June 6, 1972 H. H. FULCHER 3,667,809

APPARATUS FOR OPERATING ON BRUSH STOCKS

Filed Aug. 13, 1970 4 Sheets-Sheet 1

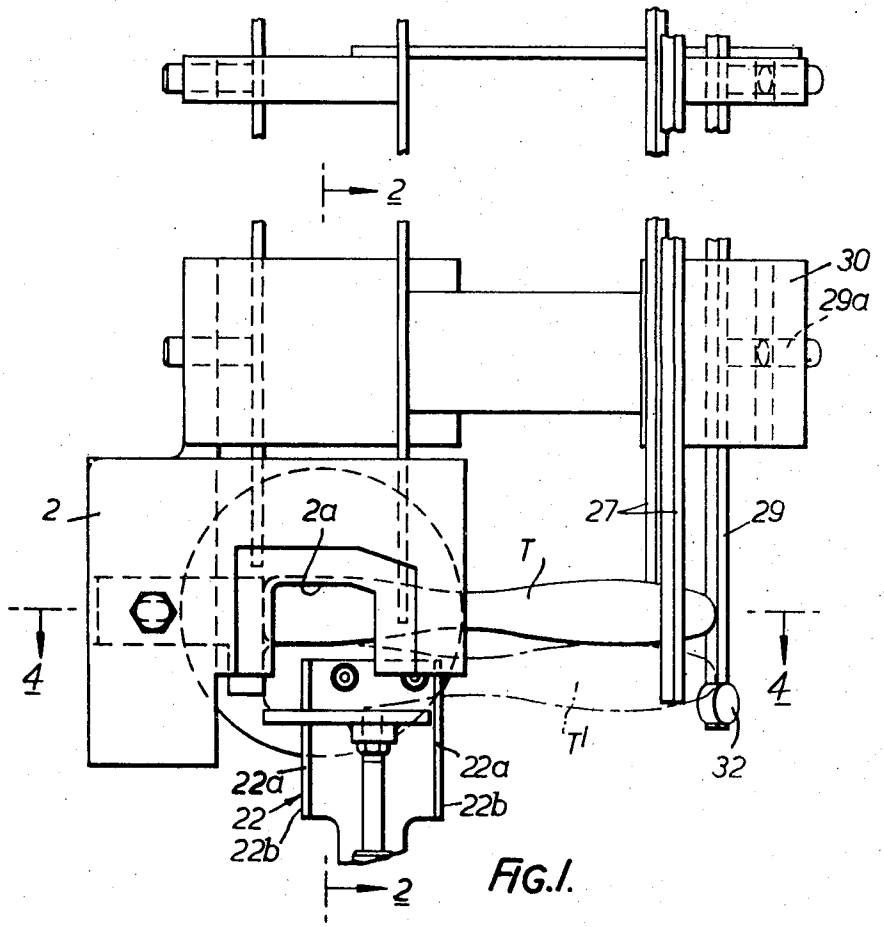

FIG. 1.

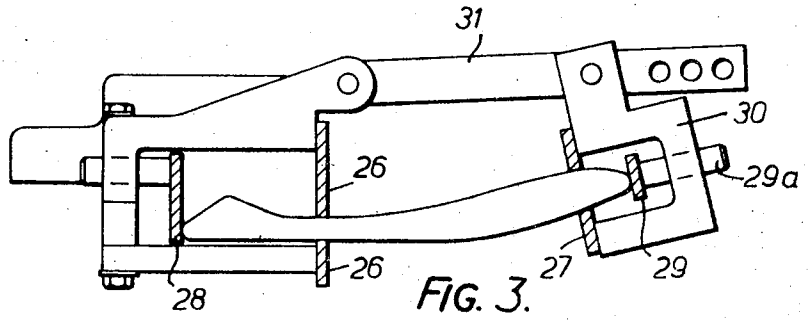

FIG. 3.

APPARATUS FOR OPERATING ON BRUSH STOCKS

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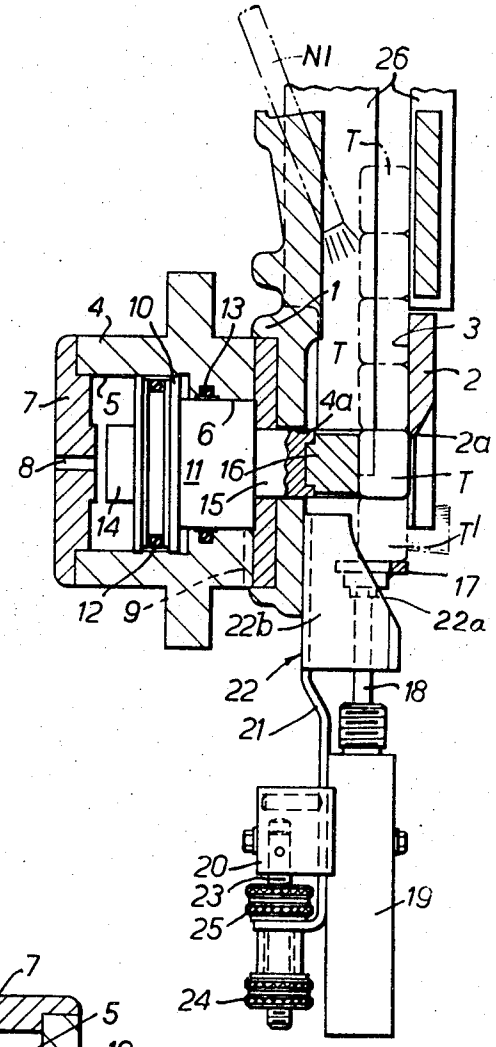

FIG. 2.

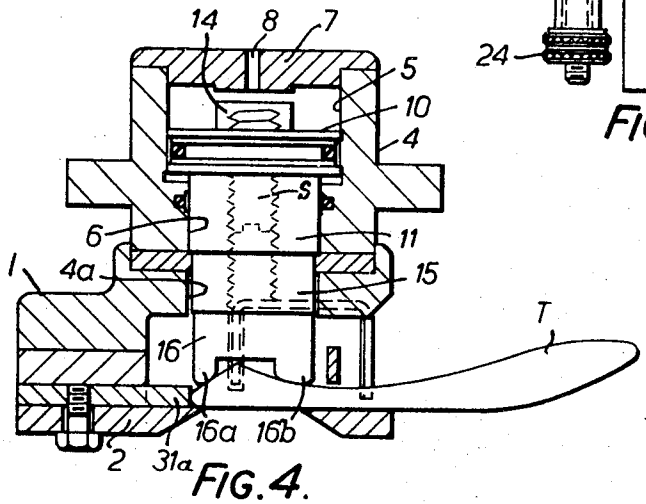

FIG. 4.

APPARATUS FOR OPERATING ON BRUSH STOCKS

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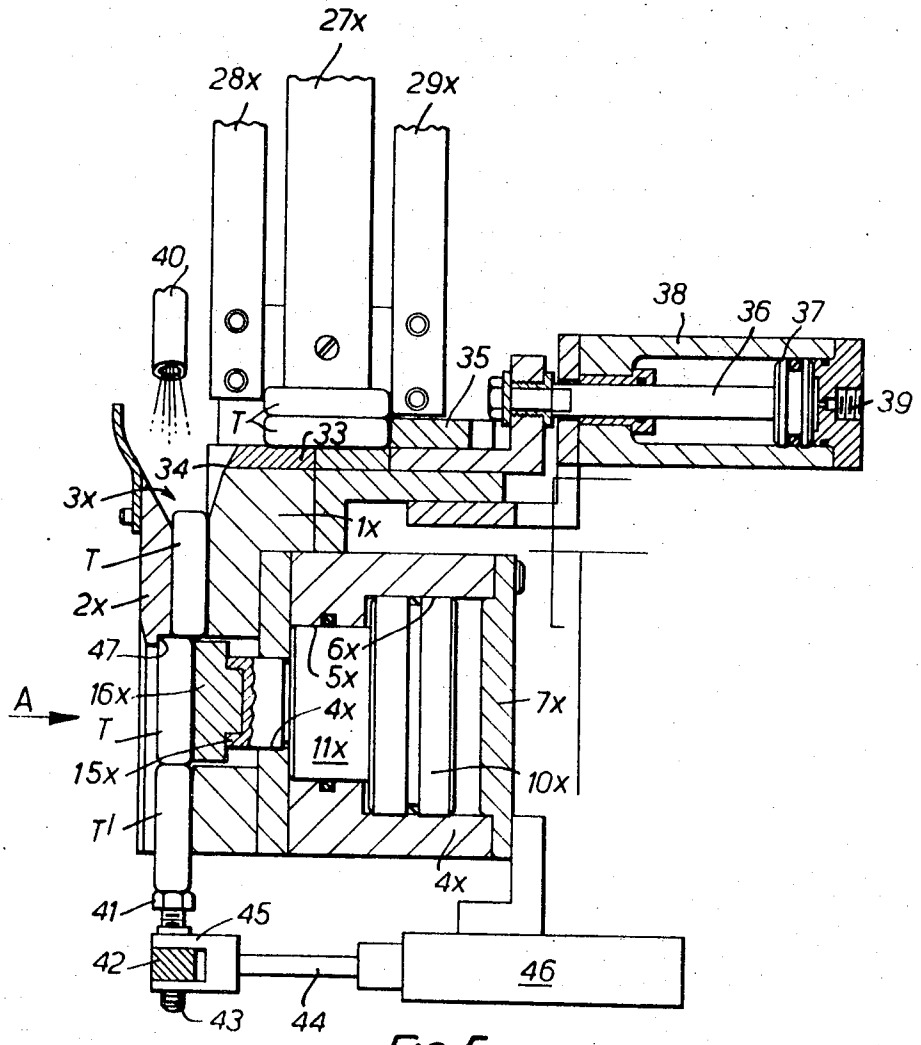

FIG. 5.

APPARATUS FOR OPERATING ON BRUSH STOCKS

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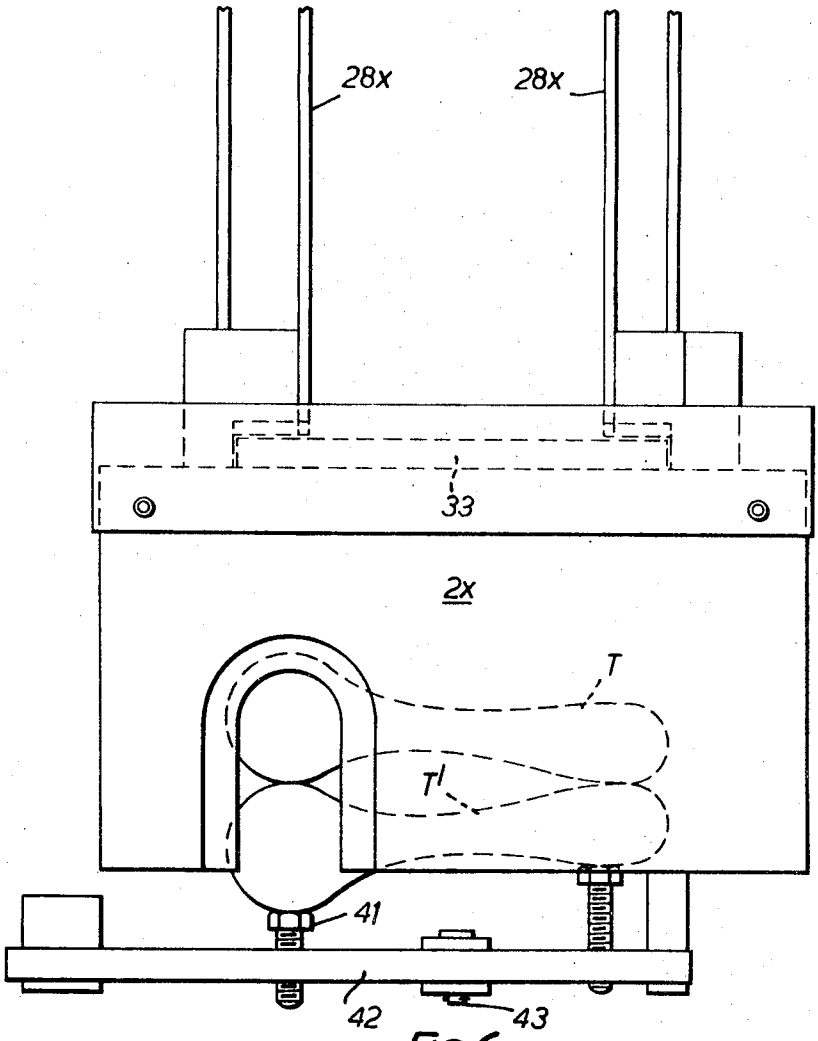

FIG. 6.

United States Patent Office 3,667,809 Patented June 6, 1972

3,667,809

APPARATUS FOR OPERATING ON BRUSH STOCKS

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Filed Aug. 13, 1970, Ser. No. 63,497
Claims priority, application Great Britain, Aug. 25, 1969, 42,274/69
Int. Cl. B25b 1/20
U.S. Cl. 300—11 9 Claims

ABSTRACT OF THE DISCLOSURE

The invention provides apparatus for supporting and clamping brush stocks in a brush making machine comprising a releasable stop for supporting the brush stocks in a guide while a clamping device clamps one stock to be operated on by a tool, while the operation by the tool is being carried out, the stop is released to discharge one brush stock and then is repositioned to again support the brush stocks.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for operating on brush stocks and more particularly to secure them while the brush stocks are being operated on by tools in a brush making machine.

SUMMARY OF THE INVENTION

The present invention provides apparatus for supporting and clamping brush stocks to be operated on by a tool in a brush making machine comprising vertically disposed guide means down which a plurality of brush stocks are adapted to travel and be fed in succession past the tool which is intermittently operated, a releasable stop being provided for engaging the lowermost of the brush stocks thereby to support all the brush stocks which are disposed in superposed relation within the guide means, a clamping device also being provided for clamping the next to lowermost of the brush stocks in the guide means and hold it clamped while it is being operated on by the tool, the clamping device, stop and tool being automatically operated in timed sequence such that a cycle of operations is effected comprising actuating the clamping device to clamp the next to lowermost brush stock, operating the tool to operate on said brush stock and while the tool is operating, releasing the stop to permit the lowermost brush stock to be discharged and thereafter repositioning the stop in its operative brush stock supporting position and after the completion of the operation on the brush stock by the tool releasing the clamping device to permit the brush stocks in the guide means to fall by gravity so that the lowermost brush stock which has just been operated rests on the stop which again serves to support all the brush stocks in the said guide means.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a front view of apparatus according to one embodiment of the invention;

FIG. 2 is a sectional view on the line 2—2 of FIG. 1;

FIG. 3 is a plan view, partly in section, of stock in the guides, certain components being omitted;

FIG. 4 is a section on the line 4—4 of FIG. 1 with certain other components removed;

FIG. 5 is a sectional view of a second embodiment according to the invention; and

FIG. 6 is a front view of the embodiment of FIG. 5 as viewed in the direction of the arrow A.

DESCRIPTION OF PREFERRED EMBODIMENTS

As illustrated in the drawings, the apparatus comprises a support 1 adapted to be attached to or form part of a brush making machine, the support having a plate 2 secured to its front face so as to co-operate with the adjacent portions of the support to define a vertically extending space 3 into which brush stocks T are adapted to be delivered and clamped against the rear face of the plate 2 as will hereinafter be described.

A cylinder block 4 is mounted on the rear of the support 1, its front end opening into the space 3 through an aperture 4*a* in the rear wall of the support. The cylinder block is formed with stepped bores 5 and 6 and at its rear end is closed by a back plate 7 having a port 8 for connection to a supply of fluid pressure, a further port 9 being provided in the side wall of the block.

A piston is reciprocably mounted in the cylinder block and includes a piston portion 10 sliding in the bore 5 and a piston portion 11 of reduced diameter sliding in the bore 6. Sealing means in the form of O rings 12, 13, are provided.

The rear end of the piston portion 10 is provided with an adjustable stop 14 and the forward end of the piston portion 11 is provided with an extension 15 slidable within the aperture 4*a*. Preferably the extension 15 has at least one flat side edge co-operating with an edge of the aperture 4*a* to prevent the piston rotating as it reciprocates. Adjustability of the stop 14 is obtained by means of a screw stud S which extends axially through the piston portions 10, 11, and extension 15, the rear end of the stud engaging a screw threaded recess in the stop 14. The forward end of the stud is accessible from the forward end of the extension 15 by removing the bolster 16, and accordingly the position of the stop can be readily adjusted without dismantling the piston from the apparatus.

A bolster 16 is attached to the forward end of the extension 15 so that its forward face is spaced from the inner face of the plate 2 and being adapted to clamp a brush stock T against the said inner face of the plate while the brush stock is being operated on by tools (not shown) of the brush making machine, for example, a filling tool, a trimming tool or a drill.

A brush stock supporting platform 17 is provided supported by a rod 18 connected with a piston operating in an air cylinder 19. The cylinder 19 is attached to a block 20 which is adjustably mounted on an arm 21 integral with an ejector element generally indicated by 22 and which is attached to the support 1. The block 20 is adjustable relative to the arm 21 by means of a post 23 carried by an extension of the arm, the post extending into a recess in the block 20 and being adjustable by means of a knurled knob 24 and being securable in adjusted position by a locking nut 25.

In use, the piston 10, 11, and the rod 18 are reciprocated in timed sequence to the operation of the brush making machine, for example, under the control of the main cam of the machine, which controls the operation of valves which regulate the supply of fluid under pressure, for example, air into the bores 5 and 6 and air cylinder 19.

In FIG. 2 the parts are shown in the position at the start of an operation on the brush stock T which is located in alignment with a U-shaped opening 2*a* in the front plate 2. It will be noted that the brush stock T to be operated on is supported on a brush stock T^1 which has previously been operated on and in this particular instance the brush stock T^1 is shown as having been filled with bristles by a filling tool of the machine which is adapted to be mounted in alignment with the opening 2*a* so that in its reciprocating filling stroke it will

pass into and out of the opening **2***a* to insert tufts of bristles into preformed holes in the brush stock. As shown in FIG. 2, the piston **10, 11**, is in its forward position so that the front end of the bolster engages the back of the brush stock T to clamp it against the inner face of the plate **2**.

The clamped brush stock is then in position for operation by the tool (not shown) for example, a tuft filling tool.

During the time the tool is operating on the clamped brush stock, fluid under pressure is supplied to the piston in the cylinder **19** to effect the downward movement of the rod **18** to lower the platform **17** and the completed brush stock T^1 supported on the platform. As the new brush stock T is already tightly clamped by the bolster, the support of the completed brush stock T^1 is no longer required. The new brush stock remains clamped by the bolster during the operation of the filling or other tool.

As the platform **17** is lowered, parts of the completed brush stock T^1 which project laterally of the ejector element **22** will abut the curved upper edges **22***a* of the opposed side walls **22***b* which serve to deflect the brush stock outwardly to fall into a receiving hopper or on to means for transferring the brush stock to another tool, for example, a trimming tool.

During the time that the new brush stock is being operated on, the platform **17** descends to eject the completed brush stock and then returns to its rest position indicated in FIG. 2. When the operation on the brush stock T has been completed, the fluid pressure supplied to the ports **8** and **9** is controlled so that the pressure in the bore **5** at the rear of the piston **10** is exhausted through the port **8** and fluid under pressure is delivered through the port **9** to retract the piston. This releases the clamping action on the brush stock T which falls by gravity to rest on the platform **17** and the next brush stock also falls by gravity to rest on the top of the brush stock on the platform. The new brush stock is accordingly aligned with the opening **2***a*. Fluid under pressure is now exhausted through the port **9** and delivered through the port **8** so that the piston **10, 11**, is moved forwardly to cause the bolster **16** to clamp the new brush stock and hold it clamped while it is operated on by the tool. Immediately the clamping action is effected, the platform **17** is lowered as previously described and the cycle of operations repeated.

Preferably the front face of the bolster **16** is shaped according to that of the back of the brush stock it is to clamp so as to ensure efficient clamping action and also to ensure that the brush stock will not be tilted or displaced as it is being clamped.

As is shown more particularly in FIG. 3, the back of the brush stock T has a hump-shaped protuberance and the front face of the bolster is provided with two differently dimensioned projections **16***a*, **16***b* adapted to engage the brush stocks on opposite sides of the hump. It will be understood that the front face of the bolster would be shaped differently for other types of brush stocks.

The brush stocks can be fed by hand into the space **3** but normally they would be fed automatically from a hopper or magazine such as illustrated in the drawings and which, as shown, comprises two pairs of laterally spaced guide plates **26, 27**, and end plates **28, 29**. The plates extend upwardly of the support **1** parallel to the plane containing the space **3**. The brush stocks are inserted into the magazine so that portions of the head and handle lie between the plates constituted by the respective pairs **26, 27**, the forward end of the head abutting the end plate **28** and the tail abutting the end plate **29**. As indicated in FIG. 3, the plates **27** are carried by a bracket **30** adjustably mounted on a transverse plate **31** forming part of the magazine. The bracket **30** is capable of adjustment longitudinally of the plate and angularly relatively thereto so as to accommodate differently shaped brush stocks.

The end plate **29** is carried by a stud **29***a* adjustably mounted on the bracket **30** to accommodate different lengths of brush stocks.

It will be understood that the magazine will be filled with brush stocks arranged on their sides with the face which is to be operated on by the tools facing forwardly and during the operation of the apparatus the brush stocks will automatically fall into the space **3**.

At the start of the operation of the apparatus, there will be a series of brush stocks in the space **3** arranged one above the other. The lowermost one of the series will be located on the platform and the one immediately above will be positioned in alignment with the opening **2***a* and therefore in alignment with the tool which is to operate on the brush stock. It will be understood that the lowermost brush stock indicated by T^1 will not be operated on by the tool during the succeeding operation of the apparatus and in practice this brush stock may be one that has been operated on during the previous operation of the machine.

During the operation of the apparatus, successive brush stocks will fall by gravity into alignment with the opening **2***a* and be clamped by the bolster **16** and remain clamped while they are operated on by the tool. During the operation by the tool, the platform **17** will be lowered to eject the brush stock positioned thereon and then raised, ready to receive the next brush stock until it is clamped by the bloster and the cycle of operations can be repeated indefinitely.

An end stop **31***a* is provided against which the head of the brush stock abuts when it is fed into alignment with the opening **2***a*.

As shown, the lower end of the end plate **29** carries a roller **32** which serves to support the tail of the brush stock which is located on the platform **17**.

To enable the stroke of the piston **10, 11**, to be varied to suit brush stocks of different cross-section, the stop **14** is adjustable in an axial direction relative to the piston portion **10** as explained above.

If desired, the downward movement of the brush stocks within the space **3** may be assisted by jets of air directed at an acute angle to the front and rear faces of the brush stocks. A nozzle **N1** for producing one of the jets is shown in dotted lines in FIG. 2.

Instead of the platform **17** being mounted for reciprocating movement in a vertical direction, it may be pivotally mounted and adapted to be raised into a horizontal plane for receiving a brush stock and lowered to permit the brush stock to slide downwardly over the platform into a receiving hopper or on to transfer means. The pivoted platform may be actuated by any suitable means.

With reference to the second embodiment of the invention illustrated in FIGS. 5 and 6, parts corresponding to those illustrated in the drawings of the first embodiment are given similar reference numerals with the addition of the suffix *x*.

The principal difference in the second embodiment is the means for feeding the brush stocks T to the space **3***x*. As shown, the magazine or hopper comprises vertically upstanding guide plates and the brush stocks are stacked in superposed relation in the area defined by these plates so as to fall one at a time on to a horizontal table surface indicated by **33**. The forward end of the table surface and the adjacent portion of the support **1***x* is cut away to form a downwardly sloping ramp **34** leading to the space **3***x*.

A pusher **35** is mounted for sliding movement over the table surface **33** and connected to a rod **36** of a piston **37** reciprocating in a cylinder **38** to which fluid under pressure, for example, air is supplied through a port **39**. The supply of fluid pressure is controlled in timed sequence to the operation of the brush making machine so that the piston is intermittently moved forward, that is to the left as viewed in FIG. 5, to slide the pusher **35** forwardly over the table surface and move the lowermost brush

stock in the magazine forwardly until it is tipped over the forward edge of the table surface so as to slide down the ramp **34** onto the space **3***x*. Air jets from a pipe **40** are directed on to the brush stock as it moves down the ramp.

Means for supporting the lowermost brush stock in the space **3***x* is also modified and, as shown in FIGS. 5 and 6, an adjustable stop **41** is carried on an arm **42** pivoted at **43** for swinging movement in a horizontal plane. The arm is connected to a rod **44** of a piston by a yoke **45** operating in a cylinder **46**.

In use, when the brush stock to be operated on by the tools has been clamped by the bolster **16***x*, fluid under pressure is supplied to the cylinder **46** to swing the arm **42** in a direction to move the stop **41** from supporting relation with respect to the brush stock which accordingly falls by gravity into a receiving hopper or on to transfer means for moving the brush stock to another station where it is to be operated on, for example, trimmed. During the time the clamped brush stock is being operated on by the tool, the supply of fluid pressure to the cylinder **46** is reversed to swing the arm **44** back to the position indicated in the drawings so that the stop **41** is again positioned for supporting a brush stock when the operation of the tool is completed and the clamping action of the bolster released.

It will also be noted that, as shown in FIG. 5, the inner face of the front plate **2***x* is cut away to form a recess **47** shaped to accommodate the shape of the portion of the brush stock which is clamped.

It will be understood that ports for the supply of fluid under pressure will be provided in the piston portions **5***x*, **6***x*, similar to those referred to in the first embodiment and an adjustable stop similar to **14** of the first embodiment may also be provided. The ports and the adjustable stop have been omitted from FIGS. 5 and 6 for reasons of clarity but it is to be understood that they will take forms identical with those of the corresponding parts described above with reference to FIGS. 1–4.

I claim:

1. Apparatus for supporting and clamping brush stocks to be operated on by an intermittently operated tool in a brush making machine comprising a vertically disposed guide, means for feeding a plurality of brush stocks down said guide, a releasable stop for engaging the lowermost of the brush stocks in said guide thereby to support all the brush stocks which are disposed in said guide, a clamping device for clamping the next to lowermost of the brush stocks in the guide and hold it clamped while it is being operated on, and means for operating said stop and said clamping device in timed sequence such that a cycle of operations is effected comprising actuating the clamping device to clamp the next to lowermost brush stock while it is operated on, releasing the stop to permit the lowermost brush stock to be discharged and thereafter repositioning the stop in its operative brush stock supporting position, and at the completion of the operation on the brush stock, releasing the clamping device to permit the brush stocks in said guide to fall by gravity so that the lowermost brush stock, which has just been operated on, rests on the stop which again serves to support all the brush stocks in the said guide.

2. Apparatus for supporting and clamping brush stocks to be operated on by a tool in a brush making machine, the apparatus comprising in combination a guide for receiving a plurality of brush stocks, said guide having an entrance and exit for said brush stocks, a discharge position in said guide immediately adjacent said exit, said discharge position receiving each brush stock in said guide after the brush stock has been operated on, means adjacent said exit for controlling the discharge therefrom of a brush stock in said discharge position, an operate position in said guide adjacent said discharge position, and clamping means located in said operate position for clamping a brush stock in that position during operation by said tool.

3. Apparatus as claimed in claim **2** wherein said means for controlling the discharge comprises a vertically movable rod, having an upper and a lower end, a horizontal platform secured to said upper end, and means secured to said lower end for effecting reciprocation of said rod.

4. Apparatus as claimed in claim **3** and further comprising position adjusting means for adjusting the position of said paltform relative to said exit.

5. Apparatus as claimed in claim **2** in which said clamping means comprises brush stock locating surfaces, a piston-cylinder arrangement and a clamping bolster operable by said piston-cylinder arrangement for clamping a brush stock against said locating surfaces.

6. Apparatus as claimed in claim **5** and further comprising stop means adjustably mounted in said piston-cylinder arrangement for effecting variation of the stroke thereof.

7. Apparatus as claimed in claim **3** in which said guide comprises a vertically extending magazine for feeding said brush stocks by gravity to a horizontal feed plate, a reciprocating pusher being provided for moving each brush stock along the feed plate towards said operating position.

8. Apparatus as claimed in claim **7** wherein a sloping ramp is provided at the end of said feed plate leading to said guide.

9. Apparatus as claimed in claim **7** wherein a sloping ramp is provided at the end of said feed plate and an air nozzle is provided for directing air on to the brush stocks on said feed plate and said ramp to assist their movement towards said operating position.

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