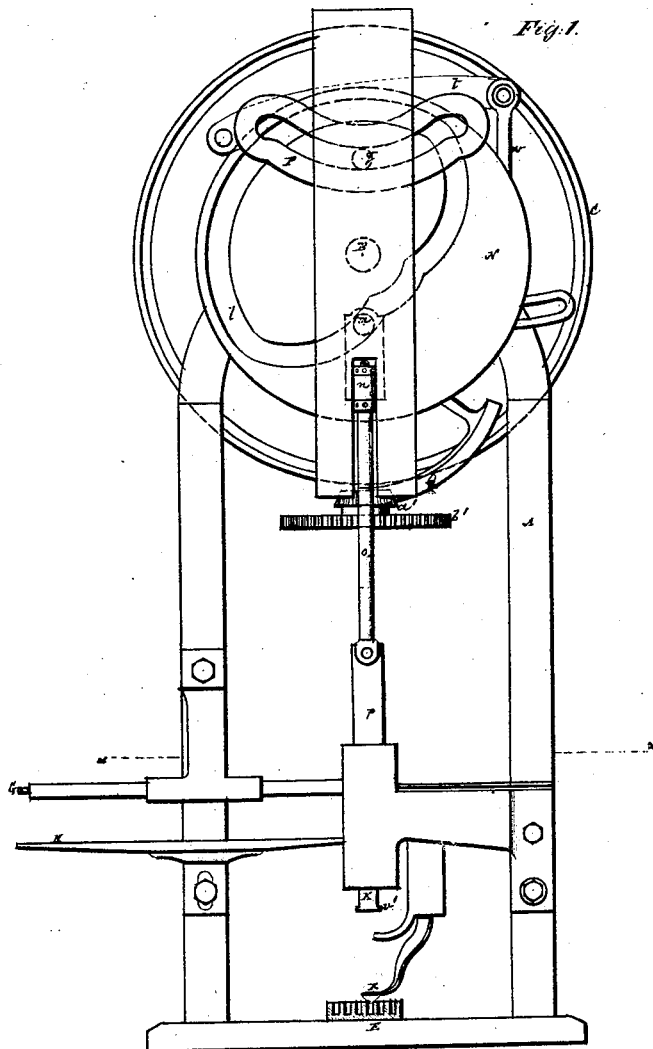


*O. D. Woodbury,* <sup>3, Sheets, Sheet, 1.</sup>

*Brush Machine.*

*No. 110,529.*

*Patented Dec. 27, 1870.*



*Witnesses*  
*Fred. Maynes*  
*E. C. Woodbury*

*Oscar D. Woodbury*

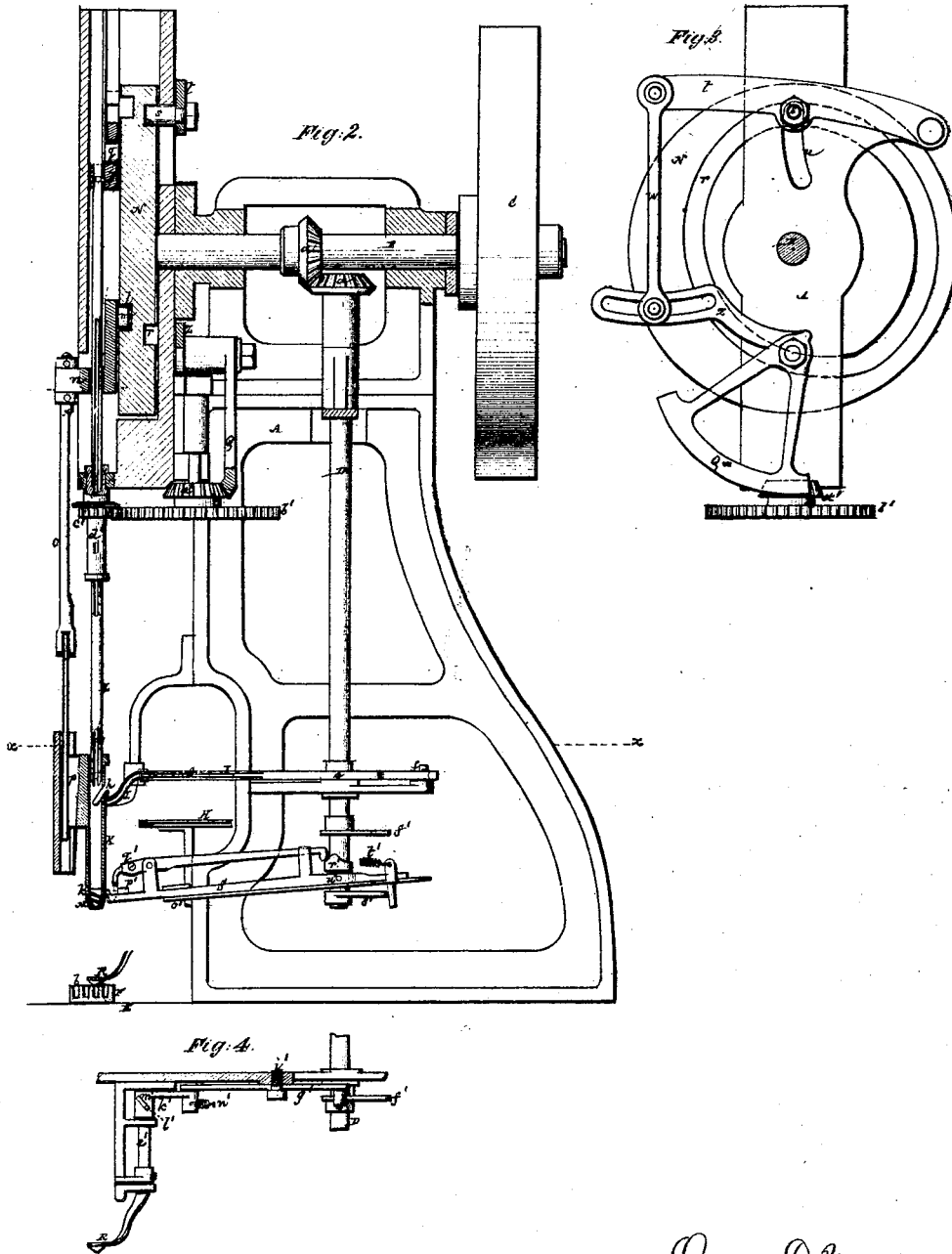
O. D. Woodbury,

3, Sheets, Sheet 2.

Brush Machine.

No. 110529.

Patented Dec. 27, 1870.



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Brush Machine.

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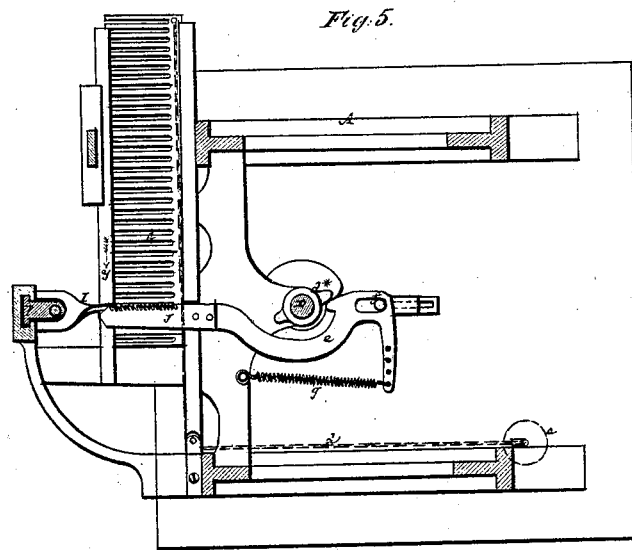


Fig. 6. Fig. 7.

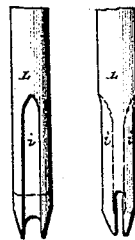


Fig. 9.

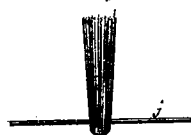


Fig. 10.

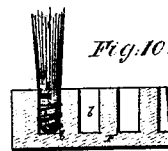


Fig. 8.



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OSCAR D. WOODBURY, OF NEW YORK, N. Y.

Letters Patent No. 110,529, dated December 27, 1870.

### IMPROVEMENT IN MACHINES FOR MAKING BRUSHES.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, OSCAR D. WOODBURY, of the city, county, and State of New York, have invented certain new and useful Improvements in Machines for Making Brushes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a front elevation of a machine, in part constructed in accordance with my invention.

Figure 2, a partially sectional side elevation of the same.

Figure 3 represents an elevation, as seen from the rear, of certain mechanism for rotating the plunger, which doubles the bristles and aids in the insertion of them within the brush-back or stock.

Figure 4 is a side view of mechanism for centering the brush-back.

Figure 5 is a sectional plan of the machine, taken mainly as indicated by the line *xx* in figs. 1 and 2.

Figures 6 and 7 are side views, at right angles to each other, on an enlarged scale, of the lower portion of the doubling-plunger; and

Figure 8, a sectional view of an internally-threaded or spirally-grooved mouth-piece or nut, used at the lower end of another plunger that, in conjunction with the doubling plunger, serves to effect the insertion of the bristles.

Figure 9 represents a detached bunch of bristles having the wire passed through it, but not yet bent spirally around it; and

Figure 10, a sectional view of a brush-back in part, with a bunch of bristles secured therein, by way of illustrating the kind of work it is more particularly the object of my invention to produce.

Similar letters of reference indicate corresponding parts.

My invention is mainly designed for the manufacture of brushes constructed in accordance with Letters Patent of the United States (No. 102,460) issued to me April 26, 1870, the same comprising a brush in which the bunches of bristles are bound with wire in a spiral manner to form a screw, and the bunches so bound are screwed into the stock.

This invention consists in a combination of an inner and outer plunger, together with a nut or mouth-piece having a female thread in it, the whole being constructed and operating to double the bristles into a bunch, to bind the wire in a spiral manner around the latter, and to effect the insertion of the wire-bound bunch by screwing into the brush-back or stock.

The invention also consists in a combination of an intermittently-travelling comb and reciprocating saw-shaped feeder, for supplying the outside or hollow plunger with bristles.

It also consists in a combination of a gauge or twisted receiver with a bristles-feeding device or devices, for directing the bristles from the latter to the devices which operate to form them into bunches, and to effect the insertion thereof.

The invention likewise comprises a centering device, constructed to automatically center the brush-back or stock under the devices used for the insertion of the bunches.

It furthermore includes a combination, with the plungers hereinbefore referred to, of a wiring apparatus arranged to feed the wire in measured lengths through said plungers while the same are in motion.

Finally, the invention consists in a combination, in the one machine, of a bristles-feeding device or devices, with a device or devices operating to double the bristles, to bind the wire spirally around the bunch, and to insert or screw the latter into the brush-stock, together with an apparatus for feeding in suitable lengths the wire through the loops or folds formed by the doubling of the bristles.

Referring to the accompanying drawing—

A represents the main frame of the machine. This frame may be of any suitable construction for support of the working parts, and carries, at its top, a horizontal driving-shaft, B, which receives its motion from a pulley, C.

D is a secondary shaft arranged vertically within the machine, and deriving its motion from the main shaft B, by bevel-gear *a a*. This secondary shaft D serves to operate the devices by which the bristles are fed to the plungers that effect the doubling of them, the binding of the bristles by the wire, and the insertion of the bunch in the brush-back or stock. The mechanism for centering the brush-back or stock under the bristles-inserting devices, may also derive its motion from this secondary shaft. These last-mentioned devices are operated by the other or main shaft B.

E represents the table-surface on which the brush-back or stock F, having holes *b* in it for the reception of the bunches, lies.

G is a horizontal comb, arranged over an upper table, H, situated in the rear of the bristles-inserting devices. This comb, the teeth of which face the front of the machine, has an intermittent travel in direction of the arrow *y*, fig. 5, a tooth or space between two teeth at a time, when feeding the bristles for their passage to the bunch-forming and inserting devices. The bristles are placed, by any suitable means, between the teeth of said comb so that they stand in an upright position therein, projecting for about half their heights or lengths above the comb and resting at their lower ends on the table H.

Each intermittent movement of the comb G which

is effected by a weight, *c*, and cord *d*, passing over suitably-arranged pulleys or guides, causes a space between two contiguous teeth in the comb to be brought opposite a twisted receiver or gauge, *I*, into and down or across through which the bristles in said comb-space are passed by the action of a saw-shaped feeder, *J*, having an intermittently-reciprocating motion in a transverse direction to the comb.

This saw-feeder has its motion communicated to it in its one or backward direction by a toe-cam, *d\**, on the shaft *D*, operating against a roller or projection carried by a rod or arm, *e*, which is guided in its course by a pin and slot, *f*. Said saw-feeder is worked in a reverse direction or thrown forward by a spring, *g*, pulling on the arm *e*.

Each forward motion of the saw-feeder *J* projects a certain quantity of the bristles in the comb-space facing the spiral receiver *I* into said receiver. The bristles, as they are crowded down and through the twisted receiver *I*, are turned so as to occupy a horizontal position or thereabout, and pass from said receiver into the outer plunger *K* of the bristles-inserting devices, which plunger has the doubling plunger *L* arranged for operation within it.

Before describing the action of these devices, however, which operate upon the bristles in detached quantities of a size or amount corresponding to the bunches to be made, it may be here stated that the resistance of the bristles in the comb-space opposite the receiver *I*, against the saw-feeder *J*, serves to hold the comb *G* in check against prematurely moving forward another space.

A suitable stop-motion may also be combined with the comb, in addition, if desired, and furthermore, if necessary, a crowding-fork be used to aid the saw-feeder in its feed of the bristles down or through the twisted receiver; likewise, a separating or dividing contrivance be attached to the outer plunger for apportioning the supply of bristles to the latter from the receiver, and to shut off, at necessary intervals, discharge from the receiver.

The bristles are introduced to the hollow and outer plunger *K*, through a transverse side slot or oblique passages, *h*, during the up-stroke of the plunger.

A deposit of bristles having been made in the oblique slot *h* of the plunger *K*, and preferably so that they project through or beyond it on opposite sides, said plunger remains stationary for a time, while the doubling-plunger *L* comes down within it.

This last-mentioned plunger is made bifurcated at its lower end, and with longitudinal grooves *i* up its sides, so that, in the early portion of its descent, it catches on or over the bristles lying across and through the plunger *K*, and, as said inner plunger *L* continues its descent alone toward a nut or mouth-piece, *M*, at the bottom of the outer plunger, folds or doubles up the bristles into the side-grooves *i*.

The bristles, in thus being drawn out of the oblique slot *h* by the descent of the plunger *L* to form a bunch, may be straightened or combed out by being drawn through a comb arranged to partially surround and attached to the outer plunger.

After the inner plunger *L*, in its solitary descent, as described, has entered the nut *M*, which is of tapering configuration internally, and the bottom of the plunger *L*, of corresponding shape, the wire *j* to bind the bristles is introduced through the loop formed by the doubling of them, by passing it through cross-passages or perforations *K*, made in or through the nut *M*, and through the bifurcated portion of the plunger *L*, said wire being of a suitable length to project through and beyond, for a shorter or greater distance, said perforations on opposite sides of the nut *M*.

The two plungers *K* and *L* then move down in common toward or onto the brush-back or stock *F*, over

a hole, *b*, therein, or the wiring may be effected while they are so moving, as hereinafter described.

While the two plungers *K* and *L* are thus descending in common, or as they reach the end of their downward stroke, the doubling plunger *L* is rotated in a suitable direction to wind the wire spirally around the doubled bristles, which is aided or effected by the threads or spiral grooves in the mouth-piece *M*, the wire entering said threads.

The plunger *L* continuing to rotate in the same direction, the wire-bound bunch is projected through the bottom of the nut or internally-threaded mouth-piece and, by its wire binding, caused to screw its way into the hole *b* in the brush-back.

The plunger *L* is then rotated in a reverse direction to take the twist out of the bristles, and the two plungers *K* and *L* move up or back to their raised positions for a further like action on a succeeding lot of bristles, and so on till the brush is completed.

The devices by which these several motions and intermediate necessary pauses are secured to the plungers *K* and *L* may be as follows:

On the main shaft *B* is a disk, *N*, which has in the front face of it a cam-groove, *l*, that, by its configuration, serves to give the requisite movements and pauses to the hollow plunger *K*, the connection with the latter being established by a pin or roller, *m*, traveling in the groove *l*, and carried by an arm, *n*, in adjustable attachment, by screw-nuts, with a vertically-moving rod, *o*, which serves to operate a vertical slide, *p*, that carries the hollow plunger *K*.

The inner and doubling plunger *L* is operated by an eccentric-pin, *q*, on the face of the disk *N*, said pin working, as the disk rotates, in and along a suitably-slotted or grooved cross-head, *P*, mainly of a shape corresponding with the path in which the pin *q* travels during the lower portion of its motion, and it being guided so as to have an intermittent vertically-sliding action under the operation of the revolving eccentric-pin *q*.

The upper end of the plunger *L* is attached to this cross-head *P* by a screw and annular groove, as shown in fig. 2, in order to admit of said plunger having its necessary intermittent rotary as well as its intermittent vertical movement.

The requisite rotary motion is communicated to said plunger *L* to spirally wind the wire around the doubled bristles, and to screw the bunch into the hole in the brush-back; also, to take the twist out of the bristles when the plungers retire, by means of a suitably-shaped groove, *r*, in the back of the revolving disk *N*, said groove serving to operate a pin, *s*, attached to a lever, *t*, and working up and down through a curved slot, *u*, in the main frame.

By these means an intermittent up-and-down motion is communicated to the lever *t*, and through the latter by means of a pitman, *w*, and slotted or adjusting-arm *z*, an intermittent vibratory motion is given to a toothed sector, *Q*, which is in gear with a horizontal bevel-pinion, *a'*.

This pinion *a'*, as it is rotated in the one direction or the other, which takes place at the close of the descent of the plungers *K* and *L*, and as they commence to move up again, carries on its arbor a spur-wheel *b'*, that gears with a pinion, *c'*, to rotate the plunger *L* as required.

This pinion *c'* is connected with a sleeve, *d'*, through which the plunger *L* slides by groove and feather. This provides for the rotary as well as the up-and-down motions of the plunger *L*.

The pinion *c'* may be arranged loose on the sleeve *d'*, and the rotation of the sleeve by the pinion be effected by a clutch-tension and friction device, constructed so that, when the plunger *L* is being rotated forward to wind the wire around the bristles and to screw the bunch into the brush-back, a stiff or positive rotary

motion will be communicated to the plunger, but when said plunger is being rotated backward it will have a yielding or slipping action, to free itself in an easy manner from the inserted bunch and avoid all risk of unscrewing the latter.

The brush-back F is made to automatically center itself, as regards the bringing of its holes *b* in succession under the plungers K, L, by first approximately adjusting said back or stock in a free or loose manner on its bed or table, after which a conical centerer, R, operated by the machine, brings the hole in the brush-back in precise position to receive the bunch of bristles.

This centerer R is cranked or crooked in its attachment to a vertical spindle, *e*, which is made capable of slight up-and-down motions, also of a swinging or vibratory motion around its axis.

The action of this centerer is as follows:

Being situated on one side, out of the way, it first is swung forward and gently descends over or in line with the plungers K and L, entering the hole in the brush-back and centering the latter relatively to said plungers, after which it rises from said hole and swings back out of the way to make room for the plungers to descend over the centered hole. The swinging motion of said centerer R, on or by its vertical spindle *e* to move the centerer to and away from its work, is effected, at the proper intervals, by a cam, *f*, operating against a lever, *g*, which works on a center, *i*, and is connected to a crank, *k*, loose on the spindle, but in gear therewith, by a pin, *l*, and slot *m*. This moves the centerer R over the brush-back, and it is swung back when the cam *f* ceases to operate on the lever *g* by the action of a spring, *n*. Its falling motion when swinging forward, and rising one when returning, are effected by the oblique or other suitable configuration of the slot *m* in the crank *k*, operating on the pin *l* attached to the spindle *e* of the centerer.

The apparatus for feeding and passing the wire to and through the perforations *k* in the nut M, and through the bifurcated portion of the inner plunger L may be varied, and similar in most of its features to any ordinary feeding apparatus, for supplying in short or measured lengths wire from a coil.

S represents such an apparatus in part, in which the wire is supposed to be taken from a drum and fed forward, at the proper time, by the action of a suitably-constructed reciprocating gripping-slide, *o*, through a cutting-block, *p*, and through the nut M and bifur-

cated plunger L, when a cutting-lever, *q*, comes down and cuts the wire off to its required length, said cutter being operated by a cam, *r*, on the shaft D, and the feeding-slide *o* being actuated by a cam, *s*, and spring *t*. The only peculiarity here claimed about such or other suitably-constructed wire-feeding apparatus is, that it is hung so as to move up and down with the plungers K and L for a portion of their stroke; by, for instance, supporting it on a pivot, as at *u*, and causing it, at its forward end, to rest on a shoulder, *v*, of the plunger K, whereby it effects the passing of the wire through the nut M and bifurcated plunger L, while the two plungers K and L are in motion, thus saving time and insuring the proper relative position of the wire-feeding apparatus to the hole *k* in the nut, for the passage of the wire through the latter and inner bifurcated plunger.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination of the inner bifurcated plunger L with the outer or hollow plunger K and nut or mouth-piece M, having a female thread in it, substantially as and for the purposes herein set forth.
2. The comb G and saw-shaped feeder J, constructed and arranged for operation together, essentially as specified.
3. The combination of the gauge or twisted receiver I, with a device or devices for feeding the bristles to the device or devices by which they are inserted in the brush-stock, substantially as specified.
4. The centerer R, constructed to operate, essentially as described, in combination with a device or devices for inserting the bristles in the brush-back.
5. The combination, with the plungers K and L, of an apparatus, S, for feeding the wire to or through the latter, and whereby said apparatus is made to move in common with the plungers, substantially as specified.
6. The combination, in one machine, of a bristle-feeding device or devices, a device or devices operating to double the bristles, to bind the wire spirally around the bunch and to insert or screw the latter into the brush-stock, together with an apparatus for supplying or feeding the wire through the folds formed by the doubling of the bristles, essentially as herein set forth.

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Witnesses:

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