

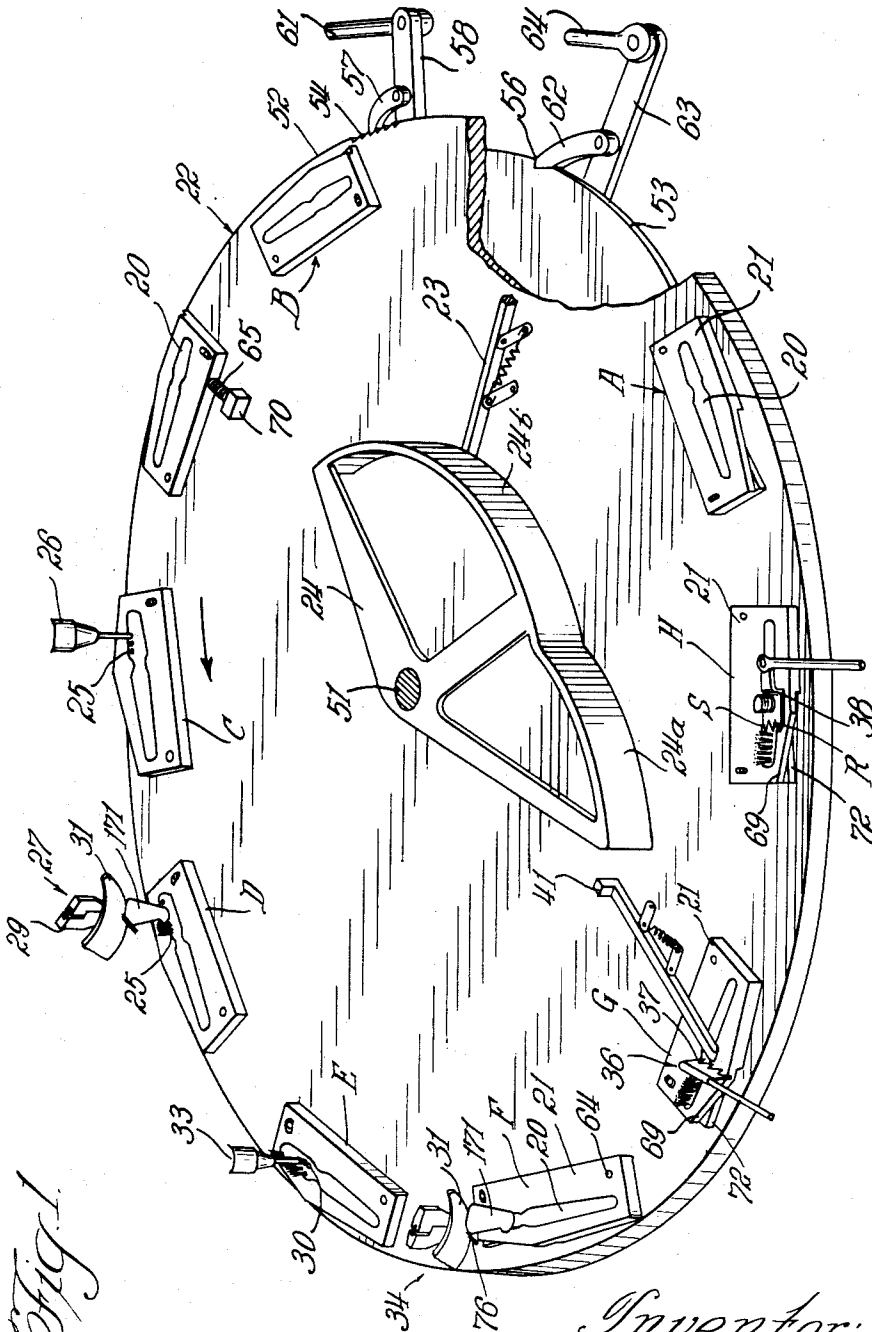
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2,433,192

BRUSH MAKING MACHINE

Original Filed March 24, 1943 5 Sheets-Sheet 1



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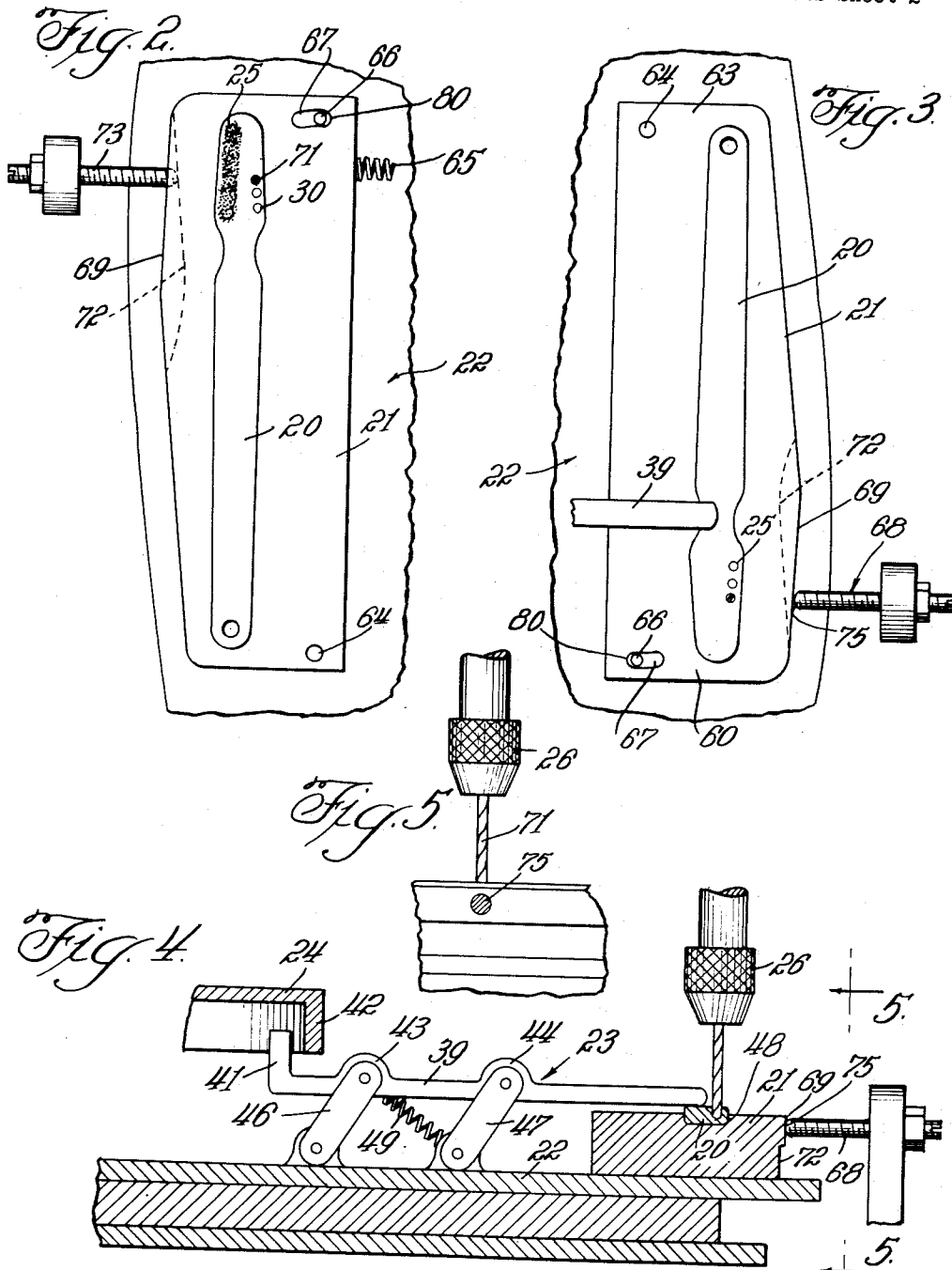
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BRUSH MAKING MACHINE

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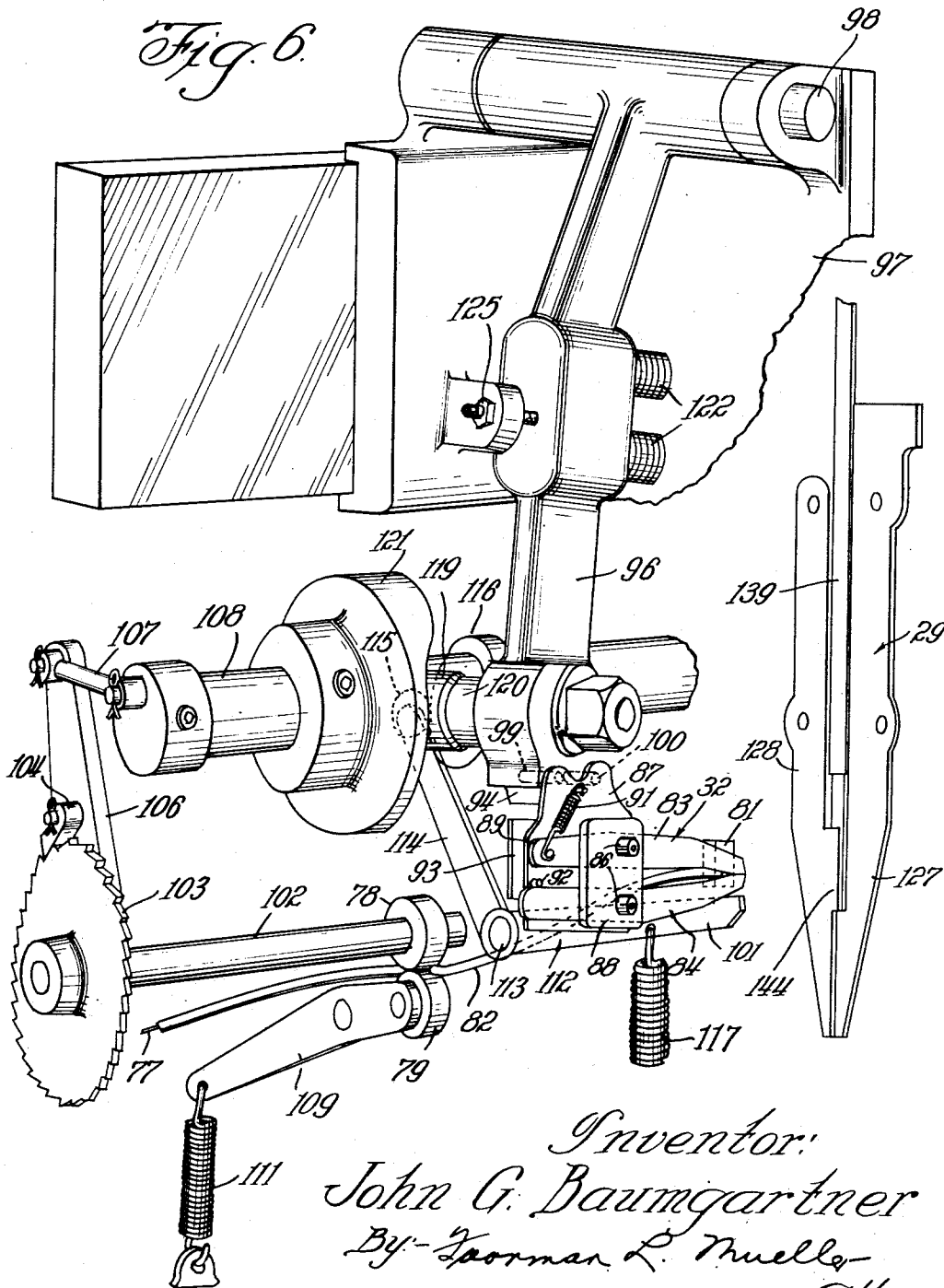
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Fig. 7

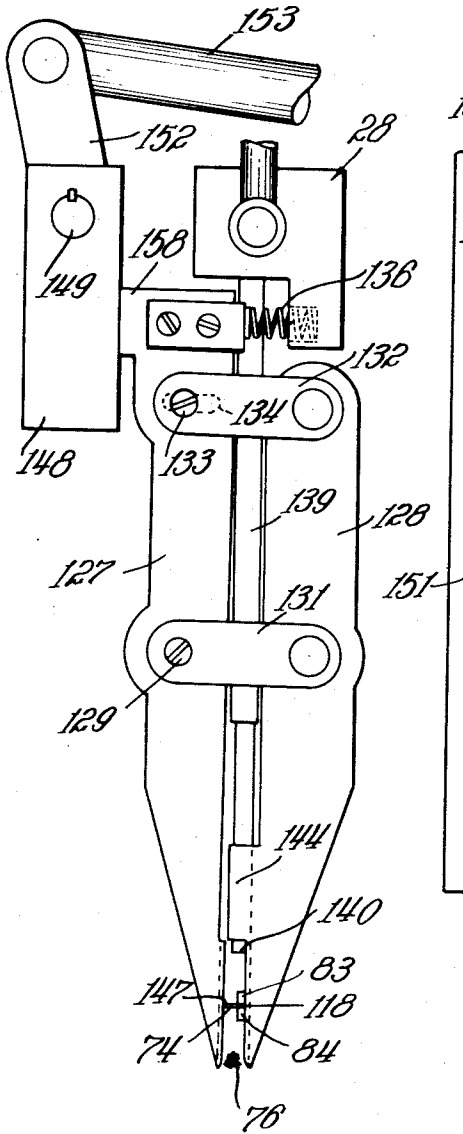
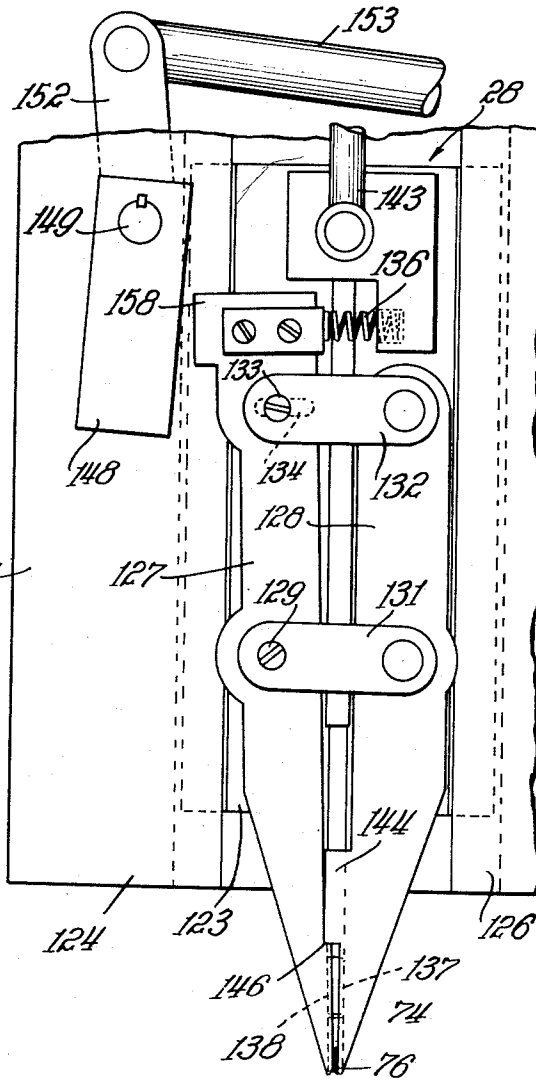


Fig. 8



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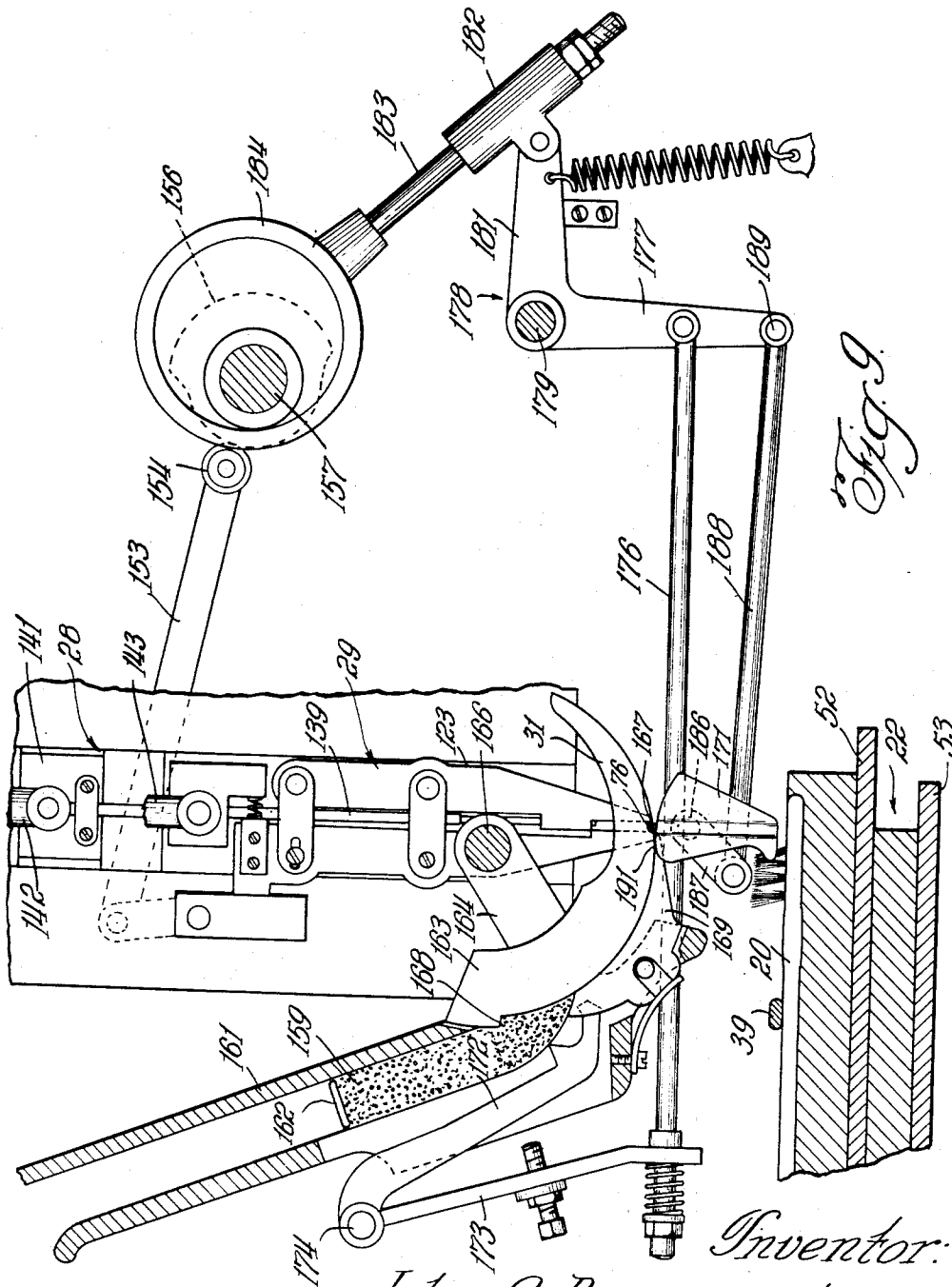
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BRUSH MAKING MACHINE

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UNITED STATES PATENT OFFICE

2,433,192

BRUSH MAKING MACHINE

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Continuation of application Serial No. 480,353,
March 24, 1943. This application August 7,
1945, Serial No. 609,442

19 Claims. (Cl. 300-10)

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This invention relates generally to brush making machines and in particular to a brush making machine in which a series of related operations are successively performed on a brush block to complete a brush. This application is a continuation of application Serial No. 480,353, filed March 24, 1943, now abandoned.

The prior art machines for making brushes in a series of operations successively performed on a brush block by related operating units, such for example as machines for making toothbrushes and the like, include relatively complicated and bulky mechanism for moving a brush block from one operating unit to a next related operating unit and for successively moving a brush block, in a predetermined path, to a plurality of operating positions relative to the same operating unit. As a result of this complicated mechanism the initial cost of the machine, as well as the cost of servicing and attention required to maintain an efficient operation of the machine, is greatly increased. Also the complexity of these mechanisms appreciably reduces their production as well as their flexibility for application to brushes having different bristle arrangements or patterns thereon.

Further, in the prior art machines of this type which use a straight anchor for retaining a bristle tuft in the brush block, considerable difficulty has been encountered in positively providing for the insertion of the anchor lengthwise into the brush block. The mechanism for inserting the anchor in the brush block usually consists of a pair of jaws having a groove in each closing portion for supporting and guiding the straight anchor at its ends while it is driven lengthwise from the jaws or guides into the brush block by a driving rod acting on a longitudinal side of the anchor. If the anchor is initially tilted or misaligned relative to a plane which is substantially normal to the inner faces of the closing portions of the jaws or guides, this misalignment is generally increased or aggravated rather than corrected when the driving rod engages and pushes the anchor, so that the anchor is oftentimes driven into the brush block when it is in a substantially endwise position. It is apparent of course that when driven in this position the anchor fails entirely in its function to retain or anchor a corresponding bristle tuft in the brush block.

It is an object of this invention, therefore, to provide an improved brush making machine.

It is a further object of this invention to provide a brush making machine having a continuously rotating rotary table for carrying the brush

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blocks, in which a brush block is adjustably moved relative to the table and to an operating unit, during rotation of the table, to continuously position the brush block as it passes an operating unit so that like operations are performed on the brush block along a predetermined path.

Yet a further object of this invention is to provide a brush making machine having a rotary table in which a selected positioning of the brush block relative to the table and to an operating unit is accomplished during the continuous rotation of the table in a single direction.

Another object of this invention is to provide a brush making machine having a rotary table for carrying a brush block, in which means are provided to successively move the brush block from one operating unit to a next related operating unit, and to selectively position the brush block to have a series of like operations performed thereon along a predetermined pattern, all while the table is intermittently but continuously rotated in a single direction.

A still further object of this invention is to provide in a brush making machine means providing for an anchor of straight form being always driven substantially lengthwise into a brush block.

Another object of this invention is to provide, in a machine for making brushes having straight anchoring means for holding a bristle tuft therein, means for locating the anchor in the anchor inserting means such that the anchor is always inserted in a lengthwise position within the brush block.

A feature of this invention is found in the provision of a brush making machine having a rotary table, in which a brush block holder is movably supported on the table and adjustable during rotation of the table by stationary means adjacent the table to define a predetermined path of travel of the brush block relative to an operating unit.

Yet another feature of this invention is found in the provision of a brush making machine, in which an anchor of straight form is initially positioned in anchor inserting means by combination anchor forming and carrying means, such that it is always located in a plane substantially normal to the inner faces of the closing portions of the jaws prior to the engagement of the anchor with an anchor driving rod.

Further objects, features, and advantages of this invention will become apparent from the following description when taken in connection with the accompanying drawings, in which:

Fig. 1 is a top perspective view of the rotary table for the brush making machine, with a fragmentary showing in perspective of the operating units for successively performing related operations on a brush block carried on the table;

Fig. 2 is an enlarged plan view of a brush block holder showing means for driving the holder in a defined path relative to an operating unit;

Fig. 3 is illustrated similarly to Fig. 2 showing a changed position of the brush block holder;

Fig. 4 is an enlarged sectional view of a brush block holder showing means adapted for automatically clamping and releasing the brush block therein, and the adjusting means for the brush block;

Fig. 5 is a fragmentary sectional view as seen along the line 5—5 in Fig. 4;

Fig. 6 is an enlarged detail view in perspective showing the relative assembly of anchor cutting and carrying means with the jaws for inserting the anchor and a corresponding bristle tuft in a brush block;

Fig. 7 is a detailed elevational view of the tuft and anchor inserting means showing the jaws thereof in a position for receiving the anchor and a corresponding bristle tuft therein;

Fig. 8 is illustrated similarly to Fig. 7 showing the jaws in a closing position on an anchor and a bristle tuft; and

Fig. 9 is a detailed fragmentary elevational view partly in section showing the assembly arrangement of a tuft packing and picker mechanism, tuft and anchor inserting jaws, and a tumbler unit, these mechanisms being shown in relation to a brush handle or block located on the rotatable machine table.

In the practice of this invention there is provided a simple and efficiently operated brush making machine which in a continuous automatic operation requiring only the feeding of brush blocks or handles to the machine and the removal therefrom of the finished brush by an operator, acts otherwise to automatically adjust a handle carried on a rotary table for successive operations thereon by an operating unit, to drill spaced holes in two rows in the handle, to separate substantially measured tufts of bristles from a bristle holding magazine, insert the tufts within the rows of holes in the handle, secure the tufts within the handle by means of a wedging or anchoring pin of straight form, uniformly comb the bristles and then trim the bristles to the same height. All of the operating units for accomplishing the above defined operations are arranged about a rotary table on which the brush blocks are carried in an angularly spaced relation. The brush is completed during substantially one revolution of the table so that the finished brush comes off the table at approximately the same place that the brush block was originally positioned upon the table.

Adjustable holders for the brush blocks are arranged substantially tangentially of the rotary table and are pivoted near one end for sliding pivotal movement on the table within defined limits. The pivotal movement of a brush block in one direction is accomplished by spring means acting on the brush block holder and movement in an opposite direction by stationary means having a follower portion engageable with a corresponding cam portion on the brush block holder. The follower portion is substantially in a vertical plane which includes the operating portion of an operating unit and acts on the cam portion, as the brush block is moved past the operating por-

tion by the rotating table, to continuously position the brush block relative to the table and operating portion to provide for a series of like operations being performed on the brush block along a predetermined path. Thus for example in toothbrushes, the rows of bristles may be arranged in parallel alignment longitudinally over the brush portion of the brush, or such rows of bristles may be straight but inclined at an angle relative to each other. It is readily apparent, of course, that with the brush block in a fixed position on a rotating table, the rows of bristles would be of a substantially arcuate shape because of the arcuate path defined by the brush block as it travels by an operating unit on the rotating table. In other words, the arcuate path will be of a shape corresponding substantially to the peripheral contour of the rotating table. To accomplish an operation of the operating units in a linear path on the brush block adjustable means are provided for continuously positioning the brush block, as it passes an operating unit, relative to the rotating table and operating unit. The adjustable means are adapted to move the brush block for operations thereon in parallel straight lines, or in straight lines inclined relative to each other.

As previously mentioned, considerable difficulty is encountered in brush making machines using straight anchors, in positively assuring the insertion of the anchors lengthwise into the brush block. In this invention anchor carrying fingers, which are also included in the anchor forming mechanism of the machine, are adapted for co-operative action with a pair of jaws for inserting the anchor in a brush block, so as to position the anchor lengthwise between the closing portions of the anchor inserting jaws and in a plane substantially normal to such closing portions, with the anchor ends in a position to be positively located within guiding grooves in the jaws. The anchor is retained in this position by the anchor carrying means until the jaws are closed on the anchor. The anchor carrying means are then released or retracted from a carrying or holding position relative to the anchor to permit engagement of the anchor with an anchor driving rod for anchor inserting purposes.

The machine is illustrated in the drawings for making a brush having a pair of straight rows of bristles extended longitudinally of the brush, but inclined relative to each other, this arrangement of the rows being common in toothbrushes. It is to be understood, of course, that the machine is not limited alone to the making of toothbrushes and may be used in the making of brushes having straight parallel rows, or a single straight row, such as an eyebrow brush, or for making a brush having one or more rows of shapes other than linear.

As shown in Fig. 1 of the drawings, a brush block or unworked handle 20 is positioned in a holder 21 carried on a rotary table 22 which is rotated in a counterclockwise direction as indicated by the arrow in Fig. 1. The holders 21 are angularly spaced in a circle about the table and near the outer periphery thereof. A brush block 20 is positioned within a corresponding holder when such holder is in the position indicated in Fig. 1 at A, and is arranged within the holder so as to extend longitudinally in a direction which is substantially tangential to the table 22. When the brush block is in the position indicated at A locking means 23, operatively associated with each holder 21 for releasably locking a block

in a holder, is automatically held in a released position by a stationary cam 24, carried on the table axis means 51 to permit the free removal of a finished brush and the insertion of a new block within the holder. The locking means 23 is held in a released position for a movement of the block from its position at A to a position indicated at B. On leaving the position B the block is locked in a fixed position within a corresponding holder 21 so as to be firmly held while the various operations providing for a completed brush are performed on the block. At the position C the block is operated on by a drill unit, indicated generally as 26, which drills one row of holes 25 in the brush block for receiving bristle tufts. As illustrated, the machine is adapted to provide a brush having two rows of bristles, with each row being comprised of six tufts. Since each tuft requires a corresponding drill hole, means are provided to rotate the table such that the brush block 20 is positioned in six positions relative to the drill unit 26 to provide for the drilling of the six holes.

When the brush and holder assembly are rotated to a position shown at D, the brush is operated on by a tuft inserting and anchor wedging unit 27, which inserts tufts in the row of holes made by the drill 26. As seen in Fig. 9 this unit includes an anchor driving means 28 and a tuft and anchor carrying jaw means 29 adapted to have a bristle tuft presented thereto by a picker member 31. An anchor is carried to the jaw means 29 by a combination anchor forming and carrying means 32 (Fig. 6). The tuft inserting and anchor wedging unit 27 operates to insert and secure a tuft within the corresponding holes in the row 25 so that the table is also rotated to six operating positions relative to this unit. A brush block 20 is positioned in an operating position relative to the drill 26 concurrently with the positioning of a drilled brush block at the tuft inserting unit 27. Rotation of the tables at six operating positions thus provides for the concurrent operations of drilling and tuft inserting in corresponding brush blocks.

After the bristles are secured in the row 25 the brush block is moved to a position at E where it is operated on by a second drill unit 33, similar to the drill 26, for drilling a second row of holes 30 in the brush block. On completion of this second drilling operation the brush block is moved to a position F to be operated on by a second tuft inserting and anchor wedging unit 34, similar to the unit 27, which inserts and anchors the tufts in the row of holes 30. It is to be understood, of course, that both of the drilling operations and the tuft inserting and anchor wedging operations are performed simultaneously, but on different brush blocks, so that the making of the brush is a continuous operation. On completion of the drilling and tuft inserting operations the brush block is moved substantially to a position G where the bristles in the rows 25 and 30 are combed by a combing mechanism indicated generally as 36. The comb 36 includes a pivoted combing plate 37 which is pivotally reciprocated in an arc transversely of the bristle tufts in the rows 25 and 30. When the bristles are properly combed and cleaned the brush block is moved to the position indicated at H, where it is operated on by a trimmer mechanism 38. The cam portion 24a, radially spaced from a block 20 at the position H serves merely to guide the follower portion 41 of the locking means 23 into an engaging position with the cam portion 24b and is

ineffective to release the locking means 23. The trimmer mechanism is comprised essentially of stationary blades S operatively associated with a reciprocating blade R, with the row of bristles being passed in a direction longitudinally between the stationary blades. As the block leaves the trimmer mechanism 38 the follower portion 41 of the locking means 23 is engaged by the stationary cam portion 24b to release the completed brush for removal at the position A. It is seen, therefore, that the locking means 23 is retained in a released position substantially between the positions A and B and further that all of the operations on the brush block 20 to produce a completed brush are accomplished in something less than one complete revolution of the rotary table 22.

The locking means 23, shown in detail in Fig. 4, includes a locking bar 39 movably supported for movement in a direction substantially radially of the table 22 and transversely of a corresponding block holder 21. The rod 39 is of a substantially L-shape with the short leg or follower portion 41 extended upwardly, as viewed in Fig. 4, for engaging the cam or lip portion 42 on the cam means 24. The long leg of the rod 39 is pivotally connected at portions 43 and 44 with a corresponding link member 46 and 47, which link members in turn are pivotally connected with the table 22. This pivotal connection of the locking rod 39 with the table 22 permits movement of the rod both transversely and upwardly relative to the block holder 21. The free end of the locking rod 39 extends at least partially over a cavity 48 in the holder 21 for receiving a brush block 20. With the brush block 20 in the cavity 48, its top surface projects slightly above the top level of the holder 21 for frictional engagement with the locking rod 39. The rod 39 is moved into a locking position by a spring 49 connected at one end to the pivotal connection of the rod portion 43 and at its opposite end to the pivotal connection of the leg 47 with the table 22. Movement of the rod 39 out of a locking position relative to the holder 20 is accomplished by the cam means 24 in response to the rotation of the table 22 relative to the cam means. The hinged or pivoted connection of the rod 39 with the table 22 provides for a positive locking of the block 20 in a corresponding holder 21 regardless of any slight differences in the thickness of the brush handles being worked on. This pivoted connection also prevents any loose bristles which might fall on the table 22 from interfering with a free movement of the locking bar 39.

The cam means 24 is fixed on a stationary axis means 51 (Fig. 1) upon which the table 22 is freely rotatable. The table 22 includes two sections 52 and 53, which are suitably connected for concurrent rotation, with the complete table assembly 22 being slidably supported for rotation on a base portion (not shown) for the machine, which is located below the table section 53. In order to rotate the block 21 from one operating unit to a next related operating unit and successively relative to the same operating unit the section 52 is formed on its peripheral surface with angularly spaced ratchet or rack portions 54, and the periphery of section 53 with angularly spaced notches 56. Although the sections 52 and 53 are illustrated as being separate it is to be understood that these two parts can be integrally constructed. Each ratchet portion has a series or set of six teeth. As previously mentioned the brush with which this invention is illustrated is comprised of

two rows of bristles 25 and 30 with each row including six tufts. There is thus a tooth in each ratchet portion 54 which corresponds to a tuft or hole in the brush being made. The teeth in each tooth set or ratchet portion 54, on the section 52, are engageable with a pawl or dog member 57 pivotally carried on a crank arm 58 having one end pivotally supported on the table axis means 51. The opposite end of the crank arm 58 is pivotally connected to one end of a connecting rod 61 which is connected to a suitable driving means (not shown) for the crank arm 58. The notches 56, angularly spaced about the section 53 correspond to the number of operating positions for the table 22, ten of which are indicated in Fig. 1. These notches are selectively engageable with a pawl or dog 62 pivoted on a rocker arm 63, which is pivotally supported at one end on the axis means 51 and pivotally connected at its opposite end with a connecting rod 64 adapted to drive the arm 63 in a predetermined sequence relative to the arm 58.

In the operation of the machine the rotation of the table 22 corresponding to one tooth space in a tooth set 54 advances the table in a counterclockwise direction a distance adapted to provide for the drilling of another hole in the brush block or the insertion of another tuft in a corresponding hole, it being previously explained that the operation of the machine is continuous with the drilling and inserting operations performed concurrently on different brush blocks. The pawl 62 for the notches 56, and its associated driving mechanism, functions to advance the table an angular distance corresponding to the angular spacing between adjacent ones of the brush block holders 21. During the rotation of the table 22 by the ratchet and pawl mechanism 54-57, the pawl 62 makes an idle movement or stroke relative to a notch 56 for the first five tooth movements of the pawl 57. On the sixth stroke of the pawl 57 and the corresponding sixth stroke of the pawl 62 the pawl 62 moves into engagement with the notch 56 corresponding to each brush station and advances the table to the next brush station. It is seen, therefore, that the pawl 57 moves the table only a fractional part of the distance which the table is moved by the pawl 62.

For the large table movement accomplished by the pawl 62 some difficulty might be encountered in stopping the table 22 at a position such that the teeth 54 are correctly located with reference to a position of the brush block 20 providing for the performance of a series of like operations thereon. To assist in the stopping of the table at the desired position, brake linings (not shown) may be provided between the table 22 and the base portion upon which it is supported.

As explained above, with the holders 21 in a fixed position on the rotary table 22, the brush blocks 20 will be moved in an arcuate path relative to an operating unit, which path would determine the shape of the bristle row in the brush. In order to provide for the bristles being arranged in a pair of straight rows inclined relative to each other, while the block 20 is continuously rotated on the table 22 to successive operating positions, a holder 21 is adjustably movable for sliding movement relative to the table by means now to be described.

Each holder 21 is of a substantially rectangular form and is extended longitudinally in a direction substantially tangential to the periphery of the table 22. The cavity 48 in each holder 21 extends longitudinally of a corresponding holder 21

to in turn provide for the positioning of the handle 20 being worked on in a direction substantially tangential to the periphery of the table 22 (Figs. 2 and 3). Each holder at its end 63, at which the handle portion of the block 21 is arranged, is pivoted on a pin 64 carried on the table 22. The pivotal movement of the opposite end 60 of the holder 21 is defined by a pin 66 on the table 22 which is slidably received in an elongated opening or cavity 67 formed in the holder. The holder end 64 is moved in a direction toward the periphery of the table 22 by springs 65 arranged in compression between the holders 21 and stop portions 70 on the table 22 as is illustrated only for the brush block 21 at the position C in Fig. 1. A pivotal movement of the holder end 64 in an opposite direction, or inwardly toward the center of the table 22, is accomplished by a stationary follower means 68, carried on the machine frame adjacent the table 22, which engages a corresponding cam surface or portion 69 formed on the holder 21 adjacent the holder end 64.

Referring to Figs. 3, 4, and 5, the adjustable stationary means 68 is illustrated in an operating position with the brush block 21 when such a block is at the position C to be operated on by the drill 26. The cam surface 69 is formed near the top of the holder 21, as viewed in Fig. 4, and to the outside thereof. This surface 69 is parallel with a linear path on the brush block 20 corresponding to the row 25 to be formed, as is clearly shown in Fig. 3. The follower portion 75 of the stationary means 68 for engaging the cam surface 69 is adjustable in a direction radially of the table 22 and located in a vertical plane which also includes the operating portion or drill 71 of the drill unit 26 (Fig. 5). As the block 20 is successively moved from one operating position to a next operating position relative to the drill 71, the row 25 follows a linear path below the drill 71 by virtue of the holder end 64 being pivotally movable to always ride against the follower portion 75 so that the distance between the point of engagement of the follower portion 75 with the cam surface 69 and the drill 71 is always equal. The drilling of each hole in the row 25, therefore, takes place in a path on the block 20 parallel to the cam surface 69. At the position D (Fig. 1) where the tuft is anchored in the holes in the row 25 there is a second stationary means 68 for engaging the cam surface 69 to position the row 25 for linear travel beneath the tuft and anchor inserting unit 27.

In the drilling and tufting of the second row 30, which is inclined relative to the row 25, there is formed at the end 64 of the brush holder 21 and below the cam surface 69 a second cam surface 72 (Figs. 1, 2, and 4) the surface of which is parallel to the row 30. The cam surface 72 is associated with a stationary means 73, similar in construction to the stationary means 68, which operates in all respects relative to the cam 72 similar to the operation of the stationary means 68 and cam 69. A further description of the stationary means 73 and cam 72 is, therefore, believed to be unnecessary.

In the movement of a block holder 21 from one operating position to a next related operating unit, the end 64 of the brush block is moved by a corresponding spring 65 to an outer position defined by the engagement of the pin 66 with the end 80 of the slot 67 (Figs. 2 and 3). On the holder 21 reaching an operating position the engagement of a stationary means with a corresponding cam surface moves the holder end 64 inwardly against

the spring 65, so that the spring 65, at each operating position, acts to positively maintain the engagement between a stationary means and a corresponding cam surface. Although the adjustment of the block 21 has been described above with respect to the forming of two straight rows 25 and 30 which are inclined relative to each other, it is apparent that straight rows 25 and 30 inclined reversely relative to each other as compared to their inclination in Figs. 2 and 3, or straight rows parallel to each other may be readily formed by merely changing the slope of the cam surfaces on the holder 21 to conform to the desired row arrangement. Although during the adjustment of a brush holder 21 by a stationary means 68 or 73 movement thereof takes place relative to the locking bar 39, the block 20 is always retained fixed relative to the holder by virtue of the sliding and pivotal movement of the locking rod 39 provided by its pivoted connection with the table 22, and the action of the spring 49 to always retain the locking rod 39 in frictional engagement with the block 20. A simple means is thus provided for forming straight rows of bristles in a brush block which is carried on a continuously rotatable table to related operating units to complete the brush.

The drill units 26 and 33 are of a like construction and of a usual type, with each drill unit being associated with a suitable driving mechanism (not shown) operable to lower and raise a drill at the proper times relative to the movement of the brush block thereunder. A further description of the drill is, therefore, thought to be unnecessary. The tuft and anchor inserting units 27 and 34 are also of a like construction. Only one unit 27 will, therefore, be referred to in detail in the following description.

As previously mentioned, considerable difficulty has been encountered in the prior art brush making machines using an anchor of straight form for retaining a corresponding bristle tuft in a brush block, in providing for the positive insertion of the anchor lengthwise into the brush block. This difficulty has been completely eliminated in the present invention by a combination anchor forming and carrying means 32 adapted for co-operative action with the jaw means 29 of the unit 27 to always position the anchor within the jaw means to assure its being properly driven into a brush block by an anchor driving rod 139. An anchor 74 for securing a tuft 76 within the brush block 20 is shown in Figs. 7 and 8. This anchor is essentially a short, straight length of a thin piece of hard wire which, although shown as round, may be of any other configuration. The wire 77 (Fig. 6) from which the anchors 74 are formed is fed into the machine from a suitable supply source (not shown) over timed feeding rollers 78 and 79 into a stationary die member 81 having a wire receiving aperture therein. The wire 77 is guided in its passage from the supply source to the rollers 78 and 79 and from these rollers to the die 81 through a tube 82 which is broken at the rollers 78 and 79 to permit the rollers to directly engage the wire 77 therebetween. The die or stationary guiding block 81 is adjacent the closing end of a pair of anchor carrying fingers 83 and 84 with the lower finger 84, as viewed in Fig. 6, having a notch for receiving the wire 77 from the block 81.

The fingers 83 and 84 are pivotally supported intermediate their ends on corresponding axis means 86 supported on a mounting plate 87 and are held against the mounting plate by a retain-

ing plate 88. The end 89 of the finger 83 is connected to one end of a tension spring 91, the opposite end of which is connected to the mounting plate 87. The spring acts to rotate the finger 83 in a clockwise direction, as viewed in Fig. 6, and into engagement with the finger 84 to in turn rotate such finger in a clockwise direction and against a stop member 92 on the mounting plate 87. By virtue of this stop the fingers 83 and 84 are retained in a closed position by the spring 91. The mounting plate 87 is carried on a floating or pivotally movable portion 93 rotatably supported in a boss portion 94 formed at the lower end of a long upright pivoted arm 95 which is pivoted to a portion 97 of the machine frame on a shaft 98. The pivotal movement of the mounting plate 87 in one direction is limited by a stop member 100 fixed on the boss portion 94 and in an opposite direction by the engagement of the plate 87 directly with the portion 94. The mounting plate 87 is yieldably retained against the stop portion 100 by a spring 99 arranged in compression between the boss portion 94 and the retaining plate 87. When the closing ends of the fingers 83 and 84 are adjacent the stationary block 81, the action of the spring 99 acts to retain these finger portions in sliding engagement against the block 81. In other words, the stop 100 limits the pivotal movement of the retaining plate 87 in a direction toward the die 81 when the fingers 83 and 84 are removed from the die 81.

As previously noted, the pivotal movement of the fingers 83 and 84 in a clockwise direction, as viewed in Fig. 6, by the spring 91 is limited by the stop 92. However, the fingers are capable of pivotal movement together in an opposite or counterclockwise direction on pressing upwardly of the finger 84 against the finger 83. Thus in the forming of an anchor 74 from the wire 77, with the wire extended between the fingers 83 and 84, a driving arm 101 is moved upwardly against the finger 84 to move the fingers 83 and 84 in a counterclockwise direction or upwardly relative to the die member 81. This movement of the fingers provides a cutting action between the finger 84 and the die member 81 to cut the wire 77 and leave an anchor 74 between the fingers 83 and 84. The length of the anchor 74 is determined by the timed movement of the rollers 78 and 79. In other words, a partial relative rotation between the rollers 78 and 79 moves the wire 77 a predetermined distance through the die 81 for cutting into an anchor. Thereafter the fingers 83 and 84 move to the wire for cutting the wire and provide the anchor 74. In accomplishing this rotation of the rollers 78 and 79 the roller 78 is mounted on a shaft 102 which also carries a ratchet wheel 103. The ratchet 103 is associated with a pawl 104 pivoted on an arm 106 which is rotatably supported at one end on the shaft 102 and is pivotally connected at its opposite end to a crank 107 eccentrically mounted on a driving shaft 108. Thus when the shaft 108 is rotated through a complete revolution the roller 78 is rotated through a predetermined angular distance corresponding to the desired length of the anchor 74. The roller 79 is essentially an idler roller carried at one end of a pivoted arm 109, the opposite end of which is under the tension of a spring 111 to continuously urge the roller 79 against the roller 78. The wire 77 is thus frictionally engaged between the rollers 78 and 79, with the positive moving of the wire 77 between the rollers being facilitated by knurling the peripheral surface of the roller 78.

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The driving arm 101 forms one arm of a bell crank 112 which is pivoted at 113. The free end of the other arm 114 of the bell crank 112 has a cam follower 115 associated with a cam 116 mounted on the driving shaft 108. The cam follower is maintained in a following relation with the cam 116 by a spring 117 connected to the arm 101 and to a portion of the machine frame. It is seen, therefore, that the driving arm 101 is driven against the finger 84 by the cam 116 and is returned to a rest or idle position out of engagement with the finger 84 by the spring 117.

By virtue of the closed ends of the fingers 83 and 84 being slidable against the stationary guiding block 81 during an anchor cutting operation and the cutting of the anchor 74 by the finger 84 the formed anchor 74 within the fingers 83 and 84 has one end 118 terminating at the side surface of the fingers adjacent the block 81, and an opposite end 147 extended outwardly from the fingers (Fig. 7). The moving of the fingers 83 and 84 away from the stationary block 81 and to a position for presenting the anchor 74 to the jaw means 29 is accomplished by means including a roller 119 rotatably mounted on a shaft 120 carried in the boss portion 94 of the pivoted arm 96. The roller 119 is operatively associated with a cam 121 mounted on the drive shaft 108 and is held in a following relation with the cam 121 by spring members 122 arranged in compression between the pivoted arm 96 and the machine frame portion 97. The pivotal movement of the arm 96 by the springs 122 is limited by an adjustable stop 125 on the frame 97 to retain the follower 119 away from the cam 121 during the feeding and cutting operations of the wire 77. On completion of these operations the follower 119 is acted on by the high surface of the cam 121 to move the fingers 83 and 84 with the anchor 74 therebetween toward the jaw means 29 and to the position indicated in Fig. 7.

The jaw means 29 includes a block member 123 (Figs. 8 and 9) which is slidably supported for movement in a vertical direction in cooperating way members 124 and 126 mounted on the machine frame and carries a movable jaw 127 and a stationary jaw 128. The jaw 128 is fixed on the reciprocating block 123 and is adapted for closing engagement with the movable jaw 127 which is pivotally supported on the sliding block 123 at 129. The jaw members 127 and 128 are retained on the sliding block 123 by straps 131 and 132 with the pivotal movement of the jaw 127 being guided and defined by the reception of a pin 133 carried on the block 123 in a slot 134 in the jaw 127. Pivotal movement of the jaw 127 into a closing position with the jaw 128 is accomplished by a spring 136 acting at the upper end of the jaw 127, as viewed in Figs. 7 and 8, which spring releasably retains the jaws in such closing position. In closing position the closing portions of the jaws 127 and 128 have their inner faces in substantial parallel alignment. Each inner jaw face has a corresponding longitudinal groove 137 and 138 for guidably retaining the ends of the anchor 74. Since the movable jaw 127 is spread away from the jaw 128, as is shown in Fig. 7, to receive the anchor 74 therebetween the inner surface of the closing portion of the jaw 128 is always in a substantially vertical plane.

The jaws 127 and 128 are normally spaced apart to receive therebetween a driver 139 for the anchor 74. The driver 139 is formed as a part of the anchor driving means 28 which further includes a block 141 for carrying the driver 129

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slidable in the ways 124 and 126 but movable relative to the block 123 (Fig. 9). The driver 139 is operated through a connecting rod 142 pivoted to the block 141, while the jaws 127 and 128 are operated through a corresponding connecting rod 143 pivoted to the block 123, the rods 142 and 143 being actuated through suitable mechanism (not shown) to accomplish a predetermined relative movement between the driver 139 and the jaws 127 and 128 during a tuft and anchor inserting operation. In the operation of the driver 139 its lower end 140 engages the upper surface of the anchor 74, the ends of which are guidably retained or supported in the grooves 138 and 139 of the jaws 127 and 128, respectively. In one embodiment of the invention the anchor 74 has a diameter of about .018 inches and is about $\frac{1}{8}$ of an inch long. Because of the small diameter of the anchor the driver 139 has a corresponding thickness of about .018 inch and a width of about $\frac{1}{8}$ of an inch so as to be of a narrow, thin, ribbon form. To assure a positive engagement of the driver with the anchor at all times of operation, the stationary jaw 128 above the closing portion thereof is integrally formed with a projecting or guide portion 144 (Fig. 8) extended toward the movable jaw 127 which is formed with a corresponding shoulder portion 146 to guidably receive the projection 144 when the jaws are in a closing position. The projection is formed with slots or grooves for slidably receiving the driver 139, with the vertical movement of the driver being such that it is continuously guided in a vertical path within the projection 144. The groove 137 in the closing portion of the jaw 128 is continuous with one of the guiding grooves in the projection 144 so that the driver is continuously guided relative to the jaw 128, and aligned for reception in the groove 138 in the movable jaw 127 when the jaws are in a closing position. The driver is thus always capable of engaging the anchor 74 so that any possibility of the driver not riding in the grooves 137 and 138 during an anchor inserting operation, as sometimes occurs when the driver is retracted from the jaws at some point in its movement, is positively eliminated.

To assure the anchor 74 always being driven lengthwise into a brush block 20 it is necessary that, prior to the anchor driving operation, it be positioned lengthwise between the jaws 127 and 128 in a plane substantially normal to the inner faces of the jaw closing portions, or to the grooves 137 and 138 in such faces, with the ends of the anchor in corresponding grooves. Where the anchor is between the jaws in a tilted or inclined position relative to this plane, the driver 139, even though engageable with the upper side of the anchor, acts to further tilt the anchor rather than to properly straighten or position it for insertion lengthwise into the block 20. As a result of this action the anchor oftentimes is inserted endwise into the block so that it fails entirely to secure a corresponding tuft in the block. Of course, the failure of one tuft to be secured in the block 20 spoils the complete brush so that it must be scrapped or rejected.

As previously mentioned, the anchor 74 between the carrying fingers 83 and 84 has an end 118 terminating in one side face of the fingers 83 and 84, and an opposite end 147 projected from between the fingers. In the positioning of the anchor 74 between the jaws 127 and 128 the side surface of the fingers 83 and 84 at the anchor end 118 is moved into slidable engagement with

the inner face of the closing portion of the stationary jaw 128 when the jaws are in their open position as shown in Fig. 7. The ends of the fingers 83 and 84 are tapered to facilitate the fingers being inserted between the jaws 127 and 128 and by virtue of the pivotal movement of the retaining plate 87 relative to the pivot arm 96 the fingers 83 and 84 are slidably moved against the stationary jaw 128 to a position at which the anchor end 118 is directly opposite the groove 137 in the stationary jaw 128. This position of the anchor end 118 is determined by the movement of the fingers 83 and 84 by the cam 121. Further the jaws 127 and 128 are arranged in a plane substantially normal to the plane of pivotal movement of the fingers 83 and 84 so that the anchor 74 is positioned in a plane substantially normal to the plane of the inner faces of the closing portions of the jaws 127 and 128 concurrently with the location of the anchor end 118 immediately at the groove 137. The end 147 of the anchor 74 is thus in turn located opposite the groove 138 in the movable jaw 127. With the anchor 74 retained in this position by the fingers 83 and 84 the movable jaw 127 is moved into a closing position with the stationary jaw 128 to receive the anchor 74 for guidable support within the corresponding grooves 137 and 138, as is shown in Fig. 8, while extended lengthwise between the jaws is a plane substantially normal to the inner faces of the jaw closing portions. After the jaws 127 and 128 have been closed on the anchor 74 the fingers 83 and 84 are moved out of an anchor holding or carrying position by the cam 121, the end of the fingers 83 and 84 being pulled away from the anchor 74 by the anchor spreading the fingers apart against the action of the spring 91.

Since any vertical movement of the jaw means 29 and in turn of the jaws 127 and 128 during the time the anchor 74 is not held by the fingers 83 and 84 might result in tilting the anchor between the jaws, the jaw means is held against any vertical movement until after the jaws have closed on the anchor. Movement of the jaw 127, while the jaw means is stationary is made by a cam portion 148 carried on a shaft 149 rotatably supported in a portion 151 of the machine frame including the ways 124 and 126. The cam 148 (Figs. 8 and 9) is suitably keyed to the shaft 149 which also carries thereon in a keyed relation an arm 152 pivotally connected with a connecting rod 153 having a follower 154 at its free end for engaging a cam 156 mounted on a driven shaft 157 which is also common to the picker mechanism of the machine, and which will be later described. The cam 148 is engageable with a corresponding projection 158 at the top of the movable jaw 127, as viewed in Figs. 8 and 9, and is operated by the cam 156 and the follower 154 to move the jaw 127 relative to the jaw 128 in a predetermined sequence relative to the moving of the fingers 83 and 84 by the cam 121.

In the picker mechanism shown in Fig. 9, the bristles 159 used in making the brushes are stored in a magazine or rack 161 arranged in a substantially upright or vertical position, the bristles being positioned in a longitudinal direction and extending from front to back as viewed in Fig. 9. A weighted plate 162 on the top of the bristles in the rack 161 maintains a certain amount of pressure on the bristles to feed them through the rack and toward the pivoted picker member 31.

The picker member 31 has a substantially arcu-

ate portion 163 which is pivotally movable across the lower end of the bristle magazine, as viewed in Fig. 9, and has a radial arm 164 carried on a rotatable shaft 166. The outer peripheral edge of the arcuate portion 163 maintains the bristles 159 in the rack 161 as the picker member is rotated across the lower end thereof. This peripheral edge has a notch 167 which is of a size to remove from the face of the bristles at the lower end of the storage rack 161 a quantity of bristles in an amount to produce a tuft 76 of a desired size for the brush. The picker member 31 is shown in Fig. 9 at one end of its operating stroke with a tuft 76 in the notch 167 at a position to be received between the jaws 127 and 128 for insertion with the anchor 74 into the brush block 20. The picker member is pivotally movable in a plane which is substantially parallel and adjacent to the plane of vertical movement of the jaw means 29 to permit free relative movement between these parts. The shoulder or offset portion 168 near one end of the arcuate portion 163 acts to pack down the bristles in the storage rack.

It is important, of course, that the bristles at the lower end of the magazine 161 be in a condition such that a substantially uniform quantity of bristles is received within the notch 167 on each passage thereof across the magazine. Although the upright position of the magazine in cooperation with the weighted plate 162 tends to pack the bristles toward the lower end, this packing is usually inadequate, particularly when the picker member 31 is operated at relatively high speeds. As previously mentioned, the shoulder portion 168 on the picker assists in this packing function. To further pack the bristles at the lower end of the magazine 161 there is provided a packer means comprised of a packer arm 172 and an operating arm 173 fixed with respect to each other and supported for pivotal movement on a stationary axis means 174. The lower end of the packer arm 172, as viewed in Fig. 9, is formed with two spaced projecting portions which on pivotal movement of the arm 172 towards the magazine 161 acts to pack the bristles at the lower end of the magazine in a direction toward the picker member 31. The arm 172 is driven by means including a connecting rod 176 connected at one end to the lower end of the arm 173 and pivotally connected at its opposite end to the leg 177 of a bell crank 178. The bell crank 178 is pivotally supported at 179 and has the leg 181 thereof pivoted to a sleeve member 182 slidable on a shank 183 formed as part of an eccentric 184 supported on the drive shaft 157. The eccentric 184, sleeve 182, and bell crank 178 are all part of the driving mechanism which provides a delayed or lost motion action for properly timing the operation of the packer arm 172 with reference to the operation of the picker member 31, so that the packer arm 172 is moved toward the picker member 31 as the notch 167 is moved in a counterclockwise direction, as viewed in Fig. 9 across the lower end of the bristle magazine 161.

A pivotal movement of the picker member 31 across the lower end of the rack 161 is accomplished by suitable operating mechanism (not shown) associated with the shaft 166. In the operation of the picker member 31 the notch 167, when moved in a counterclockwise direction, as viewed in Fig. 9, across the lower end of the bristle rack 161, cuts or removes a measured quantity of bristles from the magazine. When the notch passes from the bristle magazine the bristles are

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retained in the notch by a buffer plate 169 having an arcuate surface of mating contour with the arcuate portion 163 of the picker member, which surface is slidably engageable with such arcuate portion. The bristles 76 are thus supported in the notch 167 by the buffer plate closing the notch 167. It is apparent, of course, that the notch 167 is open at the peripheral edge of the arcuate portion 163 and that means must be provided to retain the tuft 76 within the notch to carry the tuft from the buffer plate to a position for engagement by the jaw means 29. This carrying of the tuft 76 is accomplished by a tumbler unit 171 which cooperates with the buffer plate 169 to retain the tuft 76 within the notch 167 at all times of its transfer from the bristle rack 161 to the jaw means 29.

The tumbler 171 is located below the picker member 31 and above the holder 21 for a brush block 20 (Fig. 9) and is mounted on a shaft 186 for pivotal movement in and out of vertical alignment with the jaw means 29. As shown in Fig. 9 the tumbler is in vertical alignment with the jaw means 29 and in this position functions during an anchor and tuft inserting operation, to double up the bristle tuft 76 and to guide the doubled tuft all the way down to a position in the brush block 20. The tumbler 171 is pivotally moved by a crank arm 187 rigidly mounted on the tumbler shaft 186 and pivotally connected at its free end to one end of a connecting rod 188. The other end of the rod 188 is pivotally connected at 189 to the arm 177 of the bell crank 178. The driving mechanism for the packer arm 172 is thus common to the driving mechanism for the tumbler 171 with the lost motion in this driving mechanism being such as to properly time the movement of the tumbler with respect to the jaw means 29 and the picker member 31. Thus as shown in Fig. 9, the tumbler 171 is in vertical alignment with the jaw means 29 concurrently with the location of the tuft 76 at a position to be engaged by the jaws 127 and 128 of the jaw means 29.

With the tumbler 171 in vertical alignment with the jaw means 29, the upper edge thereof is used to retain the tuft 76 within the notch 167 after the notch is moved away from the buffer 169. That is, the extreme end 191 of the buffer member 169 stops short of the center of the jaw means 29 so as not to interfere with the operation of the jaws 127 and 128 in engaging the tuft 76 and carrying the same to the brush block 20. However, because of the timed relation of the tumbler 171 relative to the jaw means and picker member, the upper edge of the tumbler 171 is in substantial alignment with the arcuate surface of the buffer member 169 at the time the notch 167 passes off the buffer 169 so that the tuft 76 is continuously retained within the notch 167 for transfer from the rack 161 into the path of movement of the jaw means 29 and between the jaws 127 and 128. Thus at the jaw means 29 the tuft 76 is retained in the notch 167 by the upper surface of the tumbler 171. It is seen, therefore, that the tumbler 171 performs its usual functions in retaining inserted bristle tufts free of the hole in which a new tuft is to be inserted, and a bristle doubled until the time it is inserted in the brush block 20, and further acts to retain the tuft 76 within the picker member 31 until it is engaged by the jaw means 29.

From the above description it is seen that both the anchor 74 and bristle tuft 76 are presented to the jaws 127 and 128 for insertion together into

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the brush block 20 by the driver 139. In order for the jaws 127 and 128 to close on both the anchor and the tuft it is necessary that they be in their open-position, shown in Figs. 7 and 9, when the anchor and tuft are first presented therebetween. In the embodiment of the invention above referred to, the overall vertical movement of the jaw means 29 above the position shown in Figs. 7 and 9, at which the tuft is received between the jaws 127 and 128, is only about one quarter of an inch. In this one quarter inch overall movement the jaws 127 and 128 may be spread apart by the cam 148 acting on the movable jaw 127 either on the up-stroke of the jaws away from the tuft receiving position shown in Figs. 7 and 9, or on the down stroke of the jaws from a top or uppermost position toward a tuft-receiving position, or over both the up and down strokes of the jaws in the one quarter inch overall movement. The jaw carrying fingers 83 and 84 are operated to move between the jaws 127 and 128 after they are in an open position and into sliding engagement with the inner surface of the closing portion on the stationary jaw 128. This relative position of the anchor carrying fingers and the jaws 127 and 128 is retained until the jaws are moved to their position shown in Figs. 7 and 9 for receiving the bristle tuft 76.

At this position of the jaws 127 and 128 the jaw means 29 is retained against vertical movement and the cam 148 is moved out of an engaging position with the projection 158 to permit the jaw 127 to close with the jaw 128, on both the anchor 74 and the bristle tuft 76. After the jaw 127 has closed with the stationary jaw 128 the anchor holding fingers 83 and 84 are withdrawn from between the jaws and the jaw means 29 moved downwardly into the tumbler 171 concurrently with the operation of the driver 139 to insert the tuft 76 and anchor 74 in the brush block 20. It is seen, therefore, that the jaws 127 and 128 are retained against any vertical movement downwardly, while the jaw 127 is being closed on the anchor 74 and tuft 76, and that their downward movement is continued substantially concurrently with the retraction of the fingers 83 and 84 from the anchor 74. As a result the guiding of the fingers 83 and 84 on the inner face of the stationary jaw 128 to properly locate the anchor 74 for gripping between the jaws 127 and 128 is positively retained by virtue of the anchor 74 being stationary relative to the jaw 128 during the closing of the jaws.

From a consideration of the above description and drawings it is seen that the invention provides a machine in which a brush block carried on a continuously rotating table to related operating units is automatically adjusted during the rotation of the table such that the completed brush is formed with straight rows of bristles. The invention further provides means for assuring an anchor of straight form being driven lengthwise into the brush block to positively secure a corresponding bristle tuft. Although the machine has been particularly described with respect to making a brush in one continuous operation having a pair of straight rows thereon inclined relative to each other it is apparent that the means for adjusting the brush block holder 21 are adapted to provide, in conjunction with the brush holder, a row of bristles on the brush of any form. In those instances where the brush block is formed by a molding operation, during which operation the holes for receiving the bristles are simultaneously formed, the drills 28 and 33 may be eliminated

and one or more anchor and tuft inserting units used depending upon the number of rows of holes in the molded handle to be tufted.

Although the invention has been described with reference to a specific embodiment thereof it is to be understood that it is not to be so limited since modifications and changes can be made therein within the intended scope of this invention as defined by the appended claims.

I claim:

1. In a machine for making a brush having a brush block with a bristle tuft retained therein by an anchor, mechanism for inserting said anchor in said brush block including a stationary jaw and a jaw movable to a closing position with said stationary jaw, said jaws being adapted to receive said anchor therebetween, with each of said jaws having a groove therein for guidably retaining said anchor, and means slidably supported in said stationary jaw and guidably supported in said grooves during an anchor inserting operation for driving said anchor from said jaws into said brush block.

2. In a machine for making a brush having a brush block with a bristle tuft retained therein by an anchor, means for inserting the anchor in said brush block including a stationary jaw and a jaw movable to a closing position with said stationary jaw to retain said anchor in a lengthwise position therebetween, sliding means supporting said jaws for concurrent movement relative to said brush block, means for presenting an anchor to said jaws, means retaining said jaws against movement by said sliding means when the anchor is closed between said jaws, and means for moving said movable jaw relative to said stationary jaw to retain said jaws open to receive said anchor from said anchor presenting means and to close said jaws after said anchor is therebetween.

3. Brush making machine mechanism for producing and moving wire members for securing bristles in a brush block, said mechanism including in combination wire cutting and transporting means having a combination wire cutting and holding and transporting portion therein, means receiving wire members from said first-mentioned means to be driven into a brush block, said receiving means including supporting means, a pair of jaws on said supporting means with one of said jaws being stationary relative thereto, means mounting the other jaw for movement relative to the first jaw, and said mechanism including pivoted means pivotable independently of said other jaw for engaging said other jaw and for moving it to open said jaws for the introduction of a wire member therein.

4. In a brush making machine, the combination including anchor cutting and transporting means for receiving anchor material and having a movable portion acting in the cutting of an anchor from said material and thereafter gripping a cut anchor in said means, a jaw unit having a pair of jaws adapted to be intermittently opened and closed, means for moving said cutting and transporting means to the jaws to position the anchor therebetween with one end of the anchor at the inside face of one jaw, and spring means pivoting the other jaw to close on the other end of the anchor and retain the anchor between the inside faces of the two jaws.

5. In a machine for making brushes having an anchor for holding a bristle tuft therein, said machine including movable anchor-carrying means and means for inserting said anchor and tuft in said brush, said anchor-carrying means

including finger portions for releasably holding said anchor therebetween with one end of said anchor terminating in a side surface of said finger portions, and said inserting means including a pair of jaws having corresponding closing portions, with each of said closing portions having a longitudinally extending groove therein, means for moving said finger portions and said anchor therewith when said jaws are open to position said anchor lengthwise between said jaws with the said side surface against the face of one of said closing portions and with said one end of the anchor opposite the groove in said one closing portion, and means for closing said jaws on said anchor to guidably retain the ends thereof in corresponding grooves, with said moving means when said anchor is retained in said jaws being actuated to release said finger portions from said anchor.

6. In a brush making machine including mechanism for inserting an anchor into a brush block for retaining a bristle tuft therein, said mechanism including a pair of jaws adapted to guidably support said anchor therebetween during an anchor inserting operation, the means for presenting said anchor to said jaws for support therein in a plane substantially normal to the inner faces of the closing portions of said jaws including movable means for releasably carrying said anchor with one end of said anchor terminating in a face portion of said carrying means, means for moving said carrying means when said jaws are in an open position to locate said anchor in said plane with said face portion against the inner face of one of said closing portions and said one anchor end at said inner face, and means for closing said closing portions on the ends of said anchor prior to releasing said carrying means from a held anchor position.

7. In a brush making machine utilizing a wire anchor for retaining bristles in a brush block, the means for producing an anchor and transporting it to a brush block including in combination, a gripping unit adapted to receive wire therein and having a face portion, a wire guide unit adjacent said face portion, means providing relative movement between said units to shear the wire at said face portion and provide in said gripping unit a wire anchor with one end flush with said face portion, a bristle tuft and anchor carrying unit having a spring-pressed pivoted jaw and a non-pivoted jaw with the latter having an inside face, means mounting said gripping unit and said carrying unit relative to one another and for moving said gripping unit so that said anchor in said gripping unit is introduced between said jaws with said face portion of said gripping unit substantially in engagement with said jaw-inside-face and with said one end of said anchor at said inside face, means maintaining the pivoted jaw spaced from said non-pivoted jaw at one end to permit the introduction of said anchor therebetween, and means for moving said maintaining means relative to said pivoted jaw to permit spring-urged pivotal movement thereof to clamp the anchor therebetween for transporting to the brush block.

8. In a brush making machine utilizing a wire anchor for retaining bristles in a brush block, the means for producing an anchor and transporting it to a brush block including in combination, a gripping unit adapted to receive wire therein and having a face portion, means cooperating with said gripping unit to shear at said face portion the wire gripped in said unit, with

the gripped wire comprising an anchor and having one end flush with said face portion, bristle tuft and anchor carrying means having a spring-pressed pivoted jaw and a non-pivoted jaw, with the latter having an inside face, means mounting said gripping unit and carrying means relative to one another and for moving said gripping unit so that said anchor in said gripping unit is introduced between said jaws in a position with said gripping unit face portion substantially in engagement with said jaw inside face, said anchor in said gripped unit remaining in the same position therein from the time it is sheared until presented between said jaws, means maintaining the pivoted jaw spaced from said non-pivoted jaw at one end to permit the introduction of said anchor therebetween, and means for moving said maintaining means relative to said pivoted jaw to permit spring-pressed pivotal movement thereof to clamp the anchor therebetween for transporting to the brush block.

9. In a brush making machine operating through a work cycle and having bristle and bristle-retaining supply means, the means for directing bristles and a bristle-retainer to a brush block including in combination a pivoted jaw member and a non-pivoted jaw member, means connecting said jaw members intermediate their ends for pivotal movement of the pivoted jaw member relative to the other jaw member, spring means at one end of one of the jaw members urging such jaw member toward the other jaw member at the ends of each jaw member opposite said one end, and an independently movable part acting during one portion of a work cycle on the pivoted jaw member at the spring means end to pivot said jaw member and open said members at the other ends thereof wide enough for insertion of bristles and a bristle retainer.

10. In a machine for making a brush having a brush block with a tuft retained therein by an anchor, anchor inserting means including a stationary jaw and a jaw movable to a closing position with said stationary jaw, with said two jaws being supported for longitudinal movement together and each of said jaws having a groove therein for guidably supporting said anchor at its ends during an anchor inserting operation, means for driving said anchor to an anchored position in said block including a plunger guidably supported in said stationary jaw and in the grooves in said two jaws during said anchor inserting operation, means for locating said anchor lengthwise between said jaws in a plane substantially normal to said grooves to provide for the insertion of the anchor in said block in a lengthwise position including holding means for releasably holding said anchor therein, said holding means having a guiding face portion and said anchor having one end at said guiding portion, means for moving said holding means, when said jaws are in an open position and retained against longitudinal movement, to engage said guiding portion with said stationary jaw to position said anchor lengthwise in said plane between said jaws, with said one anchor end at the groove in said stationary jaw and the other anchor end opposite the groove in said movable jaw, means for closing said movable jaw to receive said anchor ends in corresponding grooves, and means for longitudinally moving said jaws and operating said plunger to drive said anchor after the release of said holding means from said anchor.

11. In a brush making machine having an operating means for performing a series of opera-

tions on a brush block, the combination including a frame means movable relative to the operating means, a brush block holder unit adapted to support a brush block thereon mounted on said frame means and movable in its entirety relative to said frame means and moving the supported block therewith to the operating means to be worked upon, an adjusting unit adjacent the operating means but fixed relative to said frame means with one of said two units having an engaging portion and the other unit having a patterned cam portion engageable therewith when the frame means moves said brush block holder unit adjacent to the operating means, with continued movement of said frame means effecting a movement of the engaged block holder unit relative to the frame means and the operating means in a pattern corresponding to the pattern configuration of the cam portion to present a brush block on the block holder unit to the operating means for a series of operations thereon in positions corresponding to the pattern of the cam portion.

12. In a brush making machine having a movable work table, a brush block holder on the table for supporting a brush block and adapted to move the block to different positions to be worked upon, pivot means mounting said holder for pivotal movement relative to the table, a plurality of cam portions, a corresponding plurality of cam follower portions, with one type of plurality of portions on said pivoted holder, and the other type of plurality of portions mounted stationary relative to the table, with each cam portion and each corresponding cam-follower portion in the pluralities of portions being engageable and upon movement of the table acting to move the holder to one of the different positions to be worked upon.

13. In the machine defined in claim 12, the plurality of cam portions comprising a plurality of cam faces on the brush-block holder, each providing a pattern for a different pivotal movement of the holder, and each cam face being engageable by a corresponding cam follower portion.

14. In the machine defined in claim 12, the plurality of cam follower portions each comprising an adjustable follower in a stationary position relative to the work table and the pivoted holder acting on a corresponding cam portion to move the holder in a pattern corresponding to the configuration of such cam portion.

15. In a brush making machine having a movable work table, a brush-block holder on the table, pivot means mounting said holder for pivotal movement in its entirety relative to the table to move a brush block therewith to be operated upon in different positions, a cam portion, a cam follower portion, with one of said portions being on said pivoted holder and the other portion being mounted stationary relative to the table, said portions being engageable to move said holder upon movement of the table.

16. In the machine defined in claim 15, the cam portion comprising a cam face on the pivoted brush-block holder, engageable by the cam follower to prescribe the pattern of movement of the holder upon movement of the work table.

17. In a brush making machine having a table rotatable in a horizontal plane and a portion for operating on a brush block carried on said table movable in a substantially vertical direction relative to said brush block, the means presenting a brush block for the operation by said operating portion in a straight path over a portion of said

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brush block including a holder for said brush block pivotally connected at one end with said table, with its opposite end pivotally movable for sliding movement relative to said table, said brush portion being carried in said holder at said opposite end, a cam portion on the holder at said opposite end having a vertical surface parallel with said straight path, and means for pivoting said holder including a stationary means slidably engageable with said vertical surface on rotation of said table to provide for a linear movement of said brush portion relative to said operating portion.

18. In a machine for making a brush having a straight row of bristles therein, said machine including a table rotatable in one direction in a single plane for carrying a brush block to related operating units for successive operations thereby to complete a brush, means for rotating said table to move said block from one operating unit to a next related operating unit, means for rotating said table to successively position said block for a series of like operations by an operating unit, and means for continuously adjusting said brush block relative to said table during said successive positioning of the block at an operating unit to provide for the operations by said unit being performed in said straight row on the brush block.

19. In a brush making machine having a movable work table, a brush-block holder on the table, pivot means mounting said holder for pivotal movement in its entirety relative to the table to move a brush-block therewith to be operated upon in different positions, a cam portion, a cam follower portion, with one of said portions being on

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said pivoted holder and the other portion being mounted stationary relative to the table, said portions being engageable to move said holder upon movement of the table, and means operative in response to the movement of the table for maintaining a brush-block in the holder while operating thereon and during pivotal movement of the holder, said maintaining means including a movable member having a portion extendable over a brush-block to hold it in the holder and withdrawable from over the brush-block after completing the operations on the brush-block.

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