

(No Model.)

2 Sheets—Sheet 1.

A. C. ESTABROOK.

MACHINE FOR BUNCHING BRISTLES.

No. 351,908.

Patented Nov. 2, 1886.

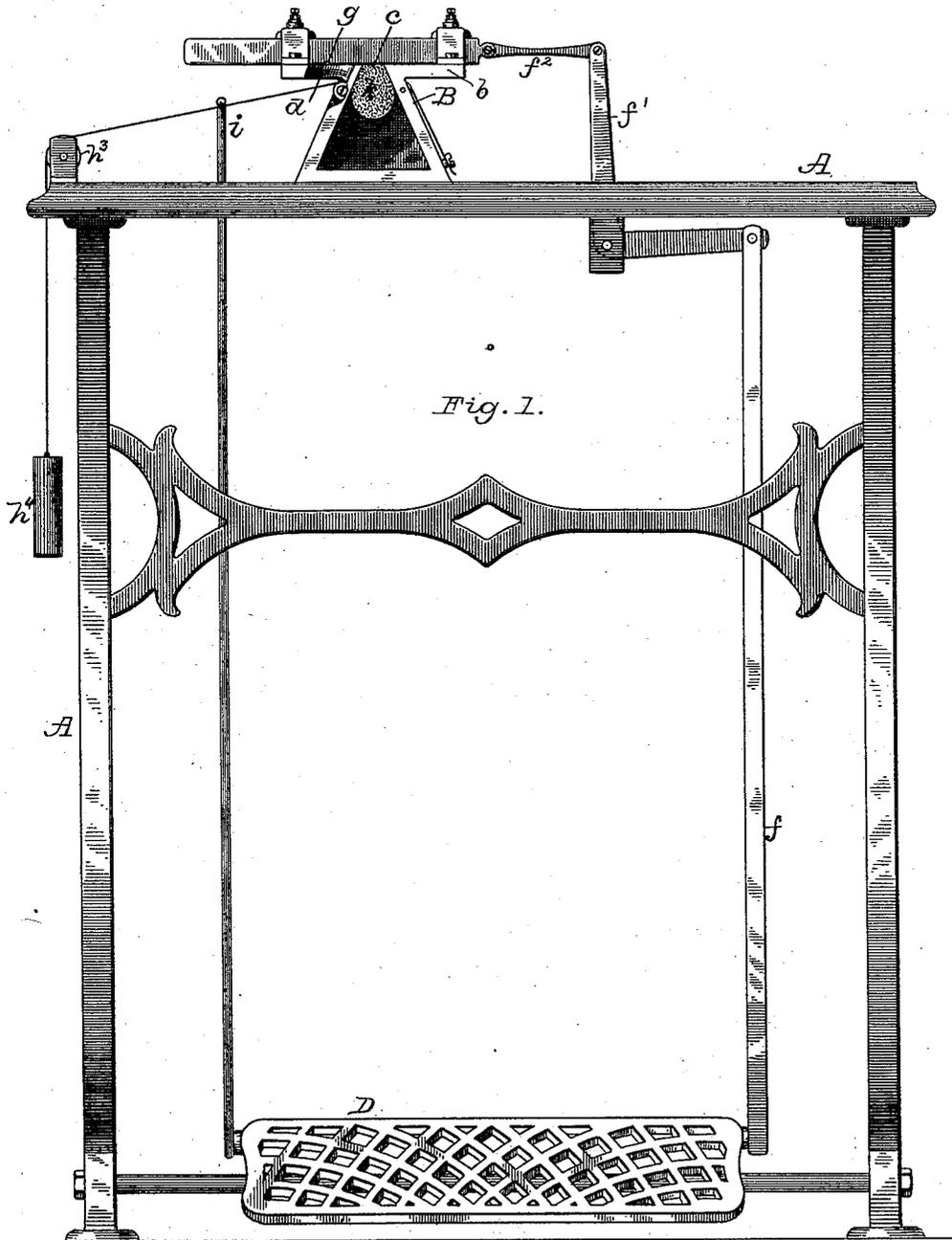


Fig. 1.

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(No Model.)

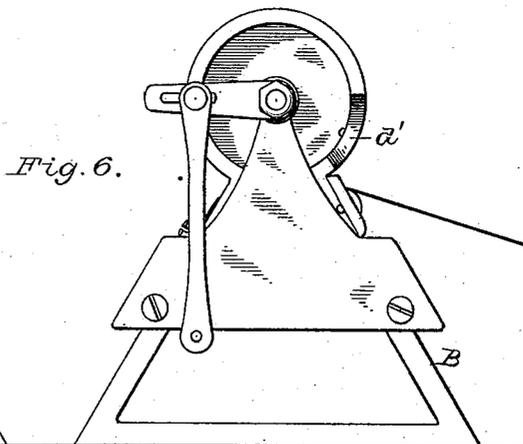
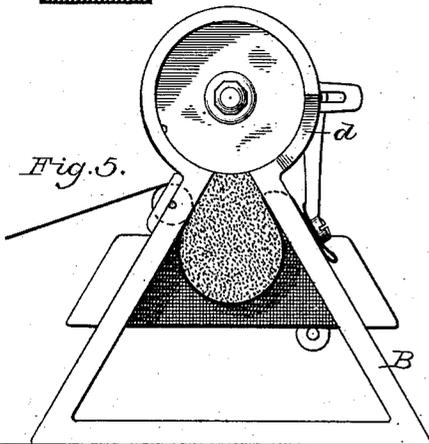
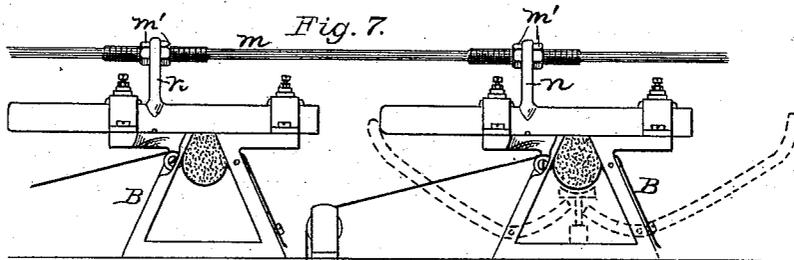
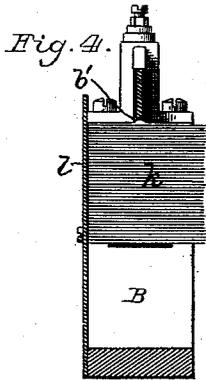
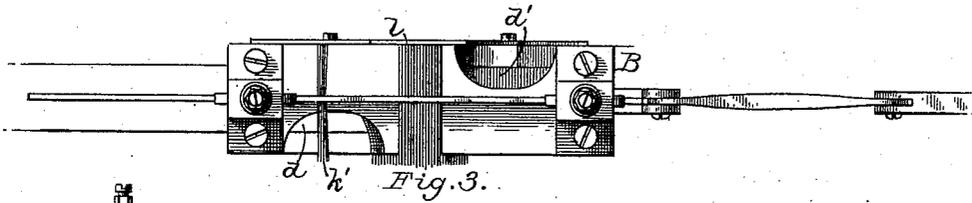
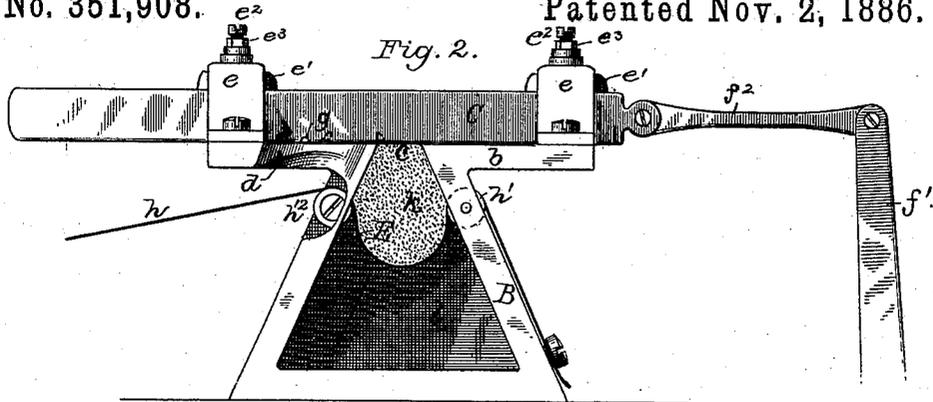
2 Sheets—Sheet 2.

A. C. ESTABROOK.

MACHINE FOR BUNCHING BRISTLES.

No. 351,908.

Patented Nov. 2, 1886.



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UNITED STATES PATENT OFFICE.

ALANSON C. ESTABROOK, OF FLORENCE, MASSACHUSETTS, ASSIGNOR TO
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MACHINE FOR BUNCHING BRISTLES.

SPECIFICATION forming part of Letters Patent No. 351,908, dated November 2, 1886.

Application filed July 17, 1884. Serial No. 137,959. (No model.)

To all whom it may concern:

Be it known that I, ALANSON C. ESTABROOK, of Florence, town of Northampton, in the county of Hampshire and State of Massachusetts, have invented certain new and useful Improvements in Machines for Bunching Bristles for use in the Manufacture of Brushes; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of the several features of my invention.

My said improvements pertain to that well-known class of machines which are relied upon solely for separating from a mass of bristles and so presenting a properly-sized tuft thereof that it may be readily seized by the brush-maker preparatory to mounting it, whether said tuft is to be thereafter doubled at its middle or inserted endwise into the holes in which it is to be mounted or into the holes of well-known tools, as employed in the manufacture of certain kinds of brushes.

Although machines embodying my improvements are capable of general service, I have organized them with special reference to fine work.

All machines of the class above referred to embody either a straight reciprocating sliding blade or a reciprocating rotative disk-blade, both of which have a notch, and sweep with said notch across the surface of a mass of bristles held in a hopper, so that said notch fills itself with bristles and delivers its contents as a tuft of proper size at a point convenient for seizure. In my machines I employ those elements; but in connection with their construction, combination, and arrangement I have devised various improvements with a view to the attainment of the several novel and improved results hereinafter indicated.

One important feature of my invention has for its object the reduction of abrasive friction between the notched reciprocating blade (however it may be constructed) and the mass of bristles, and at the same time enable a machine to serve for two brush-makers, instead of but for one, as heretofore. This end I accomplish by utilizing the forward and the return movements of the reciprocating notched

blade for separating tufts, instead of utilizing the forward movement only, as heretofore, and therefore I not only make one machine serve two brush-makers, but in tufting a given quantity of bristles the notched blade is reciprocated only half as many times as heretofore, and hence the bristles exposed to friction are proportionably less liable to injury by abrasion.

Another feature of my invention has for its object a specially favorable presentation of the bristles in mass to the action of the notched reciprocating blade. Heretofore in these machines the bristles have been massed in a box-hopper and forced toward the delivery end of the hopper and against the notched reciprocating blade by a weighted follower, either in the form of a block or of a lever, so that pressure is only applied upon one end of the mass of bristles; but I have now for the first time devised a flexible and contractible hopper, which has a mouth across which the notched blade reciprocates, and which exerts pressure upon the mass of bristles (by means of weights or springs) substantially in radial directions toward the mouth of the hopper and toward the reciprocating blade, which in one sense is, as heretofore, a part of the inclosing-wall of the hopper. I have also devised an agitator by which the flexible portion of the hopper is intermittently vibrated, thus keeping the mass of bristles in a condition favorable for their advancement toward the reciprocating device by constantly varying the pressure upon the mass of bristles. In this connection, I will state that it is not new to employ cords or wires controlled by weights for compressing bristles within a hopper, or for forcing them toward a delivery aperture; but such have always heretofore been employed merely for solidifying the mass of bristles, so that a notched needle could be forced through some part of said mass, and to enable the notch of the needle to be properly filled preparatory to forcing a tuft in a doubled-up condition through a tube, as, is for instance, illustrated in the United States Letters Patent of Taylor and Davis, May 1, 1845, No. 4,027.

Certain minor improvements made by me will be designated in connection with the fol-

lowing detailed description, after which the several features of my invention will be specified in the several clauses of claims hereunto annexed.

5 Referring to the drawings, Figure 1 is a side view of a machine containing a straight reciprocating sliding blade and embodying all of my improvements. Fig. 2 is an enlarged side-view of the upper part of the same. Fig. 10 3 is a top view of Fig. 2. Fig. 4 is a vertical longitudinal central section of the same above the table. Fig. 5 is a side or front view of a machine containing a reciprocating disk-blade embodying some of my present improvements, 15 and although said machine is made the subject of a separate application for Letters Patent, it is here shown for illustrating the application thereto of certain features of my invention herein intended to be broadly claimed. 20 Fig. 6 is a rear view of the machine, Fig. 5. Fig. 7 illustrates the coupling of two or more machines like Fig. 1, as when operated simultane- ously.

The table or stand A may be variously constructed, according to circumstances, without 25 departure from my invention. Sometimes the table may be a mere shop-bench; but as here shown it is light, portable, and ornamental, and specially adapted for use in connection 30 with such factories as employ brush-makers who work at home.

The frame B of the machine may also be variously constructed without departure from my invention; but as here shown its base is 35 of triangular outline, having a bottom plate, by which it is secured to the top of the table by screws or bolts. The top of the frame is varied in its construction, according to the particular form of notched blade employed.

40 In Figs. 1, 2, 3, and 4 the frame B has a straight-surfaced top plate, *b*, the top of which serves (in connection with the notched blade, to be hereinafter described) as a notch-closing and tuft-bearing surface, and said top plate 45 may be separately formed and secured to the base, but can be more economically constructed, if integral therewith, in the novel form shown. At a central point said top plate is cut away from side to side, as at *c*, to form the mouth 50 of a hopper, as will be hereinafter described. At its opposite edges, on both sides of the hopper-mouth *c*, the top plate, opposite the outer ends of the notch-closing surfaces, is cut away, as at *d* and *d'*, to afford finger-spaces for the 55 convenient grasping of tufts of bristles by brush makers seated on opposite sides of the machine. At each end of said top plate there is a vertical standard, *e*, slotted in line with the center of the plate. In the slots of these 60 standards the straight reciprocating notched blade C is mounted, each standard having a gib, *e'*, which bears evenly upon the upper edge of the blade, and is backed up by adjusting-screws *e''*, tapped into threaded holes in the tops 65 of the standards and provided with set-nuts *e'''*. This blade is reciprocated by the foot of the brush-maker acting upon the treadle D,

which is coupled by a rod-link, *f*, to the bell-crank lever *f'*, which at its upper end is coupled to the blade by a link, *f''*. Other 70 means for reciprocating said blade may be employed without departure from my invention.

The tuft-gathering notches heretofore used in the blades of prior machines have always 75 been either inclined, as in straight sliding blades, or tangential, as in disk or rotative blades, so that they could only operate successfully while moving in one direction—viz., the direction in which the notch inclines toward its mouth—and while I do not preclude 80 myself from employing such inclined and tangential notches in connection with certain features of my invention, it is practically impossible to use a single notch of either of those prior forms for delivering tufts at both move- 85 ments of the blade.

The tuft-notch *g* of the blade C is novel, in that it is straight or at right angles to the lower or bearing edge of the blade, which lies in close contact with the upper surface of the top plate 90 *b*, and therefore it can readily fill itself, whether moving forward or backward, and as the result of either movement it will deliver a tuft of bristles at one or the other of the tuft-discharging points *d d'*. While the straight 95 notch has special value in connection with the double delivery of tufts, it has also value with a single delivery, because being straight, or at right angles to the top plate, its edges at its mouth are less liable to cut the bristles 100 than if it be inclined, as heretofore. Although I have devised this organization to accomplish this novel double delivery, by the use of the novel straight notch, said capacity for double delivery is of substantial value, even if inclined 105 notches be relied upon; but in that case two notches oppositely inclined should be employed, as indicated in dotted lines in Fig. 2, and that construction would embrace certain portions of my invention. The back of each 110 blade may be provided with a notch of larger or smaller size, thus involving only a reversal of a blade for varying the size of the tuft, and two or three of such blades, if interchangeable, will provide for the various sizes of tufts 115 desired.

In all prior bristle-bunching machines the tuft-gathering notch in the blade could only be closed at one side of the hopper-mouth, because the blade had but one tuft-bearing or 120 notch-closing surface to co-operate therewith, and if another such surface had been provided it would have been useless for closing a tuft-notch and bearing the tufts, because no notched blade in any bristle-bunching machine known to me prior to my invention was 125 capable of gathering tufts while moving in both directions across the mouth of a hopper.

Regardless of the particular construction of the blade and its notch or notches, it is im- 130 portant that the bristles be delivered thereto in as favorable a condition as possible. Heretofore the notched blades, whether straight or disk-shaped, have always been below the bris-

tle-hopper, and in onesense they served as the bottom of the whole or a main portion of the hopper, and while the relative positions of my hopper and blade may be reversed without
 5 departure from certain portions of my invention, the location of the hopper below the blade constitutes another important portion of my invention. By feeding the bristles upward into the tuft-notch of the blade there is
 10 obviously a minimum liability of undue displacement of those bristles in the hopper which lie in contact with the edge of the blade, and that portion of the bristles is also immediately under the eye of the workman and readily
 15 accessible for rearranging the bristles with the fingers from time to time should a tendency to derangement ever occur.

In order that the tufts shall be uniform in bulk, it is essential that the bristles should be
 20 parallel with each other and at right angles to the blade when they enter and occupy a notch. When the hopper is above the blade, the bristles fall directly into the notch without any support, except at their central portions, and
 25 hence they are as liable to fall angularly as any other way; but with the hopper below the blade the bristles are lifted into the notch while supported throughout their length by the underlying bristles, and hence the parallelism of the bristles is secured within a notch
 30 and uniform tufts are obtained.

Heretofore machines having a reciprocating notched blade, whether straight or disk-shaped, have had hoppers which were straight-sided, or largest next to the blade; but my
 35 hopper has a contracted mouth, which causes the bristles at the center of the mouth to press upwardly with somewhat greater force than at the sides of the mouth, and therefore, with
 40 properly-adjusted pressure, the notch is readily filled without liability of cutting the bristles which lie next to or alongside the edges of the mouth.

The hopper E here shown is of novel construction; but it is to be understood that without
 45 departure from certain portions of my invention hoppers of other kinds may be employed. The mouth *c* of this hopper has been before described as a lateral opening in the top
 50 plate, *b*, and it will be observed that at each side and below said opening the interior inclined surfaces of the triangular frame constitute small portions of the side walls of the
 55 hopper. The main portion of the side walls of the hopper is flexible, being composed of a band or belt, *h*, of leather, cloth, or similar material, secured at one end to the outside of the frame, passing upward over a roller, *h'*, mounted
 60 in a slot beneath the top plate, on that side, thence downward and upward, to form a contractible bristle-holding loop, to the opposite side of the frame, thence over another roller, *h''*, and downward over a roller, *h'''*, on the table-top, thence through said top, and provided
 65 with a weight, *h''''*, or with a spring for affording a yielding tension upon the band and

a yielding pressure upon the mass of bristles, and gently forcing them by said pressure applied in various directions toward the blade and into the notch therein. Both ends of the
 70 band or belt *h* may be provided with a weight or spring, if desired. This loop-shaped flexible hopper, in combination with a reciprocating blade, whether of the straight or the disk variety, is broadly new; but, as hereinbefore
 75 indicated, strings or wires with weights applied thereto have been heretofore employ for massing bristles, through which a notched needle was thrust for carrying a notch full of
 80 bristles in a doubled-up condition into a tube preparatory to the insertion of the bent tuft into a hole in a brush-back.

The hopper as employed by me enables the bristles to be properly delivered to the notched blade with a minimum of pressure, and therefore
 85 said blade must operate with but little abrasive or cutting effect thereon, and it is but little liable to drag out stray bristles at either side of its notch and then to roll them
 90 to and fro between its bottom edge and the top plate, none of which contingencies can occur in connection with the use of the prior notched needles referred to in connection with said
 prior weighted wires or cords.

In connection with my flexible loop shaped
 95 hopper I employ an agitator, as another novel feature in the combination shown, for varying the pressure on the bristles at every stroke of the blade, and for so agitating the bristles as
 100 to prevent them from getting so packed or set as to prevent their free advancement to the mouth of the hopper. This agitator may be variously constructed and operated without
 105 substantial departure from my invention; but it is preferably organized to vary the tension of the weight *h''''* at each stroke of the blade and permit the latter to operate with intermitting
 110 slight shocks upon the belt or band which forms the flexible walls of the hopper. In its simplest form the agitator is afforded by the rod *i*, having an eye at its upper end, through
 115 which the band *h*, or a cord connected thereto, passes, and it is pivoted at its lower end to the treadle D, as shown in Fig. 1, so that at each rocking movement of said treadle-lever the
 belt will receive the desired shock.

In lieu of the simple agitator shown, one or
 120 two bell-crank levers may be employed for vertically vibrating a rod surmounted by a plate beneath the hopper, as indicated in dotted lines in Fig. 7, said bell crank levers being alternately struck by the ends of the reciprocating
 125 blade; but this or other analogous contrivances would merely involve unnecessary and expensive complication as compared with the agitator shown, which admirably performs the
 desired service.

When the band or belt *h* has a weight or
 130 spring at each end, as hereinbefore indicated, the agitator is applied either beneath the hopper or to the band at both sides of the hopper, so as to more thoroughly enliven the mass of

bristles; but this will seldom be found necessary, except when bristles of extraordinary length are to be employed.

I am aware that for use with notched needles box-hoppers have been vertically reciprocated, and that such hoppers have embodied weighted wires in contact with a mass of bristles forced against one side of the box-hopper; but such an organization is practically incapable of use with a reciprocating blade, and is only suited for use with a reciprocating needle, which is thrust through a portion of the mass of bristles.

The operation of the machine, Figs. 1, 2, and 3, will be readily understood—*k* representing a mass of bristles, and *k'* in Fig. 3 representing a tuft of bristles presented for grasping by the operator at the point *d*, it being obvious that when the blade is next moved in the opposite direction it will deliver another tuft, as shown in dotted lines at the point *d'*, on the opposite side of the machine, and also that at each vibration of the treadle the delivery of a tuft will thus be made. In some cases it is advisable to employ a spring-treadle, which will be rocked in one direction by its spring and in the other by the foot of the brush-maker in a manner well known. The means for adjusting the blade to the top plate enables me not only to compensate for wear from time to time, but also to accurately set the plate for properly operating upon filaments of various kinds employed in brush-making. The rear side of the hopper has a plain smooth back plate, *l*, which enables the mass of bristles to be accurately held in the hopper and to be evenly located crosswise of the blade.

When machines like Fig. 1 are intended for factory service, a series of them should be mounted in line in the center of a bench accessible to brush-makers at both sides thereof. In Fig. 7 two machines are illustrated, having blades coupled together by means of the rod *m*, mounted in guide-bearings and continually reciprocated by foot or steam power. Each blade has a vertical arm, *n*, the upper end of which is located between nuts *m'*, mounted on threaded portions of the rod *m*, thus affording a readily-adjustable connection, and enabling any one machine of a series to stand idle, if necessary. As a rule, it will not be desirable to have more than, say, six machines in line for serving from six to twelve persons, who, being graded as to skill, will be constantly prompted to give close attention to duty and result in a minimum loss of time. Although each machine is adapted to serve two persons, they can of course be used to advantage for serving one person, in which case it is generally desirable that the treadle be blocked for limiting its movement in one direction for limiting the movement of the blade.

With the notched edge of the blade in full contact with the surface of the top plate, at each edge or side of the hopper-mouth, there is a liability of cutting bristles when by chance they lie crosswise in said mouth, and to reduce

said liability to a minimum the blade-bearing *b'* is slightly elevated above the surface of the top plate, and has pointed ends adjacent to the hopper-mouth, thus presenting but little area of shearing-surface, and enabling a crosswise bristle to either be wholly arrested by said points or to pass freely upward into the notch.

Referring now to the machine shown in Figs. 5 and 6, it is to be understood that it constitutes the subject of a separate application for Letters Patent; but it is here illustrated for the purpose of showing the applicability of certain features of my invention herein broadly claimed to machines having both varieties of blade. It will be seen that, although this machine has a notched disk-blade, it has the notch-closing or tuft-bearing surfaces on both sides of the mouth of the hopper and the two delivery-points *d* and *d'* on opposite sides of the machine, and also the flexible hopper, to which the agitator may be applied in precisely the same manner as already described; and, still further, that the hopper may be located beneath the disk, instead of above it, as heretofore.

It is not to be understood that I limit certain portions of my invention to the flexible loop-shaped hopper, composed mainly of such material as leather or cloth, it being obvious that a band of metal or other material, in one piece or several pieces, can be readily substituted therefor, and made to operate in substantially the same manner, with approximately desirable results.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a bristle-bunching machine, the combination, substantially as hereinbefore described, of a bristle-hopper having tuft-bearing or notch-closing surfaces at both sides of its mouth and a reciprocating notched blade movable across said mouth in close contact with said surfaces and capable of gathering tufts of bristles while moving in both directions across the mouth of said hopper, whereby at each stroke of said blade it is enabled to gather and present a tuft of bristles first on one side and then the other side of said mouth.

2. In a bristle-bunching machine, the combination, substantially as hereinbefore described, of a bristle-hopper having at each side of its mouth a straight notch-closing or tuft-bearing surface and a straight longitudinally-reciprocating notched blade in close contact with said surfaces and adapted to gather tufts of bristles when moved in either direction across the mouth of the hopper, whereby at each stroke said blade is enabled to present a tuft of bristles at one or the other of said surfaces.

3. In a bristle-bunching machine, the combination of a bristle-hopper and the straight longitudinally-reciprocating blade, having a tuft-holding notch at right angles to its bearing-edge, substantially as described.

4. In a bristle-bunching machine, the com-

5 bination, with a reciprocating notched blade, of a bristle-holding hopper located below said blade and from which the bristles are delivered upwardly to the blade and its notch, substantially as described.

10 5. In a bristle-bunching machine, the combination, with the notched blade, of a bristle-hopper having a contracted mouth below and crossed by said blade, substantially as and for the purposes specified.

15 6. In a bristle-bunching machine, the combination, with a reciprocating notched blade, of a flexible and contractible bristle-hopper having an open mouth crossed by said blade, substantially as described.

20 7. In a bristle-bunching machine, the combination, with a reciprocating notched blade, of a contractible bristle-hopper composed mainly of a band or belt of flexible material and having an open mouth crossed by said blade, substantially as described.

8. In a bristle-bunching machine, the combination, with a notched blade, of a flexible

bristle-hopper and an agitator for intermittingly varying the pressure of the walls of the hopper against the bristles, substantially as described. 25

9. In a bristle-bunching machine, the combination, with the top plate, the hopper, the notched sliding blade and its slotted standards, of the gibs and their adjusting-screws, substantially as described, whereby the notched blade is adjusted with reference to the top plate, for the purposes specified. 30

10. In a bristle-bunching machine, the combination, with a notched blade and the bristle-hopper, of the frame B, having the interior space for the bristle-hopper, and the top plate co-operating with the blade for closing its notch and having an opening for the mouth of said hopper, substantially as described. 40

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