at the front it is in a lower position.

The carrier 10 has parallel longitudinal walls 14 and 16 and has a bottom wall 18 provided with

a central bottom opening. One wall of the carrier is secured to a slide 20 which is vertically movable with respect to a bracket 22 on the main slide 12, as shown in Fig. 8. The slide 20 extends through an opening in the main slide 12 and is provided near the bottom with a roller 24 entered in a cam groove 26 formed in a stationary bracket 28. The roller 24 and the cam groove 26 serve to vertically reciprocate the slide 20 and the carrier 10 as the main slide 12 is reciprocated horizontally. At its forward end the cam groove 26 has a downward extension 30 which is below the roller 24 when the parts are in their normal forward positions as shown. A spring 32 normally prevents downward movement of the slide 20 from the position shown, but permits such movement when necessary as hereinafter explained.

The slide 20 has a vertical hole 34 which registers with the opening in the bottom wall 18 of the carrier. A hose 36 communicates with the hole 34 at the bottom thereof and is connected with a suitable exhaust means so as to maintain a partial vacuum within the carrier 10.

The carrier 10 preferably includes a separate cradle 38 which is positioned between and which fits the parallel carrier walls 14 and 16. The cradle preferably has openings therethrough from top to bottom, the said openings being between longitudinal front and rear walls 40 and 42. The said front and rear walls of the cradle are connected by transverse ribs 44, 44 constituting end walls and by transverse intermediate ribs 46, 46, all of which ribs are preferably but not necessarily uniformly spaced. The said end walls and transverse intermediate ribs project substantially above the level of the top surfaces of the front and rear cradle walls 40 and 42. The top faces of the said front and rear walls constitute fiber supporting surfaces at one level, these surfaces being separated by the said transverse ribs. The top faces of the transverse ribs constitute fiber supporting surfaces at a higher level. The purpose of these fiber supporting surfaces at different levels will be hereinafter more fully explained.

The transverse intermediate ribs 46, 46 and the end walls 44, 44 are provided with similar open-top notches 48, 48. The bottom of each notch has beveled surfaces as shown to cause a bottom wire W to be centrally positioned as shown in Fig. 2. At the opposite sides of each cross rib 46 are similar vertical grooves 50, 50 which extend downward to near the bottom of the rib. Transverse inserts 52, 52 are preferably secured to the opposite sides of the respective ribs so as to close the outer sides of the corresponding grooves 50, 50. Thus the grooves and the inserts cooperate to provide vertical channels at the opposite sides of the ribs.

Preferably, the cradle 38 is vertically adjustable with respect to the main body of the carrier, such adjustment being effected by screws 54 and 56. The cradle can be clamped in adjusted position by screws 58, 60 and 62.

During each cycle the carrier is moved rearward and also upward to the magazine station, and a lower wire W is deposited thereon in the notches 48, 48 before it reaches the said station. Preferably, the wire is deposited automatically during rearward movement by means of a suitable wire feeding mechanism, as disclosed in the said copending application. At the end of the rearward and upward movement the carrier is at the magazine station and is immediately below a fiber magazine 64 as shown in Figs. 3 and 4. The magazine 64 is essentially a rectangular container open at the top and at the bottom, and transversely arranged fibers F are placed therein by the operator from time to time so that a sufficient supply is always maintained. One wall of the magazine, as for instance the left wall, may be movable to adjust the length of the magazine to correspond with the length of the particular carrier 10 being used. The end walls 44 of the carrier cradle substantially register with the end walls of the magazine. Movable across the bottom of the magazine are two similarly formed, but oppositely positioned, slicing knives or bars 66 and 68. The bottom faces of these bars terminate in points at their adjacent ends and the said bars have inclined faces extending upward from their said pointed ends. The bars are connected together for reciprocable movement in unison, and they move in one direction during one cycle and in the opposite direction during the next following cycle. They are shown as moving from left to right.

With the carrier 10 at the magazine station as shown in Figs. 3 and 4, the cradle is so positioned that the top surfaces of the transverse ribs 46, 46 and of the end walls 44, 44 are above the path of movement of the bottoms of the slicing bars, the lower parts of the said bars traveling within the several notches 48, 48. It will be seen that the slicing bars support the fibers which are vertically above them, and that the fibers between the ends of the two bars are free to move downwardly onto the carrier, some of the fibers being supported by the top surfaces of the front and rear walls 40 and 42 of the cradle, and some of them being supported by the top surfaces of one or more of the transverse ribs 46, 46. As the bar 68 is withdrawn it permits the mass of fibers to move downward so that a part thereof engages and is supported by the cradle as aforesaid, and as the bar 66 advances it slices off layers of fibers, which layers remain on the cradle. Inasmuch as the top surfaces of the transverse ribs 46, 46 are above the level of the bottom faces of the slicing bars, the fibers supported by the said transverse ribs are not sliced from the mass and they remain in the magazine. Thus the advancing bar 66 serves merely to slice off layers of fibers in the spaces between the transverse ribs 46, 46 and the end walls 44, 44. The net result is that the cradle of the carrier, instead of receiving a continuous layer of fibers, receives a plurality of longitudinally spaced layers of fibers as determined by the spacing between the transverse ribs and the end walls.

The thickness of the layers of fibers can be changed by adjusting the cradle 38 with respect to the main body of the carrier in the manner already described. To obtain thicker layers the cradle is adjusted downward and to obtain thinner layers the cradle is adjusted upward.

Immediately following the movement of one of the slicing bars across the bottom of the magazine to slice off layers of fibers, the carrier is moved downward and forward to a twisting station in register with the twisting mechanism hereinafter referred to. It has already been stated that a partial vacuum is maintained within the carrier and this serves to hold the fibers in place during forward and downward movement of the carrier. Before twisting takes place an upper wire W is deposited on the carrier immediately above the fibers and the lower wire, the layers of fibers being positioned between the two wires and being longitudinally spaced apart as aforesaid by the ribs 46, 46. Preferably, the upper wire is deposited automatically during forward movement

by means of the aforesaid wire feeding mechanism.

The wire twisting mechanism is shown in Figs. 5 and 6 and is more fully shown in the said copending application. As shown, the twisting mechanism is carried by the slide 12 so that it moves rearward and forward with the carrier 10. It comprises a nonrotatable vise generally indicated at 70, and a rotatable chuck generally indicated at 72. The vise and the chuck include relatively movable jaws which are engageable with the ends of the wires W, twisting being effected when the wires are gripped by the jaws and when the chuck is rotated. The vise 70 is movable toward the right during twisting to accommodate the shortening of the effective length of the wires. The vise 70 has a vertical slot 74 for the downward entry of the wires into the vise during rearward and forward movement of the vise with the carrier. The chuck has a similar slot 76 which is in vertical position during rearward and forward movement and which serves for entry of the wires.

The means for controlling the wire gripping jaws and the rotation of the chuck is not a part of the present invention. Ordinarily, the jaws are engaged manually by suitable mechanism, and the rotation of the chuck is started manually by suitable mechanism. The rotation of the chuck is automatically stopped after a predetermined amount of twisting.

Substantially simultaneously with the starting of chuck rotation to effect twisting, the carrier 10 is lowered from the position shown in Figs. 6, 8 and 10. Such lowering is effected manually by suitable mechanism which moves the slide 20 downward, the roller 24 entering the cam groove extension 30. The downward movement of the carrier is necessary in order that it may not interfere with the rotative movement of the fibers during twisting. After the carrier has been moved downward, the fibers F are supported solely by the upper and lower wires W.

When the fibers are supported solely by the wires and before the wires have been twisted to grip the fibers, the said fibers are only loosely held and some of the fibers at the ends of the spaced layers might shift endwise or angularly with the result that the ends of the layers would not be sharply defined. In order to avoid any possible shifting of the fibers prior to the gripping thereof by the twisting of the wires, the mechanism to be now described is preferably provided.

A longitudinal bar 78 is provided at the front of the carrier, this bar carrying transverse fingers 80, 80 which register with the transverse ribs 46, 46 of the carrier cradle and transverse fingers 82, 82 which register with the end walls 44, 44 of the carrier cradle. Each of the fingers 80 is provided with two depending fiber retaining elements 84, 84 which are positioned to enter the before described vertical grooves or channels at the opposite sides of the corresponding rib 46. Each of the fingers 82 is provided with a depending fiber retaining portion or element 86 which is positioned to enter the notch 48 in the corresponding end wall 44. The fiber retaining elements 84, 84 are bifurcated to straddle the wires W as shown most clearly in Fig. 2, and the retaining elements 86, 86 are notched to receive the wires. Immediately before the carrier is lowered, as before described, the bar 78 and the fingers 80, 80 and 82, 82 are lowered to move the fiber retaining elements 84, 84 into their respective vertical grooves or channels and to move the fiber retaining elements 86, 86 into the corresponding notches 48, 48. The several fiber retaining elements are thus positioned at the ends of the spaced layers of fibers. With the retaining elements in place as described, the carrier is lowered to permit rotative movement of the fibers during twisting, but the fiber retaining elements remain momentarily in position to prevent any shifting of the end fibers of the several layers. Immediately after the starting of twisting the bar 78 and the parts carried thereby are lifted.

The bar 78 is supported on an upright strut 88 secured to the front of the machine, and it is pivotally movable about a longitudinal horizontal axis at 90. Preferably there is a frame 92 which is directly pivoted to the strut 88, the bar 78 being supported on the said frame. Downward movement of the frame 92 and of the bar 78 and of the parts carried by the latter may be limited by a stud 94 projecting downward from the frame 92 and engageable with the top of the bracket 22 as shown in Fig. 10. The stud 94 is movable with respect to the frame and is normally held in its lowermost position by a spring 96.

A latch 98 is pivoted on a stud 100 projecting rearward from the strut 88, and this latch has a notch therein as shown in Fig. 9 for engaging a portion of the frame 92. When the notch in the latch is engaged with the frame 92, the said frame and the bar 78 and the parts carried by the latter are held in their upper positions as shown in Fig. 7. Connected with the latch 98 is a rod 102 which extends longitudinally and is manually engageable. A spring 104 extends between the rod 102 and the frame 92, this spring serving to bias the frame downward and to bias the latch 98 toward its operative position.

A lever 106 is carried by a bar 108 projecting rearward from the strut 88, the said lever being movable about a longitudinal horizontal axis at 110. A link 112 is pivotally connected at its upper end with the frame 92 and is pivotally connected at its lower end with the front end of the lever 106. The rear end of the lever 106 carries a screw 114 which is positioned to be engaged by the bottom of the carrier 10 when the said carrier is moved downward.

In operation the frame 92 and associated parts are normally held in their upper position by the latch 98. When the carrier with the wires and fibers thereon has been moved to its forward position or station, as shown in Figs. 5, 6 and 7, and when the wires have been engaged by the jaws of the vise and of the chuck, the operator presses the rod 102 downward to disengage the latch 98 from the frame 92. When so disengaged the frame moves downward by gravity and by the action of the spring 104, the fiber retaining elements on the fingers 80, 80 and 82, 82 moving to their operative positions as already described. Downward movement of the said fiber retaining elements is limited by the engagement thereof with the carrier or with the upper wire W, and is ordinarily not limited by engagement of the stud 94 with the bracket 22.

Then the operator substantially simultaneously starts the rotation of the chuck 72 and moves the carrier 10 downward. As the carrier moves downward it is separated from the fibers and from the fiber retaining elements 84, 84 and 86, 86, the said elements remaining momentarily in engagement with the end fibers of the several layers to prevent shifting of the said fibers. It will be seen that the retaining elements 84, 84 and 86, 86 do not interfere with rotative movement of the fibers during twisting. As the carrier approaches its

lowermost position it engages the screw 114 on the lever 106. By this time twisting has started and the fibers are firmly held by the partly twisted wires. Continued downward movement of the carrier after engagement with the screw 114, causes the lever 106 to turn in the clockwise direction. As the lever 106 so turns it acts through the link 112 to lift the frame 92 and the fiber retaining elements, the frame being automatically engaged and held by the latch 98.

Preferably, the bar 78 is not rigidly connected with the frame 92, but is so connected therewith as to permit limited relative pivotal movement about a transverse axis. As shown, the frame 92 includes a longitudinal bar 116 which is directly below but spaced from the bar 78. A transverse cylindrical pin 118 is seated in grooves in the two bars 78 and 116, and the bar 78 can rock on the pin. The bar 78 is connected with the bar 116 by bolts 120, 120 which are slidable in apertures in the said bar 116. Springs 122, 122 surround the lower portions of the bolts 120, 120 and normally serve to hold the bar 78 in parallelism with the bar 116. However, the springs permit the bar 78 to rock to a limited extent on the pin 118.

Sometimes the wires W are so engaged by the jaws of the vise or of the chuck that the wires rotate somewhat eccentrically during twisting. When the wires rotate eccentrically the bar 78 and the parts carried thereby can rock correspondingly on the pin 118.

What we claim is:

1. The combination in a brush making machine, of a magazine for containing a mass of transverse fibers, a twisting mechanism having an operative position which is spaced from the magazine in a direction perpendicular to the longitudinal lines of the magazine, a carrier for wires and fibers, means for moving the carrier to a position beneath and adjacent the magazine and then to a position in alignment with the operative position of the twisting mechanism, and means operable while the carrier is adjacent the magazine for separating fibers from the mass of fibers in the magazine and distributing them on the carrier in a plurality of longitudinally spaced horizontal layers.

2. The combination in a brush making machine, of a magazine for containing a mass of transverse fibers, a twisting mechanism having an operative position which is spaced from the magazine in a direction perpendicular to the longitudinal lines of the magazine, a carrier for wires and fibers movable to a position beneath and adjacent the magazine and then to a position in alignment with the operative position of the twisting mechanism, the said carrier being provided with a plurality of longitudinally disposed and longitudinally spaced horizontal fiber supporting surfaces and with upward extending transverse ribs between the said surfaces, and means operable while the carrier is adjacent the magazine for separating fibers from the mass of fibers in the magazine and distributing them in a plurality of longitudinally spaced horizontal layers on the said fiber supporting surfaces between the said transverse ribs.

3. The combination in a brush making machine, of a magazine for containing a mass of transverse fibers, a twisting mechanism having an operative position which is spaced from the magazine in a direction perpendicular to the longitudinal lines of the magazine, a carrier for wires and fibers movable to a position beneath and adjacent the magazine and then to a position in alignment with the operative position of the twisting mechanism, the said carrier being provided with a plurality of longitudinally disposed and longitudinally spaced horizontal surfaces adapted to engage and support some of the fibers in the magazine and being provided with longitudinally spaced transverse ribs between the said surfaces which ribs have top surfaces above the level of the first said surfaces and adapted to engage and support other fibers in the magazine and which ribs have open-top notches therein, and two connected longitudinally spaced and longitudinally movable slicing bars at the bottom of the magazine having the adjacent ends of their bottom faces terminating in points, the path of movement of the said slicing bars being such that when the carrier is positioned adjacent the magazine the lower portions of the bars move in the notches in the ribs so that the point of the advancing bar moves beneath the fibers supported on the second said surfaces and slices from the mass of fibers a plurality of longitudinally spaced layers of fibers which are on the first said surfaces and between the transverse ribs.

4. The combination in a brush making machine, of a magazine for containing a mass of transverse fibers, a twisting mechanism having an operative position which is spaced from the magazine in a direction perpendicular to the longitudinal lines of the magazine, a carrier for wires and fibers movable to a position beneath and adjacent the magazine and then to a position in alignment with the operative position of the twisting mechanism, the said carrier being provided with longitudinal front and rear walls the top surfaces of which are adapted to engage and support some of the fibers in the magazine and being provided with a plurality of longitudinally spaced transverse ribs extending between the front and rear walls which ribs have top faces above the level of the first said surfaces and adapted to engage and support other fibers in the magazine and which ribs have open-top notches therein, and two connected longitudinally spaced and longitudinally movable slicing bars at the bottom of the magazine having the adjacent ends of their bottom faces terminating in points, the path of movement of the said slicing bars being such that when the carrier is positioned adjacent the magazine the lower portions of the bars move in the notches in the ribs so that the point of the advancing bar moves beneath the fibers supported on the ribs and slices from the mass of fibers a plurality of longitudinally spaced layers of fibers which are on the said front and rear walls and between the transverse ribs.

5. The combination in a brush making machine, of a magazine for containing a mass of transverse fibers, a twisting mechanism having an operative position which is spaced from the magazine in a direction perpendicular to the longitudinal lines of the magazine, a carrier for wires and fibers movable to a position beneath and adjacent the magazine and then to a position in alignment with the operative position of the twisting mechanism, the said carrier being provided with a plurality of longitudinally disposed and longitudinally spaced horizontal surfaces adapted to engage and support some of the fibers in the magazine and being provided with a plurality of longitudinally spaced transverse ribs between the said surfaces which ribs have top surfaces above the level of the first said surfaces and adapted to engage and support other fibers in

the magazine and which ribs have open-top notches therein, two connected longitudinally spaced and longitudinally movable slicing bars at the bottom of the magazine having the adjacent ends of their bottom faces terminating in points, the path of movement of the said slicing bars being such that when the carrier is positioned adjacent the magazine the lower portions of the bars move in the notches in the ribs so that the point of the advancing bar moves beneath the fibers supported on the second said surfaces and slices from the mass of fibers a plurality of longitudinally spaced layers of fibers which are on the first said surfaces and between the transverse ribs, and means for vertically adjusting the first said fiber engaging and supporting surfaces to vary the thickness of the said layers of fibers sliced from the fiber mass by the slicing bars.

6. The combination in a brush making machine, of a carrier for wires and fibers movable alternately to a magazine station and to a twisting station, the said carrier being adapted to receive a longitudinal wire before it reaches the magazine station and to receive a second longitudinal wire after leaving the magazine station, a magazine at the magazine station for containing a mass of transverse fibers, means operable while the carrier is at the magazine station for separating fibers from the mass of fibers in the magazine and distributing them on the carrier above the first said wire in a plurality of longitudinally spaced horizontal layers, a twisting mechanism at the twisting station adapted to engage the end portions of the said wires to twist them and thus form a brush, and means at the twisting station separate from the carrier for engaging the fibers at the respective ends of the several said layers for retaining the said end fibers in position prior to twisting .

7. The combination in a brush making machine, of a carrier for wires and fibers movable alternately to a magazine station and to a twisting station, the said carrier being adapted to receive a longitudinal wire before it reaches the magazine station and to receive a second longitudinal wire after leaving the magazine station, a magazine at the magazine station for containing a mass of transverse fibers, means operable while the carrier is at the magazine station for separating fibers from the mass of fibers in the magazine and distributing them on the carrier above the first said wire in a plurality of longitudinally spaced horizontal layers, a twisting mechanism at the twisting station adapted to engage the end portions of the said wires to twist them and thus form a brush, means for moving the carrier downward from its initial position at the twisting station to permit rotative movement of the fibers during twisting, and means at the twisting station separate from the carrier for engaging the fibers at the respective ends of the several said layers for retaining the said end fibers in position prior to twisting and after the said layers of fibers have been disengaged by the carrier.

8. The combination in a brush making machine, of a carrier for wires and fibers movable alternately to a magazine station and to a twisting station, the said carrier being adapted to receive a longitudinal wire before it reaches the magazine station and to receive a second longitudinal wire after leaving the magazine station, a magazine at the magazine station for containing a mass of transverse fibers, means operable while the carrier is at the magazine station for separating fibers from the mass of fibers in the magazine and distributing them on the carrier above the first said wire in a plurality of longitudinally spaced horizontal layers, a twisting mechanism at the twisting station adapted to engage the end portions of the said wires to twist them and thus form a brush, means for moving the carrier downward from its initial position at the twisting station to permit rotative movement of the fibers during twisting, a frame adjacent the twisting station movable upward and downward, and elements on the frame so spaced longitudinally that upon downward movement of the frame they engage the fibers at the respective ends of the several said layers to retain the said end fibers in position prior to twisting and after the said layers of fibers have been disengaged by the carrier.

9. A brush making machine as set forth in claim 8, wherein a releasable latch is provided for holding the frame and the fiber retaining elements in their upper inoperative positions, the said frame and elements automatically moving downward into operative positions upon release of the latch.

10. A brush making machine as set forth in claim 8, wherein a releasable and automatically engageable latch is provided for holding the frame and the fiber retaining elements in their upper inoperative positions, the said frame and elements automatically moving downward into operative positions upon release of the latch, and wherein means is provided operably by downward movement of the carrier for moving the frame fiber retaining elements upward to their inoperative positions where they are automatically engaged by the latch.

11. A brush making machine as set forth in claim 8, wherein a longitudinal bar is provided which is connected to the frame for rocking movement about a transverse axis and wherein the fiber retaining elements are carried by the said bar.

12. The combination in a brush making machine, of a carrier for wires and fibers movable alternately to a magazine station and to a twisting station, the said carrier being adapted to receive a longitudinal wire before it reaches the magazine station and to receive a second longitudinal wire after leaving the magazine station and the said carrier being provided with longitudinally spaced fiber supporting surfaces and with upward extending transverse ribs between the said surfaces, a magazine at the magazine station for containing a mass of transverse fibers, means operable while the carrier is at the magazine station for separating fibers from the mass of fibers in the magazine and distributing them on the carrier above the first said wire and on the spaced fiber supporting surfaces in a plurality of longitudinally spaced horizontal layers, a twisting mechanism at the twisting station adapted to engage the end portions of the said wires to twist them and thus form a brush, means for moving the carrier downward from its initial position at the twisting station to permit rotative movement of the fibers during twisting, a frame adjacent the twisting station movable upward and downward, and elements on the frame so spaced longitudinally that upon downward movement of the frame they engage the fibers at the respective ends of the several said layers and adjacent the said transverse ribs to retain the said end fibers in position prior to

twisting and after the said layers have been disengaged by the carrier.

13. A brush making machine as set forth in claim 12, wherein the transverse ribs on the carrier have downward extending grooves in the sides thereof, and wherein the fiber retaining elements on the frame are positioned to enter the said grooves upon downward movement of the frame.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
928,549	Schwartz	July 20, 1909
1,824,140	Hertzberg	Sept. 22, 1931
2,358,443	Cave	Sept. 19, 1944