

(No Model.)

7 Sheets—Sheet 1.

E. L. FENERTY.
BRUSH MAKING MACHINE.

No. 302,900

Patented Aug. 5, 1884.

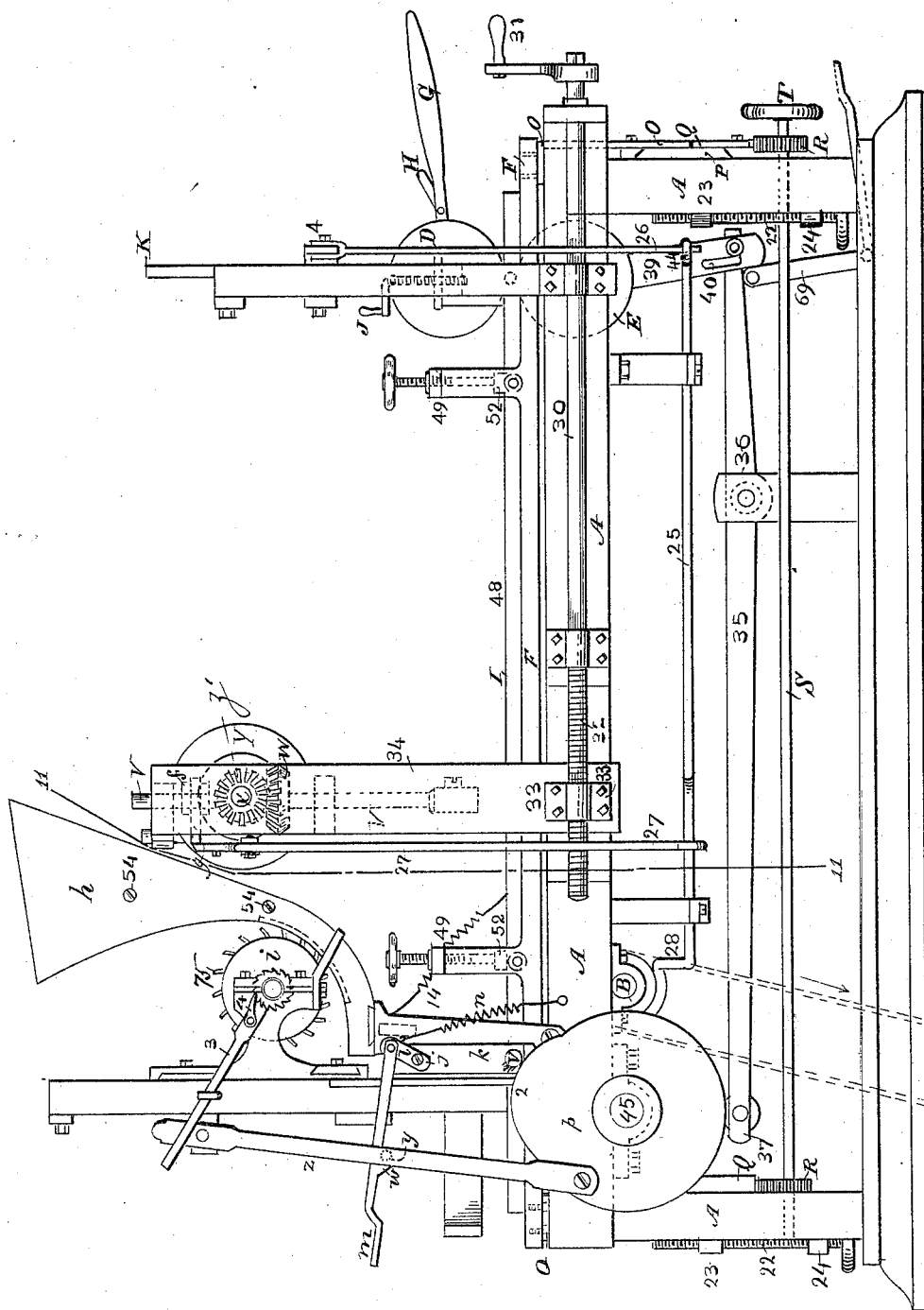


Fig. 1.

Witnesses:
H. E. Pernick
L. J. White

Inventor:
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per C. A. Shaw
Att'y.

(No Model.)

7 Sheets—Sheet 2.

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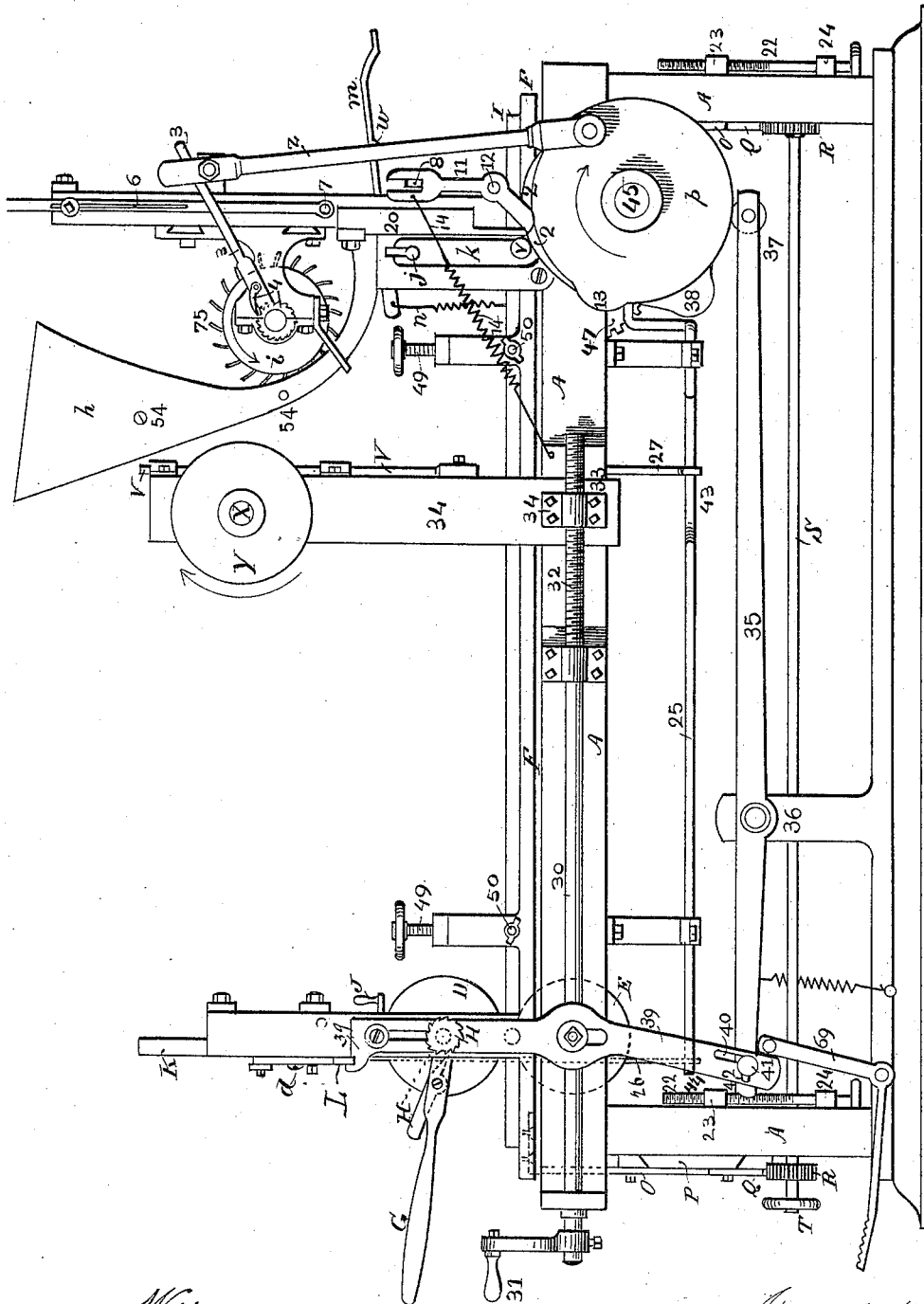


Fig. 2.

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(No Model.)

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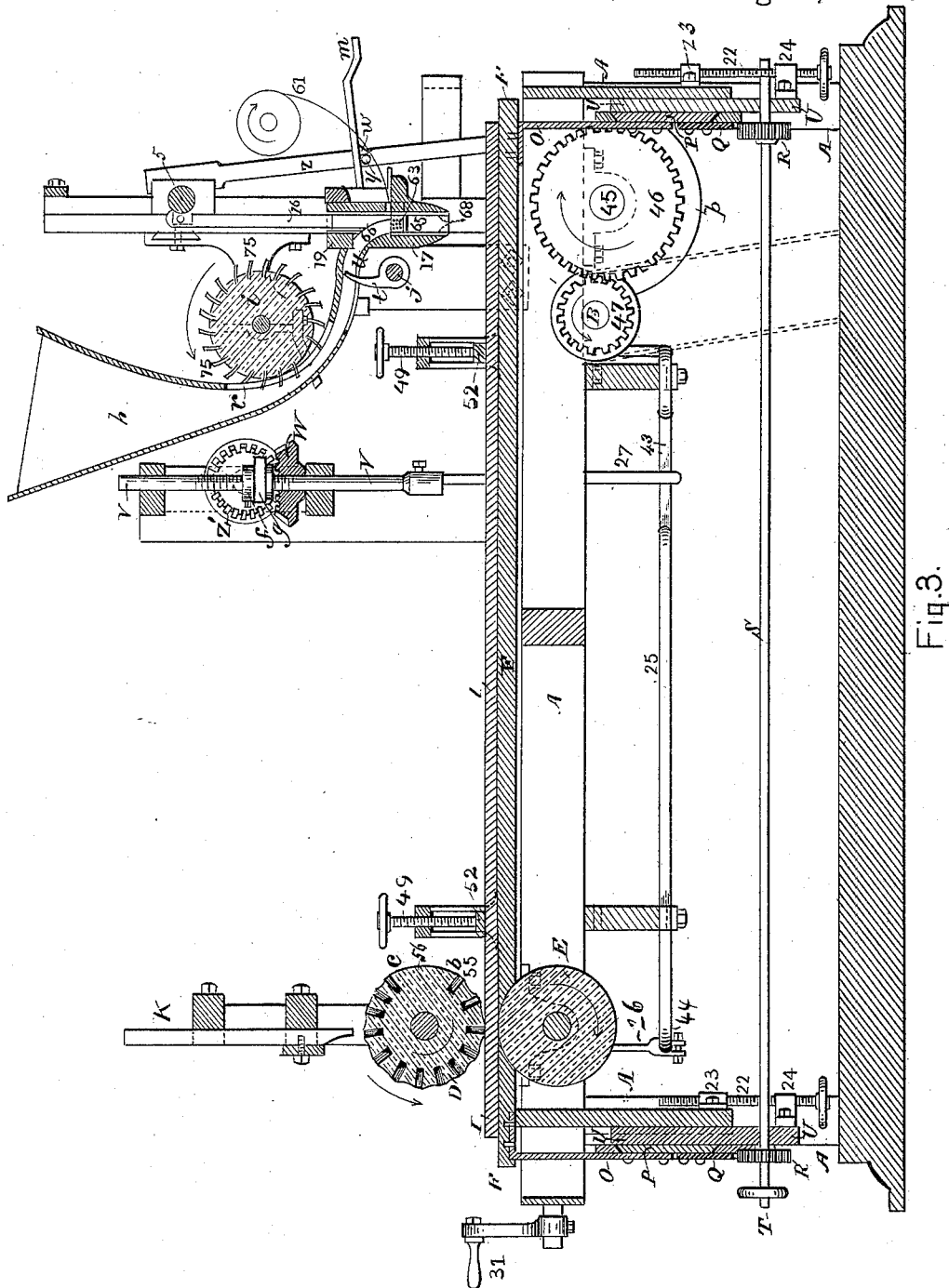


Fig. 3.

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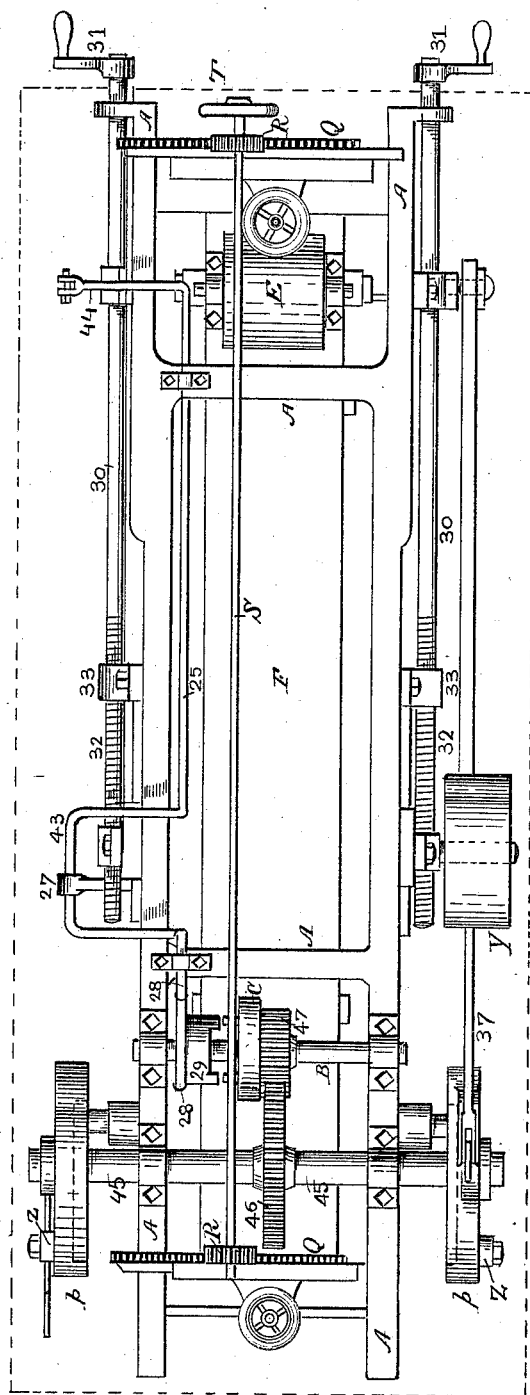


Fig. 4.

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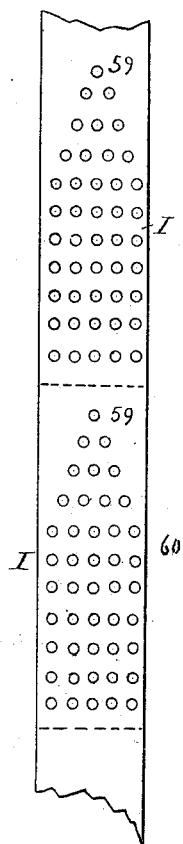


Fig. 10.

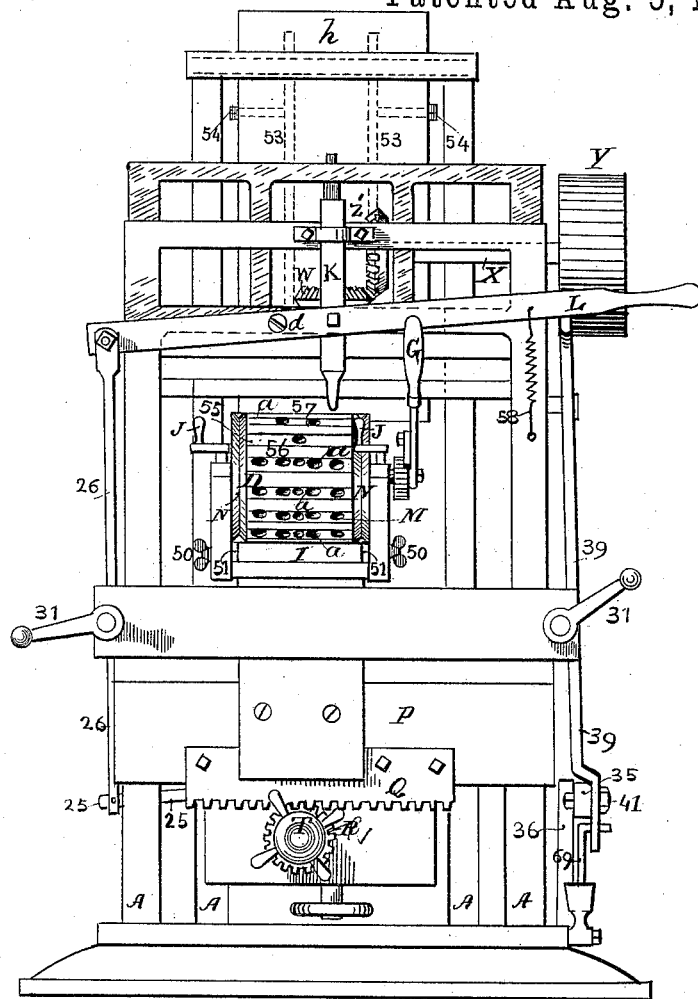


Fig. 5.

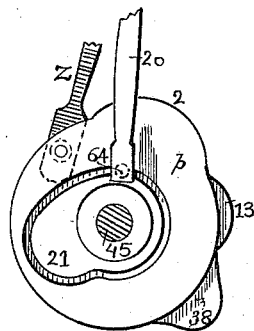


Fig. 9.

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(No Model.)

7 Sheets—Sheet 6.

E. L. FENERTY.
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Patented Aug. 5, 1884.

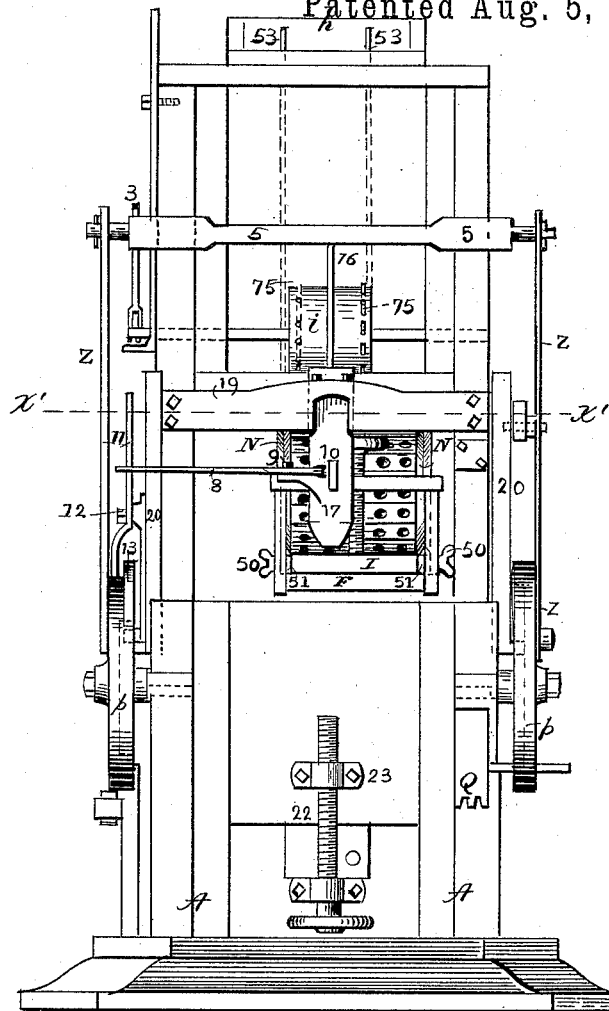


Fig. 6.

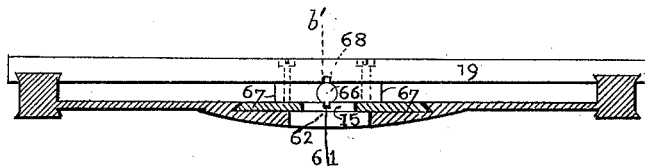
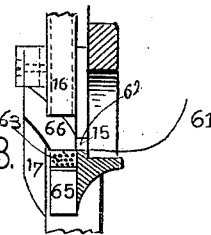


Fig. 7.

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Fig. 8.



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(No Model.)

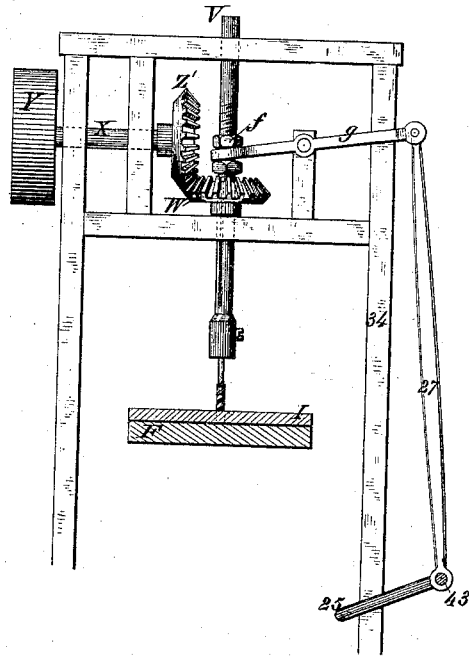
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Patented Aug. 5, 1884.

Fig 11.



WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD LAWSON FENERTY, OF HALIFAX, NOVA SCOTIA, CANADA.

BRUSH-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,900, dated August 5, 1884.

Application filed March 5, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWARD LAWSON FENERTY, a subject of the Queen of Great Britain, residing at Halifax, in the county of Halifax, Province of Nova Scotia, Canada, have invented a certain new and useful Improvement in Brush-Making Machines, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of my improved machine; Fig. 2, a like view, being the reverse of Fig. 1; Fig. 3, a vertical longitudinal section; Fig. 4, a bottom plan view; Fig. 5, a front elevation or end view; Fig. 6, a rear elevation or end view the reverse of Fig. 5; Fig. 7, a sectional view taken on the dotted line *x'* in Fig. 6; Fig. 8, a vertical section of the tufting device, taken on line *b'* in Fig. 7; Fig. 9, a view showing the face-cam of the disk; and Fig. 10, a plan view of the blank. Fig. 11 is a cross-section of the upper portion of the machine on line 11 11, Fig. 1, just back of the hopper, and looking toward the boring device.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates more especially to means for boring and tufting the brush; and it consists in a novel construction and arrangement of the parts, as hereinafter fully set forth and claimed, by which a more effective device for this purpose is produced than is now in ordinary use.

The improved machine, considered as a whole, embodies the following instrumentalities, in combination with suitable operative mechanism, to wit: a feeding device for feeding the blank to the boring and tufting devices; a pattern device for determining the location of the tufting-holes in the blank; a device for moving the blank laterally in respect to the pattern, boring, and tufting devices; a boring device for forming the tuft-holes; a feeding device for feeding the bristles, hair, or fiber to the tufting device; a feeding device

for feeding the securing-wire to the tufting device; a cutting device for cutting off the securing-wires; a tufting device for inserting the bristles, hair, or fiber and securing-wires in the tufting-holes; a device for adjusting the blank vertically in reference to the tufting device; a device for connecting the boring device and tufting device with the pattern device in such manner that they may be operated in unison; a device for adjusting the boring device horizontally in respect to the pattern device; and a shipping device for stopping the operations of the tufting and boring devices automatically.

In connection with the foregoing, the nature and operation of the invention will be readily understood by all conversant with such matters from the following description.

In the drawings, A represents the frame or body of the machine, B the main shaft, and C the main driving-pulley.

The feeding device proper, for feeding the blanks to the boring and tufting devices, consists of the rollers D E, bed F, and lever G. The lever is pivoted at its inner end to the shaft of the roller D, and is provided with an ordinary pawl-and-ratchet mechanism, H, for turning the roller and feeding the blank I to the boring and tufting devices, the roll being caused to bear on the blank by means of the set-screws J.

The pattern device proper for determining the location of the tufting-holes in the blank consists of the roller D, bar K, ratchet-lever G, and lever L. The roller is provided with a series of longitudinal grooves, M, extending partially around its periphery, and with two circumferential grooves, N, one at either end, the longitudinal grooves being provided with a series of indentations or holes, *a*, corresponding with the pattern of the brush, as best seen by plan view, Fig. 10. A portion of the roller D from *b* to *c* is not provided with grooves or holes, this part of the roller corresponding with that part of the blank I, which is not to be bored. The bar K is for locking the roller D in any desired position, its lower end entering the holes *a* in the roller, said bar being worked vertically by means of the horizontal lever L, which is pivoted at *d* to the frame of the machine.

The device for moving the blank laterally in respect to the pattern, boring, and tufting devices consists of the bed F, having a vertical bar, O, attached to its under side at either end. These bars O respectively carry horizontal slides, P, which are fitted to move back and forth in proper ways on the vertical slides U, which work in ways secured to the frame of the machine. A rack, Q, is attached to each of the horizontal bars P, which intermeshes with corresponding pinions R on the horizontally-journalled shaft S, carrying the hand-wheel T.

The boring device proper consists of the vertically-arranged spindle, V, provided with the miter-gear W, and the horizontally-arranged shaft X, provided with the miter-gear Z' and the pulley Y. The spindle is fitted to slide through the gear W, but prevented from turning therein by means of an ordinary fin or spline, the spindle being raised and depressed in the operation of boring by the collet f and a horizontal lever, g, for that purpose.

The feeding device proper for feeding the bristles, hair, or fiber to the tufting device, consists of the hopper h, feed-roller i, rocking shaft j, vertical sliding bars k, crank l, bar m, spring n, and cam-disks p p. The roller i is provided with two rows of curved or inclined spurs or teeth, 75, as shown in Figs. 2 and 3, the teeth being inclined in a direction opposite to that in which the roller revolves, and working in corresponding elongated slots r, in the upper side of the hopper. The shaft j is mounted in the upper ends of the bars k, and provided with two upwardly-projecting fingers, t, which work in corresponding slots u, in the lower side of the hopper. The bars k are provided at their lower ends with studs v, which engage cams 2 on the disks p, causing the fingers t to enter the slots u, the fingers being withdrawn therefrom by the bars falling when the studs v have passed said cams. The bar m is provided with a shoulder, w, which engages a stud, y, on the pitman-rod z, operated by the disk p. A lever, 3, is pivoted on the shaft of the roller i, and provided with a ratchet-and-pawl mechanism, 4, for revolving said roller intermittently, the lever 3 being operated by the cross-bar 5, the throw of the lever being regulated by the adjustable bar 6, having the stud 7, the lever resting on the stud when it falls to its lowest position.

The feeding device proper, for feeding the securing-wire to the tufting device, consists of a horizontally-arranged lever, 8, pivoted at 9, and having an ordinary feeding clutch-head, 10, which grasps the wire to draw it forward to the cutting device, and releases it as it returns to take a new hold, the lever being operated by the bent lever 11, which is pivoted at 12, and actuated by the cam 13 on the disk p, a spring, 14, keeping the lower end of the bent lever in contact with the disk.

The cutting device proper for cutting off the

securing-wires consists of the bed-die 15, and movable die or plunger 16, the bed-die being disposed in the vertical tube or tufting socket 17, and provided with a hole through which the wire passes into the socket.

The tufting device proper, for inserting the bristles, hair, or fiber in the tufting-holes, consists of the vertical tube or tufting-socket 17, attached to the cross-head 19, which is worked vertically in proper ways in the frame of the machine by means of the rods 20 and face-cams 21 on the disks p. The plunger 16 is attached to the cross-bar 5 and is operated by the disks p and pitmen z.

The device for adjusting the blank vertically in reference to the tufting device consists of a screw, 22, at either end of the machine, the upper end of the screw working in a nut, 23, attached to the frame, and the lower end in the brackets 24, attached to the vertical bar or slide U, which is connected with the slides P, bars O, and bed F.

The device for connecting the boring device and tufting device with the pattern device in such manner that they may be operated in unison consists of the rocker-shaft 25, the pitman 26, attached to the outer end thereof and to the lever L, and the pitman 27, attached to the center of said shaft and to the lever g. The rocker-shaft is elongated, and has an upwardly-turned arm, 28, at its inner end, which operates the clutch 29 on the driving-shaft B, causing it to engage the driving-pulley C, which is loose on said shaft, until secured by the clutch.

The device for adjusting the boring device horizontally in respect to the pattern device consists of the rods 30, provided with the crank 31 at their outer ends, and with the screws 32 at their inner ends, the screws working in the brackets 33 on the movable frame 34, in which the boring-spindle is mounted.

The shipping device proper for stopping the operations of the boring and tufting devices consists of the horizontally-arranged lever 35, pivoted at 36 to the frame of the machine, its free end 37 working in connection with the cam-disk p, the lever being operated by the cam 38. The inner end of the lever is provided with a vertically-arranged sliding bar, 39, working on the frame of the machine, and having a slot, 40, into which the stud 41 projects. This slot is provided with a supplemental slot, 42, branching at right angles from the slot 40, which, in connection with the stud, forms a rest for the sliding bar 39, the upper end of which engages and lifts the lever L. When the lever L is down, the bar K in one of the holes in the pattern-roller D, the boring-spindle V depressed, the cranks 43 and 44 of the rocker-shaft 25 elevated, the clutch 29 engaged with the pulley C, the stud 41 in the slot 42, and the free end 37 of the lever 35 in contact with the disk p, the machine being in operation, if, now, the cam 38 engages the lever 35, the end 37 of said lever will be de-

pressed, the bar 39 elevated, lever L and bar K thrown up, pitman 26 lowered, shaft 25 turned, and its cranks 43 and 44 depressed, pitman 27 and lever *g* operated to raise the spindle V, and the clutch 39 disengaged from the driving-pulley C, thereby stopping the action of the boring and tufting mechanisms. The cam-disks are mounted on a shaft, 45, journaled horizontally in one end of the frame-work of the machine, and are provided with a gear, 46, which intermeshes with the pinion 47 on the driving-shaft B.

In the use of my improvement, the machine is first adjusted in the following manner: The frame carrying the boring-spindle provided with a suitable bit, is moved longitudinally on the frame of the machine by means of the rods 30 and cranks 31, until the distance between the center of the bit and the center of the tufting-socket 17 corresponds with the circumference of the pattern-roller D. The strip or blank I is then placed on the bed F of the machine, being pushed through under the pattern-roller (which also acts as one of the feed-rollers) until its inner end passes beyond the boring-spindle a distance corresponding with the end margin of the brush, the strip being centered or adjusted laterally by the screws 50 and strips 51. The pattern-roller is then turned until the end of the bar K rests in the groove 55, or first groove forward of the blank 56 on said roller, this groove in the pattern shown being provided with but one hole, 57. The set-screws J are then turned down until the pattern-roller is brought into forcible contact with the strip, the cam-disks *p* being also turned to bring the tufting-socket down to its lowest point. The bed F is next raised by means of the screws 22, until the lower end of the tufting-socket 17 stands at a distance from the bed corresponding with the thickness of the strip I, and the pressure-bars 52 turned down into loose contact with the strip by means of the screws 49, or so that the strip will pass freely under the bars, and at the same time be prevented from being raised from the bed by the action of the boring or tufting devices. The bristles, hair, or fiber, cut to a proper length, and otherwise suitably prepared, are then placed in the hopper *h* in a horizontal position, and centrally adjusted therein by means of the loose guides 53 and set-screws 54 for adjusting said guides, the sliding bar 6 and stud 7 being adjusted so that the lever 3 will have sufficient range of motion to cause the roller to turn, so as to feed the requisite quantity of bristles to the tufting device. Power is now applied to the pulley Y, and the bed F moved laterally by the hand-wheel T, until the bar K falls into the hole 57 in the pattern-roller, the free end of the lever L, to which the bar is pivoted, being forced down by the spring 58 and its opposite end elevated, drawing up the pitman 26, rocking the shaft 25, and forcing up the pitman 27, thereby depressing the inner end of the lever *g* and forcing down

the spindle V, bringing its bit into contact with the strip I and boring the hole 59, (see Fig. 10,) which corresponds with the hole 57 in the pattern-wheel. After the first hole has been bored, as described, the lever L is raised, withdrawing the bar K from the hole 57 and the bit from the hole 59 in the strip I. The bed F is now moved laterally by the hand-wheel T until the point of the bar K enters one of the circumferential grooves N in the pattern-roller, which is then turned back by means of the ratchet-lever G until the point of the bar is opposite the next longitudinal groove in said roller, or opposite the groove next in front of that in which the hole 57 is located. The bed F is now moved laterally until the bar K enters the first hole in the groove, and the operation of boring another hole in the blank is repeated in substantially the same manner as already described. After all of the holes necessary for one brush, or a number of holes corresponding with the holes in the pattern-roller, have been bored in the blank, as shown in section 60 of Fig. 10, the bed F is moved laterally until the point of the bar K enters one of the circumferential grooves N, after which the pattern-roller is turned, by means of the lever G, until the bar comes opposite the groove in which the hole 57 is disposed. Power is now applied to the loose pulley C, and the bed F moved laterally until the bar K enters the hole 57, thereby permitting the spring 58 to depress the free or outer end of the lever L, drawing up the pitman 26, depressing the spindle V, and causing the clutch 29 to engage the pulley C. The clutch being engaged with the pulley C, the shaft B will be caused to revolve, transmitting motion through the pinion 47 and gear 46 to the shaft 45 and cam-disks *p*. The hole 59, first bored in the blank I, being now directly under the tufting-socket 17, and the disks *p* revolving, the studs *v* of the sliding bars *k* will be brought into contact with the cams 2 on said disks, and the fingers *t* on the shaft *j* caused to enter the slots *u* in the bottom of the hopper *h*, the fingers passing upwardly through the bristles in the throat of the hopper. At the same time the shaft *j* is raised, the face-cams 21 on the disks *p*, acting on the studs 64 in the sliding bars or rods 20, cause the bars to descend, and the tufting-socket to be brought into contact with the blank I. The disks *p* continuing to rotate, the stud *y* on the pitman *z* will be brought into contact with the shoulder *w* under the bar *m*, drawing the bar forward, and causing the shaft *j* to partially rotate in the direction of the tufting-socket 17. The fingers *t* having been passed up through the bristles in the throat of the hopper, when the shaft *j* is partially turned, as described, that portion of the bristles in front of the fingers, or enough to form one tuft of the brush, will be forced forward out of the throat of the hopper into the tufting-socket 17, and deposited across the path of the plunger 16, or vertical hole through

the socket in which the plunger works, the plunger being elevated. The cam 13 on the disk *p* is brought into contact with the lower end of the lever 11, causing it to operate the feed-lever 8 to feed the wire 61 forward into the tufting-socket 17, through the hole 62 in the bed-die 15, over the bristles 63, then in said socket. The wire having been fed into the socket 17, over the bristles, as described, the plunger 16, actuated by the disks *p*, through the pitmen *z*, descends, and acting as a shear in combination with the die 15, cuts off that portion of the wire which is in the socket, and continuing on its downward course comes into contact with the bristles 63, forcing them down into the hole in the blank, the tuft of bristles being doubled or folded by the plunger as they pass through the mouth 65 of the socket, and before they enter the hole in the blank.

A slot, 66, is formed in the rear central portion of the tufting-socket 17, for receiving the bristles from the throat of the hopper *h*. This slot is of the same width as the diameter of the hole 65, forming the mouth of the socket, and of a length extending laterally entirely across the socket, or from 67 to 67. The plunger 16 is composed of a thin narrow strip of metal slightly wider than the slot 66, and extends into the side slots 68, the wire 61 also extending across the bristles 63 into said slots, so that when cut by the plunger, as described, the piece cut off will be longer than the diameter of the mouth 65 in the socket and corresponding hole 59 in the blank, and when the wire and bristles are forced by the plunger into the hole 59 the ends of the wire will "drag" or be brought into contact with the sides of the hole in such a manner as to cause the wire to be bent slightly downward at its center, and when the bristles reach the bottom of the hole and are compressed by the plunger, the wire will be straightened, causing its ends to pierce or engage the sides of the hole and secure the tuft in position. After the tuft has been forced into the hole, as described, the disks *p*, continuing to revolve, will raise the pitmen *z* and withdraw the plunger from the hole, and the cams 21, acting on the rods 20, will raise the tufting-socket, drawing it off of the tuft secured in the blank preparatory to inserting another tuft, which is accomplished in substantially the same manner. After the plunger and tufting-socket have been raised, as last described, the disk *p*, continuing to revolve, brings the cam 38 into contact with the end 37 of the lever 35, the stud 41 being in slot 42, and raises the sliding bar 39, causing the lever *L* to act upon the pitman 26 and shaft 25, to raise the boring-spindle *V*, and disengage the clutch 29 from the pulley *C*, thereby stopping the operations of the boring and tufting devices. After the clutch 29 has been disengaged and the boring-spindle *V* raised, as described, the stud 41 being in the cross-slot 42, and the bar 39 elevated, the pattern-roller is again adjusted preparatory to boring an-

other hole, by means of the lever *G* and by moving the bed *F* laterally, as hereinbefore described. The bar 39 is then tripped or pushed back by means of the bell-crank treadle 69 acting upon its lower end to force the stud 41 out of the cross-slot 42 into the vertical slot 40, thus permitting the bar to fall, after which the bed *F* is again moved laterally to bring the bar *K* into one of the holes in the pattern-roller, and the operation of boring and tufting another hole in the blank is repeated.

It will be obvious that the circumference of the pattern-roller is equal to one section of the blank, or corresponds with the length of the brush; also, that any pattern of brush may be produced by changing the pattern-roller or holes therein, as desired.

The machine may be used for "set-work" by using cement instead of the wires for securing the tufts in the holes, the cement being introduced into the holes by any suitable means for that purpose. It will be obvious, however, that when used for set-work the feeding and cutting device for the wire may be dispensed with; but I do not confine myself to the use of either wire or cement for securing the tufts in the holes.

Having thus explained my invention, what I claim is—

1. In a brush-making machine substantially such as described, the combination of the following instrumentalities and operative mechanism therefor, to wit: a pattern device for determining the location of the tuft-holes in the blank, a device for moving the blank laterally in respect to the pattern, boring, and tufting devices, a boring device for boring the tuft-holes, a feeding device for feeding the bristles, hair, or fiber to the tufting device, a tufting device for inserting the bristles, hair, or fiber in the tuft-holes, a device for adjusting the blank vertically in respect to the tufting device, a device for connecting the boring device and tufting device with the pattern device in such a manner that they may be conjointly operated, a device for adjusting the boring device horizontally in respect to the pattern device, and a shipping device for automatically stopping the operations of the tufting and boring devices, substantially as set forth.

2. In a brush-making machine, the combination, substantially as set forth, of the following instrumentalities, to wit: a pattern device for determining the location of the tuft-holes in the blank, a device for moving the blank laterally in respect to the pattern, boring, and tufting devices, a boring device for boring the tuft-holes, a feeding device for feeding the bristles, hair, or fiber to the tufting device, a tufting device for inserting the bristles, hair, or fiber in the tuft-holes, a feeding device for feeding the wire to the tufting device, a cutting device for cutting off the securing-wire, a device for adjusting the blank

vertically in respect to the tufting device, a device for connecting the boring device and tufting device with the pattern device in such a manner that they may be conjointly operated, a device for adjusting the boring device horizontally in respect to the pattern device, and a shipping device for automatically stopping the operation of the tufting and boring devices.

3. The combination, substantially as set forth, of feeding-rolls, one of which is provided with grooves and holes, whereby it is adapted to serve as a pattern device, means for adjusting the pressure of said rolls, means for operating said rolls, means for moving said rolls laterally, and means for arresting the lateral movement of the rolls at the desired points.

4. In a brush-making machine substantially as described, the pattern-wheel D, provided with the longitudinal grooves M, circumferential grooves N, holes *a*, and blank side 56, substantially as set forth.

5. The combination, substantially as set forth, of feed-rolls, means for adjusting the same vertically and laterally, a boring device, and a tufting device.

6. The combination, substantially as set forth, of rolls, one of which is provided with grooves and holes, whereby it is adapted to serve as a pattern-roll, means for moving said rolls laterally, means for arresting the lateral motion of said rolls in accordance with the pattern-holes, a boring device, and a tufting device.

7. The combination, substantially as set forth, of a tufting-socket, means for moving said socket vertically in respect to the bed of the machine, a plunger, and means for operating the latter.

8. The combination, substantially as set forth, in a brush-machine, of a feeding device, a pattern device, a tufting-socket, a plunger therefor, and a wire-feeding device, said plunger being provided with cutting-edges adapted to sever the wire.

9. The combination, substantially as set forth, of a pattern device, a boring device, a tufting device, and a bristle-feeding device, having a roller provided with teeth inclined reversely to the revolution of the same.

10. The combination, substantially as set forth, of a boring device, a tufting device, and a feeding device for feeding the blanks to the boring and tufting devices, consisting of the rollers D E, bed F, lever G, and operative mechanism therefor.

11. In a brush-making machine substantially as described, a pattern device for determining the location of the tufting-holes in the blank, consisting of the roller D, bar K, levers G L, and operative mechanism therefor, combined and operating substantially as set forth.

12. In a brush-making machine substantially as described, a device for moving the blank laterally in respect to the pattern,

boring, and tufting devices, consisting of the bed F, bars O P, rack Q, shaft S, pinions R, wheel T, and operative mechanism therefor, said elements being combined and operating substantially as described.

13. The combination, substantially as set forth, of a pattern device, a tufting device, an intermediate boring device, and means for horizontally adjusting said boring device relative to said pattern and tufting devices.

14. In a brush-making machine substantially as described, a feeding device for feeding the bristles, hair, or fiber to the tufting device, consisting of the hopper *h*, roller *i*, rocking shaft *j*, fingers *t*, bars *k*, crank *l*, bar *m*, spring *n*, rod *z*, lever 3, bar 6, disks *p*, and operative mechanism therefor, all combined and operating substantially as set forth.

15. The combination, substantially as set forth, of a tufting-tube, a clutch-lever, 8, for feeding wire to said tube, a lever, 11, for actuating said clutch-lever, a cam for moving the actuating-lever, and a spring for restoring said levers to their normal positions.

16. The combination, substantially as set forth, of a tufting-tube, mechanism for feeding bristles to said tube, a wire-feeding mechanism, a die within said tube, and a plunger for cutting off and inserting the wire.

17. In a brush-making machine substantially as described, a tufting device for inserting the bristles, hair, or fiber in the tufting-holes, consisting of the vertical tube or socket 17, plunger 16, cross-head 19, rods 20, cross-bar 5, pitmen *z*, disks *p*, and operative mechanism therefor, all combined and operating substantially as set forth.

18. In a brush-making machine substantially as described, a device for adjusting the blank vertically in reference to the tufting device, consisting of the slide U, screws 22, nuts 23, slides P, bars O, and bed F, the parts being combined and arranged to operate substantially as described.

19. In a brush-making machine substantially as described, a device for connecting the boring device and tufting device with the pattern device in such manner that they may be operated in unison, consisting of the rocker-shaft 25, pitman 26, lever L, pitman 27, lever *g*, arm 28, clutch 29, pulley C, shaft B, and operative mechanism, the parts being combined and arranged to operate substantially as set forth.

20. In a brush-making machine substantially as described, the combination of a pattern device, a tufting device, and a device for adjusting the boring device horizontally in respect to the pattern device, consisting of the rods 30, cranks 31, screws 32, and frame 34, substantially as described.

21. In a brush-making machine substantially as described, a shipping device for stopping the operations of the boring and tufting devices, consisting of the lever 35, having the stud 41, bar 39, having the slots 40

and 42, lever L, shaft 25, pitmen 26 and 27, lever *g*, clutch 29, and disk *p*, having the cam 38, and operative mechanism therefor, all combined and operating substantially as set forth.

22. In a brush-making machine substantially such as described, the tufting-socket 17, provided with the slot 68, formed partially in the cross-head 19 and partially in the body 10 of the socket 17, to receive the edge of the plunger 16 and end of the wire 61, substantially as set forth.

23. In a brush-making machine substantially such as described, the treadle 69, in combination with the lever 35 and bar 39, having the slots 40 and 42, substantially as and for the purpose specified.

EDWARD LAWSON FENERTY.

Witnesses:

C. A. SHAW,
L. J. WHITE.