No. 734,625. PATENTED JULY 28, 1903.

C. W. SMITH.

MACHINE FOR PLACING MATERIAL IN BRUSH BACKS.

APPLICATION FILED FEB. 14, 1902.

NO MODEL. 6 SHEETS—SHEET 1.

Fig. 1.

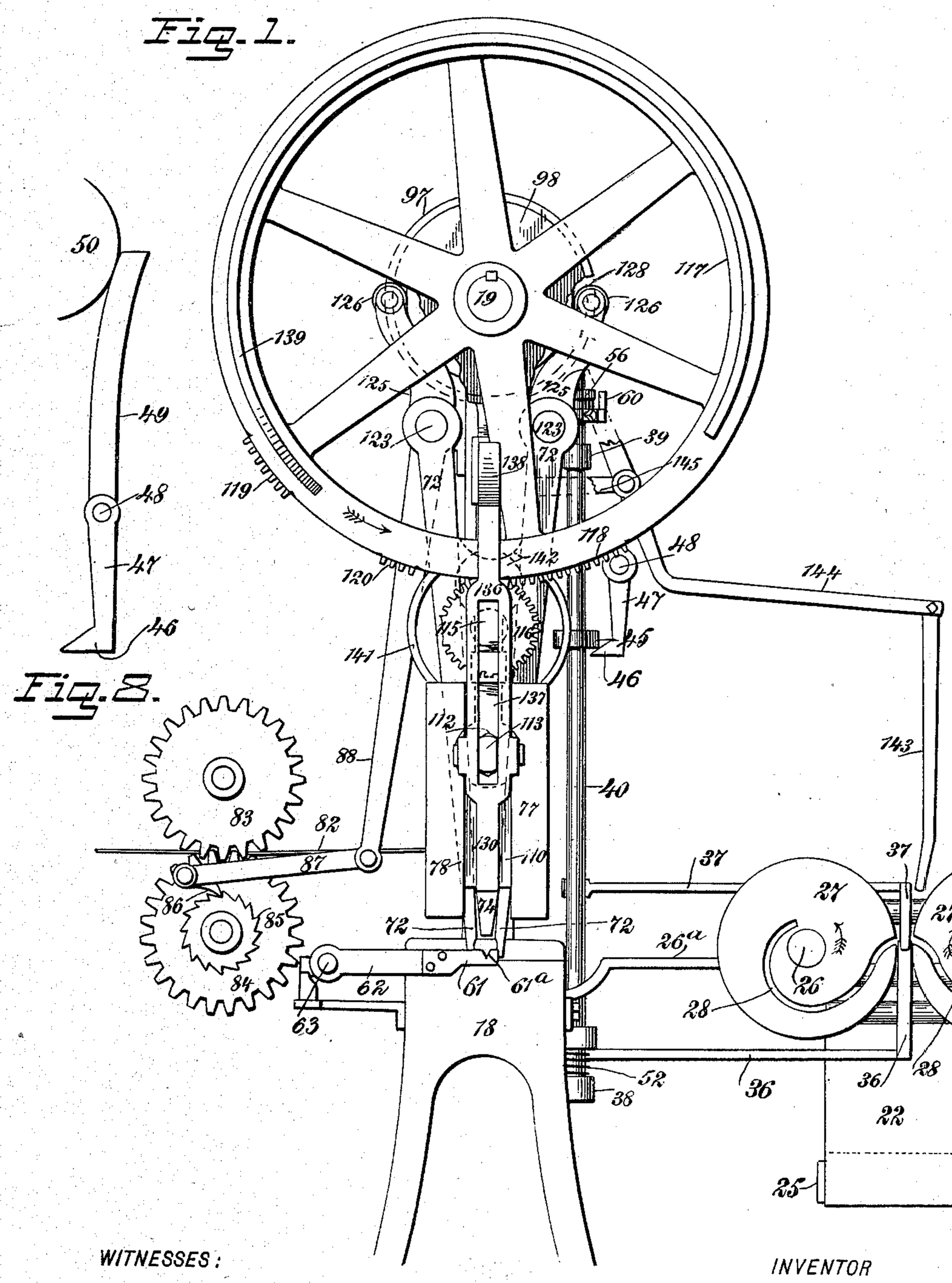

Fig. 8.

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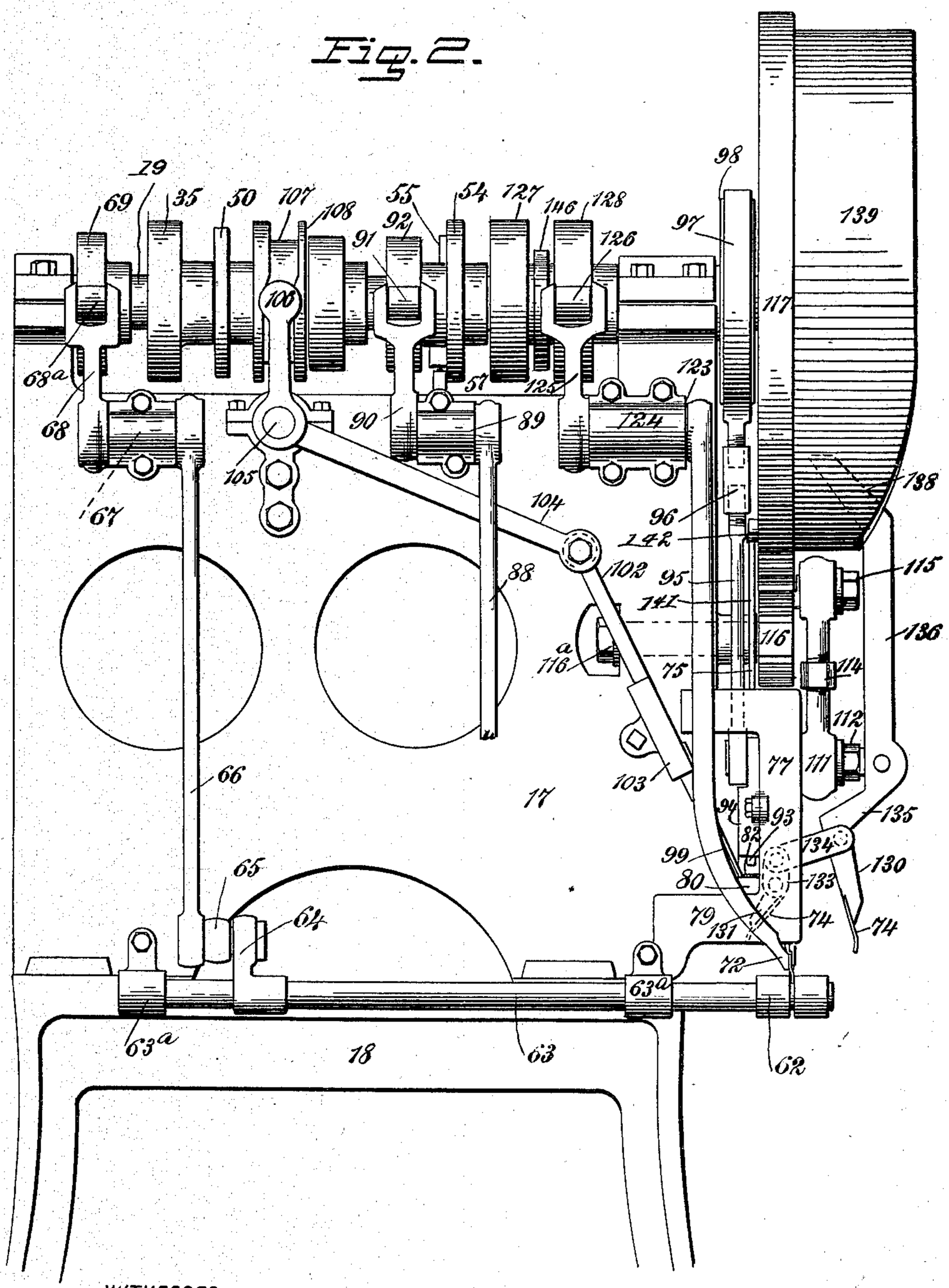
NO MODEL. 6 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 6 SHEETS—SHEET 3.

Fig. 3.

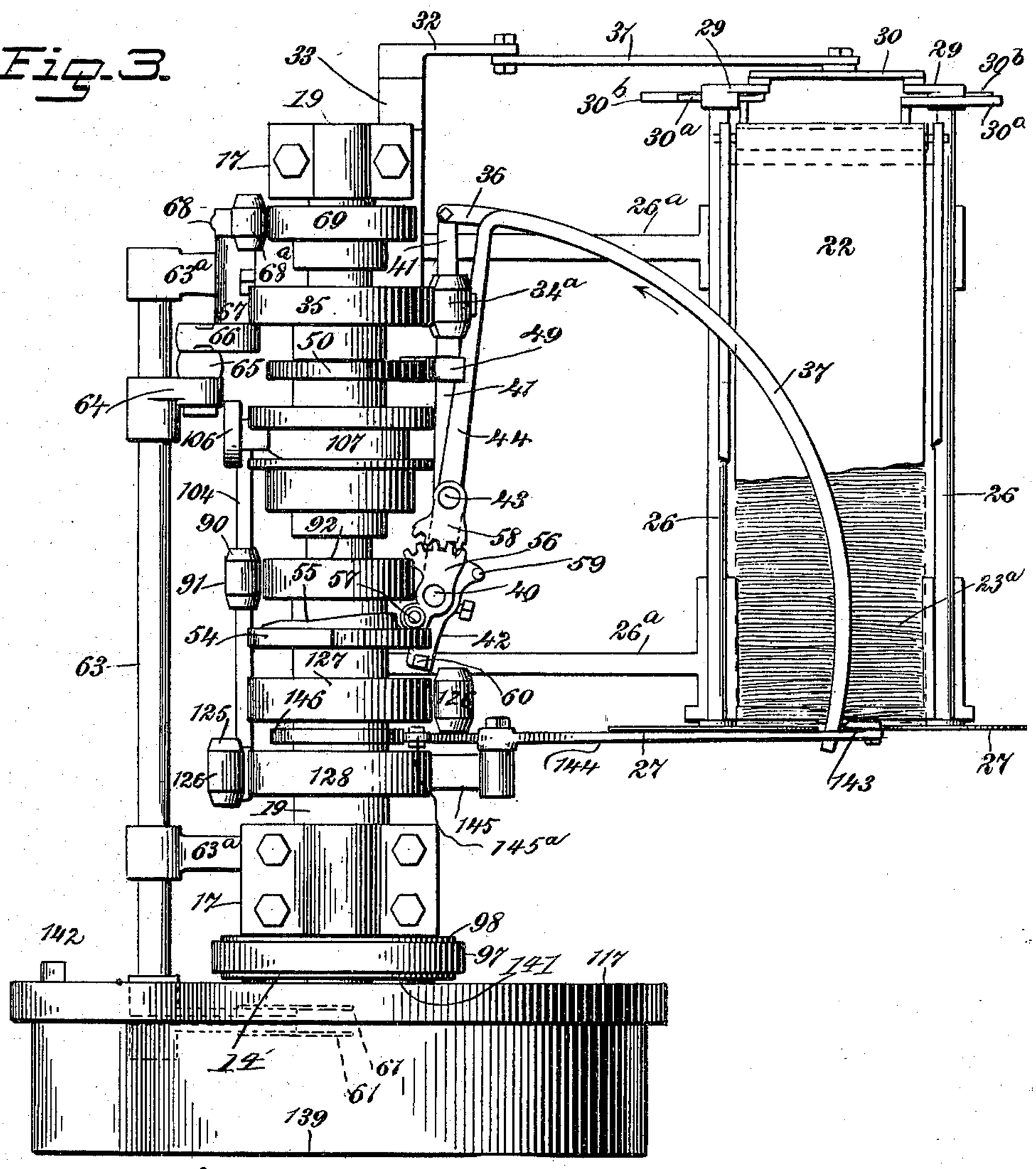
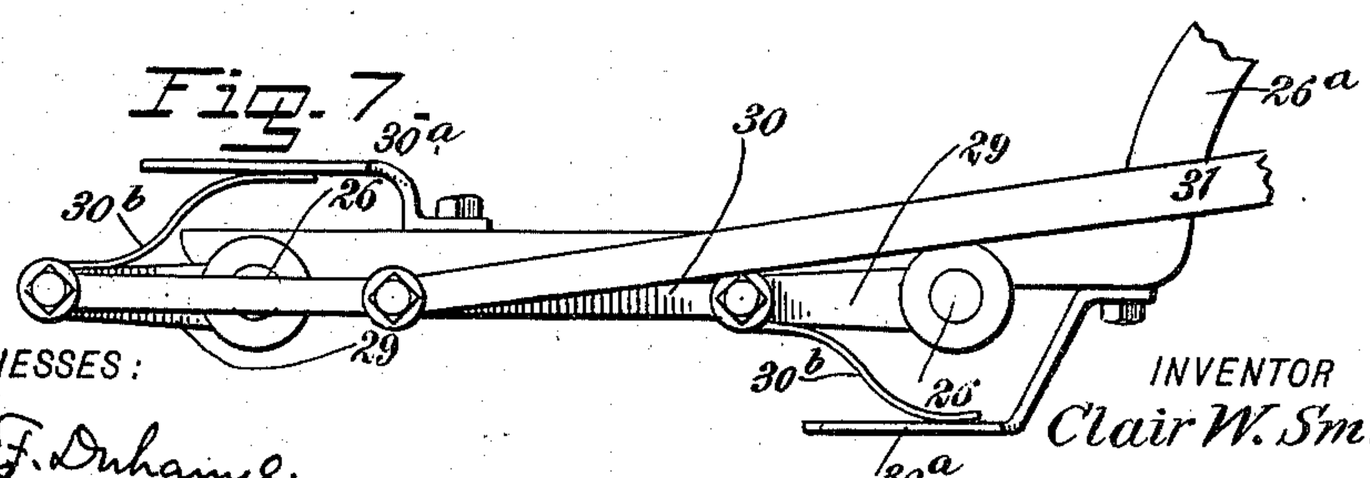


Fig. 7.



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NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.

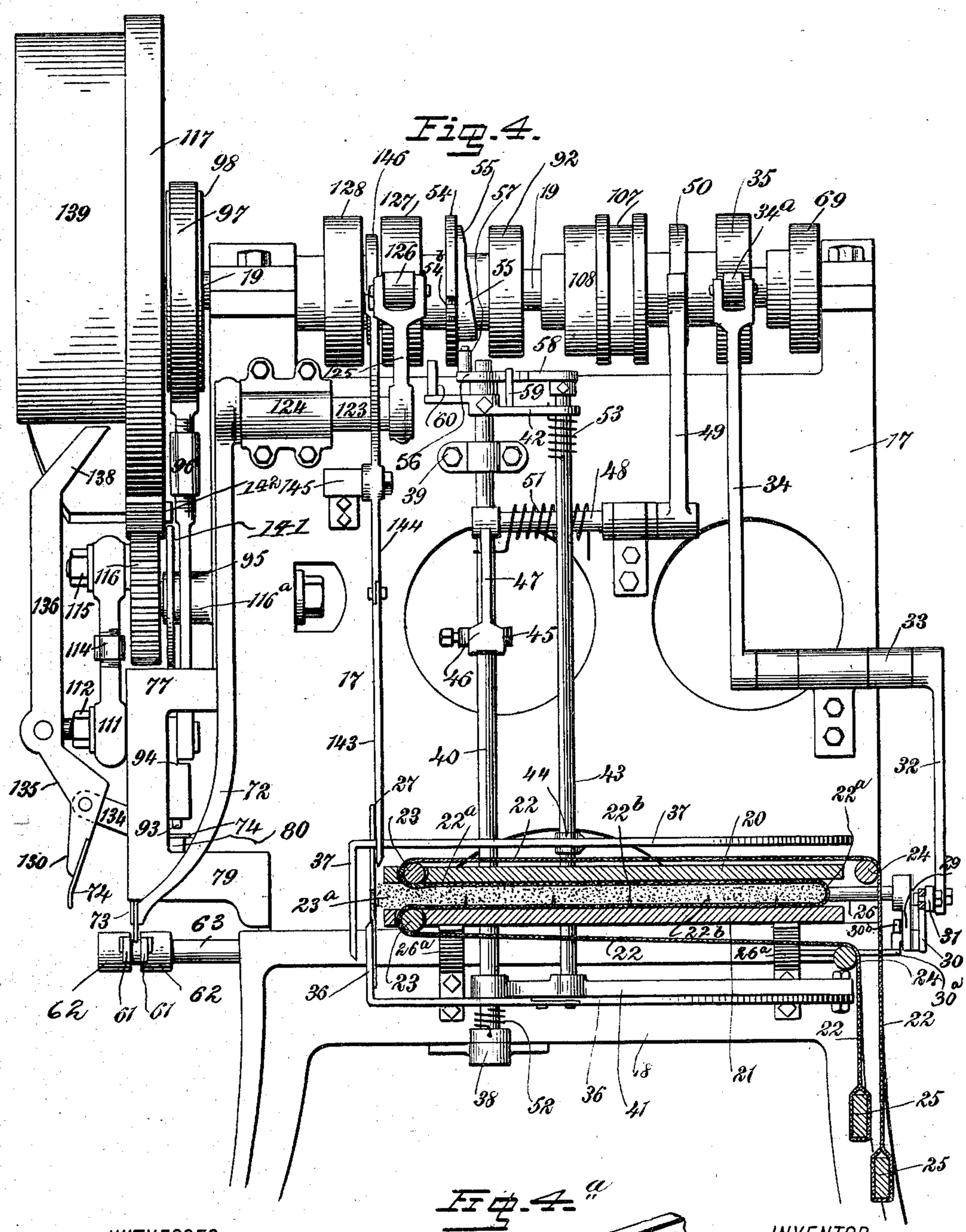
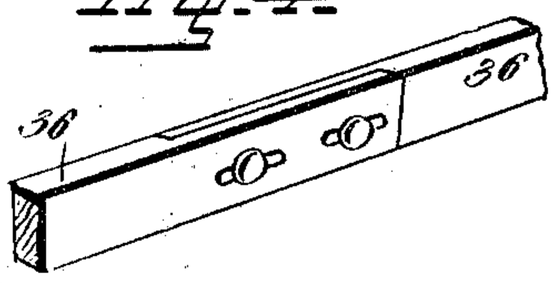


Fig. 4a.



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NO MODEL. 6 SHEETS—SHEET 5.

Fig. 5.

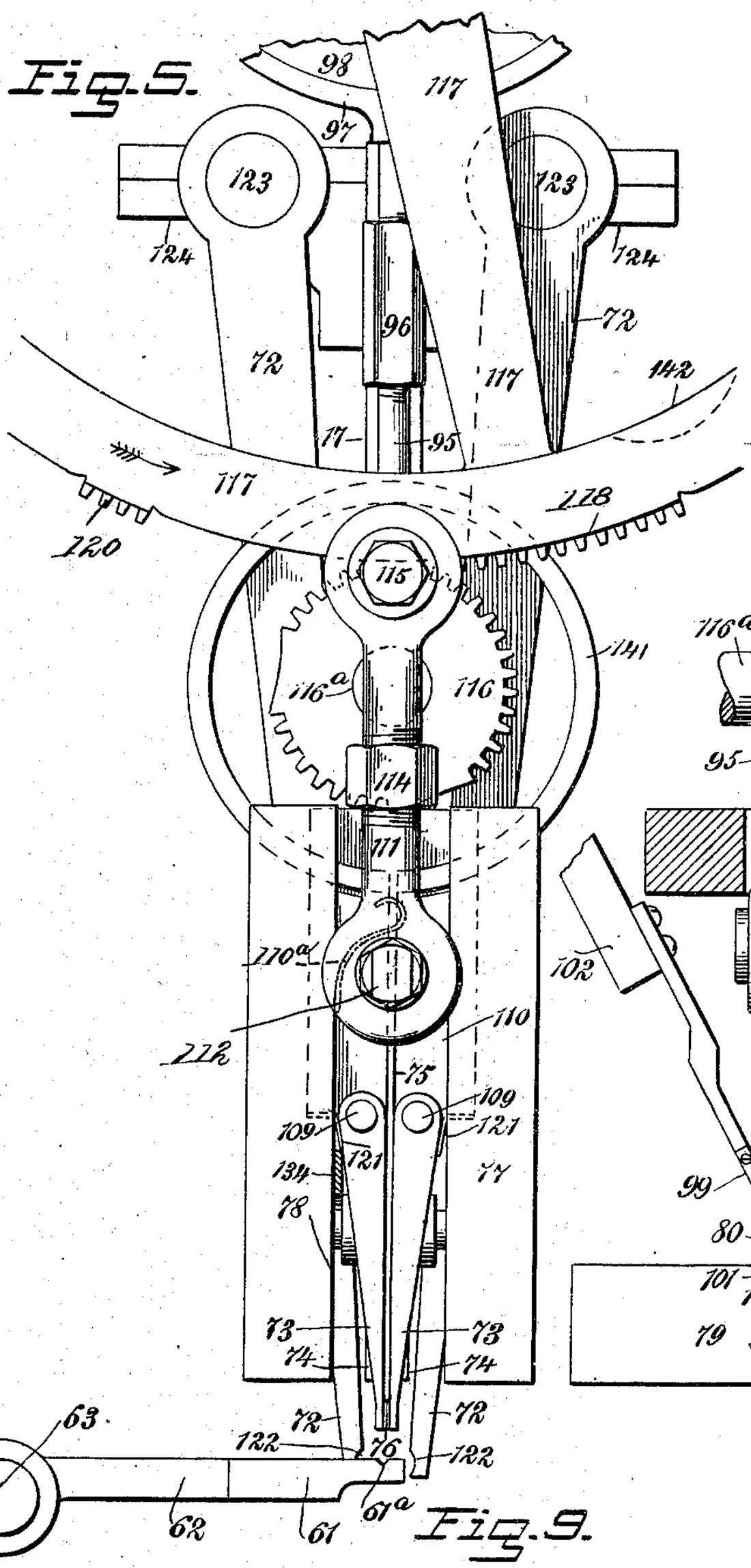

Fig. 6.

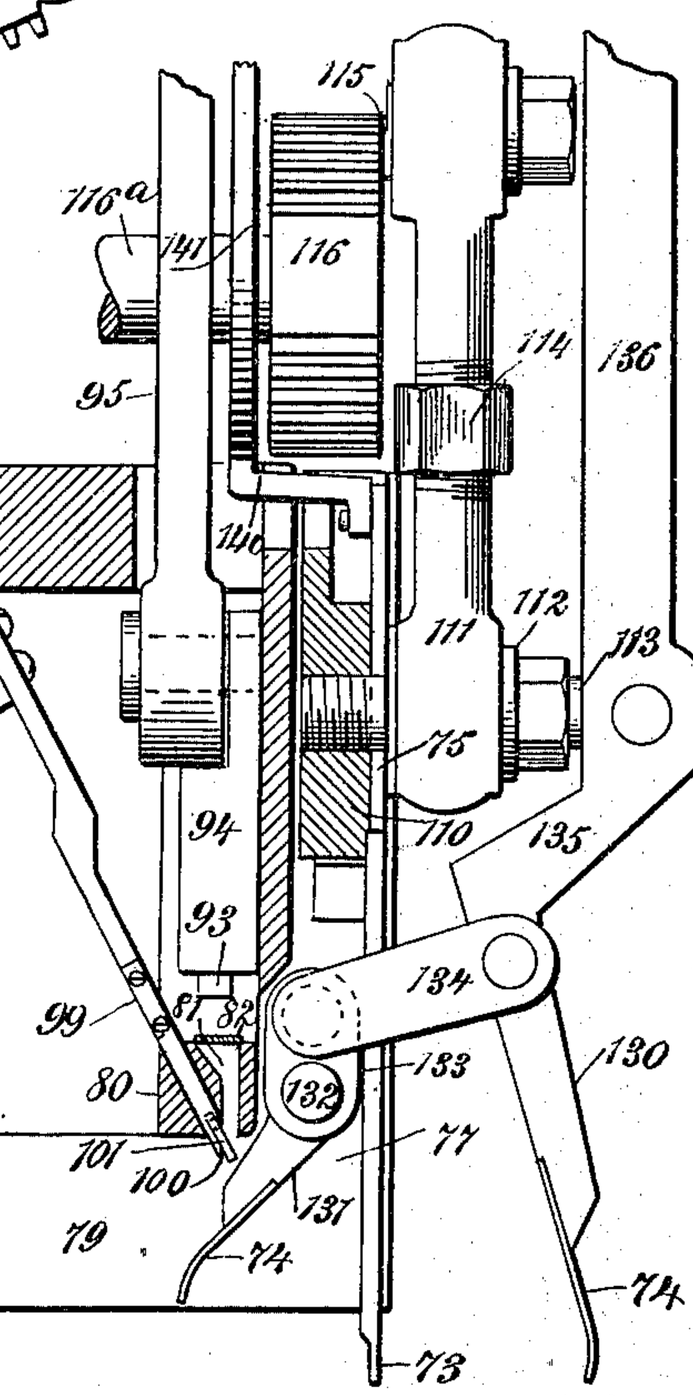

Fig. 9.

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NO MODEL. 6 SHEETS—SHEET 6.

Fig. 10.

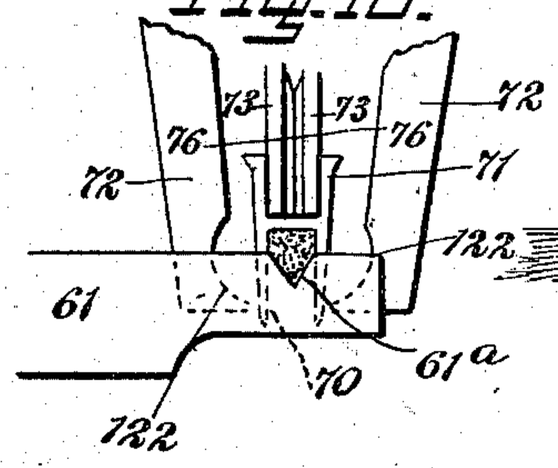


Fig. 11.

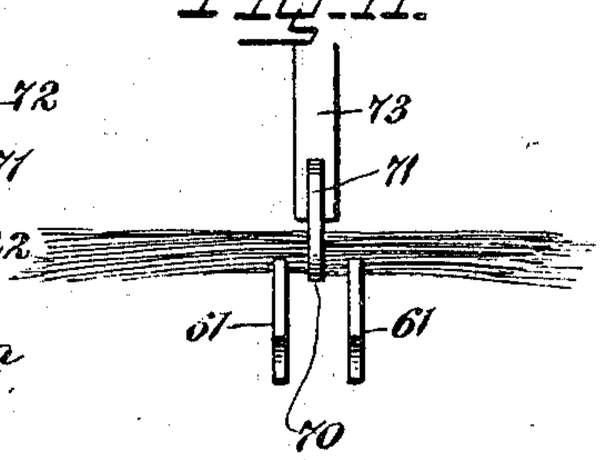


Fig. 12.

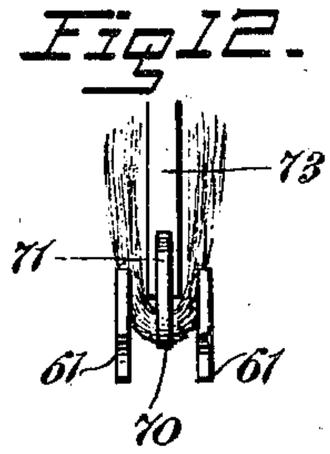


Fig. 13.

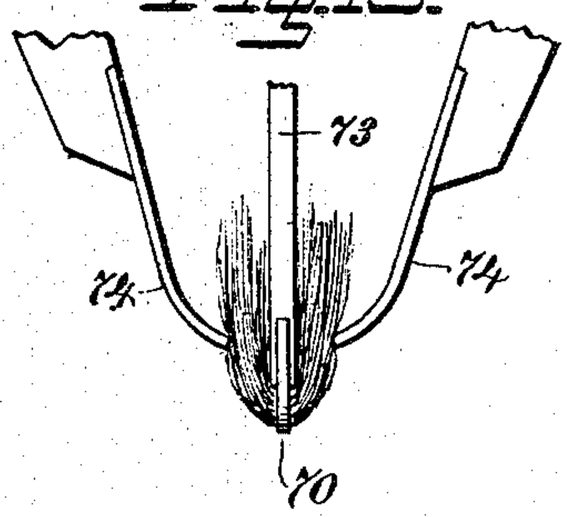


Fig. 14.

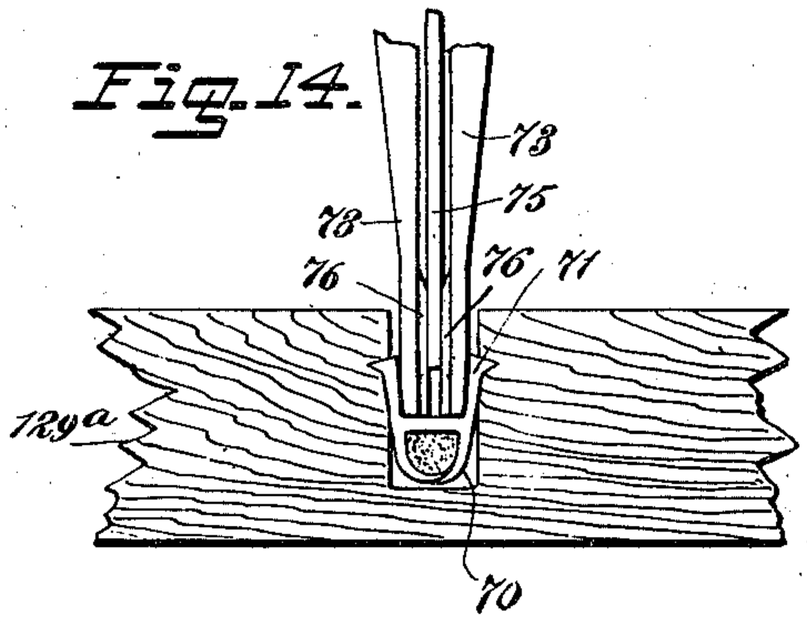


Fig. 15.

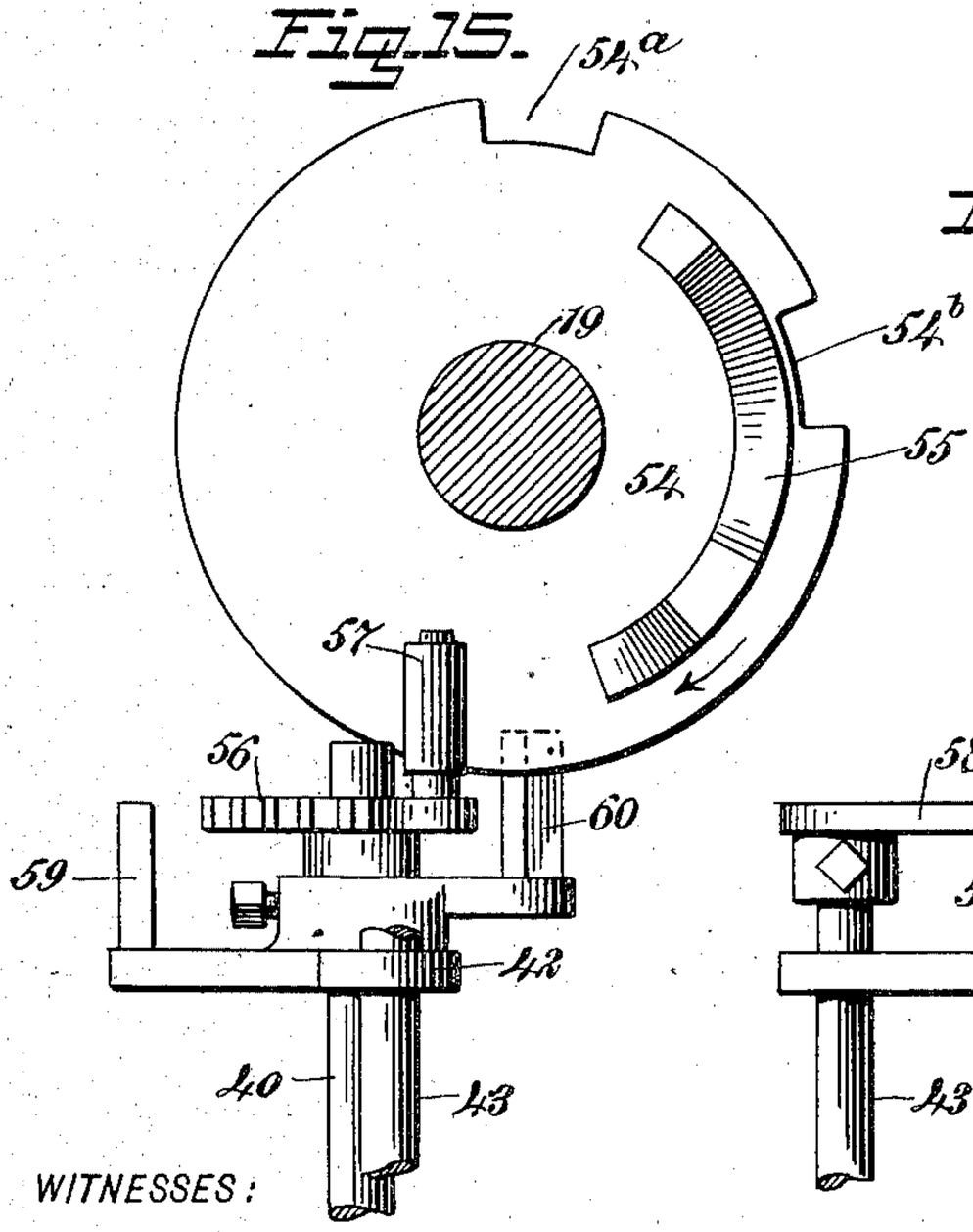
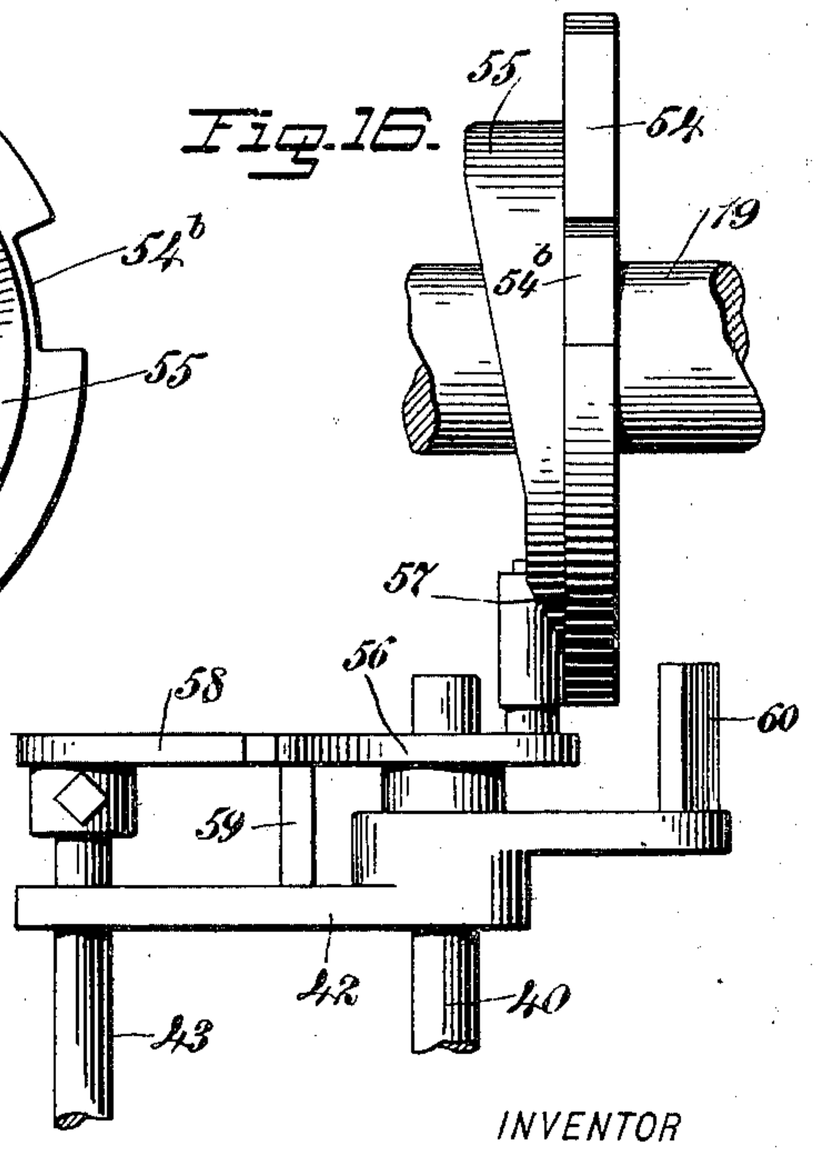


Fig. 16.



WITNESSES:

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No. 734,625. Patented July 28, 1903.

UNITED STATES PATENT OFFICE.

CLAIR WHITNEY SMITH, OF NEW YORK, N. Y.

MACHINE FOR PLACING MATERIAL IN BRUSH-BACKS.

SPECIFICATION forming part of Letters Patent No. 734,625, dated July 28, 1903.

Application filed February 14, 1902. Serial No. 94,058. (No model.)

To all whom it may concern:

Be it known that I, CLAIR WHITNEY SMITH, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Machine for Placing Material in Brush-Backs, of which the following is a full, clear, and exact description.

This invention relates to a machine having devices for grasping a certain number of bristles or a certain amount of brush material and separating it from the stock in bulk in sufficiently-sized tufts to fill the hole in the block to a proper extent. These devices then carry the brush material to a point on the machine where a clip is applied, and the brush material is then bent to form a double thickness. Finally the clip is held so that the brush-back may be taken in the operator's hands and forced on the brush material, holding devices then acting to fasten parts of the clip into the brush-back, whereby the brush material is securely held in place. The entire operation is automatic excepting in so far as concerning the movement of the brush-back to fasten the bristles or other material therein, this being done manually, as above explained.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a front end elevation of the machine. Fig. 2 is an elevation of the left-hand side thereof. Fig. 3 is a plan view of the machine. Fig. 4 is an elevation of the right-hand side of the machine with the material-holding box in section. Fig. 4ª is a detail perspective view of a portion of the finger for separating the material, showing the manner for which its sections are adjustably connected. Fig. 5 is an enlarged fragmentary front elevation of the same parts with certain elements in section. Fig. 6 is a fragmentary side elevation of the same parts with certain elements in section. Fig. 7 is a detail view of the link-gear for turning the stop-disks. Fig. 8 is a detail view showing the devices for raising the fingers adapted to operate upon the material. Figs. 9 to 14, inclusive, are views illustrating the manner of clasping and bending the material and fastening it in the brush-back and a detail view of the fastening device; and Figs. 15 and 16 are detail views of the gearing for operating the fingers.

The machine has a frame 17, mounted on a suitable base 18. A main shaft 19 is revolubly carried at the top portion of the frame, driven with a continuous rotary movement from any desired source of power, and upon this shaft are carried the cams, eccentrics, and intermittent gearing for operating all the parts of the machine. At the right-hand side of the machine (see Fig. 4) is arranged the means for carrying the loose material or bristles, which are laid in parallelism with each other transversely to the shaft 19. The material is held in a box or holder comprising a top wall 20 and a bottom wall 21, arranged horizontally. A flexible apron 22 has a bight 22^a formed therein, which is passed into this box, in which bight the material 23^a is arranged. At the lower portion of the bight 22^a a series of pins 22^b is located. (Also shown in Fig. 4.) These pins 22^b are located about one-half of an inch apart, and their chief purpose is to retain the material in its proper position—namely, to keep the material parallel with disks to be hereinafter described—located at the front end of the box. By the use of these pins a great advantage is gained, because bristles have a natural taper—that is to say, the butt-ends are larger in diameter than the flag ends. Therefore such taper has a tendency to cause the material to slide lengthwise and get out of proper position and also to bunch up when a large amount is gathered together; but as the pins 22^b lie close together they place a large amount of assembled material on the basis of a small bunch, as in reality the pins take all of the pressure of the weights to be hereinafter referred to, which act to pull the material forward. Thus all along the apron 22 the pins 22^b hold the material in proper position, as the free ends of the pins extend toward the opposing stretch of the apron, and without the use of these pins it would be necessary to handle smaller

amounts of material at a time, thereby increasing the cost of handling, and the delivery of the material is effected with the material in the same order as that in which it is placed in the box or holder. At the front part of the box for the brush material the two parts of the apron 22 pass over rollers 23 and extend, respectively, over the top and under the bottom of the box beyond the rear end thereof. These parts of the apron finally pass over rollers 24, and the apron is held taut with a steady pressure thereon by weights 25, attached to the ends of the apron; but any suitable tension devices may be substituted for the weights. It will be understood that by this arrangement the material is fed forward longitudinally of the machine, but transversely to the material itself, a steady pressure being exerted on the material by the weights 25, as described, and the pins in the apron serve to keep the material in proper order and not too tight together.

As is shown in Fig. 3, rotary shafts 26 are arranged in suitable bearings at the stock-box for material, and, as is illustrated in Figs. 1 and 3, each shaft 26 carries a stop-disk 27 at its forward end. These stop-disks are disposed vertically and lie directly in front of the material-box, with a space between their peripheries, as is particularly shown in Fig. 1. The stop-disks 27 prevent the material from moving out of the box under the pressure of the weights 25 and the apron 22; but these stop-disks are formed with helical grooves 28 therein, which extend from points adjacent to their axes to the peripheries of the disks, and as a small bundle of material is grasped by the stock-fingers 36 and 37, to be hereinafter described, and pushed forward the disks 27 upon rotating in the direction of the arrows in Fig. 1 will cause this bunch of material to be passed through the slots or grooves 28, and when a little more than one-half of the revolution of the disks has been performed this bunch of material has been passed completely through the slots and will lie in front of the disks.

The box for the brush material, as is shown in Figs. 3 and 4, is supported on brackets 26^a, that extend from the main frame 17. The shafts 26 are driven by devices located at their rear ends, as is shown in Figs. 3 and 7, such devices comprising cranks 29, fastened to the shafts, and a link 30, connected to the ends of the cranks. These cranks are in one position so disposed as to rotate the disks in opposite directions in one complete revolution. In order to insure the cranks turning in proper direction, especially when the machine is started, guide-plates 30^a are secured to the rear portions of the frame in which the shafts 26 are mounted, the outer plate being on top of the frame over the outer shaft 26, while the inner guide-plate is at the bottom portion of the frame below the inner shaft 26, as is shown in Fig. 7, and each crank-arm 29 carries a spring 30^b, which when the crank-arms are horizontal engage with the guide-plates, compelling the cranks to turn in the one and proper direction, and when such revolution of the cranks is brought about the springs 30^b in no manner interfere with the movements of the cranks.

Attached to the link 30 is a connecting-rod 31, which extends laterally to a comparatively long crank-arm 32 on a rock-shaft 33, suitably mounted in a box on the frame 17. This rock-shaft has an upwardly-projected arm 34, to which a swinging movement is imparted by a cam 35 on the shaft 19. When the movement of the rock-shaft 33 takes place, the connecting-rod 31 will move to the right, and at such time the cranks 29 must start to turn in opposite directions by the movement given to them by the connecting-rod 31, and in order to make certain that the cranks 29 will turn each in the correct direction the springs 30^b are employed. It will be readily seen that when the connecting-rod moves to the right the crank-arms 29 must move either one way or the other; but the springs 30^b force them to start in a correct direction—that is, the crank at the right turns upward, turning to the right hand, and the crank at the left-hand side turns downward, but moves to the right-hand side also. Where the arm bears against the cam, a friction-roller 34^a is preferably provided, as is illustrated in Fig. 4. Now it is clear that the rotation of the shaft 19 will rock the shaft 33 and swing its arm 32. The throw of this arm is sufficient to rotate the cranks 29 and their shafts 26, which in turn will impart all the necessary movement to the disks 27.

The fingers for depositing the bristles or brush material comprise a separating-finger 36 and a pinching-finger 37, the former being preferably in adjustable sections, as is shown in Fig. 4, and located beneath the box, while the pinching-finger 37 is located above the box. The stock-fingers comprising the separating and pinching fingers 36 and 37 have their front ends bent toward each other, as is also shown in Fig. 4. These bent front ends of the fingers lie directly between the disks 27, as shown in Fig. 1. Under the pressure of the weights 25 the brush material will be held firmly against the rear faces of the disks.

I desire it to be understood that by "material" and "brush material" I refer to brushing material—such as bristles, tampico, horse and camel hair, sea-root, bassini, jamava, cocoa, and other fibers—and that the term "box" is employed to designate the receptacle in which the brushing material is placed for distribution.

According to the principles of my invention the first movement toward the grasping of the clump or tuft of material is in the upward movement of the fingers 36 and 37. The bent end of the finger 36 will pass behind such material as is desired to be separated from the material in bulk, the exact amount being governed by the position of the adjust-

able section of the finger 36, said section being set back from the disks for a larger amount of material to separate it from the body or major portion of the material. The lower part of the finger 36, that which is under the box or holder, is made in two sections, (shown in Fig. 4,) which permit of a slight adjustment of its forward part. The main portion of the finger 36 always springs back to a predetermined distance at each operation; but so as to arrange for different sizes of tufts being taken out of the box the front portion of the finger 36 must be adjustable. When a small-sized tuft is needed, the forward portion of the finger 36 is set nearer to the disks 27 in order that when the finger comes up through the material there will be but a small amount of material on the front side of the bent end of said finger; but if, on the other hand, a larger-sized tuft is required the forward adjustable portion of the finger 36 is set farther back, because the material is always close against the rear surfaces of the disks 27. Thus under such circumstances if the forwardly-bent end of the finger 36 comes up through the material farther back from the disks 27 more material is selected thereby. The next movement is the independent rearward movement of the pinching-finger 37, resulting in pressing the bent end of this finger back upon the material which has been separated, so as to pinch it firmly between the two fingers. The material being thus selected and pinched between the two fingers, it is necessary to complete its separation from the body of the material and then carry the selected material forward to the point where the other operations are performed. Certain mechanism, to be hereinafter described, starts the fingers 36 and 37, which move forward, and simultaneously the disks 27 turn, so that the material works out through the slots 28 in the disks and passes to the front side thereof as the disks 27 revolve. The stock-fingers 36 and 37 continue their movement until finally the material reaches the front of the machine, where the bending and pinching operations are performed. When the material reaches this point, it is necessary to cause a slight independent movement of the pinching-finger 37, so that it releases the material from the dividing or separating finger, and then the fingers must be bodily returned to their position of rest, which is shown in Figs. 3 and 4.

I will now describe the mechanism for imparting the above-outlined movements to the fingers.

Mounted to turn and to slide slightly in boxes 38 and 39, suitably carried by the framing of the machine, is a vertically-extending shaft 40. Fastened rigidly to this shaft is an arm 41, located near the lower end thereof, as is shown in Fig. 4. This arm carries rigidly the dividing-finger 36, as is shown in the same figure. A bracket 42 is fastened to the upper end of the shaft 40, and in this bracket and the arm 41 is loosely carried a shaft 43. Fastened to the shaft 43 is an arm 44, on which is carried rigidly the pinching-finger 37. The fingers 36 and 37 are arc-shaped, as shown in Fig. 3, and their movement is in the arc, said arc being concentric to the center of the shaft 40. A collar 45 is secured upon the shaft 40 by a set-screw or its equivalent and on the under side of which bears the inclined fork 46 of an arm 47. Said arm 47 is fastened to a horizontal rock-shaft 48, suitably mounted on the framing of the machine, and having an upwardly-projecting arm 49 in engagement with the cam 50 on the shaft 19.

51 indicates a torsional spring which is carried on the shaft 48 to throw the shaft and the attached parts against the action of the cam 50. Upon the rotation of the cam 50 a rocking movement is imparted to the shaft 48. This swings the arm 47, and as the inclined fork 46 (see Figs. 1 and 8) rides in upward contact with the under face of the collar 45 it bodily raises the shaft 40, which shaft carries with it the parts 41, 42, 43, 36, and 37. Fig. 4 shows these parts in their lower position, and it will be seen that upon moving them upward from this position the fingers will be raised, and this effects the first movement of the fingers, as above described, such movement resulting in the selection of the bunch of the material from the main body thereof.

52 indicates a torsional spring on the shaft 40, said spring tending to throw the shaft and all of its attached parts back to their normal position.

53 indicates a torsional spring on the shaft 43, this spring tending to give the shaft and the parts attached—namely, the finger 37—a forward movement independent of any movement imparted to it through the medium of the shaft 40 to assist in releasing the bristles.

Fastened to the shaft 19 is a disk cam 54, as is shown in Figs. 4, 15, and 16, and which controls the movement of the shaft 40. This disk is formed in its periphery with two notches 54^a and 54^b. It is also furnished with a crown-cam 55, lying on its rear face.

On the upper end of the shaft 40 is loosely carried a toothed sector 56, provided with a pin 57, on which rides the cam 55. This toothed sector meshes with a like sector 58, fastened to the upper end of the shaft 43. Rotation of the disk 54 will ride the cam 55 against the pin 57 and impart a swinging movement to the sector 56, without, however, influencing the shaft 40. Movement of the sector 56 will impart a turning movement to the shaft 43 through the medium of the sector 58. This movement will be in such direction as will draw back the pinching-finger 37. Therefore the first step of these operations following the action of the inclined fork 46 will be a slight movement of the shaft 43 to draw back the finger 37. This effects the pinching of the stock between the two fingers, as above explained. This movement con-

tinues until the sector 56 strikes on a stop-pin 59, which is fastened to the bracket 42 and stands vertically thereon. Independent movement of the sector 56 with respect to the shaft 40 will now cease, since the bracket 42 is keyed on the shaft. Therefore the shaft 40 will turn around its axis, carrying with it the shaft 43 and bodily moving the two stock-fingers forward. This movement effects the forward movement of the stock through the stop-disks 27 to the front of the machine, where the other operations are performed. The disks 27 immediately revolve as soon as the material passes forward, and the revolution of the disks brings the slots therein in line with the fingers 36 and 37. The bracket 42 carries a stud 60, which stud when carried up by the working of the machine stands vertically thereon in the plane of the lower periphery of the disk 54. When the parts are to be raised, as shown in Fig. 3, this stud will lie at the front side of the disk; but as the bracket swings the stud will move steadily toward the disk, and the location of the notch 54^b in the disk 54 is so arranged that as the stud 60 approaches the plane of the disk the notch will come opposite the stud, thus allowing the stud to pass on to the rear side of the disk. This takes place immediately upon the arrival of the material at its forwardmost position. The cam 55 now runs off of the pin 57 and the stud 60 bears against the rear face of the disk 54, thus holding the shaft 40 and its attached parts in the forward position, the spring 52 tending mainly to return these parts. When this operation takes place, the two sectors 56 and 58 will be released from the pressure of the cam 55, and the shaft 43 will be under no positive operative force. Therefore the spring 53 is allowed to assert itself, and this spring imparts a slight turning movement to the shaft in such direction as will carry the pinching-finger 37 slightly forward independently of the finger 36. This drops the material from the fingers and leaves it to be treated further by the mechanism for bending and clenching it. While this operation is being performed the disk 54 continues its rotation, bringing the notch 54^a opposite the stud 60. Then the spring 52 is allowed to act, and under this action the stud 60 is thrown back through the notch 54^a to the front side of the disk 54, and of course this movement is but incident to the backward rotation of the shaft 40, which throws the bending-fingers and their appurtenant parts back to their normal or inactive position. This finishes the cycle of the operation of the means for selecting and advancing the material. The material when delivered from the fingers 36 and 37 lies longitudinally of the machine and falls upon two bending-fingers 61, held transversely of the machine parallel with each other. These fingers are carried by arms 62, mounted upon the feathered portion of a rock-shaft 63, as is shown in Fig. 1, whereby the arms 62, carrying the bending-fingers 61, are capable of sliding movement on the shaft 63, so that the bending-fingers may release their tension on the stock after such tension is no longer required, avoiding any possibility of dragging the stock as the fingers 61 continue their upward movement, but are moved by the rotation of the said shaft, and the said shaft is suitably mounted in bearings 63^a at the left-hand side of the machine, as is shown in Figs. 2 and 3, movement being imparted to this shaft through the medium of a crank 64, secured on the shaft 63, a connecting-rod 65, carried by the crank, and a swinging arm 66, connected with the crank by said rod 65, a rock-shaft 67, journaled in a suitable bearing at the upper portion of the frame 17, as is shown best in Fig. 2, which rock-shaft is connected with the said swinging arm and a crank-arm 68, secured to the rock-shaft 67, having a roller 68^a and a cam 69, with which the roller engages, the said cam being fast on the main shaft 19 of the machine. The bending-fingers 61 are provided with angular or V-shaped pockets 61^a to receive the stock and to hold it while the clip is applied and clenched. The clip is illustrated in detail in Fig. 9 and comprises clenching members 70 and spurs 71, the clip when unbent being essentially in the form of a letter H. This clip is dropped upon the material, as is shown in Fig. 10, after the material has been deposited on the bending-fingers 61, and after the material has been gathered together by the elbow of the flat end of a mechanism for carrying the clip to its position, as will be described, and the clip being brought over the material presses the stock, forcing it down in the V grooves or pockets 61^a of the bending-fingers. An adjusting device is provided in connection with this mechanism to accommodate it to different-sized tufts of bristles, as is shown in Fig. 6 and to be hereinafter particularly described. The clip having been deposited, the clenching members of the clip are clenched around the material by the movement together of the fastener-arms 72, which press the pinching members inwardly one beyond the other, as is shown in Fig. 10. The material is now gripped by the clip at its middle, for example, its end portions being free. The cam 69 and the connected parts are timed to throw upward the bending-fingers 61 as soon as the clip has been clenched on the material. After the clip is clenched the parts assume the position shown in Fig. 11, and then, upon the upward movement of the bending-fingers 61, the material is bent, as shown in Fig. 12, the bending-fingers acting against pressure-fingers 73, which are during all these operations engaged between the spurs 71 of the clip. According to the above description the material will now be clenched firmly at the point of the clip in its middle and bent double or irregularly as to the amount of the material on each side of the center, as may be called for by the character of the work. When this has been ac-

complished, holders 74, as shown in Fig. 13, move together, gripping the material just above the clip and holding it bent. Whether the material is bent irregularly—that is, bent so that more length of the material is at the front side of the fingers 73 than at the rear side—depends on the position in which the material is deposited on the fingers 61—that is, if more length of material is wanted to be doubled on the front side of the fingers the material is deposited so that more material extends forward of the center of the fingers 61 than extends rearwardly of said fingers. The bending-fingers are constructed to move a slight bit sidewise after the material has been gripped by the holders, so that when the slide 75 goes down the bending-fingers will not drag the material, which construction is shown in Figs. 1 and 2. The holders 74 also serve to keep the clip engaged with the pressure-fingers 73. The pincers-arms 72 now release their grip on the lower members of the clip, having served to hold the clip firm during the operation of bending and gripping the stock. The slide or flange 75 now goes down, carrying with it the pressure-fingers 73, which are fastened to the same by studs 109, so held as to allow the fingers 73 to turn out at their lower ends when acted upon by a wedge projection 76, located between them. The said slide also carries downward with it the bristle-holders 74, which just before the slide goes up again release their hold on the material by a cam-ring 139, to be hereinafter described. The brush-back held in the hands of the operator, who stands in front of the machine, should be pushed up so as to enter the clip with the clenched portion of the material into a hole in the brush-back, as is shown in Fig. 14. The pressure-fingers 73 are spread apart when the slide or plunger 75 is forced downward between the wedge projections 76 of each of said fingers 73. This action forces outward the spurs 71 of the clip and causes them to pierce the brush-back, as is also shown in Fig. 14. Then the operator upon drawing down the brush-back carries with it the bristles, which have been firmly fixed in the back. The views above referred to—namely, numbers 9 to 14—will show these successive operations, and I will now describe the manner in which the parts 61, 72, 73, 74, 75, and 76 are mounted and the means for giving them their various movements.

At the forward portion of the frame a head-block 77 is secured, provided with a front recess or groove 78, extending from top to bottom, and a lower rear extension 79. (Shown in Figs. 2, 4, and 6.) On the extension 79 a table 80 is constructed having an opening 81 extending from top to bottom, and through this opening the H-shaped clips drop when cut or stamped out from a strip or tape 82 of metal, passing over the top of the opening 81, as is shown in Fig. 6. This tape or strip of metal is guided from a suitable roll properly supported between drums carrying meshing gears 83 and 84, as is shown in Fig. 1. One of these gears is provided with an attached ratchet-wheel 85, operated upon by a dog 86, carried by the arm 87, pivotally connected with a second arm 88, shown as extending up at the left-hand side of the main frame to a connection with a short horizontal shaft 89, mounted to rock in bearings on the frame 17, as is illustrated in Fig. 2, and the shaft 89 is provided with a crank-arm 90, having a roller 91 traveling on a cam 92 on the main shaft 19.

The clips are formed from the metal strip 82 through the medium of a punch or die 93, the carrier 94 whereof is mounted to slide at the rear of the head-block 77, as is shown in Fig. 6, being pivotally connected with a pitman 95, which, as is illustrated in Fig. 2, is adjustably attached by a nut 96 to a strap 97, mounted upon an eccentric 98 on the main shaft 19. After the clips are made they are received one at a time by a delivery-finger 99, having sliding movement in the table 80, as is shown in Fig. 6, and the lower end 100 of the delivery-finger is beveled and provided with opposing springs 101, strong enough to receive and temporarily retain a clip dropped from the opening 81 of the table. The clip when received by the delivery-finger occupies an upright position owing to the beveled surface 100. The functions of this finger 99 are to convey a clip to a point over the material laid upon the bending-fingers 61 and also at the same time when it comes in contact with the material to cause the stock to be forced down into the V grooves or pockets of the finger 61, thereby gathering the tufts compactly together, so that when the main slide 110 descends the fingers 73, which are attached thereon, force the clip hard upon the material with its clenching members 70 on opposite sides of the material. The finger 99 is in parts connected by set-screws, as is shown in Fig. 6, for the purpose of adjusting said fingers to different-sized tufts, as has been stated, as shown in Fig. 10. Timed movement is given the delivery-finger to and from the bending-fingers by an attached arm 102, mounted to slide in a guide 103 on the frame 17, as is shown in Fig. 2, the arm 102 being pivotally connected with a pitman 104, attached to a short shaft 105, mounted on the frame 17 and carrying the crank-arm 106, a roller of which travels in a cam-race 107 in the periphery of a disk 108, mounted upon the main shaft 19. As soon as a clip has been placed in position its connecting member is engaged by the bottom portion of the pressure-fingers 73, which enter the space between the spurs of the clip, and the clip is thereby forced downward, packing the material in the pockets 61^a. The pressure-fingers 73, as shown in Fig. 5, are preferably of tapering form, being widest at the top and straight at their bottom portions, which parts are adapted to enter between the spurs 71 of the clip, and at the inner face of the straight lower parts of the fingers 73 the wedge projections heretofore referred to are

formed, whereby the fingers are forced outward by the slide 75, which operates between them. Above the wedge projections 76 the inner longitudinal edges of the pressure-fingers are in parallelism and spaced a slight distance apart. The pressure-fingers are independently pivoted at their upper ends to the front face of a block 110, held to slide in the head-block 77 of the frame, the pivotal connection being effected by pins 109. A pitman 111 is pivotally secured to the sliding block 110 by a bolt 112, the head of which bolt is provided with opposing flat faces to serve as guides for the operating mechanism of the holders 74. Said pitman is preferably made in two parts adjustably connected by a nut 114. The upper portion of the pitman 111 is shown connected by a wrist-pin 115 with a mutilated gear 116, mounted to turn upon a short axle 116ª, secured in the frame 17, as shown in Fig. 2. The mutilated gear 116 is acted upon by a driving-wheel 117 of suitable size secured upon the drive-shaft 19. This wheel is provided with three groups of peripheral teeth 118, 119, and 120 at desired distances apart. The teeth in the outer group 118 are greater in number than the teeth in the other groups, while the intermediate group 120 contains the least number of teeth, as is shown in Fig. 1. The wheel turns in the direction of the arrows, as shown in Fig. 1, and when the teeth of the larger group 118 mesh with the teeth of the pinion 116 the pressure-fingers are carried up out of engagement with a clip, such motion occurring when the clenched tuft of bristles has been secured in the brush-back. When the intermediate group of teeth 120 acts upon the pinion 116, the pressure-fingers are carried downward a sufficient distance to enter the spurs 71 of the clip, and the said fingers 73 are carried farther downward to present the stock with the clip clenched ready for the operator to pull the brush-back up on the stock, when the group of teeth 119 mesh with the teeth of the pinion 116. Thus the teeth on the driving-wheel 117 are within a space representing about one-fourth of the circumference of the wheel. Therefore the pressure-fingers remain in their lower active position for about three-fourths of a revolution of the driving-wheel. Springs 121 are provided at the upper portions of the pressure-fingers 73, as shown in Fig. 5, which springs act to force the lower ends of the fingers in direction of each other.

With regard to the pincer-arms 72, which act to clench the members 70 of the clip about the tuft of material to be placed in the brush-back, said arms operate one at each side of the frame 17, curving downward to such a point below the head-block as to enable their lower ends, which are in the form of inwardly-facing hooks 122, to have movement to and from each other in the space between the bending-fingers 61. The upper portions of the arms 72, as is shown in Figs. 2 and 4, are connected with short shafts 123, journaled in bearings 124 at the upper portion of the frame 17, and each shaft 123 carries a crank-arm 125, provided with a roller 126. The roller of the crank-arm 125 at the right-hand side of the frame 17 engages with a cam 127 on the drive-shaft 19, while the roller of the crank-arm 125 at the left-hand side of the frame engages with another cam 128, also upon the drive-shaft 19. The action of the cams 127 and 128 is such that the hook-sections of the pincer-arms are brought into forcible contact with the members 70 from opposite sides of the clip, and such contact is continued, the hook portions of the arms moving toward each other and slightly upward until the members 70 of the clip have been positively clenched at the bottom portion of the tuft of material on the bending-fingers. After their clenching action the pincer-arms are moved outward or are separated and are so held until another clip has been placed in position upon another tuft of material.

With reference to the construction and operation of the holders 74, these, as has been heretofore stated, engage with the side portions of the tuft of bristles bent up by the upward movement of the bending-fingers and continue to hold the bristles folded until a clip has been entered into a brush-back 129ª, at which time they are released from their binding contact with the bristles, as is shown in Figs. 13 and 14. The holders proper consist of two plates, preferably of spring material and curved at their lower ends in direction of each other. These plates face one another, as is especially shown in Fig. 6, and one operates within the head-block 77 of the frame and the other outside and in front of the head-block. The outer holder-plate is secured to the lower end of an arm 130, having its lower parts straight, but provided with an outwardly and upwardly inclined intermediate section 135 and an upper straight section 136, in which a slot 137 is made, receiving the straight section 113 of the bolt 112, belonging to the mechanism of the pressure-fingers 73, and the said arm 130 is pivoted on the said bolt, thus permitting the adjustment of this arm. The head of this bolt therefore serves as a pivot and carrier for the arm 130. A guide-finger 138 is formed at the upper end of the arm 130, inclining in direction of the drive-wheel 117, being adapted for riding contact with a ring-cam 139, formed upon the front face of the drive-wheel 117 near its periphery and extending over a point back of the group of teeth 119 to a point near the largest group of teeth 118, as is shown in Fig. 1. The inner holder-plate, or that within the head-block 77, is secured to the short arm 131, attached to a shaft 132, mounted to rock in the head-block 77, as shown in Fig. 6. This shaft is provided with a crank-arm 133 and a link 134, pivotally connecting the crank-arm 133 with the other

arm 130 at a point below its intermediate section 135. When the group of teeth 120 on the drive-wheel acts to carry the pressure-fingers downward their first step, the mechanism controlling the opening and closing movement of the holders is not brought into action until just before the set of teeth 119 is to act on the pinion 116, although the holders are carried downward with the pressure-arms. Just before the time the group of teeth 119 commences to act to carry the pressure-fingers to their lowest position the guide-arm 138 of the holders 74 will commence to ride upon the ring-cam 139, and as the upper portion 136 of the arm 130 is carried outward by the action of the cam the holders will commence to approach each other, and before the first tooth of the group 119 has reached the pinion 116 the guide-arm 138 will be upon the full rise of the cam 139 and the holders will be in clamping position with the bristles, which position they will maintain until the arm 130 of the holders is released from the influence of the cam 139, which happens just before the group of teeth 118 on the drive-wheel engages the pinion 116 to raise the pressure-finger, and at such time the holders 74 in their open position are taken upward with the pressure-fingers.

The slide 75, heretofore referred to, consists of a bar (shown in Figs. 5, 6, and 14) which has sliding movement between the inner edges of the pressure-fingers and which in its extreme lower position is forced between the wedge projections 76 at the lower portion of the pressure-fingers to spread the latter and force the spurs of the upper section 71 of a clip into the brush-back and fasten a tuft of bristles therein. Under the construction shown in Fig. 6 the bar or slide 75, which will be hereinafter referred to as a "spreader-bar," is connected at its upper end to a horizontal extension 140 from a ring-frame 141, through which the shaft 116[a] passes, and the spreader-bar is forced downward by a cam projection 142 on the drive-wheel, which cam is brought into contact with the upper portion of the ring-frame 141. The sliding block 110 of the mechanism for the control of the pressure-fingers is slotted at the top to receive the horizontal extension 140 from the ring-frame 141, and when the block 110 is carried upward to remove the pressure-fingers from a clip the spreader-bar is likewise carried upward and is released from engagement with the wedge projections 76 by a spring 110[a] or like device, as shown in Fig. 5.

When the fingers 36 and 37 have moved from the box to carry a tuft of bristles to the bending-fingers at the front of the machine, it is possible that the revolving of the disks 27 will disengage the material that is adjacent to the rear of the disks. Therefore I provide a bar to exert a pressure on the material that is adjacent to said disks 27, so as to keep the stock remaining in the box in its proper position while the disks are operated and as is shown particularly in Figs. 1 and 4. This bar 143 has vertical movement back of the disks and is provided with a rocker-arm 144 of angular construction. The bar 143 is attached to the outer end of the straight portion of the rocker-arm, and at the upwardly-extending portion of the arm it is fulcrumed upon a support 145, secured to the frame. The upper end of the rocker-arm is provided with a roller 145[a], which engages the cam 146 on the main shaft 19, acting to raise and lower the bar 143 at proper time. It is evident that when the block is applied to the clenched bristles by hand-pressure the danger of splitting the block is avoided, and such presentation enables an operator to draw a brush in which the holes in the back or block are at any angle, whether it be a round-end brush or a flat or oval brush. In fact, all kinds of blocks or backs may be treated alike in the same machine. The upper members of a clip admit of the material being held securely, while the lower members of the clip grip the stock so tenaciously as to prevent shedding of material. The machine is automatic in its action throughout, excepting the hand manipulation of the back or block.

The machine is simple of its kind and is economic in bristles, not wasting any.

When a machine is constructed as described and shown, skilled labor is not necessary and the intermittent gearing employed renders the machine comparatively noiseless and better adapted to the work in hand. The application of gentle hand-pressure to pull the back up on the material insures the back being accommodated to any change of angle at which the holes may be bored, as it is obvious that if the pressure-fingers when travel-up and down do not move directly in line with the angle of the holes in the back the pressure-fingers will crowd against one side of the holes and cause the block or back to split as they force themselves down into the holes; but if the pressure-fingers are standing still at their lowest point of travel and the operator having the block in his hand pulls it up on the material the brush-back will accommodate itself to the angle of the hole under such manipulation of the back, and under such manipulation the pressure-fingers bearing the material and clip readily enter the hole of the back, avoiding any hard or extra tension on any portion of the wall of the hole, and all parts of the said wall readily take their share of the strain. There is still another valuable point in connection with the hand-pressure principle, and that is if some of the holes in a brush back or block do not happen to be bored quite as deep as others the hand-pressure will likewise accommodate the brush-back to any irregularities in that way, since it is apparent that as the pressure-fingers go down just so far at each stroke if some of the holes in the brush-back are not as deep as they should be under a mechanical manipulation of the back the pressure-fingers

will press into the brush-back and split the same. It is also evident that under the hand-pressure principle of the invention there is no necessity of bothering with any especial holding appliances for the brush-back while the material is being inserted therein, which is a time-and-money-saving feature.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In machines for placing material in brush-backs, a box, a flexible apron horizontally supported in said box and provided with a horizontal bight of equal depth throughout its length and in which material is received, stationary and roller supports for the apron, inward projections from the lower member of the bight in the apron, and tension devices at the ends of the apron, whereby the material is fed forward longitudinally of the apron but transversely of itself and the material is held in proper position in the bight for delivery, as described.

2. In machines for placing material in brush-backs, a material-box, a flexible apron having roller-supports in said box and a bight between its ends to receive material, tension devices at the ends of the apron, slotted stop-disks at the delivery end of the bight in the apron, and mechanism substantially as described for turning the disks in opposite directions, for the purpose specified.

3. In machines for placing stock in brush-backs, a box, a flexible apron having roller-supports, a bight to receive material between its ends and tension devices at its ends, and stop-disks mounted to revolve in opposite directions at the outlet of the bight, each disk being provided with a helical slot extending from a point near its center through its periphery, the outer terminals of the slots being opposite each other in the normal position of the disks, as described.

4. In a machine for placing stock in brush-backs, the combination, with a box, a flexible apron having roller-supports, a bight to receive material between its ends, and tension devices at its ends, and stop-disks having helical slots therein and mounted to revolve in opposite directions at the outlet of said bight, of fingers comprising a dividing and a pinching finger operating at a point between the disks, and means for raising and lowering the dividing and the pinching fingers, and moving them bodily to or from the stop-disks, as described.

5. In a machine for placing stock in brush-backs, the combination with a box, a flexible apron having roller-supports, a bight to receive the material between its ends and tension devices at its ends, and stop-disks having outlet-slots and mounted to revolve in opposite directions at the outlet of the said bight, of dividing and pinching fingers having overlapping members vertically disposed at the space between the stop-disks, and a mechanism for imparting concerted up-and-down movement to the fingers, an independent movement to one of the fingers, and a bodily-swinging movement to both fingers, substantially as described.

6. In a machine for placing stock in brush-backs, the combination, with a box, a flexible apron having roller-supports, a bight to receive material between its ends and tension devices at its ends, of stop-disks located at the delivery end of the said bight and mounted to turn in opposite directions, dividing and pinching fingers operating one above and the other below the box and provided with overlapping members which extend vertically between the stop-disks, means for imparting an up-and-down motion to the fingers, a lateral movement one in direction of the other, and a subsequent bodily-swinging movement to and from the stop-disks, as described.

7. In a machine for placing stock in brush-backs, the combination with a box, a flexible apron having roller-supports, a bight to receive material between its ends and tension devices at its ends, of stop-disks located at the delivery end of the said bight and mounted to turn in opposite directions, dividing and pinching fingers operating one above and the other below the box and provided with overlapping members which extend vertically between the stop-disks, means for imparting an up-and-down motion to the fingers, a lateral movement one in direction of the other, and a subsequent bodily-swinging movement to and from the stop-disks, and a pressure-bar having movement to and from the stock adjacent to the stop-disks as the dividing and pinching fingers move bodily therefrom to preserve the material in its straight and uniform condition, as described.

8. In a machine for placing material in brush-backs, a clip for the material, formed substantially as the letter H, as and for the purpose set forth.

9. In a machine for placing material in brush-backs, a clip for the material, formed substantially as the letter H, the upper members of the clip being provided with spur projections to enter a brush-back, the lower members of the clip being adapted to be clenched around a tuft of material, as and for the purpose set forth.

10. In a machine for placing material in brush-backs, bending-fingers having pockets to receive material, and a mechanism substantially as described for rocking the fingers in a vertical direction, for the purpose specified.

11. In a machine for placing material in brush-backs, the combination, with a box, a feed for the material in said box, and dividing and pinching fingers arranged to separate the material in tufts and convey the tufts from said box, of bending-fingers provided with pockets adapted to receive the tufts of material from the dividing and pinching fingers, and means for rocking the bending-fingers to and from a horizontal position, as described.

12. In a machine for placing material in brush-backs, a table having an opening therein, a tape, a feed device arranged to advance the tape over the opening in the table, a stamp having movement to and from the opening in said table, and means, substantially as described, for operating the stamp from the drive-shaft of the machine.

13. In a machine for placing material in brush-backs, the combination with the frame of the machine and its drive-shaft, a table having an opening therein, a tape, a feed device for the tape, adapted to direct the tape over the opening in the table, a carrier operating under the opening in the table and adapted to receive a stamp, and means for operating the carrier from the drive-shaft, of bending-fingers supported from the frame and having pockets to receive tufts of material, a delivery-finger operated from the drive-shaft, having movement to and from the pocket-sections of the bending-fingers and beneath the opening in the table, and clasps at the lower end of the delivery-finger, adapted to receive and temporarily hold the article formed by the stamp and deposit the same through the downward movement of the delivery-finger over the pockets in the bending-fingers and upon the tuft of material carried thereby, as described.

14. In a machine for placing material in brush-backs, the combination of the frame and drive-shaft, a clip, means operated from the drive-shaft for forming the clip, and rocking bending-fingers also operated from the drive-shaft, having movement to and from the pocket-sections of the bending-fingers and provided with devices to support a clip, and pressing and pinching devices for the clip, operated from the drive-shaft, the pressure devices operating vertically over the bending-fingers and the pinching devices laterally between the bending-fingers in direction of each other, as specified.

15. In a machine for placing material in brush-backs, the combination with the frame and drive-shaft, an H-shaped clip having spurs at its upper portion, mechanism for forming the clip, operated from the drive-shaft, and bending-fingers mounted to rock in a vertical direction, being operated from the drive-shaft and provided with pockets to receive tufts of material, of a delivery-finger operated from the drive-shaft, having movement to and from the pocket-sections of the bending-fingers and having means to support a clip, pressure-fingers and pincer-arms for the clip, also operated from the drive-shaft, the pressure-fingers operating vertically over the bending-fingers, being adapted to enter the clip between its upper members, the pincer-arms operating between the bending-fingers in direction of each other, being adapted for clenching engagement with the lower members of the clip, and holding devices also operated from the drive-shaft and adapted for engagement with opposite sides of the material after the material is clenched by the clip and carried upward by the upward movement of the bending-fingers, substantially as described.

16. In a machine for placing material in brush-backs, the combination with the frame and drive-shaft, an H-shaped clip having spurs at its upper portion, mechanism for forming the clip, operated from the drive-shaft, and bending-fingers mounted to rock in a vertical direction, being operated from the drive-shaft and provided with pockets to receive tufts of material, of a delivery-finger operated from the drive-shaft, having movement to and from the pocket-sections of the bending-fingers and having means to support a clip, pressure-fingers and pincer-arms for the clip, also operated from the drive-shaft, the pressure-fingers operating vertically over the bending-fingers, being adapted to enter the clip between its upper members, the pincer-arms operating between the bending-fingers in direction of each other, being adapted for clenching engagement with the lower members of the clip, and holding devices also operated from the drive-shaft and adapted for engagement with opposite sides of the material after the material is clenched by the clip and doubled upward by the upward movement of the bending-fingers, and an expanding device also operated from the drive-shaft and operating between the pressure-fingers to force them outward and bend the upper members of the clip in outward or opposite directions, as specified.

17. In a machine for placing material in brush-backs, the combination with rocking bending-fingers adapted to receive tufts of material, H-shaped staples, and a delivery-finger for directing the lower members of the said staples between the bending-arms, of pincer-arms having timed movement to and from the lower member of the clip and operating between the bending-fingers to carry the lower members of the clip in direction of each other and in clenching engagement with the material carried by the bending-fingers, as described.

18. In a machine for placing material in brush-backs, the combination with rocking bending-fingers having pockets therein to receive tufts of material, and an H-shaped clip, the lower members whereof are adapted to straddle the tufts of material carried by the bending-fingers and extend downward between said fingers, of pressure-fingers having vertical movement to and from the clip, being adapted to enter the space between the upper members of the clip, pincer-arms located one at each side of the clip, having movement to and from the lower members of the clip between the bending-fingers, being adapted to clench the lower members of the clip around the material, and holders adapted for engagement with opposite sides of the tuft of material when clenched, and after the clip has been released from the pincer-arms

and the bending-fingers have moved to the upper position, as and for the purpose set forth.

19. In a machine for placing material in brush-backs, the combination, with rocking bending-fingers having pockets therein to receive tufts of material, and an H-shaped clip, the lower members whereof are adapted to straddle the tufts of material carried by the bending-fingers and extend downward between said fingers, of pressure-fingers having vertical movement to and from the clip, being adapted to enter the space between the upper members of the clip, pincer-arms located one at each side of the clip, having movement to and from the lower members of the clip between the bending-fingers, being adapted to clench the lower members of the clip around the material, and holders adapted for engagement with opposite sides of the tuft of material when clenched and after the clip has been released from the pincer-arms and the bending-fingers have moved to an upper position, wedges formed on the inner faces of the pressure-fingers at the ends which enter between the upper members of the clip, and an expanding device having movement between the pressure-fingers, being adapted to enter the space between the wedges on said fingers and thus force the upper members of the clip outward, said upper members of the clip being provided with outwardly-extending lugs, for the purpose described.

20. In a machine for placing material in brush-backs, the combination with an H-shaped staple having spurs formed at the upper end of its upper members, a pair of pressure-fingers mounted for vertical movement, the lower ends of which fingers are adapted to enter the space between the upper members of the clip, wedges formed on the inner faces of the pressure-fingers at their lower portions, and an expanding-rod having sliding movement between the pressure-fingers, being adapted to enter the space between the wedges on said fingers and force the upper members of the clip outward, for the purpose set forth.

21. In a machine for placing material in brush-backs, the combination with an H-shaped clip, the upper members whereof are provided with outwardly-extending spurs, of pressure-fingers having movement to and from the clip, the lower ends of which fingers are adapted to enter the space between the upper members of the clip, wedges formed upon the inner faces of the pressure-fingers at their lower ends, an expanding bar or rod having sliding movement between the pressure-fingers and adapted when in its lower position to force the lower portion of the pressure-fingers outward, and pincer-arms arranged at opposite sides of the lower members of the clip, said arms being adapted for movement to and from said lower members, and to bend the lower members upward over each other, as and for the purpose described.

22. In a machine for placing material in brush-backs, a movable support for the tufts of bristles, a clip for the bristles, having a spur and clenching members, a clenching device adapted to act upon the clenching members of the clip, holders for the bristles acting thereon at a point above the clenching members of the clip and having movement to and from the bristles, pressure-fingers arranged to engage with the spur members of the clip, and an expanding device operating upon the pressure-fingers to force them outward together with the spur members of the clip, for the purpose described.

23. In machines for placing material in brush-backs, a box, a flexible apron supported in said box, provided with a horizontal bight of uniform depth throughout its length, in which the material is received and held for delivery, means for operating said apron, and pins projecting from the lower member of the bight in the apron in direction of the upper member of the bight, adapted to keep the bristles from bunching too closely together and preserving the bristles in proper shape for delivery, as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLAIR WHITNEY SMITH.

Witnesses:
J. FRED. ACKER,
JNO. M. RITTER.