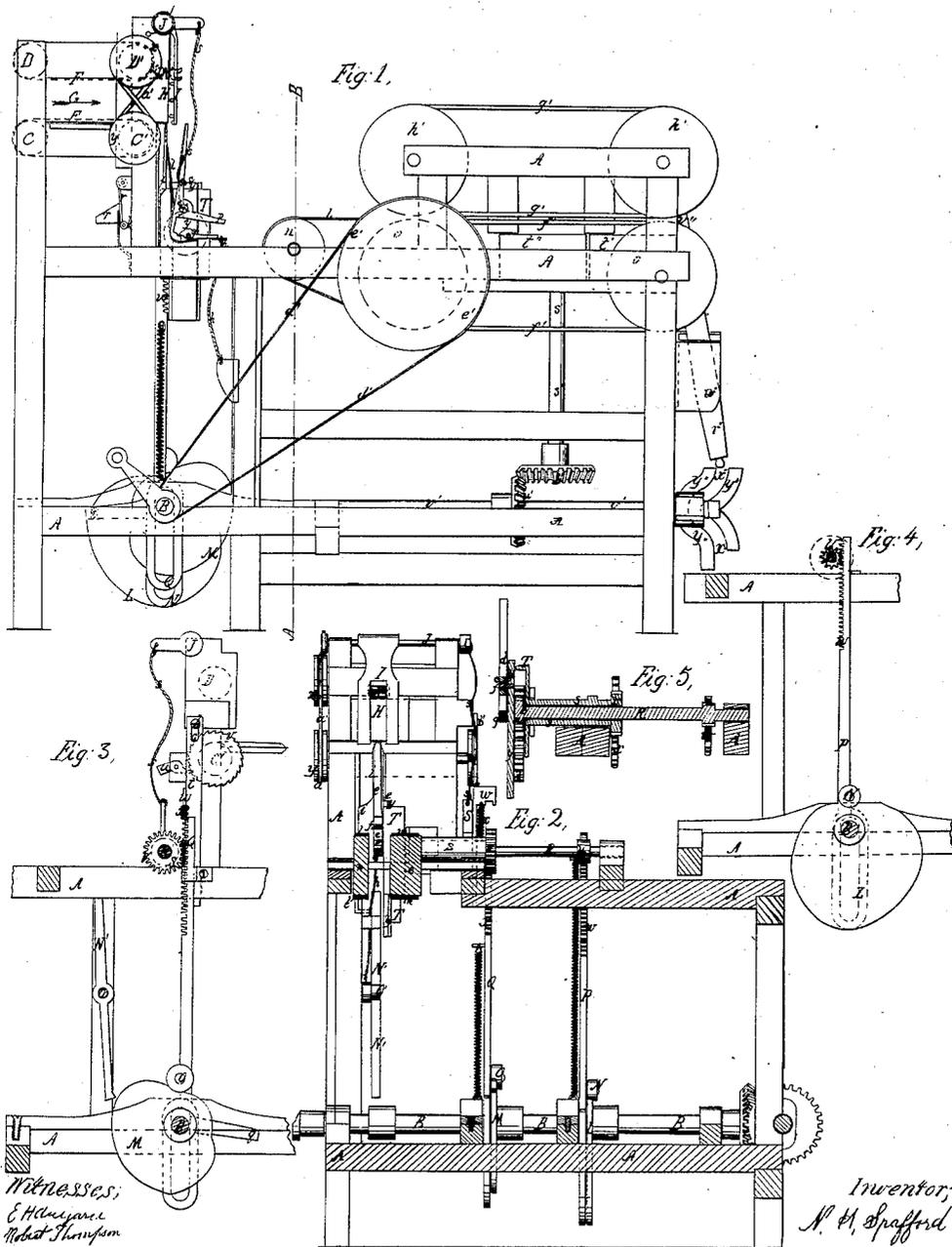


N. H. Spafford

Brush Machine.

N^o 37927.

Patented Mar. 17, 1863.



Witnesses;
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Robert Thompson

Inventor;
N. H. Spafford

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2 Sheets, Sheet 2

Brush Machine

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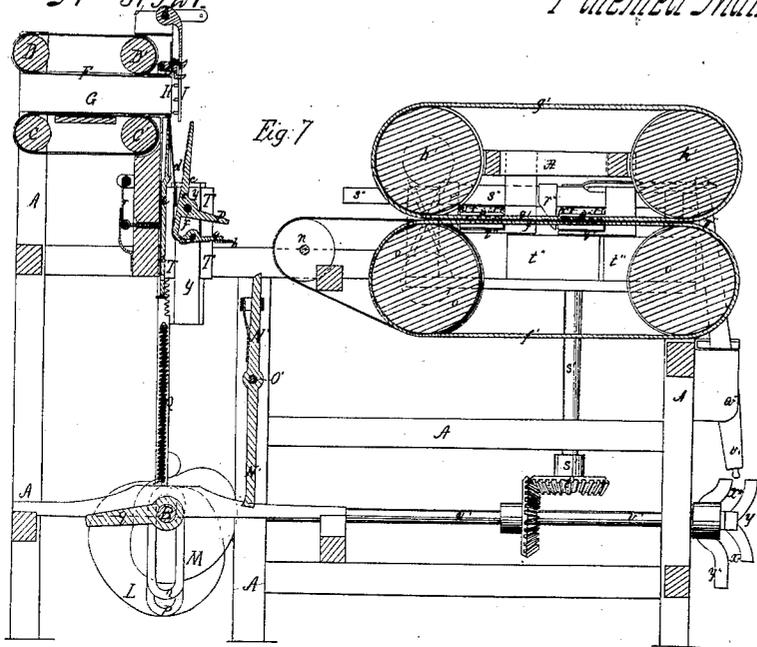


Fig. 7

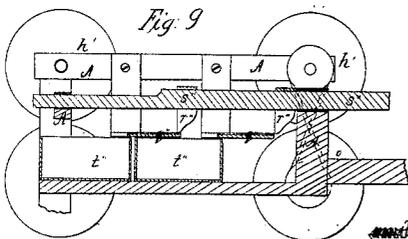


Fig. 9

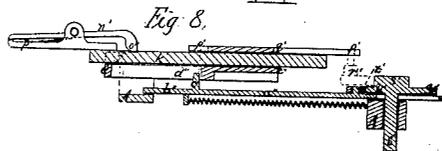


Fig. 8

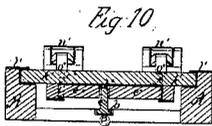


Fig. 10

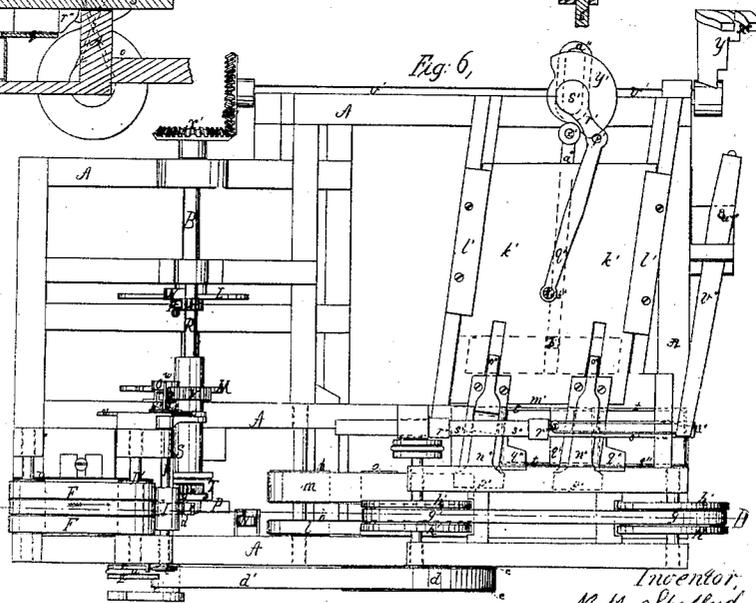


Fig. 6

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UNITED STATES PATENT OFFICE.

N. H. SPAFFORD, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN MACHINERY FOR ASSORTING BRISTLES.

Specification forming part of Letters Patent No. 37,927, dated March 17, 1863.

To all whom it may concern:

Be it known that I, N. H. SPAFFORD, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Machines for Assorting Bristles; and I do hereby declare that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The present invention relates to certain new and useful improvements in machinery to be used for the purpose of assorting bristles, the essential features and general operation of which consist in automatically feeding the bristles by means of a new and peculiar arrangement of mechanical devices, and at regular intervals of time, to a traveling horizontal belt, by and upon which they are held, and being first carried to the devices described in the schedule annexed to the Letters Patent of George Edward Burt, assignor to himself and David C. Butterfield, February 7, 1854, on certain improvements in machines for cleansing and assorting bristles, for the carding or combing, and for the "evening up" at one end of the same, are then passed between and carried along by two endless horizontal traveling belts, pulled out, assorted, and deposited, according to their respective lengths, in boxes or receptacles by means of a series of "nippers" placed upon a reciprocating horizontal traveling platform, and so arranged and operating therewith as to successfully accomplish the desired result.

The figures of the accompanying plates of drawings represent my improvements.

In Plate 1, Figure 1 is a front view of the machine. Fig. 2 is a transverse vertical section taken in the plane of the line A B, Fig. 1. Figs. 3, 4, and 5 are views in detail of the feeding devices, to be hereinafter referred to.

In Plate 2, Fig. 6 is a plan or top view. Fig. 7 is a longitudinal vertical section taken in the plane of the line C D. Figs. 6, 8, 9, and

10 are detail views of the devices for operating the nippers.

A A A, &c., in the accompanying drawings represent the supporting frame-work of the machine; B, a horizontal driving-shaft, to which a rotary motion may be imparted by any of the well-known modes.

In the upper portion of the frame-work A, and moving over the rollers C C' and D D', respectively, are two parallel horizontal endless belts, E and F, in the chamber or space G, between which the bristles to be assorted are laid in a direction at right angles to the same. To these belts E and F, by means of devices arranged and operated as will be hereinafter described, an intermittent rectilinear motion, in the direction represented by arrows in the drawings, is imparted, consequently feeding the bristles toward the opening H of the said chamber G, a forked swinging plate, I, of the shaft J, held in position by a catch, K, preventing the falling out of the same.

Attached and firmly secured to the driving-shaft B of the machine are two cam-wheels, L and M, upon the peripheries of which the friction-rollers N and O of vertical bars P and Q, respectively, bear. The peripheries of these cam-wheels L and M are so formed, and the cams themselves are so arranged with regard to each other upon their shaft B, that a vertical or up-and-down movement shall be alternately, at and during each quarter-revolution of the driving-shaft, imparted to the said bars P and Q bearing upon the same, and thus correspondingly rotate the horizontal shaft R and hollow shaft S, fastened to or forming a part of the box T. With the pinion U of said shaft R and gear-wheel V of said shaft S respectively engage the toothed racks W and X formed in the upper portion of the said bars. In the box T is placed a sliding plate, Y, having formed upon its inside surface a toothed rack, Z, with which engages the pinion a, placed upon the end b of the horizontal shaft R, above referred to, and by means of which, when the shaft R is rotated as described, the sliding plate Y is made to move forward or backward or out of or in its box or frame T. Attached to the sliding plate Y in the direction of its length, and extending beyond the end c of the same, are two tongues,

d and *e*, one of which, *d*, is permanently fastened thereto, while the other, *e*, being free to turn upon a pivot or center, *f*, is made to close upon or open from the fixed tongue *d*, for the purposes to be herein set forth, a pawl, *g*, serving to hold it in its open position until it is disengaged therefrom by the tension of the cord *h*, attached at one end thereto, and at the other to the frame-work A of the machine. Supposing the box T, with its sliding plate Y, to be in the vertical position represented, in which position the fixed tongue *d* is interlocked with the vertical sliding "separator" *i* and the loose tongue *e* is held open from the same by the pawl *g*, the sliding plate, and consequently the separator, from the action of the cam-shaped wheel L upon the rack-bar P and the intermediate gearing above described, are then moved in a vertical plane or direction. The separator, passing up through the entire depth of the feed-chamber G, then separates or places a layer of the bristles contained therein between the two tongues *d* and *e*, the loose one, *e*, of which, from the tension of the cord *h*, closes upon and firmly holds the same, and the separator, finally abutting against and lifting the catch K, disengages it from the forked plate I, that, from the force of the spring *j*, wound around its shaft J, turns or swings up clear of the opening H, thereby allowing of the easy removal of the bristles held between the tongues, as described, from the said chamber, the bristles remaining in the feed-shoulder being prevented from falling out while the forked plate is raised from the said opening H of the chamber, as described, by means of the separator, which is held in front of the said opening by a stop-pin, *k*. This pin *k* is placed in a horizontal position under the feed-chamber, and for the purpose of holding the separator, as above described, is engaged with a suitable aperture in the separator *i* when raised, by means of a spring attached in any proper manner to the same, and so remains until disengaged therefrom, as will be hereinafter described. The bristles being thus seized and held between the said tongues, the box or frame T, in which the sliding plate Y is placed, as hereinbefore described, is then, from the action of the cam-shaped wheel M upon the bar Q, engaging with the gear-wheel V of its hollow shaft S, turned or made to move around the shaft R as a center a sufficient distance, or through a quarter part of a circle, to bring the said tongues *d* and *e* in the same horizontal plane with the parallel horizontal endless traveling belts *l* and *m* of two rollers, *n* and *o*, across which the bristles held between the same are laid. Having thus reached this position, the tongues *d* and *e* are then made to release their hold upon the bristles by means of the vertical lever N', having a fulcrum at O' in the frame-work A, the upper end of which bears against the right-angular arm *p*

of the tongue *e*, while against its lower end, as the driving-shaft revolves, a projecting rod, *q*, of the same abuts, thereby operating the lever N in such a manner as to cause the loose tongue *e*, turning on its center or pivot *f*, to open from the bristles resting upon the belts *l* and *m*, in which position it is again held by the pawl *g*, as hereinbefore stated. The cam L, again operating upon the rack-bar P, as has been hereinbefore described, but at this time in an opposite direction, causes the sliding plate Y to travel back in its box T to the position from which it started, drawing away from and leaving the bristles previously held by the tongues *d* and *e* upon the belts *l* and *m*, above referred to, and the sliding plate, while thus traveling back, strikes against the projection *r* of the stop-pin *k*, thus withdrawing the same from the separator, which then drops by its own weight to the proper position for the fixed tongue *d* to again interlock with it, as the box T is turned back upon the shaft R to its vertical position, in consequence of the downward movement of the rack-bar Q while traveling over the cam-shaped wheel M, thereby placing the separator in the proper position to again pierce the bristles, for the purposes and in the manner described, as the driving-shaft continues to revolve. Previous, however, to the fall of the separator *i*, and by the turning of the hollow shaft S to bring the tongues *d* and *e* to a horizontal position, as described, the tension of the cord *s*, attached at one end to the shaft J and at the other end to shaft S, causes the forked plate I to be turned down in front of the opening H, for the purposes before specified, so that while the bristles are at all times prevented from escaping from the receiving-chamber G, they are yet allowed to be removed by the tongues, as described.

In order to prevent the friction and "binding" which would necessarily occur upon the pinion U of the shaft R through the toothed rack Z, from the turning of the box T upon the said shaft, as described, the cam-wheel L is so shaped that a sufficient movement in a vertical plane, either up or down, as the case may be, shall be imparted to its bar P as the said box is revolved, to cause the sliding plate or rack Z and pinion U to turn over, as it were, like one piece or part, continually keeping the bearing-points the same, and thereby preventing the disadvantageous results above specified.

t is a vertical sliding plate of the frame-work A, to which the pawl *u*, for operating the ratchet-wheel *v* of the roller C', is attached. Projecting from this plate *t* in the same vertical plane with the rack-bar Q is a right-angular arm, *w*. The bar Q, when moved upward by the revolution of the cam M, abuts against the said arm *w*, and thus raises the plate *t*, the pawl *u* passing loosely over the teeth of the ratchet-wheel *v*; but as the bar

moves downward or back to its original position (previous to which, however, as is evident and will be seen from the preceding description, the separator has withdrawn from the feed-chamber and the forked plate has been brought down in front of the same) the plate *t* also travels down from the force of its spring *x*, and the pawl *u*, then engaging with the teeth of its ratchet-wheel, consequently rotates the same and its roller *C'*, and by means of the pulleys *y* and *z* and belt *a'* also rotates the upper one, *D'*, in such a manner as to cause the necessary motion in the proper direction to be imparted to their belts *E* and *F*, thus feeding the bristles contained in their chamber *G* at the proper time and in a regular manner toward the opening *H*, from which they are removed, as described.

b' is a set-screw, and *c'* a slot formed in the plate *t*, by means of which the upward and downward movement of the same can be regulated at pleasure, thus causing a greater or shorter length of motion at one time to be imparted to the feed-belts by the intermittent rotation of the ratchet-wheel *v*. The bristles being thus continually and at regular intervals of time laid upon the parallel belts *l* and *m*, from the operation of the devices above described, and the said belts being moved in a horizontal plane by means of the connecting-belt *d'*, passing around the pulley *e'*, and driving-shaft *B*, the bristles, while carried along upon the same, being carded or combed and evened up at one and the proper end by means of the devices hereinbefore referred to as being described in the said Letters Patent of George Edward Burt, and which therefore need no further description herein, as they constitute no part of the present invention, are thereby placed in readiness to be operated upon by the assorting devices, now about to be described. The bristles, moving along by the said belts *l m*, finally leave the same and then pass to and between the horizontal endless belts *f'* and *g'* of pulleys or rollers *o q h'*, receiving motion from the pulley *e'* through the connecting-belt *d'* of the driving-shaft, for the purpose of being assorted to their different lengths in proper boxes or receptacles by means of a series of mechanical devices, the arrangement and operation of which are as follows:

k' is a horizontal platform moving in ways *U U'* of the frame-work, and placed at an angle to the line of travel of the belts *f' g'*. (Represented by arrows in the drawings.) On the platform *k'* and at the end *m'* thereof are placed a series of nippers, *n'' n''*, &c., that may consist of any desired number, and are so arranged with regard to the same as to project beyond the said end at different distances therefrom, according to the various lengths to which it is deemed necessary or best to assort the bristles passing through the machine, it being understood that the longest bristles are to

be seized by the first nippers, and so on. Attached by a pin or pivot, *o'*, to the top surface of the platform *k'*, is a connecting-rod, *g'*, the other end of which is attached by another pin, *p'*, to the crank *r'* of the vertical shaft *s'*. On the lower end of the shaft *s'* is a bevel gear-wheel, *t*, engaging with the teeth of a similar gear, *u'*, of the horizontal longitudinal shaft *v'*, that receives a rotary motion from the driving-shaft *B* through the two bevel gear-wheels *w' x'*, respectively placed upon the same. On the upper end of the shaft *s'*, and a little below the crank *r'*, is secured a cam-shaped wheel, *y'*, against which the friction-roller *z'* of a horizontal bar, *a''*, passing under the platform *k'*, and in the same longitudinal direction therewith, bears. This bar *a''* moves in suitable bearings, and near its end *b''* a pin or stud, *c''*, is placed, projecting up into the groove or slot *d''* in the sliding plate *e''*, placed under and attached to the platform *k'*. (See Fig. 8.)

f'' f'', &c., are a series of studs projecting above the plate *e''*, to which they are secured and in the same longitudinal plane with the nippers *n'' n''*, &c., and which, as a sliding motion is given to their common plate *e''* in a forward and back direction, from the reciprocating rectilinear movement imparted to the horizontal bar *a''*, connected therewith, as described, from the shape of the periphery of the cam-wheel *y'*, will pass under or away from the end *o''* of the nippers *n''*, &c., and thereby open or close the end *p''* of the same, as the case may be. The nippers *n'' n''*, &c., in consequence of the forward and backward movement imparted to their platform by the revolution of the crank *r'*, travel toward or from the bristles between the belts *f' g'*, (which bristles at their ends farthest from the nippers *n'' n''*, &c., have been previously "evened up," as above referred to,) and therefore, according as each nipper projects more or less beyond the end *m'* of the platform *k'*, will correspondingly seize or nip the ends of the said bristles between their jaws; the upper one of which being closed upon the same by the operation of the devices above described, and then moving back from the belts *f' g'*, by the backward travel of their platform, will thereby draw or pull the same from between the said belts. Then, having carried them to the stationary platforms or tables *q'' q''*, &c., the nippers are opened, as before described. Vertical trip-plates *r'' r''*, &c., or pointers of the horizontal sliding rod *s''* above the same, being then moved in front of the nippers, slide or push the bristles off of the tables *q'' q''*, &c., into a series of receptacles or boxes, *t'' t''*, &c., arranged for the reception of the same. To impart the necessary motion to the rod *s''*, in order to cause its trip-plates *r'' r''*, &c., to pass to and fro in front of the nippers for the said purpose, I attach to the end *u''* thereof a slanting vertical lever, *v''*, turning on a ful-

crum, w'' , of the frame-work, the other end of which moves in the cam-shaped groove or slot x'' of the sector or drum y'' , that is so formed as to give the necessary and desired length of horizontal movement to the trip-plates or pointers r'' , r''' , &c.

It will be seen from the above description that by the arrangement of the nippers upon the platform k' , and the manner in which they are operated, the bristles can be drawn out from the belts f' g' , between which they are being carried and assorted according to their different lengths, and deposited in separate boxes or receptacles accordingly, thus accomplishing automatically the accurate assortment and placing the bristles in separate boxes, whatever may be the variation in the lengths of the same—a result never before successfully practically attained.

The boxes t'' t''' , &c., it is evident, may be constructed with their bottom plate hinged, in order to allow of the easy removal of the bristles from the same without necessitating the removal of the box itself from the machine.

It will also be apparent from the description of my improved machine for assorting bristles that there are various arrangements of devices by means of which the bristles may be taken for their feed-chamber and laid or placed in the desired position to be operated upon, as has been above described and referred to, and also that the movements or motions described as taking place with the nipping devices for seizing the bristles and assorting them to their respective lengths may be successfully accomplished in a variety of ways other than those described, and, therefore, in my claims I do not intend to limit myself to the particular arrangements of devices herein described, and represented in the drawings, the essential features and objects of the present invention being, first, to so arrange a series of mechanical devices as to automatically feed, as it were, the bristles to the means employed for carding them, &c.; and, second, to so operate a series of nippers or any other suitable seizing devices in a reciprocating rectilinear direction as to cause the bristles passing through the machine to be drawn out or assorted according to their different lengths, and then placed in separate receptacles or boxes.

It will also be still further evident that the arrangement of mechanical devices hereinabove described for feeding the bristles to the devices employed for assorting the same may be also easily adapted and are applicable to the mixing of any two or more shades, qualities, or lengths of bristles. To accomplish this result, it is only necessary to arrange two—or as many more as may be desired—of the feeding devices in apposition to each other and so as to alternately operate, and then having placed in their respective feeding-chambers a different shade, quality, or length of bristle, and motion being imparted

to the mechanism, the bristles will then be taken and laid in even sheets or layers upon either a common endless traveling belt or a stationary platform, or upon any suitable device that may be deemed desirable to be used.

Having thus described my improvements, I shall state my claims as follows:

What I claim as my invention, and desire to have secured to me by Letters Patent, is—

1. Automatically conveying the bristles to the feeding-belts for the assorting devices, preparatory to their being carded and evened up, by means of positive mechanical devices, arranged and operating substantially as described.

2. The arrangement of the box T with its sliding plate Y and seizing tongues or jaws, so operating together as to first cause the tongues to seize or take a layer of the bristles inserted in the receiving-chamber of the machine, and then convey them to the belts l and m , substantially as described.

3. In combination with the mechanism employed in machines for assorting bristles, the devices hereinabove described for feeding or conveying the bristles to the same, arranged and operating as set forth.

4. The peculiar arrangement and combination of the cam-shaped wheels LM with their rack-bars P Q, connected with the box T and its plate Y, in the manner and operating together as described, for the purposes specified.

5. Giving the pinion a , engaging with the rack-bar of the sliding plate Y, a sufficient rotary motion, while the box T is being turned upon its shaft R as a center, so as to prevent a leverage upon the same by the said bar, and thus obviate friction and binding of the parts, substantially as described.

6. Imparting to the bristles contained in the receiving-chamber a motion in the proper direction by means of a pawl, w , and ratchet-wheel, v , the said pawl being arranged and operated in connection therewith substantially in the manner and by the devices described.

7. The use of the vertical separator i for piercing and separating the bristles in their receiving-chamber, arranged and operating as described.

8. The forked swinging plate I, so arranged and operated that while it prevents the escape of the bristles from the receiving-chamber it will yet allow of the easy removal of the same by the devices described.

9. The combination of the lever n , loose tongue e of the sliding plate Y, and projecting rod or arm g of the driving-shaft, arranged together and operating in the manner and for the purpose specified.

10. Automatically drawing out or taking the bristles from the machine according to their respective lengths, and thus assorting the same, by means of a series of nippers or any

suitable seizing devices, operating substantially as described.

11. The combination of the traveling platform *h'*, studs *f'' f''*, &c., and nippers *n' n'*, &c., so arranged and operating together as to open and close the said nippers, and to both seize the bristles and deposit them in boxes at the proper times, substantially as described.

12. The arrangement of the horizontal trip-rod *s''*, having a reciprocating rectilinear movement at regular intervals of time im-

parted to the same by any proper means, and operating substantially as described, and for the purposes specified.

13. The combination of the trip-rod *s''*, inclined lever *v''*, and cam-shaped grooved sector or drum *y''*, operating together as described.

N. H. SPAFFORD.

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