

No. 686,448.

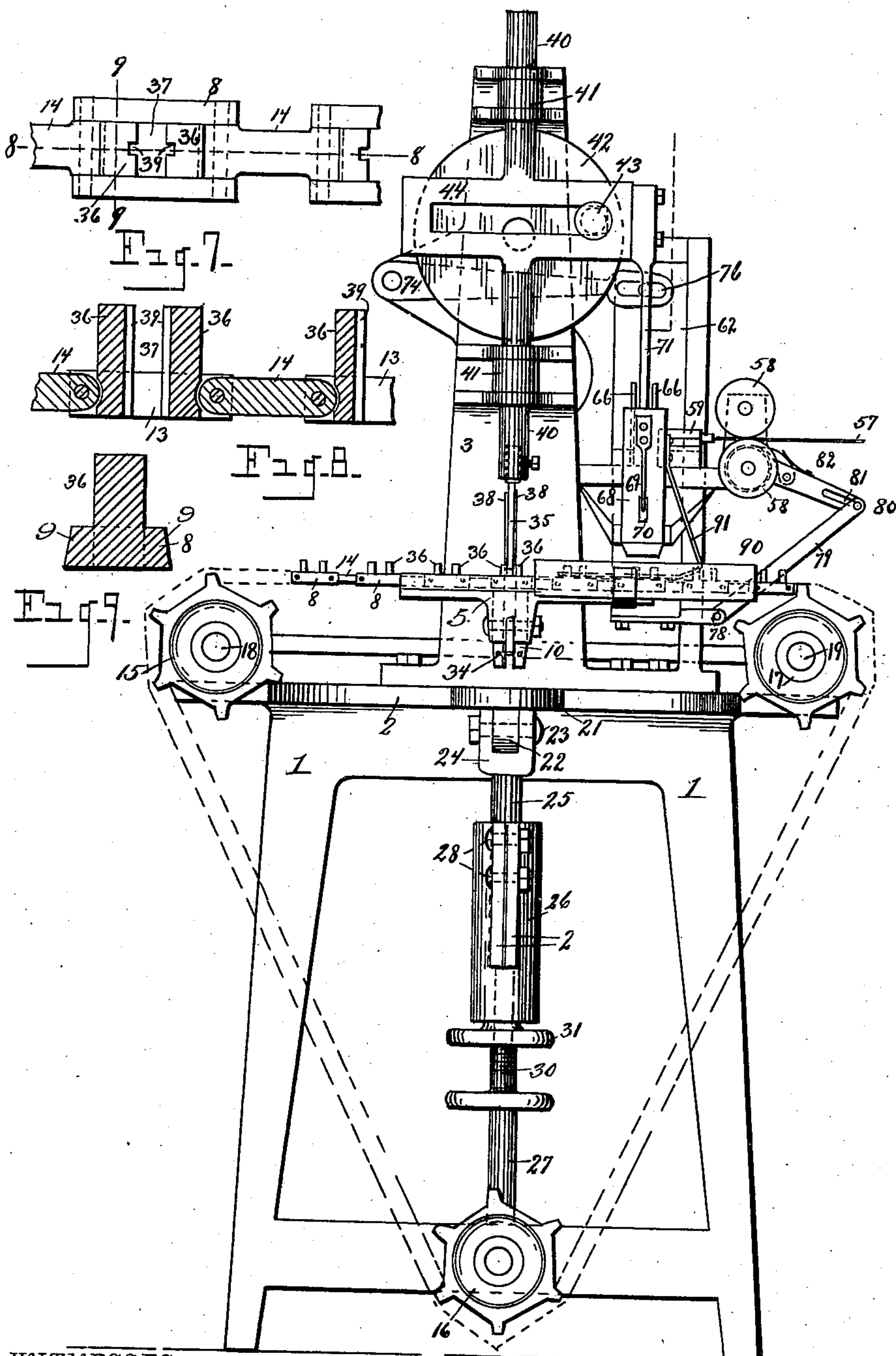
Patented Nov. 12, 1901.

W. H. GATES.  
BRUSH MACHINE.

(Application filed Aug. 3, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES.

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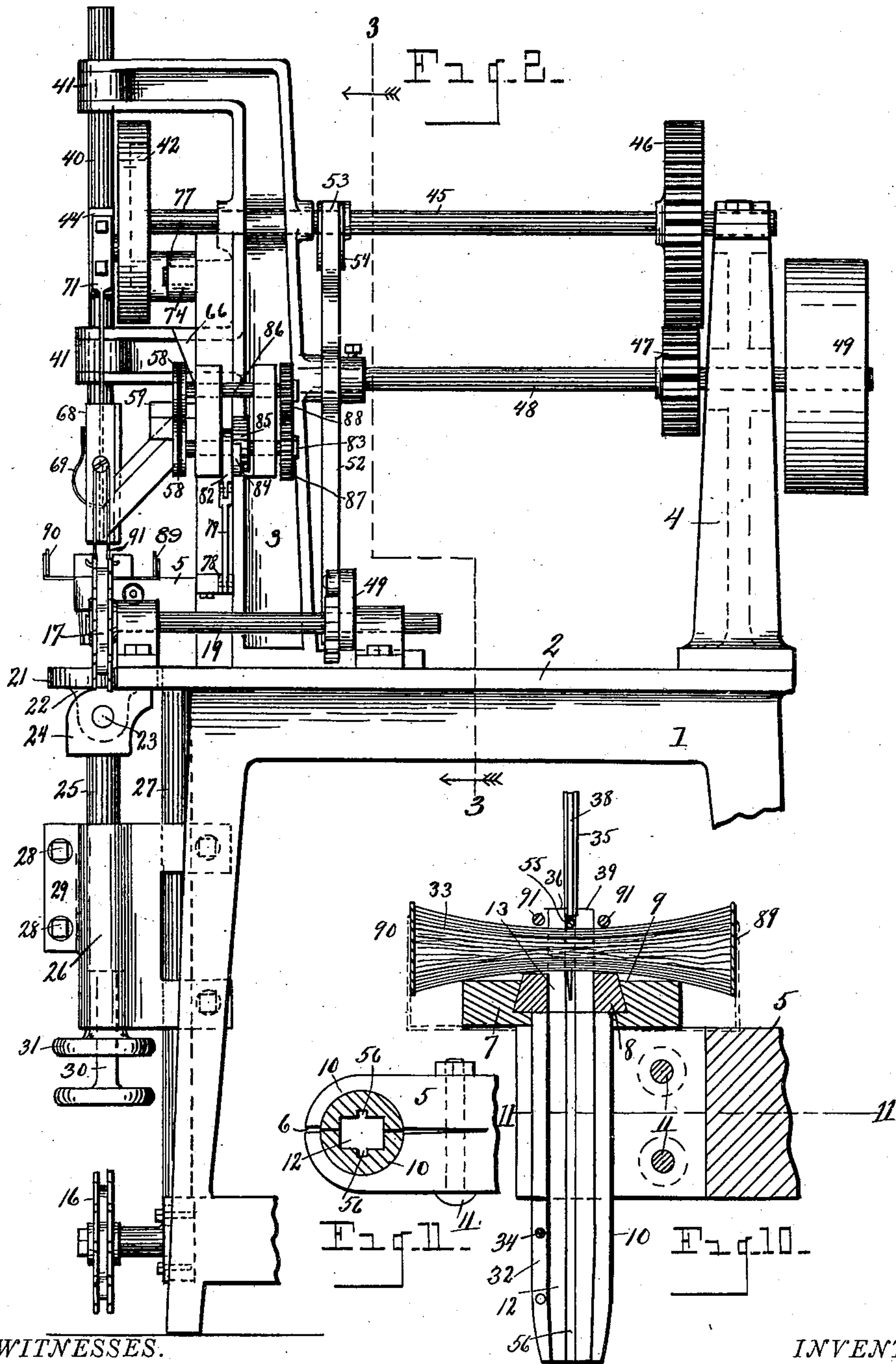
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3 Sheets—Sheet 2.



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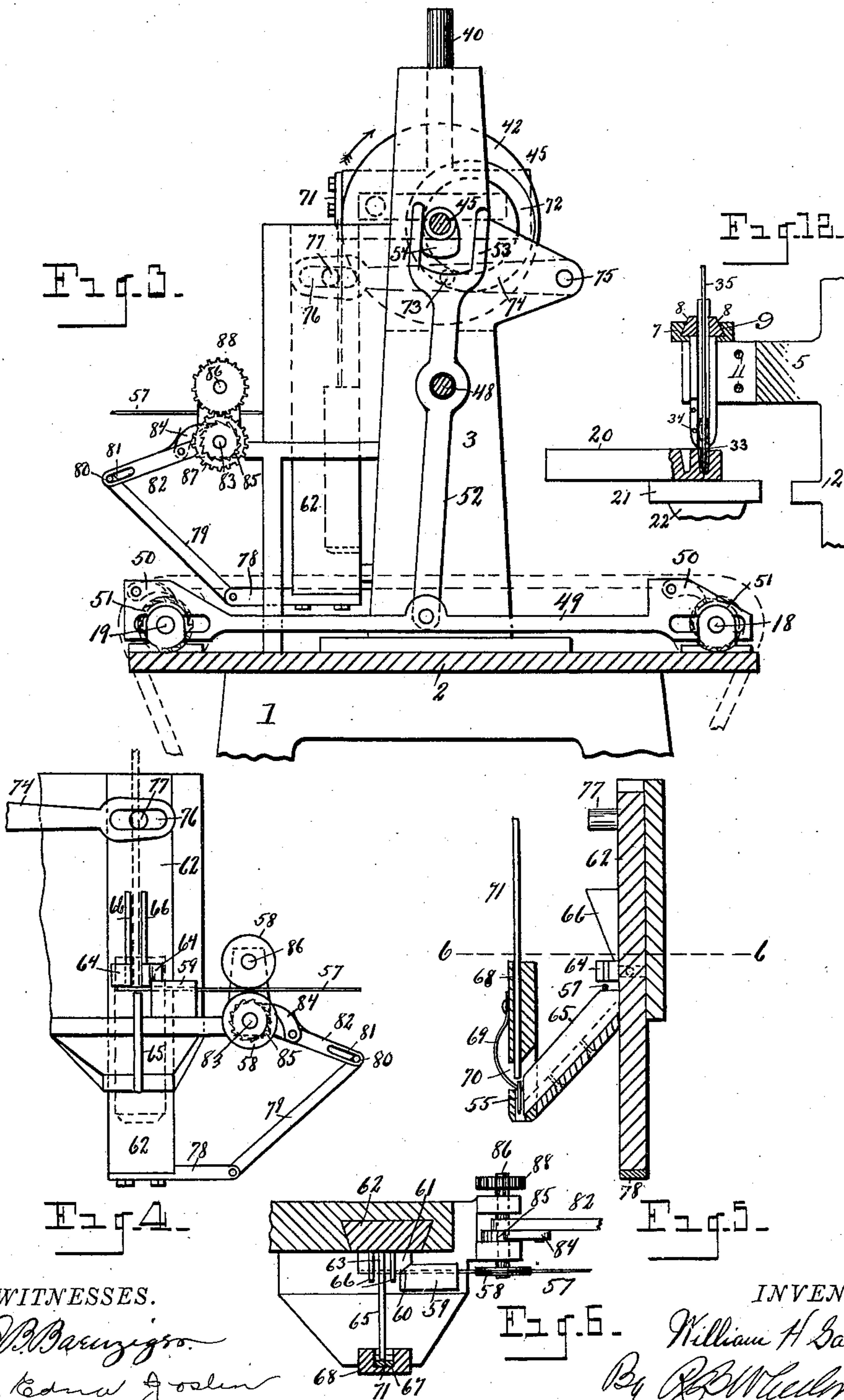
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3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

WILLIAM H. GATES, OF DETROIT, MICHIGAN.

## BRUSH-MACHINE.

SPECIFICATION forming part of Letters Patent No. 686,448, dated November 12, 1901.

Application filed August 3, 1900. Serial No. 25,737. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. GATES, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Brush-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and the figures of reference marked thereon, which form a part of this specification.

This invention relates to a machine for making brushes; and it consists in the construction and arrangement of parts hereinafter fully set forth, and pointed out particularly in the claims.

The object of the invention is to provide simple and efficient means for conveying the stock in tufts into the path of a reciprocatory plunger, whereby said stock is forced into cells in the brush-block, to provide means for forming and feeding the staples to the tufts of stock on the carriage, so that the operation of forcing the stock into the brush-block carries therewith the staples which confine the stock within said block, and to provide means for moving the carriage or stock-conveyer and driving the other operative parts of the machine in conjunction therewith to make perfect and complete the machine's operation.

The above object is attained by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is a side elevation thereof, parts of the frame being broken away. Fig. 3 is a vertical section as on line 3 3 of Fig. 2. Fig. 4 is a detail in elevation of the wire-feeding and staple-forming mechanism. Fig. 5 is a vertical section in detail through a portion of the staple-forming mechanism and the mechanism for feeding the staples to the tufts of the stock on the carriage. Fig. 6 is a horizontal section as on line 6 6 of Fig. 1, the wire-feeding mechanism appearing in plan view. Fig. 7 is a plan view of a section of the endless chain or carrier in which the tufts of the stock are carried into the path of the reciprocatory plunger. Fig.

8 is a longitudinal sectional view as on line 8 8 of Fig. 7. Fig. 9 is a transverse section as on line 9 9 of Fig. 7. Fig. 10 is an enlarged detail in section, showing the position of parts at the time of the descent of the plunger in the operation of forcing a tuft of stock through the guiding-tube into the brush-block. Fig. 11 is a horizontal section through the guiding-tube as on line 11 11 of Fig. 10. Fig. 12 is a detail in section, showing a tuft of stock forced into a cell in the brush-block by the reciprocatory plunger.

Referring to the characters of reference, 1 designates the supporting-frame carrying a bed or table 2. Mounted upon said table are standards 3 and 4, respectively, which carry the driving-shafts and operative mechanism.

Projecting from the face of the standard 3, near the base thereof, is a horizontal bracket 5, which is split longitudinally from its outer end, as shown at 6 in Fig. 11. Said bracket supports upon its outer end a horizontal guide 7, adapted to receive and direct the endless tuft-conveyer, said conveyer comprising a series of pivoted links 8, having beveled sides 9, which engage in an undercut way in said guide 7, whereby said conveyer is directed in its movement. Mounted between the divided members of the bracket 5, at the outer end thereof, is a vertical guiding-tube 10, which is composed of two semicylindrical parts clamped between the sides of the bracket 5 by the transverse bolts 11. This tube is so positioned that the aperture 12 therethrough will register with the way in the guide 7 and with the aperture 13 in the links 8 when said links are brought into alinement therewith. Said conveyer is, in effect, an endless sprocket-chain, comprising the links 8, pivotally united by the blocks 14. Said chain or conveyer passes around the sprocket-wheels 15, 16, and 17, respectively, which are mounted upon suitable shafts journaled in the frame and which are arranged in a triangle, as clearly shown in Fig. 1, motion being imparted to said conveyer through the medium of the shafts 18 and 19 of the sprocket-wheels 15 and 17, as hereinafter explained.

The table upon which the brush-block 20 is supported comprises a small circular disk 21, having a depending bracket 22, adapted to be clamped by a transverse bolt 23 between



the sides of the bifurcated upper end 24 of a stem 25, embraced by a split sleeve 26, which is in turn clamped upon a supporting-rod 27, so as to enable said sleeve to be swung and  
 5 adjusted vertically. Bolts 28, passing through the projecting lips 29 of said sleeve, enable it to be clamped upon the stem or standard of the table 21. The lower end of the standard 25 of the table is engaged within the sleeve  
 10 by a hand-screw 30, whereby by turning said screw the table 21 may be raised and lowered. The hand-screw 30 is locked by a jam-nut 31 when properly adjusted. The manner of mounting the table on the upper end of the  
 15 standard 25 allows of the tilting of said table, while the adjustable sleeve 26 and the movement vertically of the standard within said sleeve enable said table to be adjusted to any desired position or angle, so as to place the  
 20 blocks in proper relation to the lower end of the guiding-tube 10, which depends directly over said table. It will be seen that the lower end of the guiding-tube is slotted, as at 32, the purpose of which is to permit the folded  
 25 ends of the tuft 33 of the bristles to pass therefrom after said tuft has been secured in the brush-block. To provide for varying lengths of tufts, pins 34 may be passed across the slotted opening 32 of the guiding-tube to pre-  
 30 vent a too early escape of the tufts from the tube, as might result where a short length of stock is used, and prevent a proper entry of the stock into the cells of the brush-block.

The reciprocatory plunger 35 is adapted to  
 35 engage the tuft of stock upon the conveyer and carry it downward through the tube 10 into a cell of the brush-block. To confine the stock in place and direct said plunger in its movement, the links 8 of the chain or con-  
 40 veyer are provided with a short post 36, standing vertically from opposite ends of each link on opposite sides of said central opening 13 therethrough. Between these posts the tufts of stock are confined and extend transversely  
 45 of the conveyer. Said posts stand approximately parallel and form between their opposed faces a way 37, (see Figs. 7 and 8,) down which said plunger and stock are directed to the opening 13 through said link,  
 50 through which opening they pass into the directing-tube 10 and thence into a cell in the brush-block, as illustrated in Fig. 12. To prevent a possible springing of said plunger and to direct it perfectly in its operation,  
 55 its opposite sides are provided with vertical flanges 38, which project laterally therefrom and which enter the channels 39, formed in the opposite vertical faces of the posts 36, whereby said plunger is directed in its move-  
 60 ment. Said plunger is mounted in the lower end of a vertical shaft 40, supported in suitable guides 41 and receiving motion from a rotary disk 42, carrying a pin 43, which en-  
 65 gages in a slotted head 44, carried by said shaft, whereby a reciprocatory movement is imparted to said shaft and to said plunger by a rotation of said disk.

The disk 42 is mounted on a counter-shaft 45, which is driven through the medium of a gear-wheel 46 thereon, which meshes with a  
 70 pinion 47 on the main shaft 48, carrying the driving-pulley 49.

The endless chain or conveyer is driven through a rotation of the shafts 18 and 19, carrying the sprocket-wheels over which said  
 75 conveyer passes. An intermittent movement is imparted to said shafts by means of a reciprocatory bar 49, (see Fig. 3,) having slots at its opposite ends, through which said shafts  
 80 pass, respectively, and provided at each end with a pawl 50, adapted to engage with the respective ratchet-wheels 51 on said shafts. Attached to the center of said bar is a lever  
 52, which is fulcrumed upon the shaft 48 and provided at its upper end with a fork 53,  
 85 which embraces a cam 54 upon the shaft 45, whereby a rotation of the shaft 45 will oscillate the lever 52 and impart a reciprocatory movement to the bar 49, causing the pawls  
 90 carried by said bar to engage their respective ratchet-wheels and turn the shafts 18 and 19 intermittently, as will be well understood.

With the operation of forcing the tufts of stock into the brush-block a staple 55 is carried downward by the descent of the plunger  
 95 35 and driven into said block to secure the tuft of stock therein, the sides of the staple engaging in the channels 56 in the opposite walls of the tube 10, which register with the  
 100 channels 39 in said posts and receive the flanges 38 on said plunger, whereby the staple is directed perfectly into place.

The staples which are employed to secure the tufts of fiber in the brush-block are formed of a continuous strand of wire 57,  
 105 which is carried into the machine between the feed-rollers 58. After passing between the feed-rollers the wire is directed through a guide 59, which is apertured to receive it and which terminates in a beveled block or  
 110 die 60, from which the wire protrudes. The wire from which each staple is formed is severed from the strand by means of a shear-plate 61, which is mounted upon the verti-  
 115 cally-reciprocatory slide 62 and which upon its descent carries said shear-plate past the beveled face of the die 60 and cuts from the strand the desired length of wire to form the  
 120 staple. The severed strand of wire from which the staple is formed lies across the upper edge of the narrow plate 63 and is bent into shape by the descent of the opposed forming-  
 125 blocks 64, also mounted upon the slide 62, and which bend the severed strand of wire over the plate 63 and shape it in the form of a staple. After the staple is formed it is dis-  
 130 charged onto the inclined chute 65 by means of the beveled plates 66, which are also located upon the slide 62 above the forming-  
 blocks 64 and which by a further descent of the slide force the staple onto the inclined chute 65, down which it passes to the way 67 in the guide 68, with which said chute communicates. The staple is prevented from



dropping from the way in said guide 68 by means of a spring 69, mounted on the face of said guide, whose free end curves into an aperture 70 in the guide and engages the staple 5 55 in the way therein, whereby said staple is arrested and suspended within said way adjacent to the discharge end thereof. Adapted to reciprocate vertically in the way of said guide 68 is a plunger 71, whose upper end is 10 attached to the head 44 of the shaft of the plunger 35, whereby said plungers 35 and 71 are caused to reciprocate in unison. The descent of the plunger 71 carries the staple from the way in the guide downward astride of a 15 tuft of stock which at the time of said operation occupies a position in the carrier directly below said plunger, so that at each operation of said plunger 71 a staple is deposited astride of a tuft of stock in the carrier in po- 20 sition to be carried with the stock downward through the guiding-tube 10 and into the brush-block by the operation of the plunger 35 when said stock is brought into the path thereof by the movement of the carriage. 25 The result of the operation above described is that the staples are formed and successively presented to the stock on the moving carriage or conveyer in position to be forced with the stock into the brush-block by a series of operations entirely automatic.

Movement is imparted to the slide 62 by means of a camway 72 in the inner face of the rotary disk 42. Said camway receives a pin 73, (see dotted lines in Fig. 3,) projecting 35 from a lever 74, which is pivoted at 75 to the frame and at its opposite end is provided with a slot 76, which receives a pin 77, projecting from the slide 62, whereby a rotation of said disk 42 imparts a reciprocatory movement to 40 said slide.

Motion is imparted to the feed-rollers by means of a bracket 78, attached to the bottom of the slide 62 and pivoted at one end to a link or connecting-rod 79, the other end of 45 said rod carrying a pin 80, which engages in a slotted opening 81 in the outer end of the arm 82, which is mounted upon the shaft 83 of the lower feed-roller and carries a spring-pawl 84, adapted to engage a ratchet-wheel 50 85 on said shaft, whereby the vertical movement of the slide 62 imparts an intermittent rotation to said shaft of the feed-roller. In order to cause the feed-rollers to turn in unison, the shaft 86 of the upper roller is geared 55 to the shaft 83 of the lower roller by the gears 87 and 88.

In the operation of the machine the tufts of stock are fed to the traveling carriage or conveyer, so as to be carried between the opposed 60 guide-plates 89 and 90, which are located upon opposite sides of said conveyer and which serve to even the ends of the stock. The movement of the conveyer carries the stock under the curved spring-arms 91, which bear 65 upon the opposite sides of the posts 36 of the links and confine the stock therein, so that when presented by the conveyer under the

staple-discharging plunger 71 the stock is in shape to perfectly receive the staple and is held from springing out of place. The con- 70 tinuation of the operation of the machine carries the tufts of stock, with the staples astride thereof, into the path of the plungers 35, which force said stock and staples into the brush-block, as before described. 75

The several operative parts of the machine are so timed that the carriage is at rest during the descent of the plungers 35 and 71 and is moved a distance of one link when said 80 plungers have received the highest point in a reciprocatory movement. The wire-feeding mechanism from which the staples are formed is also operated when the slide 62 has attained its highest point and before the de- 85 scent thereof. The slot 81 in the lever 82 enables the throw of said lever to be regulated, so as to control the length of the wire fed into the staple-former by each operation of said lever.

Having thus fully set forth my invention, what I claim as new, and desire to secure by 90 Letters Patent, is—

1. In a brush-machine, the combination of the movable tuft-carrier adapted to receive a tuft of stock, guides to receive and direct said carrier, guides upon said carrier to confine 95 said stock, a way between said guides for the reception of a plunger, a reciprocatory plunger adapted to enter the way between said guides in said carrier and carry the stock therewith through said carrier into the brush- 100 block.

2. In a brush-machine, the combination of a flexible conveyer adapted to receive the tufts of stock, a guide to direct said conveyer in its movement and confine it in its place, 105 parts of said conveyer having an aperture therethrough to allow of the passage of the stock, means for confining the stock upon said conveyer, a reciprocatory plunger adapted to pass through the conveyer and carry 110 the stock into the brush-block below.

3. In a brush-machine, the combination of a conveyer comprising pivoted links having apertures therethrough and opposed vertical posts between which the tufts of stock are 115 received, a guide to confine said conveyer and direct its movement, a reciprocatory plunger adapted to engage the stock upon the conveyer and carry it downward into the brush-block.

4. In a brush-machine, the combination of 120 a movable conveyer having opposed guides between which the stock of the brush is adapted to be confined, said conveyer having a way therethrough in line with the opening between said guides, channels in opposite sides 125 of said guides extending through the opening in said way and a reciprocatory plunger adapted to enter between said guides and engage the stock therein, said plunger having lateral flanges which engage in said channels. 130

5. In a brush-machine, the combination of a flexible carrier adapted to move intermittently, means for imparting movement to said carrier, a guide adapted to confine and direct



said carrier, opposed guides upon the carrier adapted to embrace the stock, channels in the opposite faces of said guides, a reciprocatory plunger adapted to enter between said guides, said plunger having flanges which engage in said channels and means for presenting staples to the stock between the guides of the carrier, said staples lying in the channel therein.

6. In a brush-machine, the combination of the flexible carrier having apertures through its parts and guide-posts mounted thereon in line with said apertures, a guideway for directing the movement of said carrier, the guide-posts of said carrier having channels in their opposite faces between which the tufts of stock are adapted to be confined, means for directing staples astride of the stock, the sides of said staples lying in said channels, a reciprocatory plunger adapted to engage the stock between the guide-posts of the carrier, said plunger having flanges which engage in the channels therein.

7. In a brush-machine, the combination of a flexible endless conveyer having apertured links, guides mounted upon said links in line with said apertures adapted to receive the tufts of stock, means for forming and presenting staples to the tufts of stock between the guides of the carrier and a reciprocatory plunger adapted to engage the staples and stock and force them through the carrier into the brush-block.

8. In a brush-machine, the combination of a movable carrier adapted to receive and confine the brush-stock and having apertures through which the stock is adapted to pass, a reciprocatory plunger adapted to engage the stock and carry it through said carrier, means for forming a staple operated in conjunction with the movement of said plunger and independent thereof and means operated simultaneously with the plunger for presenting the formed staples to the stock upon the carrier in advance of said plunger.

9. In a brush-machine, the combination of a movable carrier adapted to receive the tufts of stock, a guiding-tube below said carrier, comprising the semicircular parts having a channel in each of the opposite walls thereof, a clamp for holding the parts of said tube in position, an adjustable table below said guiding-tube and a reciprocatory plunger for forcing a tuft of stock through the carrier and guiding-tube and into a brush-block upon said table, said plunger having projecting flanges which enter the channels in said guiding-tube.

10. In a brush-machine, the combination of

a carrier adapted to receive the tufts of stock having apertures through which the stock is adapted to pass, a guiding-tube below the carrier adapted to register with the apertures therein, a plunger adapted to force the stock through the carrier and guiding-tube, a table supported below said tube and adapted to support the brush-block and means providing for a tilting of said table and the adjustment thereof vertically.

11. In a brush-machine, the combination of a carrier comprising an endless chain consisting of links connected by pivoted blocks, guiding-posts carried by said links for the reception of the brush-stock, said posts having guiding-channels in their opposed faces, sprocket-wheels over which said chain passes engaging the space between the links of said chain and means for imparting an intermittent movement to said sprocket-wheels and a plunger adapted to enter between said posts having flanges entering the channels thereof.

12. In a brush-machine, the combination of a carrier adapted to receive the stock, a two-part guiding-tube clamped below the carrier through which the stock is adapted to pass, a reciprocatory plunger working through the carrier and into said tube, channels in the opposite walls of said tube to receive and guide the staple into the brush-block, the lower end of said tube having a slot to allow of the escape of the ends of the tufts of brush fiber.

13. In a brush-machine, the combination of a carrier adapted to receive the stock, a plunger for forcing the stock through the carrier into the brush-block, guides upon the carrier for the reception of the staples to hold them astride of said stock, means for feeding the wire from which the staples are formed operated in conjunction with the operation of said plunger and means for directing the staples to the tufts of stock upon said carrier.

14. In a brush-machine, the combination of a reciprocatory plunger, means for presenting the brush fiber to said plunger, a guiding-tube in the path of said plunger through which the brush fiber is adapted to be carried by the plunger's movement, said guiding-tube having a slot in the wall of the lower end thereof and a pin, or pins, crossing said slotted opening.

In testimony whereof I sign this specification in the presence of two witnesses.

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Witnesses:

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