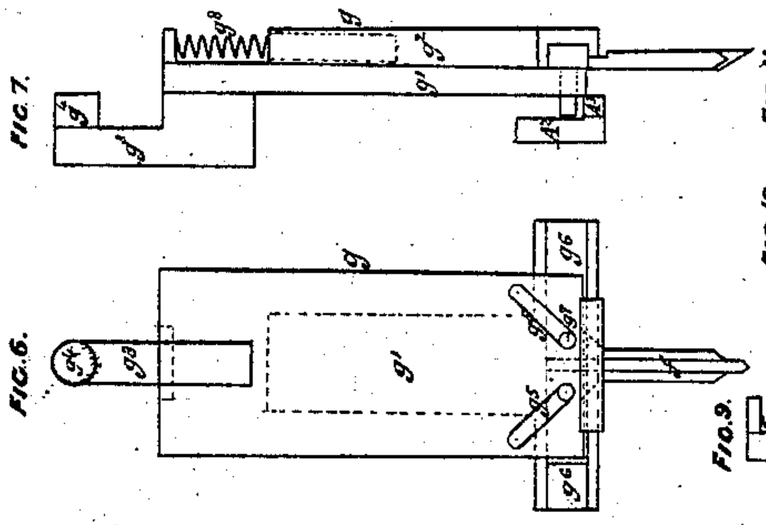
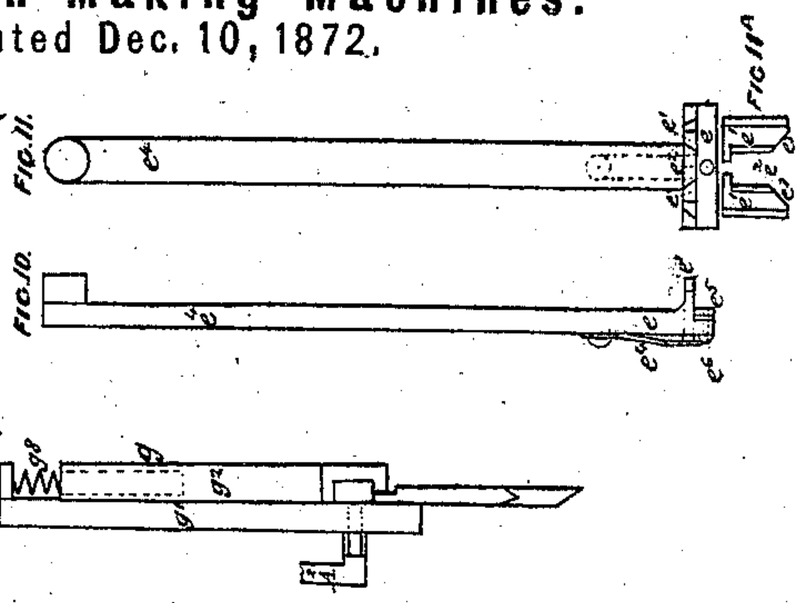
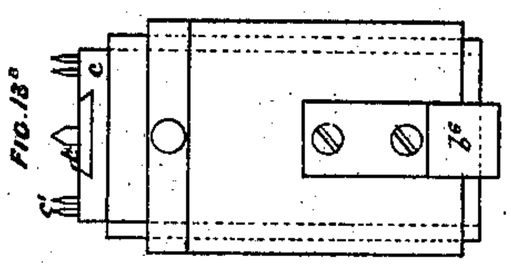
3 Sheets--Sheet 1

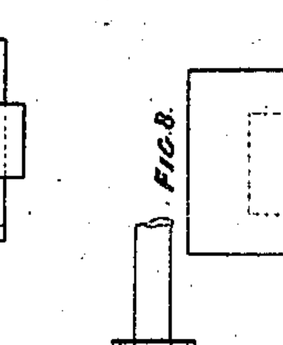
E. F. BRADLEY.
Brush-Making Machines.

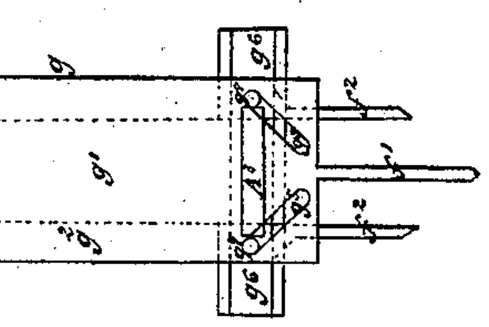
No. 133,827. Patented Dec. 10, 1872.

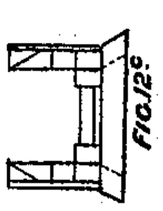


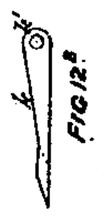


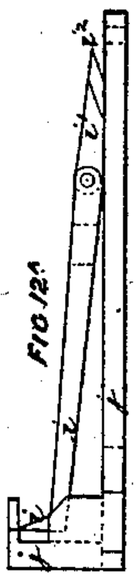


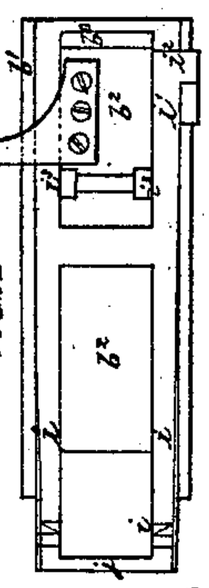


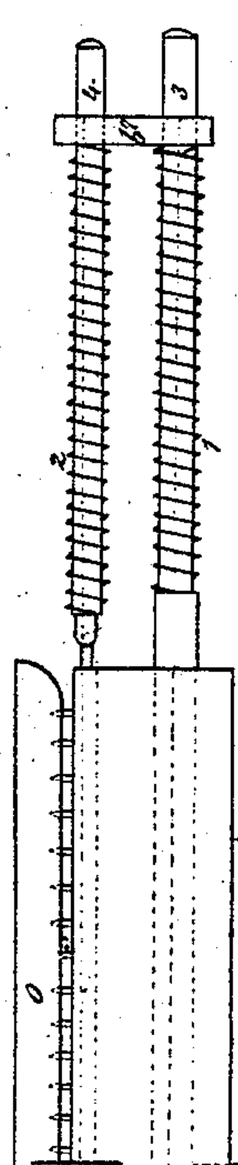












Witnesses:
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Robt. F. Brewster

Inventor.
Edward Franklin Bradley

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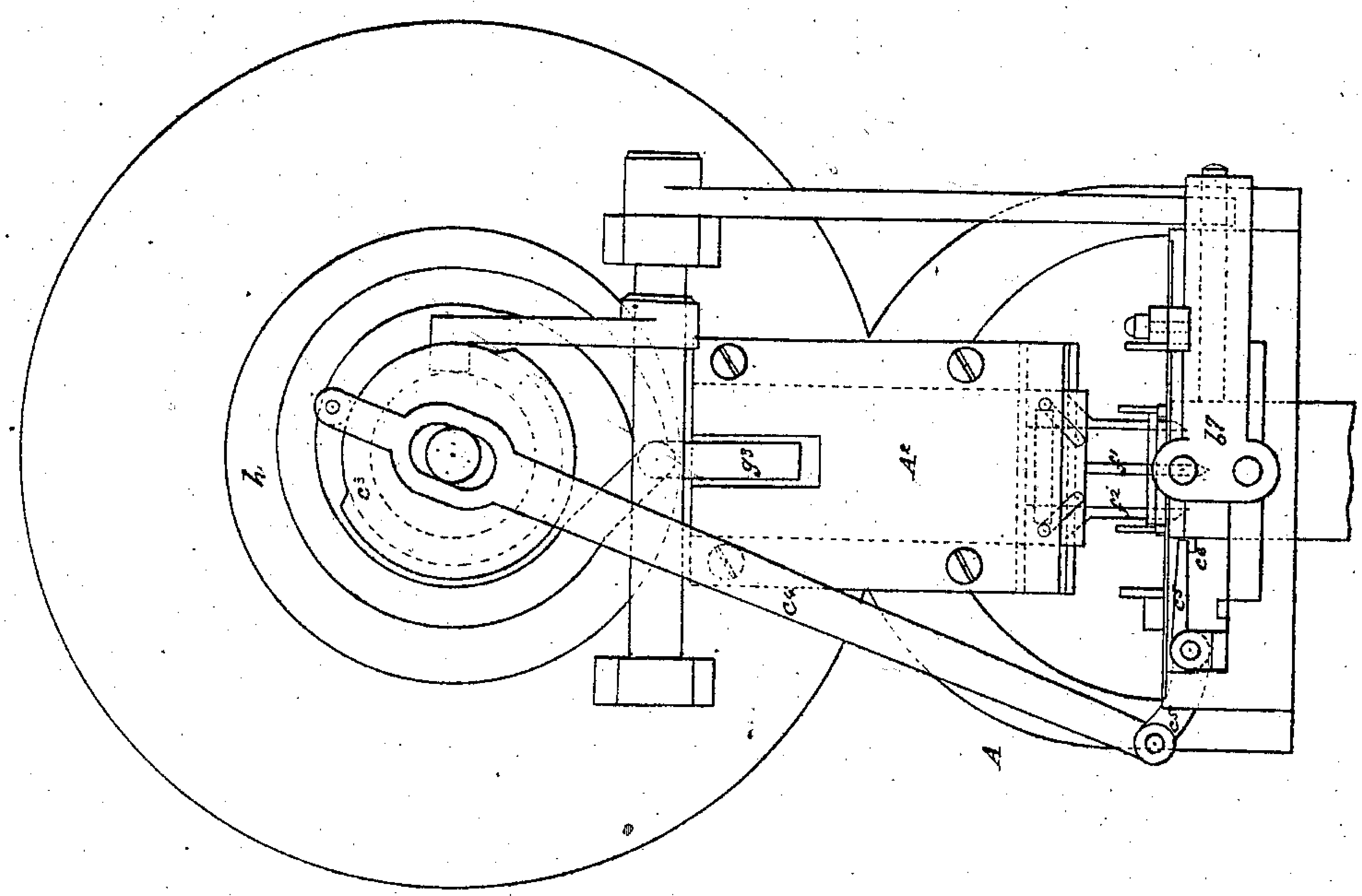
FIG. 2.



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3 Sheets--Sheet 3.

E. F. BRADLEY.

Brush-Making Machines.

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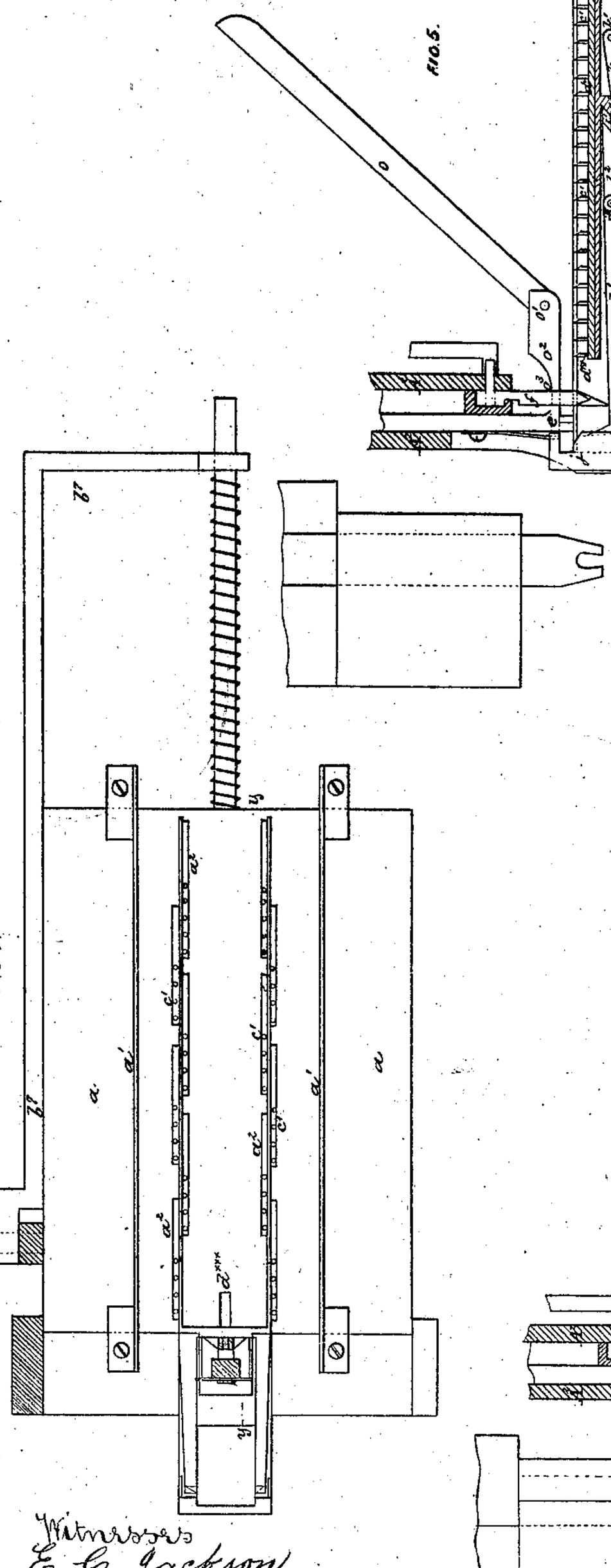

FIG. 3.

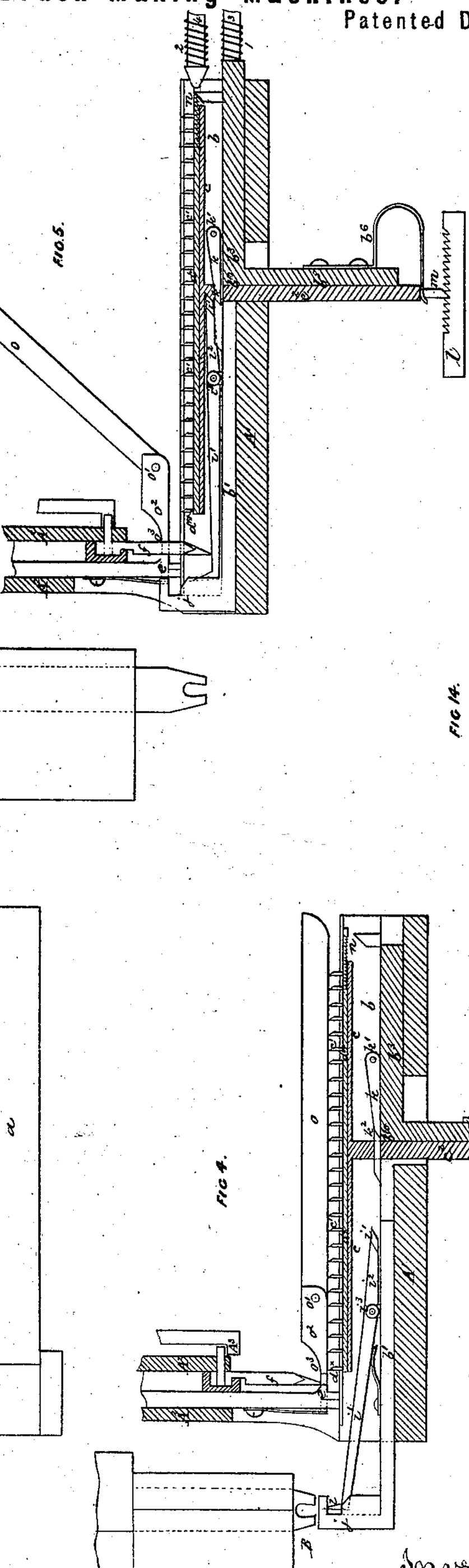

FIG. 5.

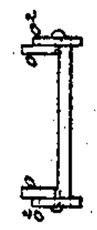

FIG. 16.

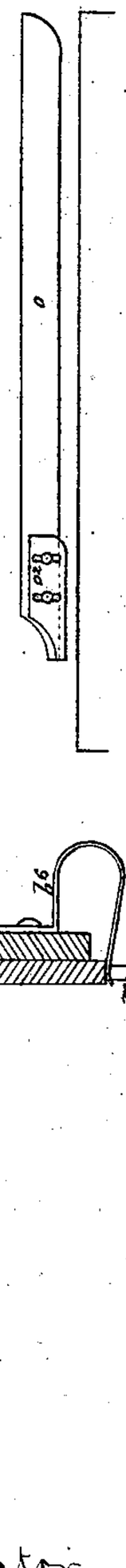

FIG. 14.

FIG. 4.

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UNITED STATES PATENT OFFICE.

EDWARD FRANKLIN BRADLEY, OF LONDON, ENGLAND, ASSIGNOR TO JOSEPH SHELDON, OF NEW HAVEN, CONNECTICUT.

IMPROVEMENT IN BRUSH-MAKING MACHINES.

Specification forming part of Letters Patent No. **133,827**, dated December 10, 1872.

To all whom it may concern:

Be it known that I, EDWARD FRANKLIN BRADLEY, formerly of New Haven, in the county of New Haven, and State of Connecticut, now of London, England, have invented new Improvements in Machinery for Manufacturing Brushes; and I do hereby declare the following, when taken in connection with the accompanying drawing and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawing constitutes part of this specification, and represents, in—

Figure 1, a side elevation of part of one of the aforesaid machines, showing the adaptation of my improved feed mechanism to the same; Fig. 2 is a front elevation of the parts shown in Fig. 1; Fig. 3 is a longitudinal section on line *x x*, Fig. 1; Fig. 4 is a vertical longitudinal section on line *y y*, Fig. 3; Fig. 5 is a vertical longitudinal section on line *y y*, Fig. 3, showing the parts in a different position; and Figs. 6 to 15 illustrate detached portions of my improved mechanism, and are hereinafter fully described.

Like letters indicate corresponding parts throughout the drawing.

My said invention relates to further improvements in the machinery described in the specification of the Letters Patent No. 85,193, granted by the United States to Albert M. White, of Thomsonville, Connecticut, December 22, 1868, as assignor to the American Brush Company. My present invention is designed to provide the means whereby, in making a brush, the bristles or other fibers shall be formed into tufts of uniform size; or, in other words, shall consist of the same or nearly the same number of bristles or fibers, so that in any one brush or number of brushes intended to be of the same quality every one of the tufts of fibers inserted in the stock shall equally and properly fill the hole formed for its reception, and the entire brush shall be throughout of the same strength, hardness, or stiffness, and the entire surface of the bristles when the brush is finished shall have a compact, regular, and uniform appearance. According to my said invention I provide the machine which inserts the bristles or fibers into the stock of a brush with novel feed mechanism, whose construction and arrangement I will now proceed to explain.

I have not thought it necessary to show any of the hitherto-existing parts of the said machine, except a portion of the frame A and those parts that are in immediate connection with my present improvements; but it will be readily understood that the motions of the parts of my improved mechanism are so arranged that the feeding action takes place always at the proper time to bring the fibers properly up to the mechanism which receives the tufts, places the wire staples thereon, and inserts the same in the brush-stock.

In a horizontal plane in front of the inserting mechanism I place a bed or table, *a*, which is supported on a bracket, A^1, on part of the machine-frame, and extended forward for a convenient distance, as shown. The bristles or fibers are laid across the middle portion of the bed or table *a*, as shown in Fig. 3, between the guides a^1, which are adjustable laterally, first, that the space between them may be increased or diminished to suit fibers of different length and so that the entire body or layer of fibers may be more or less to one side of the center of the table. By this means the thick end of the bristles may be drawn lower in the stock than the other end; consequently, in trimming the brush the thin or weak part of the fibers projects beyond the other portion, and this part only is cut off in trimming the brush. Below the bed *a* is a slide, *b*, which carries on a plate, *c*, two rows of teeth or pointed pins c^1 projecting up through slots a^2 in the top of the bed or table. The slide *b* is composed of three parts, b^1 b^2 b^3, and, although these parts have a common to-and-fro movement, yet each of them moves to some extent independently of the others, for purposes hereinafter explained. This slide, with its teeth or pins c^1, moves forward the entire body or mass of bristles or fibers gradually and regularly up to the mechanism which separates them into tufts and delivers them to the inserting devices, and for this purpose the said slide receives a reciprocating or to-and-fro motion from a cam, *d*, through the medium of the lever d^1. The said lever has its fulcrum at d^2 in an arm or bracket, D, attached to the frame A of the machine, and the lower

extremity of the said lever is connected to the rod or finger b^4 on the part of b^2 of the slide b.

In order that the reciprocating motion of the slide b may have the desired effect of carrying the bristles gradually forward, it is necessary that the pins or teeth c^1, after each forward movement of the slide, should be withdrawn from the bristles before each return or backward movement of the plate; otherwise the bristles would be simply moved to and fro instead of advancing. I therefore arrange the plate c, which carries the teeth c^1 upon the slide b, with a capability of a slight up-and-down motion thereon. I prefer to form the plate c with a vertical piece, c^2, which is fitted to slide in the piece b^5 projecting down through a slot in the bracket A^1 from the part b^3 of the slide. On this piece b^5 is a spring, b^6, which bears against the bottom of the vertical piece c^2 and tends continually to hold the plate c up against the action of the cam c^3. This, through the medium of the rod c^4 and rocking-arm c^5, which bears on a projection on the plate c at c^6, depresses the said plate just before each backward movement of the slide b. The teeth or pins c^1 are thereby withdrawn from the bristles, and as the return movement of the slide b takes place the points of the pins c^1 are below the bristles, and therefore leave them where they were last carried forward. The part b^3 of the slide is pressed forward by the spring which bears against the bent arm b^7. This arm is connected to and moves with the finger of the part b^2 of the slide. By this means I obtain the greatest pressure of the said spring at the required moment. If desired, I may have a stationary arm instead of the arm b^7, but the spring would not, in that case, act so advantageously. In the backward movement of the slide the cam acts on the part b^2 through the finger. The part b^2, after a certain interval of lost motion, hereafter explained, strikes the shoulder b^9 of the part b^1, and the parts b^1 and b^2, then moving together, after another interval strike the shoulder b^{10} of the part b^3, and move it back against the resistance of the spring. In the center of the plate c is a sliding bar, d^*, which is fitted and guided within the said plate. This bar moves to and fro with the slide b, and up and down with the plate c, but it has an independent endwise motion in the slide. The said sliding bar carries a single tooth, d^{**}, at its inner end, which projects up through a slot, d^{***}, in the center of the table. The bristles, as they are fed forward by the teeth c^1, accumulate in a compact mass at the inner end of the table a, and at this point they are compressed between the last-mentioned tooth d^{**} and an angle-piece, e, the two together, by their peculiar formation and operation, forming a box or receptacle, which opens to admit the bristles brought to it by the pins c^1 and d^1 of the feed-motion, and closes to compress the bristles into a compact mass containing about enough bristles to make two or two and a half tufts. This mass of bristles, when compressed in the box, lies under a vertically-moving divider, which descends and separates from it at every stroke a regular and uniform quantity of bristles. This separated or divided portion of the bristles, which is to form the tuft, is then held between the divider f and the angle-piece e while the return movement of the feeding-slides takes place, during which time the bristles outside the divider, being released from the pressure of the pins, become temporarily less dense or compact. The said divider is composed of three pointed fingers or prongs, f^1 f^2, Fig. 8, which, when the divider enters the mass of fibers, lie close together, as shown in Figs. 6, 7, and 9, and form one point that is forced into the compact mass of bristles at the part which is to form the center of the tuft. When this part has thus entered the mass the two outside fingers f^2 are caused to move outward through the bristles, and thereby divide them from end to end, the divided or separated portion to form the tuft being inclosed between the divider and the angle-piece, as above described. The said angle-piece forms the back and top of the compressing-box, and when the divider f is down the bristles are inclosed and tightly held on all sides between the said divider which forms the front of the box, the angle-piece which forms the back and top, and the table which forms the bottom of the box. To allow the divider to descend when the box is thus closed the top of the angle-piece e is formed of two sliding pieces, e^1, Fig. 11^a, between which is a space or aperture, e^2, for the divider f to enter. These pieces e^1 are inclined or beveled on the inner side e^3, and, when the outer prongs f^2 of the divider move outward, by acting on the sliding piece e^1 they force back the said pieces and pass in front of them, the said pieces being then again pushed out over the bristles by a spring, e^4.

These fingers are operated by the following devices: A^2 is a plate attached to the front of the machine. In this is fitted the compound slide g, Figs. 6, 7, 8, and 9, consisting of the parts g^1 g^2. The part g^1 carries an arm, g^3, which has a roller on a stud, g^4, and thereby receives motion from the cam h. The point f^1 is also fixed to this part g^1. In this part are the inclined slots g^5. The part g^2 has a horizontal groove, g^6, in which the stocks of the points f^2 slide in and out. These stocks are provided with pins g^7, which pass through the slots g^5. When the slide is forced down by the cam the two parts g^1 g^2 are caused by the spring g^8 to move together till the pins come in contact with the flange A^3 at the bottom of the plate A^2. This flange prevents the further downward motion of the part g^2 while the part g^1 continues its descent, and by the action of the inclined slots upon the pins g^7 causes the points f^2 of the divider to open or diverge from the position shown in Figs. 6 and 7 to that of Figs. 8 and 9. The parts f^2 diverge till they reach the end of the flange A^3, when they pass down outside the same, where they remain till the divider rises again. The

central sliding bar *d*, which carries the compressing finger or pin *d***, is forced forward by a separate spring, 2, which also bears upon and shares the motion of the bent arm b^7. The rods 3 4, around which these springs are coiled, are fitted to slide through the said arm to allow of the independent movements of the part b^3 and the bar *d**. As before stated, by means of this arm I relieve the pins of the pressure of these springs at the backward motion of the plate.

When the quantity of bristles or other fibers to form each tuft has been separated from the mass by the devices above described they have to be taken automatically from the box and delivered in the same dense or compact condition to the inserting devices. For this purpose I employ the carrying-fingers *i j*, which are clearly shown in Figs. 4, 5, 12, and 12^a, and which operate in the following manner: The said fingers grasp the ends of the tuft or brush of bristles or fibers held in the box, and at the same instant, or immediately after the angle-piece *e* is raised by the cam *h'*, with which it is connected by the rod or bar e^4. The fingers are then moved forward, carrying the tuft under the inserting-fingers B, as shown in Fig. 4. As these fingers are attached to the slide *b* it is obvious that the to-and-fro motion corresponds with that of the said slide. It is necessary that these fingers should open and close, so that they may receive the tuft and grasp it tightly between them, and for this purpose they are attached to the differents parts b^1 and b^2 of the said slide, as hereinbefore described. The part *i* is attached to the part b^2. As the slide *b* is moved backward after delivering a tuft to the inserting-fingers, the part *i* of the fingers, being connected to the part b^2 of the slide which first receives motion from the cam, is drawn away from the part *j* till the part b^2 of the slide strikes the shoulder on the part b^1. The two parts *i* and *j* then move backward together, the point of *i* remaining up, as in Fig. 4, till the beveled end i^1 of the arm i^2, which is pivoted to the slide at i^3, comes in contact with the inclined arm *k*, which is pivoted at k^1 to the bed of the feed mechanism. This incline throws up the said beveled end of the finger-arm, and consequently depresses the point *i*, which at this moment passes under the tuft held in the box. The said end then drops down over the rear shoulder k^2 of the arm *k*, which is beveled so that it will rise and allow the end i^2 to pass under as the slide and fingers again move forward. By this means the points *i* are raised into the position shown in Fig. 4, holding the tuft between them and the part *j*. The angle-piece *e* of the box is provided with a lining-piece, e^5, which is adjusted nearer to or further from the back of the angle-piece by means of a set-screw, e^6, to adapt this device to receive a greater or less number of bristles, according to the required size of the tufts. At the bottom of the part b^5 of the slide is a small rack, *l*, whose object is to take off the pressure of the spring 1 from the pins c^1, when the latter are being withdrawn from the bristles. Without this rack, or some equivalent device, the said pins, when their points were bearing only against the bottom layers of bristles, would advance a little and throw the bristles out of their proper positions; but with this contrivance the point of the tooth *m* enters the teeth of the rack, and holds the slide so that the pins are kept from advancing while they are being withdrawn. Another rack, *n*, on the sliding plate *d**, in combination with a tooth on the bed of the feed mechanism, has the same effect with regard to the central pin or tooth *d***. The bars *o* rest on the bristles or other fibers, as shown in Fig. 4, during the action of the feed mechanism, and they are raised by turning them up on the point o^1, as shown in Fig. 5, to allow the bristles to be placed on the bed. The part o^2 to which these bars are jointed is screwed to the bracket or frame, and its edge o^3, against which the divider slides, serves to prevent the displacement of any bristles at this point as the divider rises.

What I claim, and desire to secure by Letters Patent, is—

1. The feeding device, consisting of the teeth c^1 projecting above the table *a*, and having an upward and advancing and downward and retreating movement, substantially as set forth.

2. The adjustable piece e^5 in the receptacle described, arranged to govern the quantity of bristles for each tuft, in the manner specified.

3. The combination of the slide *b* and plate *e*, provided with teeth extending up through the bed, and having an up-and-down movement to enter and leave the mass of bristles, combined with a reciprocating movement to carry the bristles forward to the separating mechanism, substantially as described.

4. The tooth *d***, having a reciprocating movement, combined with the angle-piece *e*, together forming a receptacle for the bristles delivered thereto by the feeding device.

5. In combination with the subject-matter of the first clause of claim, I claim the tooth *d***, having a reciprocating movement, and combined with the angle-piece *e*, together forming a receptacle for the bristles delivered thereto by the feeding device.

6. In the box or receptacle to receive the bristles formed by the angle-piece *e* and the tooth *d***, I claim the arrangement of the said tooth *d*** upon a reciprocating slide, substantially as described.

7. The racks *l n*, in combination with the vertical piece c^2, and tooth *m*, and sliding plate *d** bearing the central tooth *d***, all arranged and operating substantially as specified.

8. In combination with a feeding device, substantially such as described, I claim the holding-bars *o*, as and for the purpose specified.

9. The combination of the point f^1 and points f^2 f^2, arranged upon the same slide and

operating simultaneously to be forced down into the mass of bristles, and then the points f^2 f^2 to separate, substantially as specified.

10. In combination with the subject-matter of the ninth clause of claim, I claim the fingers *i* and *j*, constructed and operating, substantially as described, to take the separated tuft and transfer it to the inserting device or fingers B.

11. The arm *k* jointed to the feed-bed, and arranged in the manner described so as to depress the points of delivering-fingers at the backward motion of the same, substantially as set forth.

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Witnesses:

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