

1,001,550.

G. S. MURDOCK.
BRUSH MACHINE.
APPLICATION FILED DEC. 10, 1910.

Patented Aug. 22, 1911.

4 SHEETS-SHEET 1.

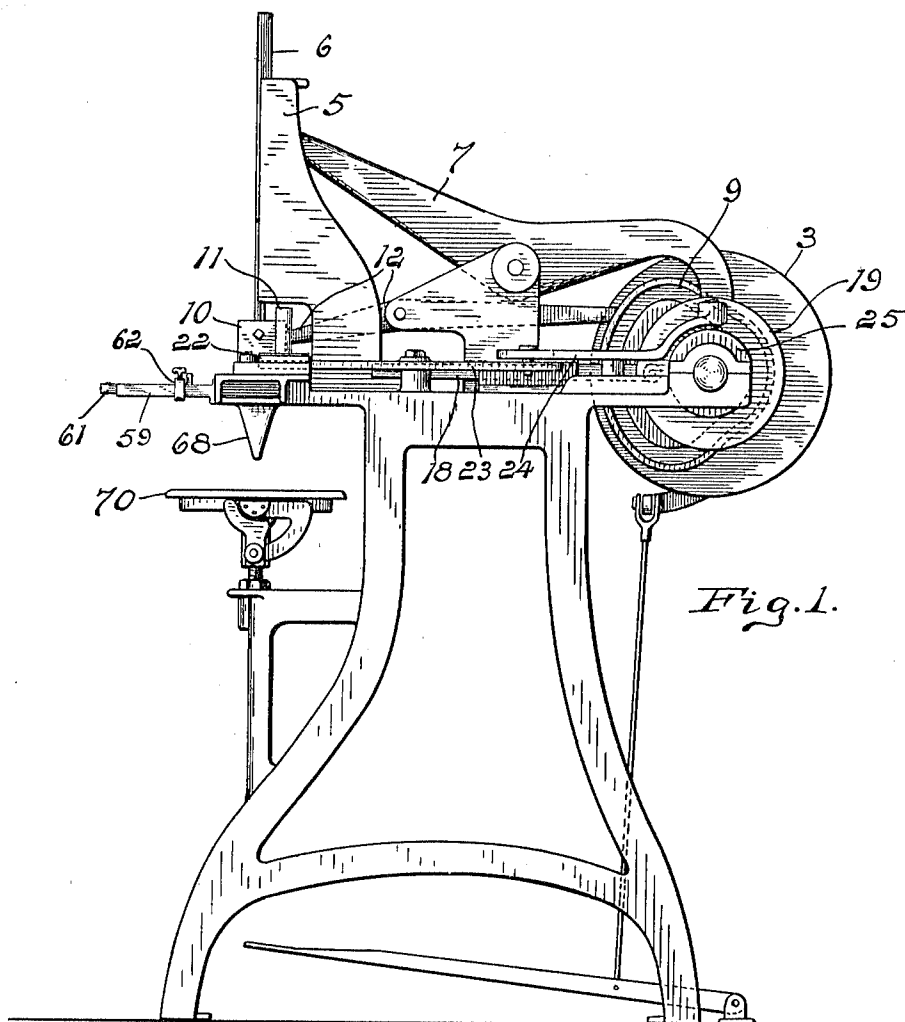


Fig. 1.

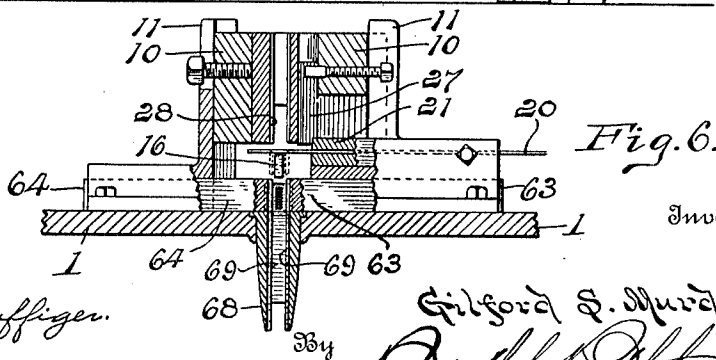


Fig. 6.

Inventor

Witnesses
Chas. W. Stauffer.
L. E. M. Kram

Gilford S. Murdock
By *[Signature]*
Attorney

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4 SHEETS—SHEET 2.

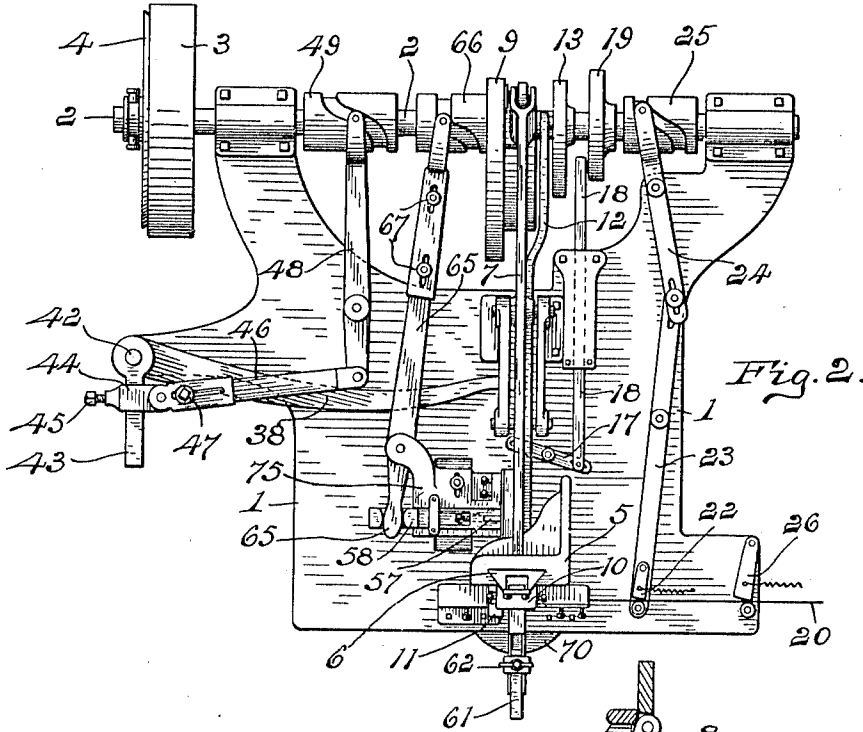


Fig. 2.

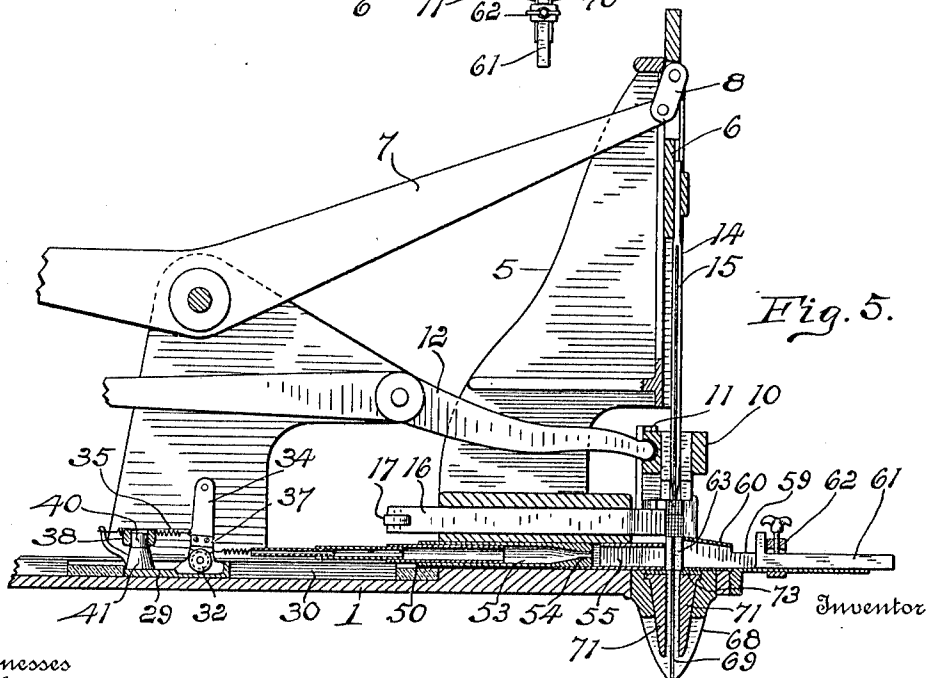


Fig. 5.

Witnesses

Chas. W. Stauffer,

W. E. McLean

By

Gilford S. Murdock

Attorney

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4 SHEETS-SHEET 3.

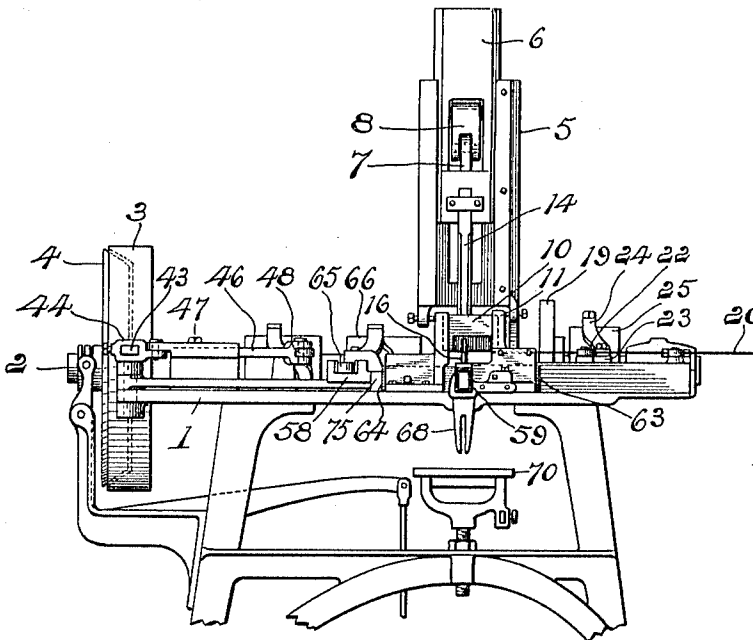


Fig. 3.

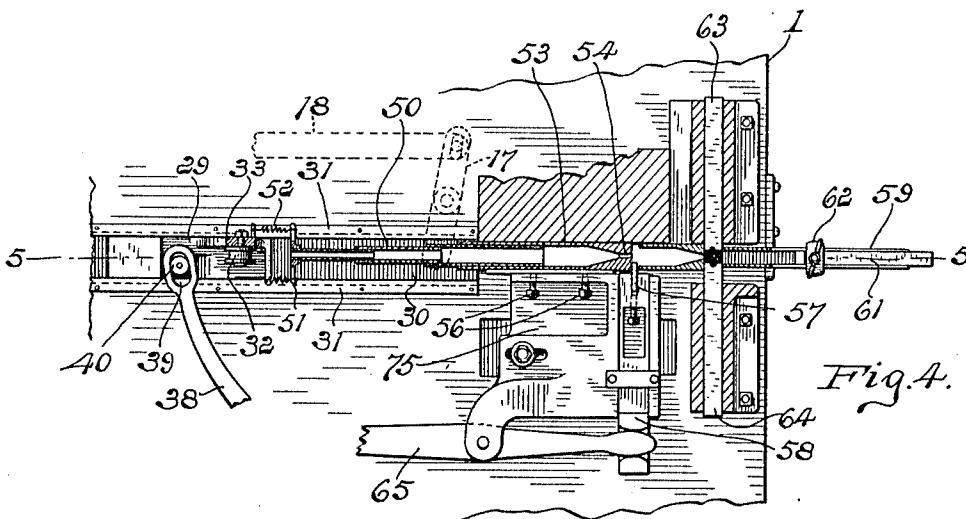


Fig. 4.

Witnesses
Chas. W. Stauffer
E. E. M. Kraus

Inventor
Gilford S. Murdock

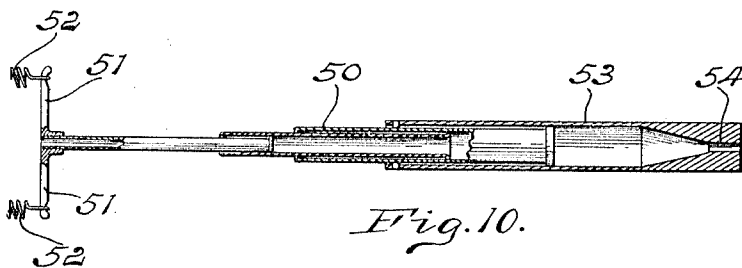
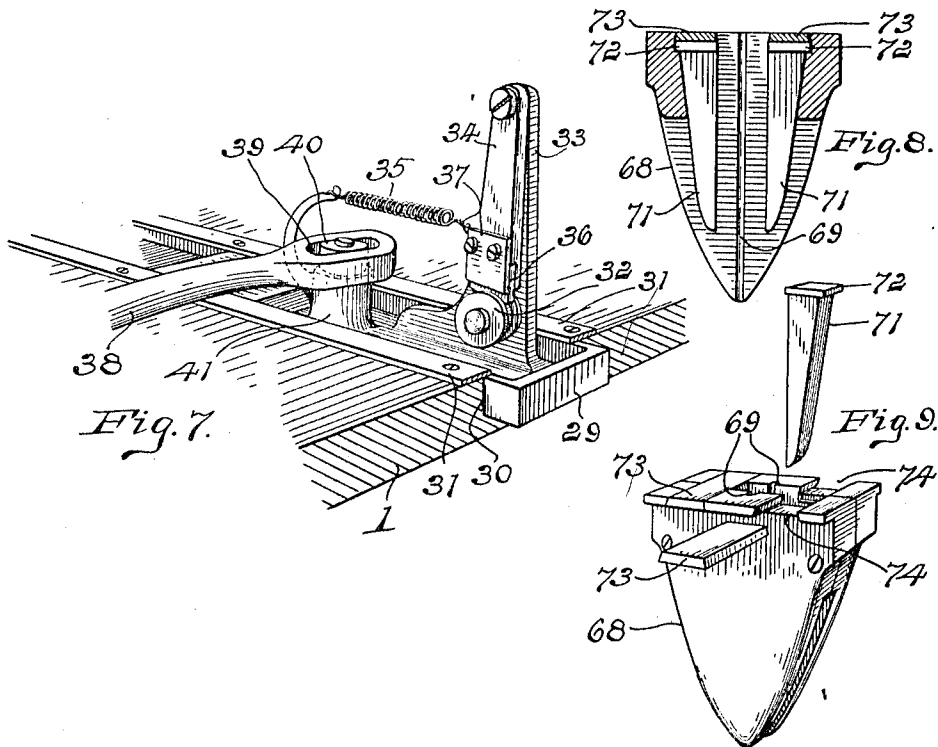
By *[Signature]*
Attorneys

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4 SHEETS-SHEET 4.



Witnesses
Chas. W. Stauffer.
L. E. McKinnon

Inventor
Gilford S. Murdock
By *[Signature]*
Attorneys

UNITED STATES PATENT OFFICE.

GILFORD S. MURDOCK, OF DETROIT, MICHIGAN.

BRUSH-MACHINE.

1,001,550.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed December 10, 1910. Serial No. 596,584.

To all whom it may concern:

Be it known that I, GILFORD S. MURDOCK, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Brush-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a brush making machine especially adapted for making wire brushes and its object is to provide a machine arranged to automatically form wire tufts or bunches from continuous wires, form staples, and secure the bunches within holes in a brush block or back by means of the staples.

To this end the invention consists in the matters hereinafter set forth and more particularly pointed out in the claims reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying the invention; Fig. 2, a plan view thereof; Fig. 3, a front elevation; Fig. 4 is an enlarged detail of the wire feeding and cutting-off mechanism, showing parts in horizontal section; Fig. 5 is a section on the line 5—5 of Fig. 4; Fig. 6 is an enlarged sectional detail of the staple forming mechanism and adjacent parts; Fig. 7 is a perspective detail of the wire feeding slide; Fig. 8 is an enlarged sectional detail of the bunch controlling guide; Fig. 9 is a perspective view of the same with parts detached; and Fig. 10 is a sectional view of the wire guide.

The staple forming and driving mechanism shown in the drawings is substantially the same as the mechanism for the same purpose shown in my Letters Patent No. 934,560 dated September 21, 1909 and No. 944,142 dated December 21, 1909, and forms no part of this invention which relates more particularly to the bunch forming and feeding mechanism, the particular construction, arrangement and combination of parts and to certain other new and useful features of the machine.

A bed or table 1 is mounted upon a suitable supporting frame and provided at its rear edge with suitable bearings for a drive shaft 2. Loosely mounted upon one end of the drive shaft is a driving pulley 3 and a clutch 4 is provided to secure the pulley to the shaft. A bracket 5 is secured to the ta-

ble 1 near its forward end and is provided with vertical guide-ways for a reciprocable slide or head 6 which is actuated by a rocking lever 7 pivoted intermediate its ends with its forward end connected to the head 6 by a link 8 and engaged at its rear end with a cam wheel 9 secured upon the shaft 2 for actuating the lever in both directions.

A vertically movable die block 10 travels in guides 11 secured to the table directly below the slide 6 and a lever 12 engages said block at its forward end to operate the same, said lever being pivoted intermediate its ends and engaged at its rear end by a grooved cam 13 on the shaft 2 for operating the lever in timed relation to the movement of the slide 6. Working vertically through the die block in a suitable guide opening or passage provided therefor, is a needle 14 secured at its upper end to the slide 6. This needle is formed with guide ribs 15 and suitable guide grooves are formed in the block to receive the ribs. The lower end of said grooved passage in the block forms a die to receive a wire which, upon the downward movement of the block, is formed into a staple over the end of a finger bar 16. This finger bar is projected into the path of the die and retracted therefrom in timed relation to the movement of the other parts by being pivotally attached at its rear end to one end of a lever 17 which is pivoted upon the table 1 intermediate its ends and is pivotally connected at its opposite end to a bar 18 reciprocable in a suitable guide on the table. This bar 18 is provided with a roll at its rear end to engage a cam groove in a cam wheel 19 secured upon the shaft 2. The wire 20, shown in Fig. 6 from which the staples are formed, is fed into the path of the die block through a hole in a suitable guide bar 21 by means of a suitable gripper 22 mounted upon the forward end of a lever 23 which is pivoted to the table 1 intermediate its ends and pivotally attached at its rear end to the forward end of a second lever 24, which is also pivoted intermediate its ends to the table and is provided at its rear end with a roll engaging a cam groove in a cam 25 on the shaft 2. The gripper 22 is arranged to grip the wire and feed the same forward a certain distance when the lever 23 is moved in one direction and release the wire and slide backward upon the same when the lever is moved in the opposite direction, a second gripper 26 being provided upon the table to

engage and hold the wire against retrograde movement while the other gripper is sliding backward. The wire 20 is thus fed beneath the vertically reciprocable die block in timed relation to the movement of the other parts and when the die is moved downward the wire is severed by means of a cutter 27 carried by the block and the ends of the severed portion are formed downward over the bar 16 into a staple which staple when so formed, lies within the lower end of the grooves 28 in the die block. The formed staple thus lies directly in the path of the needle 14 so that it will be driven downward by the descending needle, the finger bar 16 being retracted to permit the staple to be driven downward.

The bunches which form the tufts of the brush may be made up of any desired number of small wires and these wires are cut to the desired length from continuous wires led into the machine in any suitable manner from reels or coils, not shown, in the drawings, placed at the rear of the machine, and the several wires are carried forward into the rear end of the machine over the table 1 and over a slide 29 reciprocable in a suitable guide-way 30 formed in the table 1 and held in place therein by guide strips 31 engaging the upper edges of the slide. Carried by said slide is a grooved roll 32 over which the several wires are passed, and pivotally attached near its upper end to a supporting standard 33 on the slide, is a gripper arm 34 arranged to swing with its lower end adjacent to the roll 32 and grip the wires between, said arm being arranged to swing away from the roll and release the wires, upon the rearward movement of the slide. A coiled spring 35 is attached to the arm 34 to normally hold said arm turned toward the roll. The gripper arm 34 is provided with a detachable plate 36 engaging a groove in the lower end of the arm which plate is adjustably secured in place by means of a clamping plate 37 secured by screws passing through the upper end of the plate and engaging screw-threaded openings in the arm. The lower edge of the plate is suitably shaped to engage the wires within the groove of the roll and may be quickly and easily adjusted to give the arm the proper gripping effect and may be detached and its edge ground should it become grooved by use and thus fail to properly grip and hold the wires.

The slide 29 is reciprocated the proper distance to feed the desired lengths of wires into the machine, by means of an actuating lever 38 provided with a slot 39 in one end to engage a roll 40 pivotally supported upon a stud 41 on the slide. At its opposite end this lever is pivotally secured to the table 1 by a pivot pin 42 and an arm 43 is also secured to the pin to turn with the lever 38.

This arm 43 extends substantially at right angles to the lever 38 and mounted upon it to slide longitudinally thereon is a block 44 provided with a set screw 45 for holding the block in any position to which it may be adjusted upon the arm. A link 46 which is made adjustable as to length by means of a bolt 47 passing through a slot in one part of the link into engagement with the other part, is pivotally attached at one end to the block and at its opposite end to the forward end of a lever 48 which is pivotally supported intermediate its ends upon the table 1 and at its rear end is provided with a roll to engage a cam groove in a cam 49 secured on the drive shaft 2. By adjusting the length of the link 46 and by moving the block 44 along the arm 43 the throw of the lever 38 is accurately adjusted to feed the desired lengths of wire into the machine.

The several wires are led forward from the slide 29 through a telescopic guide 50 formed of telescoping tube sections, the section of smallest diameter being adjacent to the slide and provided with laterally extending arms 51 by means of which the guide is attached to the slide to be extended upon the rearward movement of the slide. Coiled springs 52 are attached at one end to the slide and at their opposite ends to the arms 51 to connect the guide to the slide and afford a yielding connection to prevent breakage of the parts. The forward end of the telescopic guide is secured within a fixed guide block 53 which is bored out from its rear end inward to receive the guide which slides therein and the forward end of its bore is tapered to a small opening 54 to bring the wires close together and direct them forwardly through the adjustable guide block 55, the forward end of which lies close to the path of the needle 14 in its downward movement.

A bearing block 75 is adjustably secured to the table 1 at one side of the guide block 53 and is provided with suitable set screws 56 to engage said guide block and securely hold the same in any position to which it may be adjusted. A knife 57 carried by a reciprocable bar 58 movable in a suitable guide-way on the block 75, lies in engagement with the end of the guide block 53 to be projected across the opening 54 in the end of the block and sever the wires.

Projecting forwardly from the front edge of the table 1 is a chute 59, the inner end of which lies close to the forward side of the path of the needle 14 and is covered or provided with an inclined top 60. When the several wires are projected forwardly through the guide 55 by the forward movement of the slide 29, the forward ends of the wires are projected outwardly into the chute 59 into engagement with a stop bar 61 in the chute which is adjustably secured in

place by means of a clamp 62. The ends of the wires forming the bunch are thus evened up by coming in contact with the stop and are inclosed within the covered end of the chute and the guide block 55 so that they are held straight and even and lie across the path of the descending needle and staple which is formed over the end of the finger bar 16 directly above. To prevent the wires from escaping laterally between the forward end of the guide 55 and the rear end of the chute 59, and to also form a guide for the descending needle and staple, two bars 63 and 64 are adjustably secured in suitable guides with their adjacent ends spaced apart and formed with guide grooves for the ribs 15 on the needle and for the staple.

The cutter 57 is actuated in timed relation to the movement of the other parts by means of a lever 65 which is pivoted intermediate its ends to the block 75 and engages at its forward end the sliding bar 58 carrying the cutter. The rear end of the lever 65 is provided with a roll to engage a cam groove in the cam member 66 secured upon the drive shaft 2. This lever is made in two parts adjustably connected by means of bolts 67 passing through slots in one part into engagement with the other part.

When it is desired to change the length of the wires forming the bunches, the stop 61 is adjusted within the chute 59, and the guide block 53 is correspondingly adjusted, the distance between the forward end of said block and the rear end of the stop, determining the length of the wires. The bearing block 75 is then adjusted to bring the cutter 57 into engagement with the forward end of the fixed guide block 53, the adjustment in the lever 65 permitting such adjustment of the bearing block. The throw of the lever 38 is then changed by adjusting the link 46 and block 44 to change the throw of the slide 29 to correspond with the lengths of wire to be cut off.

Detachably secured within an opening at the forward edge of the table 1, is a guide block 68 shown in detail in Figs. 8 and 9, which extends downward from the table and is provided with a central axial opening having side guide grooves 69 which are arranged in alinement with the grooves in the ends of the bars 63 and 64 and also the grooves 28 in the die block 11. When the staple is forced downwardly by the needle, across the bunch of wires and on downwardly into the guide 68, carrying the wires therewith, said staple is accurately held and guided by the grooves in position to be accurately driven by the needle into a brush block supported upon a table 70 beneath the lower end or point of the guide. The forward and rear sides of the guide-way through the guide 68 are formed by two hardened and tapered finger pieces 71.

These finger pieces 71 are securely held in place by providing flanges 72 upon their upper ends to engage seats in the guide block and by hardened plates 73 engaging transverse grooves 74 therefor in the upper end of the block, said plates when in place covering the upper ends of the fingers 71 and locking the same in place. The edges of the grooves 74 are slightly under-cut and the edges of the plates 73 are inclined to engage the under-cut sides of the grooves and securely hold the plates in place. The finger pieces 71 and the transverse plates 73 may both be hardened to prevent the wires which are bent over the edges of the plates 73 as they are forced downward into the guide, from wearing away the angles formed by the plates 73 and also the sides of the guide. These plates and finger pieces may be quickly and easily removed and repaired or new ones inserted in their place, it being found in practice that when these angles and sides become grooved and worn, the wires are not accurately bent intermediate their ends when forced downward into the guide by the descending staple and needle but are liable to move longitudinally, and thus when secured in place in the brush block, some of the wires of each tuft will project beyond others and the surface of the brush will be uneven.

By providing the guide blocks 53 and 55, the bars 63 and 64 and the guide chute 59, the wires forming the bunch are accurately held straight and even so that they will be evenly and accurately bent. After being severed these wires are accurately and evenly held between the stop 61 and forward end of the bar 53 in position beneath the driving needle so that when engaged and driven downward through the lower guide, they will be formed into a tuft with their ends even and will be accurately and securely fastened in the brush block by the staple.

In the operation of the machine the wire from which the staples are formed is first fed beneath the die block a proper distance to form a staple. The die block is then moved downward by the lever 12 cutting off the wire and forming it over the end of the finger 16, the staple at this time lying within the lower ends of the grooves 28 in the die block. The finger 16 is then retracted from beneath the staple and during the forming of the staple the several wires for forming the bunch are fed in by the forward movement of the slide 29. When the wires come in contact with the stop 61 the cutter 57 is advanced sufficiently by its actuating cam to bring it into contact with the wires and grip the same, securely holding them within the hole 54 in the guide block 53 so that upon the rearward movement of the slide 29 which at

once takes place, the wires will be held from being pulled out by said movement of the slide. The needle 14 is then forced downward by its actuating lever and, upon the
 5 slide 29 reaching the rear end of its movement, the cutter 57 is further actuated to sever the wires, which fall when severed to the bottom of the space in the hollow guide block 55, in position to be spanned by the
 10 staple as the needle forces the same downward. The further movement of the needle doubles the bunch intermediate its ends under the staple and forces it downward through the guide block 68.

15 What I claim is:

1. In a brush making machine, the combination with means for placing and securing bunches of wires in a brush block, of means for simultaneously feeding a plurality of strands of wire to the securing means in timed relation to the operation of said means, and a cutter for simultaneously severing the strands operating in timed relation to the movement of the securing and
 20 feeding means.

2. In a brush making machine, the combination with bunch securing mechanism comprising a reciprocable member for placing the bunches in a brush block, of means for simultaneously feeding a plurality of strands into the path of said reciprocable member and a cutter for severing said strands.

3. In a brush making machine, the combination with bunch securing mechanism comprising a reciprocable member for placing the bunches in a brush block, of feeding mechanism for simultaneously feeding a plurality of wires across the path of said reciprocable member to form bunches, means for guiding and holding the several wires in parallelism across the path of said reciprocable member, and a cutter for severing the strands.

4. In a brush making machine the combination with bunch securing mechanism comprising a reciprocable member for placing the bunches in a brush block, of a guide extending transversely of the path of said reciprocable member, means for feeding a plurality of strands endwise into said guide across the path of the reciprocable member, a stop to be engaged by the ends of said strands located at one side of the path of said reciprocable member, and a cutter for severing the strands located at the opposite side of the path of said member.

5. In a brush making machine the combination with bunch securing mechanism comprising a reciprocable member for placing the bunches in a brush block, of a guide extending transversely of the path of said reciprocable member, means reciprocable in alinement with said guide longitudinally thereof for engaging a plurality of wires

and feeding the same longitudinally into said guide, a cutter, and means for operating the cutter in timed relation to the reciprocation of the feeding means to simultaneously sever the wires.

6. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable member for forcing the bunches into a brush block, of horizontally reciprocable means for feeding a plurality of wires horizontally across the path of the said member, a cutter for severing the wires located at one side of the path of said member at a distance therefrom equal to the distance to which the ends of said wires are projected beyond said path, and means for holding the severed wires forming the bunch with their middle portion in the path of said vertically reciprocable member.

7. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable member for forcing the bunches into a brush block, of a horizontal guide for holding a bunch with its middle portion in the path of said reciprocable member, means for feeding wires endwise into one end of said guide to form the bunch, a stop in the opposite end of said guide adjustable toward and from the path of said member, and a cutter reciprocable across the path of the wires to sever the same, said cutter being adjustable toward and from the path of said reciprocable member.

8. In a brush making machine, the combination with bunch securing mechanism comprising a reciprocable bunch feeding member, of a hollow guide block having a contracted opening in one end, a cutter at the end of said block reciprocable across said opening, a guide extending from said end of said block transversely of the path of said reciprocable member, means for feeding a plurality of wires longitudinally through the block with their ends projected into said guide, and means for operating the feeding means and cutter in timed relation to each other.

9. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable member for forcing the bunches into a brush block, of a guide extending transversely of the path of said feeding member and open at one end, a reciprocable slide for feeding a plurality of wires endwise into said guide, means on the slide for gripping and holding the wires during the movement of the slide in one direction, a cutter for severing the wires, and means for moving the cutter into engagement with the wires in timed relation to the reciprocation of the slide to hold said wires against movement when the slide is moved in the opposite direction.

10. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable needle, of means for feeding a plurality of wires longitudinally across the path of the needle below the same, a cutter for severing the wires to form bunches, a downwardly extending guide having a guideway into which the bunches are adapted to be forced by the engagement of the needle with the bunches intermediate their ends, and detachable fingers forming the sides of the guideway through said guide.

11. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable needle, of means for feeding a plurality of wires longitudinally across the path of the needle below the same, a cutter for severing the wires to form bunches, a downwardly extending guide having a guideway into which the bunches are adapted to be forced by the engagement of the needle with the bunches intermediate their ends, and detachable plates forming angles at the upper end of the guideway over which angles the bunches are doubled when forced into the guideway.

12. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable needle, of means for feeding a plurality of wires longitudinally across the path of the needle below the same, a cutter for severing the wires to form bunches, a downwardly extending guide having a guideway into which the bunches are adapted to be forced by the engagement of the needle with the bunches intermediate their ends, fingers engaging seats in the guide and forming the sides of the guideway, and transverse plates detachably secured to the upper end of the guide over the upper ends of said fingers to hold the same in place and form angles at the upper end of the guideway to engage the bunches.

13. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable needle, and means for actuating the needle, spaced adjustable members having guide grooves in their adjacent faces for said needle, a guide way extending horizontally outward from the space between said members, a hollow guide member extending horizontally inward from said space between said members, said hollow guide, said members and

said guideway together forming a guide for holding bunches, means for feeding a plurality of wires endwise into said holding guide, and a cutter at the inner end of said holding guide for severing the wires.

14. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable needle, and means for actuating the needle, of a guide extending horizontally across the path of said needle, a guide formed of telescopic tubular sections at one end of said guide, a reciprocable slide to which one end of said telescopic guide is connected, means on said slide to grip a plurality of wires and feed the same endwise into said guide, and a cutter for severing the wires.

15. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable needle, and means for actuating the needle, of a guide extending transversely of the path of the needle, a slide reciprocable toward and from one end of said guide in alinement therewith, means for reciprocating the slide, a grooved roll on the slide, a gripper arm pivoted to swing toward and from the roll longitudinally of the slide, and a detachable plate on the lower end of the arm to engage a plurality of wires in the groove of the roll and grip the same between the roll and plate within the groove.

16. In a brush making machine, the combination with bunch securing mechanism comprising a vertically reciprocable needle, a drive shaft, a lever for actuating the needle and a cam on the shaft for actuating the lever, of a bunch guide having a guideway to receive the needle and bunch, a guide extending transversely to the bunch guide at the upper end thereof to hold bunches in the path of the needle, a horizontally disposed hollow block in alinement with said guide, a slide reciprocable in alinement with said block, means on said slide to hold a plurality of wires and feed the same through said block, a cutter reciprocable transversely of the block to sever the wires, a lever for actuating the cutter, and a cam on said shaft for actuating the said lever.

In testimony whereof I affix my signature in presence of two witnesses.

GILFORD S. MURDOCK.

Witnesses:

LEWIS E. FLANDERS,
OTTO F. BARTHEL.