Feb. 3. 1925. 1,525,246

A. W. LE BOEUF

TUFT FORMING MACHINE

Original Filed May 26, 1916 2 Sheets-Sheet 1

Fig. 1

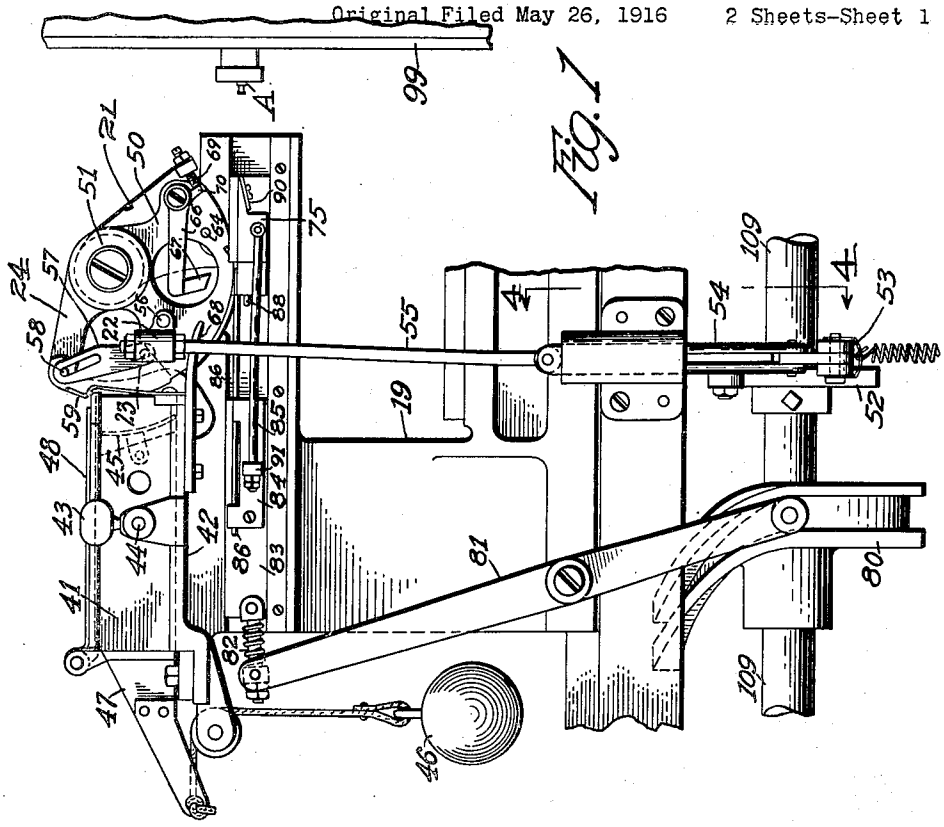


Fig. 2

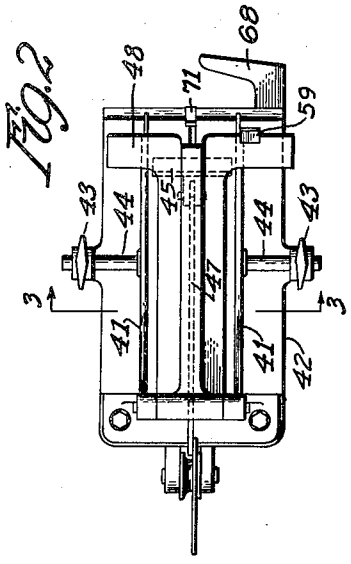


Fig. 3

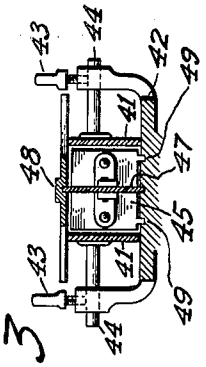
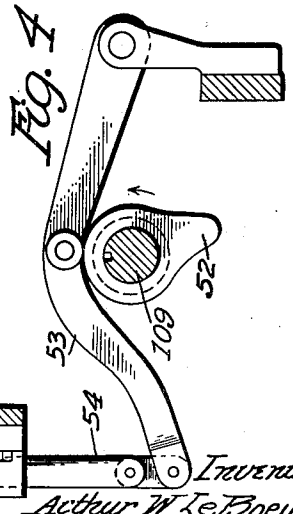


Fig. 4



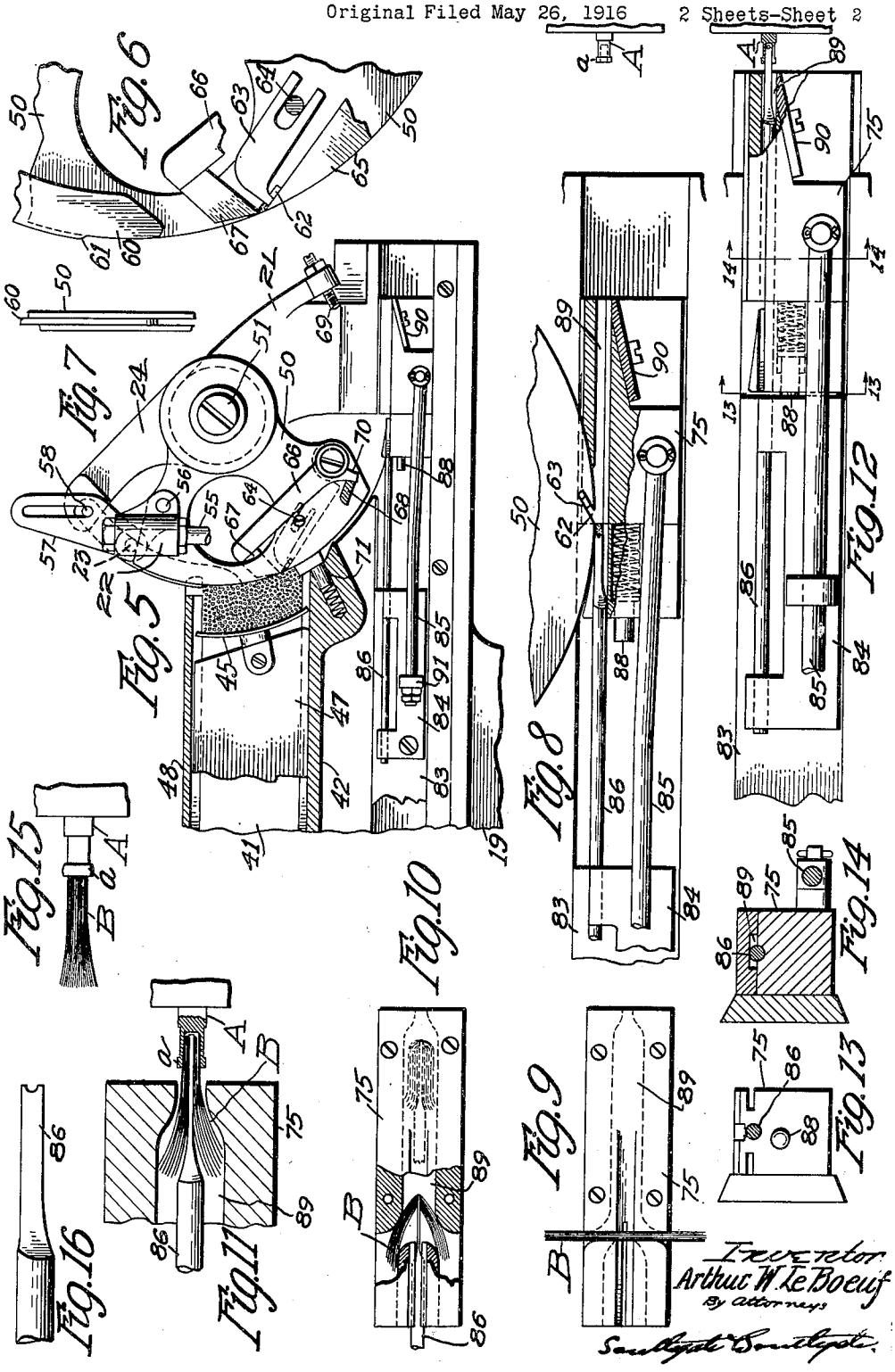
Inventor
Arthur W. Le Boeuf
By Attorneys
Southgate & Southgate.

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Original Filed May 26, 1916 2 Sheets-Sheet 2



Inventor
Arthur W. Le Boeuf
By attorneys
Sandlyke & Sandlyke

Patented Feb. 3, 1925. 1,525,246

UNITED STATES PATENT OFFICE.

ARTHUR W. LE BOEUF, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALFRED THOMAS, OF WORCESTER, MASSACHUSETTS.

TUFT-FORMING MACHINE.

Original application filed May 26, 1916, Serial No. 99,100. Divided and this application filed March 1, 1921. Serial No. 448,928.

To all whom it may concern:

Be it known that I, ARTHUR W. LE BOEUF, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and useful Tuft-Forming Machine, of which the following is a specification.

This is a division of my original Patent 1,449,424, granted March 27, 1923, on an application originally filed May 26, 1916, Ser. No. 99,100.

This invention relates to an automatic machine for manufacturing brush tufts of the type in which the bristles are first set in cups to form the tufts which afterwards are set in brush blanks.

The principal objects of the invention are to provide a machine of compact form so that the various parts thereof can be mounted on a small frame and take up very little space, which machine will be capable of manufacturing tufts or bristles automatically; that is, taking these bristles from a hopper and feeding them automatically through the machine, and applying them to a bristle holding means or cup in which they are secured, preferably on the machine, and thus forming the tufts; to provide improvements in the bristle feeding and tuft-forming mechanism of such a character that the bristles, which are difficult to handle on account of their natural resiliency, will be taken up in bunches of definite sizes, fed forward, doubled over so as to form a tuft, and then inserted in a hollow cup, and to provide improvements in means for operating and co-ordinating the various parts of the mechanism as above described and in the various details and combinations thereof. Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which—

Fig. 1 is a front view of part of a tooth brush making machine embodying this invention;

Fig. 2 is a plan of the bristle hopper;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a detail view of the cam for operating the bristle feeding and connected parts in section on the line 4—4 of Fig. 1;

Fig. 5 is a longitudinal sectional view of the bristle hopper showing the feeding mechanism in the position in which it has just taken up a bunch of bristles;

Fig. 6 is a similar view of the bristle feeding device on enlarged scale showing it in the same position;

Fig. 7 is an edge view of a portion of the same;

Fig. 8 is a front elevation of the lower portion of the bristle feeding device shown partly in section and showing the bunch of bristles brought down into position ready for the tuft to be formed;

Fig. 9 is a plan of a portion of the same showing the position of the bristles just before the tuft is formed;

Fig. 10 is a similar view showing in full lines the starting of the formation of the tuft and in dotted lines the tuft forced along to a subsequent position;

Fig. 11 is a similar view on enlarged scale showing the tuft of bristles forced into the cup;

Fig. 12 is a front view showing the parts in the same position;

Figs. 13 and 14 are sectional views on the lines 13—13 and 14—14 of Fig. 12;

Fig. 15 is a side view of the cup with its tuft or bristles located therein, and

Fig. 16 is a side view of the needle for forming the tuft.

The invention is illustrated in the form of a machine for making tooth brushes in which what I call the main shaft 109 runs longitudinally of the machine. This shaft operates most of the mechanism connected with the feeding of the bristles and the making of the tufts.

As has been stated the tufts are formed by forcing bunches of bristles into metallic cups, and these cups can be made on this machine, but I have not shown the details herein as they are shown in my original case above specified. For this purpose wires A preferably of aluminum, are supported on supporting reels. The details of this reel will not be described as they do not constitute a part of this invention.

These reels are located about a central shaft mounted on a stationary turret frame 99 carrying the wire turret which rotates. It will be understood of course that this turret is provided with a plurality of heads, each pair designed to hold the wire while some operation is being performed upon it

as shown in my original patent above identified.

The drill having performed its drilling operation the turret is then indexed around. In another position the turret brings the blank into the position for filling. In this position the head of the turret which supports the blank does not rotate. The tuft of bristles B is introduced longitudinally into the end of the blank while held in this position by means that will be described below. It is sufficient to say that it is pushed in positively and the pushing means drawn out so as to leave the doubled over part of the bristles extending to the bottom of the hole drilled in the blank and projecting from the mouth thereof.

Each indexing of the turret brings one blank around to the position shown in Fig. 1.

Referring now to Figs. 1 and 2 it will be seen that the machine is provided with a bristle hopper on the frame 19. This comprises adjustable sides 41 supported on a base 42. These sides are adjusted toward and from each other and held in adjusted position by clamping screws 43 engaging guide rods 44 secured to the sides. It will be observed that the bristles are located in this hopper transversely and horizontally, the hopper being adjusted to the proper width to receive them without doubling or bending in any way. The rear of the hopper is closed by a concave plate 45 slidable along the hopper and normally urged forward by a hanging weight 46. Connecting the weight with this rear plate 45 is a feeder slide 47 operating in a guide groove in the bottom 42 and another in the cover 48. The cover is pivoted to the frame and held down by a spring 59. The bottom 42 is also provided with two other grooves 49 for receiving projections on the bottom of the plate 45 and guiding the same. This plate is shown arcuate in cross section to conform to the shape of the oscillating carrier 50 which is mounted to oscillate on a stud 51 for the purpose of feeding the bristles. This stud is mounted in a fixed bracket 21 on the frame 19.

The carrier 50 is formed of two plates spaced apart and is oscillated by a cam 52 on the shaft 109 through a lever 53. This operates a vertically reciprocating slide 54 operating in a guide and connected with a substantially vertical link 55. On the top of this link is a head 22 to which is pivoted a pin 56 fixed on the oscillating carrier. On the head is a second pin 23 to which a link 57 is pivoted. The reciprocation of this slide 54 oscillates the carrier and moves the link 57 up and down. A substantially vertical slot in this link receives a pin 58 mounted at the end of a retaining arm 24 oscillatable on the stud 51 and with this lost motion oscillates the same. This pin 58 also passes through a bristle retainer 60 rigid on the arm 24 and adapted to hold the bristles in the hopper when the transferring part of the carrier has moved down beyond them. This has a slight swell 61 for pushing the front bristles down, during the downward motion. This retainer 60 is located in the space between the two sides of the carrier.

Through the edge of the oscillating carrier extends a notch 62 for receiving the bristles. This notch is provided with an adjuster 63 in the slot between the sides of the carrier, which by means of a screw 64 can be secured in adjusted positions along the notch to regulate its depth and consequently the size of the bunch of bristles to be received in it. The bottom of this notch is formed by a distance piece 65. Pivotally mounted on the carrier is an arm 66 having a projecting end 67 constituting a bristle lock. This end is angular in form and is located between the two sides of the carrier. The arm 66 is frictionally held on its stud so that it remains in any position in which it is placed. Mounted in stationary position on the frame 19 is a stop 68 and there is also another stop 69 which is stationary or adjustable for engaging a projection 70 on the arm 66 at alternate oscillations of the carrier. At the bottom of the bristle hopper is a spring-pressed plunger 71 projecting slightly into the hopper and providing a square base for the bristles nearest the carrier.

The movement of this carrier upwardly causes the notch 62 to pass along the bristles held by the hopper and on account of its angle they are forced inwardly so as to fill it. At the end of the upward motion the projection 70 comes into contact with the stop 68 and forces the bristles lock 67 into this notch so as to close it, excluding all the bristles beyond the edge of the lock and thus ensuring the exact filling of the notch with bristles. The parts then start downward and are maintained in this position during the downward stroke. At the end of the downward motion the projection 70 comes into contact with the stop 69 and raises the lock 67 so that the bristles are left free to be moved out of the notch and immediately thereafter the bristles come up against the flat end surface of the bristle guide 75, as shown in Fig. 9. The remainder of the motion of the carrier 50 beyond this position results in forcing the bristles out at that point and leaving the bunch of bristles lying on a flat surface of the bristle guide, as shown in Figs. 8 and 9.

On the shaft 109 is a needle cam 80 a lever 81 connected to a spring pin 82 for operating a bristle slide 83. This is mounted to slide in guideways on this part of

the frame 19. This slide 83 carries on it a plate 84 having a perforated lug 91 through which a rod 85 is free to slide and it also carries a fixed bristle needle 86 shown in Figs. 1 and 16. Mounted to slide in the same ways with this slide is the bristle guide 75 heretofore mentioned. This is connected pivotally with the end of the rod 85 and is provided with a spring-pressed pin 88 projecting out rearwardly from it and has a guide slot 89 through it for the needle. At the bottom of the bristle guide there is an inclined plate 90 which forms the edge of the passage 89 at the bottom.

It will be seen that the forward motion of the slide 83 carries with it positively the needle 86 which gathers the bristles in the notch at its end at the position shown in Figs. 8 and 9 and proceeds to push the bristles through the slot 89 as indicated in full lines in Fig. 10. At this time the bristle guide 75 is in stationary position, being held by its friction with the passage in which it operates. Further motion of the slide and needle result in bringing the bristles into the position shown in dotted lines in Fig. 10. Then the slide engages the plunger 88 and finally the guide 75, after the needle has projected through the end of the guide and extends therefrom with the tuft of bristles surrounding its end and yet retained back in the narrow contracted throat of the passage 89. This causes this tuft of bristles to be forced into the metallic cup which has been formed, all of which is illustrated in Figs. 11 and 12. The completion of the stroke in that direction having been effected the slide starts back taking with it the needle and when it reaches nearly the end of the stroke the lug on the plate 84 engages the nut on the end of the rod 85 and pulls the bristle guide back with it throughout the rest of the stroke so as to leave it finally in the position shown in Fig. 8.

Operation.

The operation of the machine is as follows:—A plurality of wires A, as stated, are located on the wire-carrying reel which is capable of rotating in its supports with the cup-forming turret. This turret is rotated intermittently, a step at a time, and one wire having been pushed forward through the first chuck or head is stopped in a definite position. The drilling operations having been completed, the head rotates another step and the first mentioned blank is then brought up into position to receive a tuft of bristles. It will be understood that the head is stopped here while the tuft is inserted in the cup. Neither the head nor the wire rotates while the tuft is being applied to the latter.

The bristles are placed in the hopper and constantly pressed toward the discharge end thereof. The oscillating bristle gathering device oscillates past the exposed end of the hopper and gathers up as many bristles as its notch will hold according to its adjustment. In gathering these it takes them at their centers preferably and forcibly pulls them out of the hopper, their ends yielding on account of the natural resiliency of the bristles. The tuft of bristles thus gathered is brought down to the slide below and laid on the guide up against the stop. While in this position the needle reciprocates through the passage in the guide, taking with it the bunch of bristles through the straight passage, doubling them up about its end in the process. The needle forces the tuft of bristles thus formed straight out into the metallic cup, which is at that time in alignment with the needle, and leaves them in this cup. This needle is withdrawn and the tuft is permanently secured in the cup as by means shown in my above mentioned patent.

It will be seen therefore that this machine is entirely automatic, forming the bristles into tufts, and forcing the tufts into the holes in the wires so as to produce the complete tuft which needs only to have the bristles trimmed down to the proper length after it leaves the machine. The bristles are separated into bunches, doubled, and conveyed from one position to another in the machine automatically and there is no need for any expert oversight of the operations. Practicallv all that the operator has to do is to see that the machine is running, and to see that it is properly supplied with the raw products which it uses.

Although I have illustrated and described only a single embodiment of the invention and shown it as applied to a definite character of brush tuft I am aware of the fact that many modifications can be made in the details of construction and combinations of parts of the mechanism and that it can be applied to the manufacture of other types of brush tufts without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited in these respects, but what I do claim is:—

1. In a tuft forming machine, the combination of a movable bristle carrier, a slide having a passage therein adapted to receive a bunch of bristles from the carrier as the carrier moves adjacent thereto, a second slide having a needle thereon for engaging said bristles and forcing them through the passage, means carried by the second slide for engaging the first slide on the forward motion and moving it forward with it at the end of its stroke, and means on the second slide for drawing the first slide back with the second slide on the reverse motion.

2. In a tuft forming machine, the combination of a hopper for bristles having an open end, a swinging member mounted centrally with respect to said end for engaging the centers of the bristles and holding them in the hopper in all positions of said oscillatable member, said member having a notch in the edge thereof for receiving bristles therein and provided with a locking arm pivotally mounted thereon and frictionally held thereon in any position in which it is placed and having an outwardly projecting end for moving into the notch at the end of the stroke and locking the bristles in the notch, and stationary means for moving said arm out of the notch at the opposite end of the stroke to permit delivery.

3. In a tuft forming machine, the combination of a bristle hopper having an open end, an oscillatable member located in front of the center of said end having a notch therein for receiving bristles as said member oscillates along a front surface of the hopper, a retaining arm carried by said member having a radial end for engaging the bristles and holding them in the notch when the member oscillates away from the hopper, and means movable tangentially for delivering the bristles from the notch in the latter position.

4. In a tuft forming machine, the combination of a movable carrier having an inclined notch in its edge for receiving bristles, a bristle guide having a flat surface with a passage therethrough, said carrier being located in position to move into said passage, whereby said flat surface will engage the bristles on the opposite sides of the carrier and hold them while the carrier moves beyond them, and a needle movable through said passage for engaging the bristles at their centers and pushing them through the passage to form a tuft.

5. In a tuft forming machine, the combination of a movable carrier for receiving bristles, a bristle guide having a flat surface with a passage therethrough, said carrier being located in position to move into said passage, whereby said flat surface will engage the bristles on the opposite sides of the carrier and hold them while the carrier moves beyond them, a needle movable through said passage for engaging the bristles at their centers and pushing them through the passage to form a tuft, said passage being narrowed at its end for compressing said bristles against the needle, and means for holding a cup in axial alignment with said passage for receiving the tuft of bristles therefrom.

6. In a tuft forming machine, the combination of a movable carrier having means for receiving bristles, a bristle guide having a flat surface with a passage therethrough, said carrier being located in position to move into said passage, whereby said flat surface will engage the bristles on the opposite sides of the carrier and hold them while the carrier moves beyond them, a needle movable through said passage for engaging the bristles at their centers and pushing them through the passage to form a tuft, and means whereby as the needle moves forward the guide will be held in stationary position until the needle moves through the end of the passage and will then be moved forward with the needle throughout the remainder of its motion.

7. In a tuft forming machine, the combination of a bristle carrier, a slide having a passage therein near one surface adapted to receive a bunch of bristles from the carrier as the carrier moves adjacent thereto, a positively operated slide having a needle fixed thereon for engaging said bristles and forcing them through the passage, a link connected with the first named slide, and means on the second slide for guiding said link and for drawing the first slide back with the second slide on the reverse motion.

8. In a tuft forming machine, the combination of a bristle carrier, a slide having a passage therein near one surface adapted to receive a bunch of bristles from the carrier as the carrier moves adjacent thereto, a positively operated slide having a needle fixed thereon for engaging said bristles and forcing them through the passage, a link connected with the first named slide, and means on the second slide for guiding said link and for drawing the first slide back with the second slide on the reverse motion, said link being longer than the needle, whereby on the forward motion the second slide will engage the next slide and move it forward with it at the end of its stroke.

9. In a tuft forming machine, the combination of a movable bristle carrier, a slide having a passage therein adapted to receive a bunch of bristles from the carrier as the carrier moves adjacent thereto, a second slide having a needle thereon for engaging said bristles and forcing them through the passage, a rod pivotally connected with the first named slide and slidably connected with the second slide, and means on the second slide for drawing the first slide back with the second slide on the reverse motion, said rod being longer than the needle, whereby on the forward motion the second slide will engage the first slide and move it forward with it at the end of its stroke.

10. In a tuft forming machine, the combination of a bristle carrier, a slide having a passage therein in position to receive a bunch of bristles from the carrier as the carrier moves adjacent thereto, a slide having a needle fixed thereon for engaging said bristles and forcing them through the passage, means for reciprocating the first named

slide, and means on the second slide for drawing the first slide back with the second slide on the reverse motion.

11. In a bristle feeding device, the combination with a hopper for the bristles having an arcuate delivery end, an oscillatable bristle carrier having a surface fitting said arcuate end and pivoted at the center of the arc thereof, an arcuate bristle retainer carried and guided by the carrier, and means for moving the retainer along the delivery end of the hopper after the carrier has started to move on its delivery stroke.

In testimony whereof I have hereunto affixed my signature.

ARTHUR W. LE BOEUF.