No. 780,825. PATENTED JAN. 24, 1905.

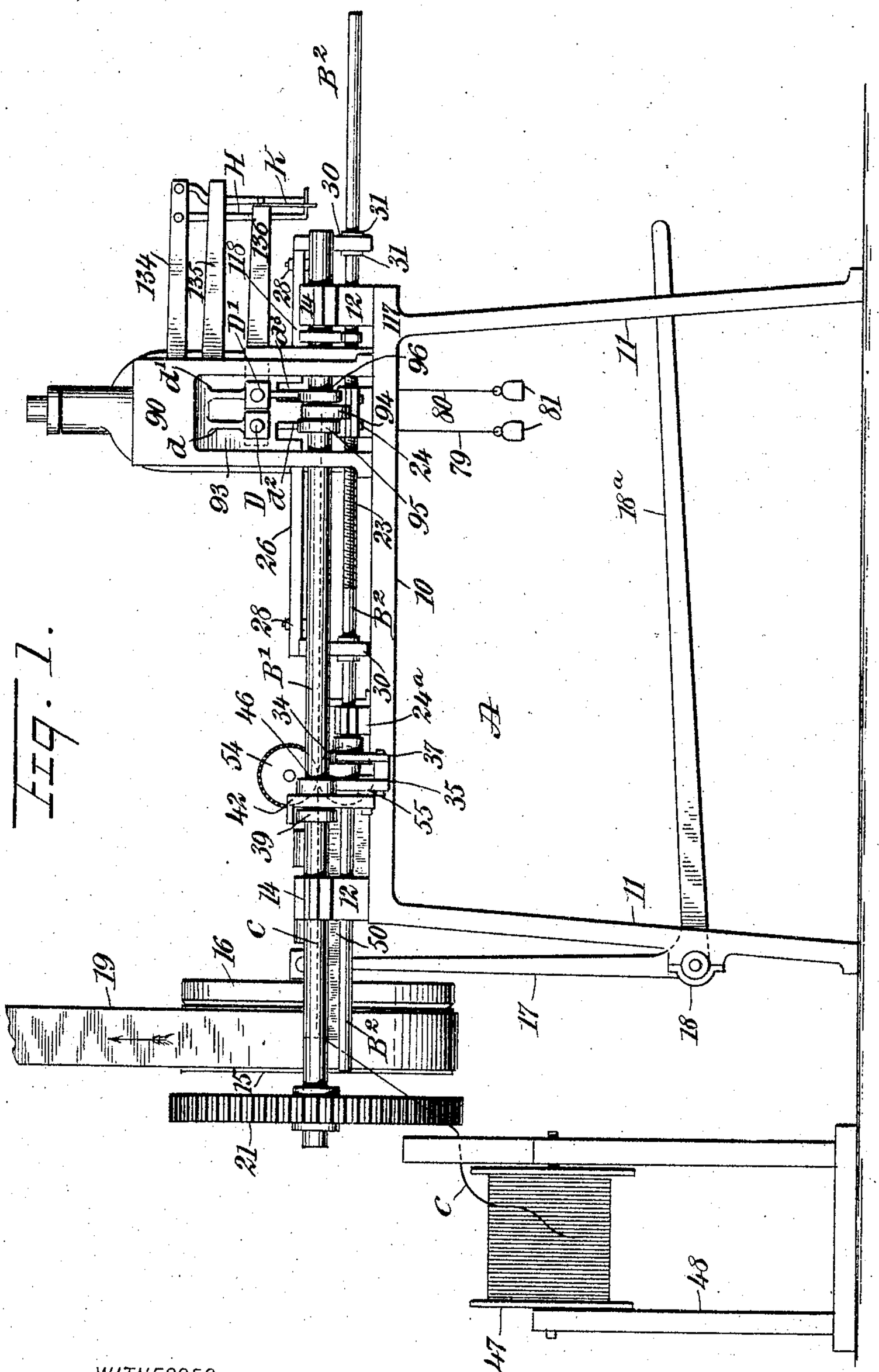
C. W. SMITH.

MACHINE FOR PLACING BRUSH MATERIAL IN BRUSH BACKS.

APPLICATION FILED JULY 25, 1903.

9 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

H. C. Walker

Fred. C. Ackers.

INVENTOR

Clair Whitney Smith

BY Munn & Co

ATTORNEYS.

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9 SHEETS—SHEET 2.

FIG. 2.

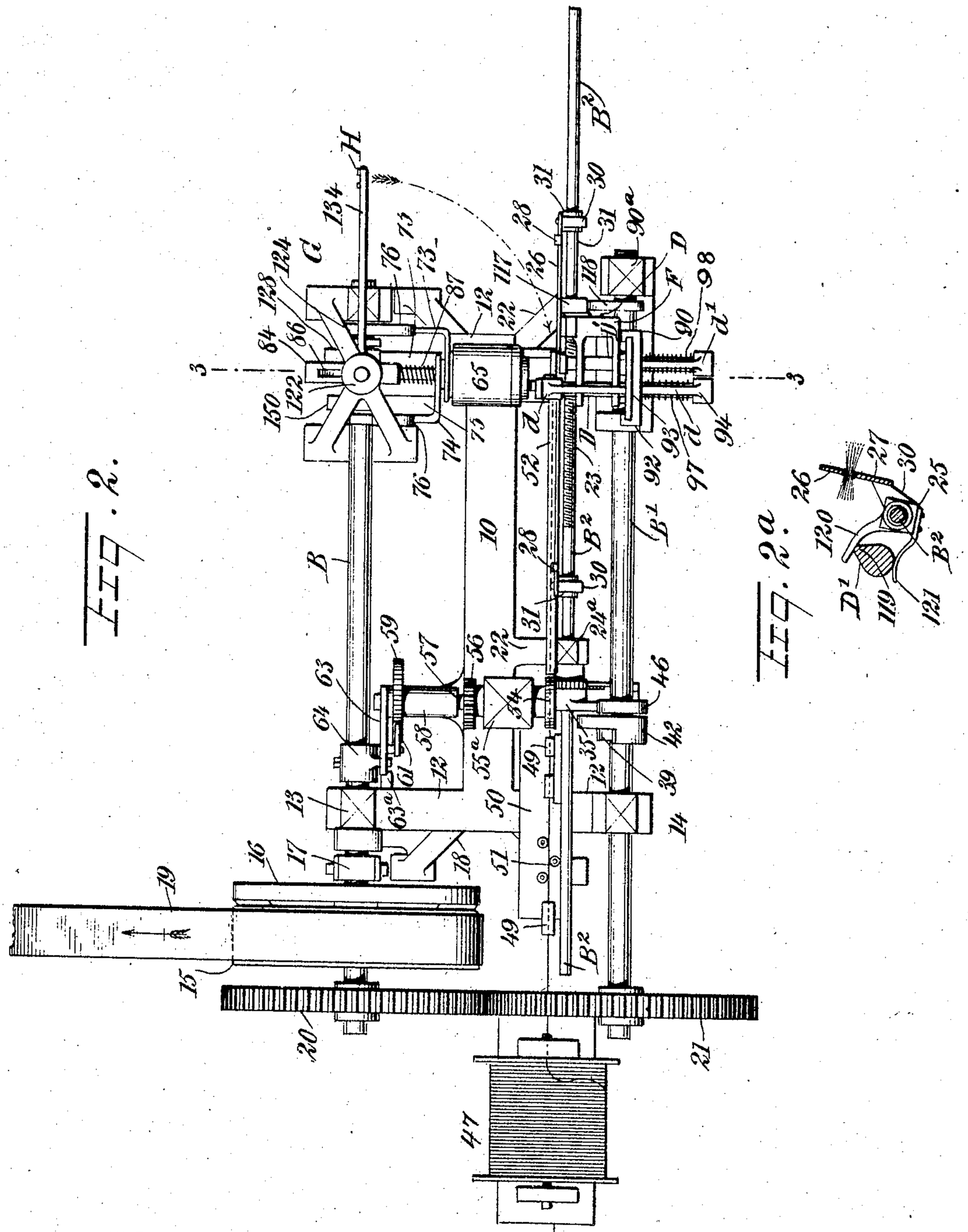

FIG. 2a.

WITNESSES:

H. Walker

J. Fred Acker.

INVENTOR

Clair Whitney Smith.

BY Munn & Co

ATTORNEYS.

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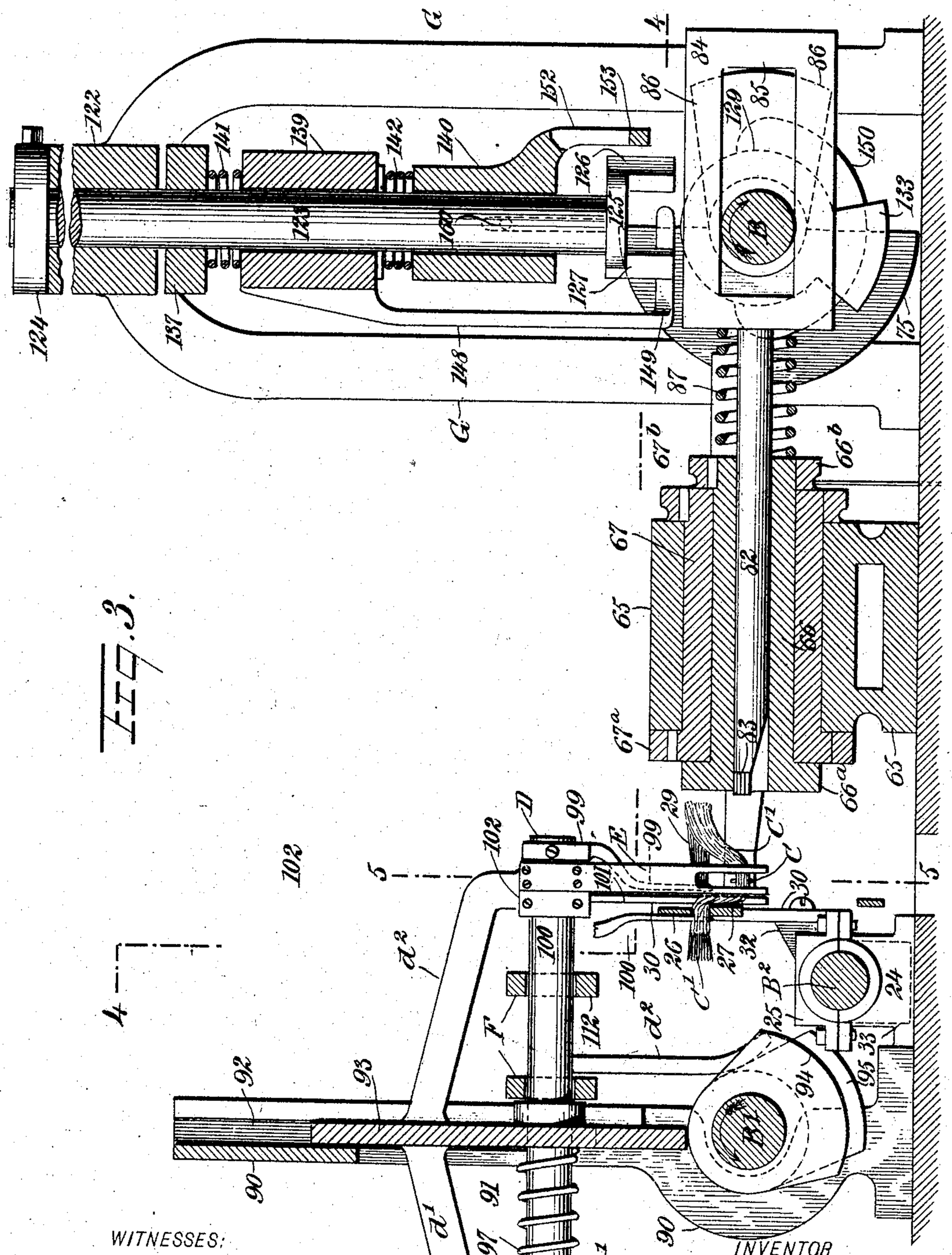
9 SHEETS—SHEET 3.

FIG. 3.



WITNESSES:

H. Walker

J. Pedrick

INVENTOR

Clair Whitney Smith

BY Munn & Co.

ATTORNEYS.

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9 SHEETS—SHEET 4.

FIG. 4.

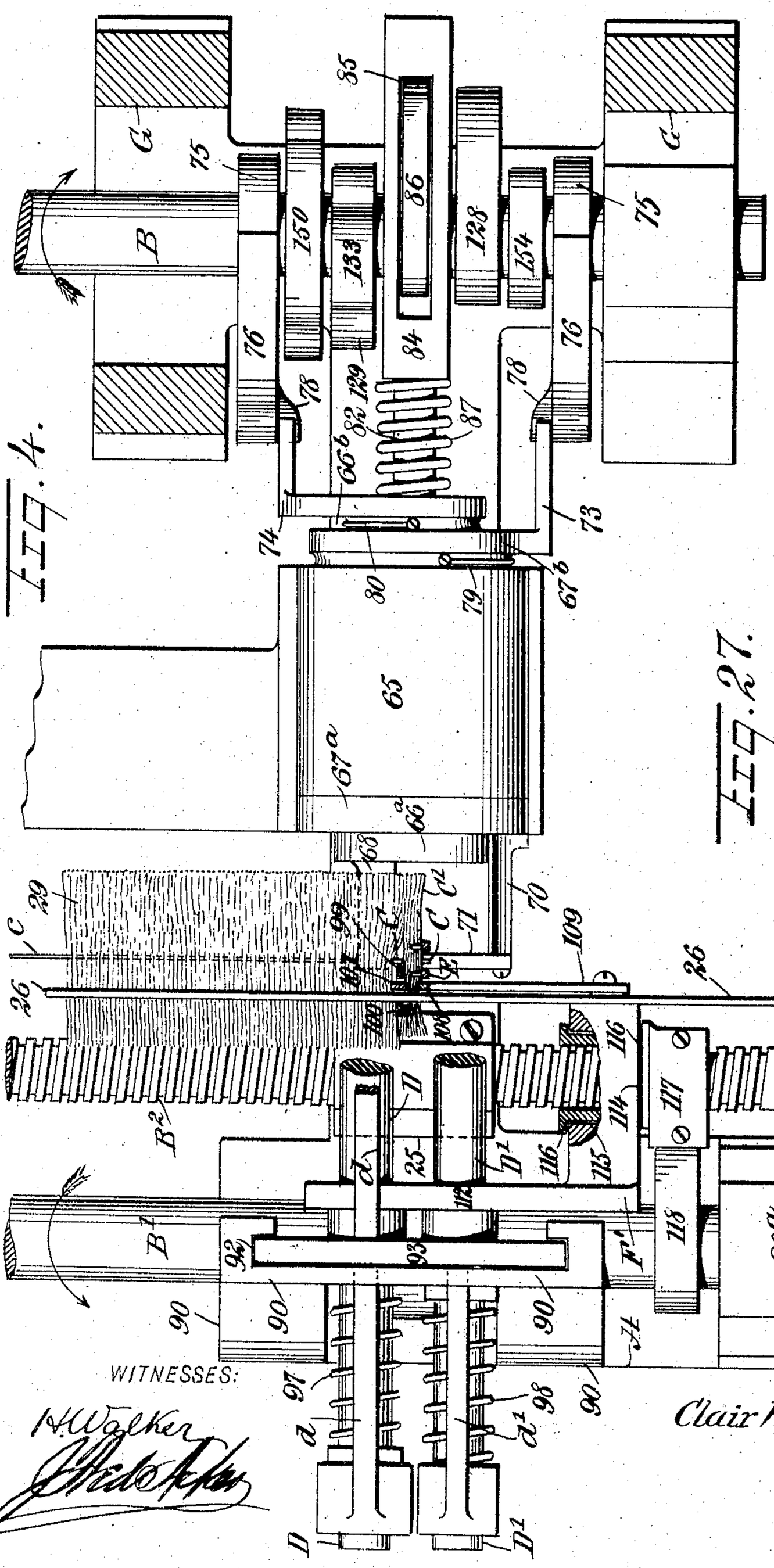
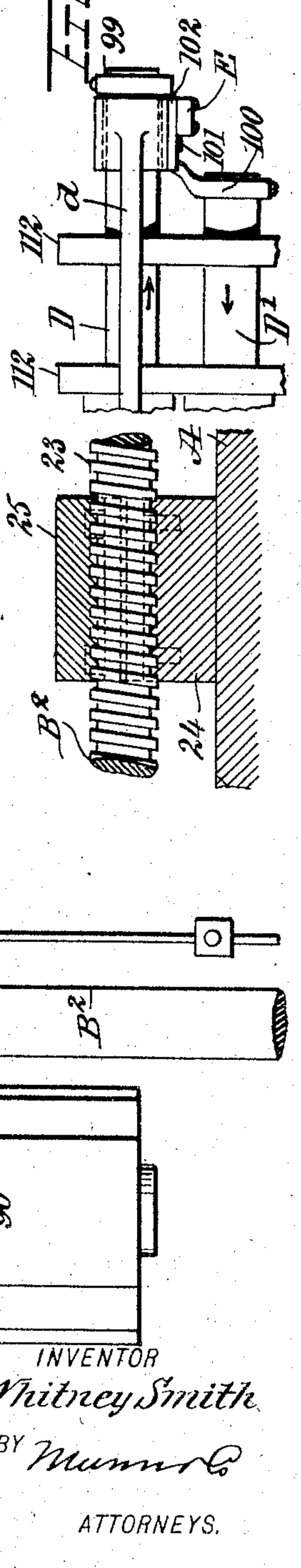


FIG. 27.



WITNESSES:

H. Walker

INVENTOR

Clair Whitney Smith

BY Munn & Co

ATTORNEYS.

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9 SHEETS—SHEET 5.

Fig. 5.

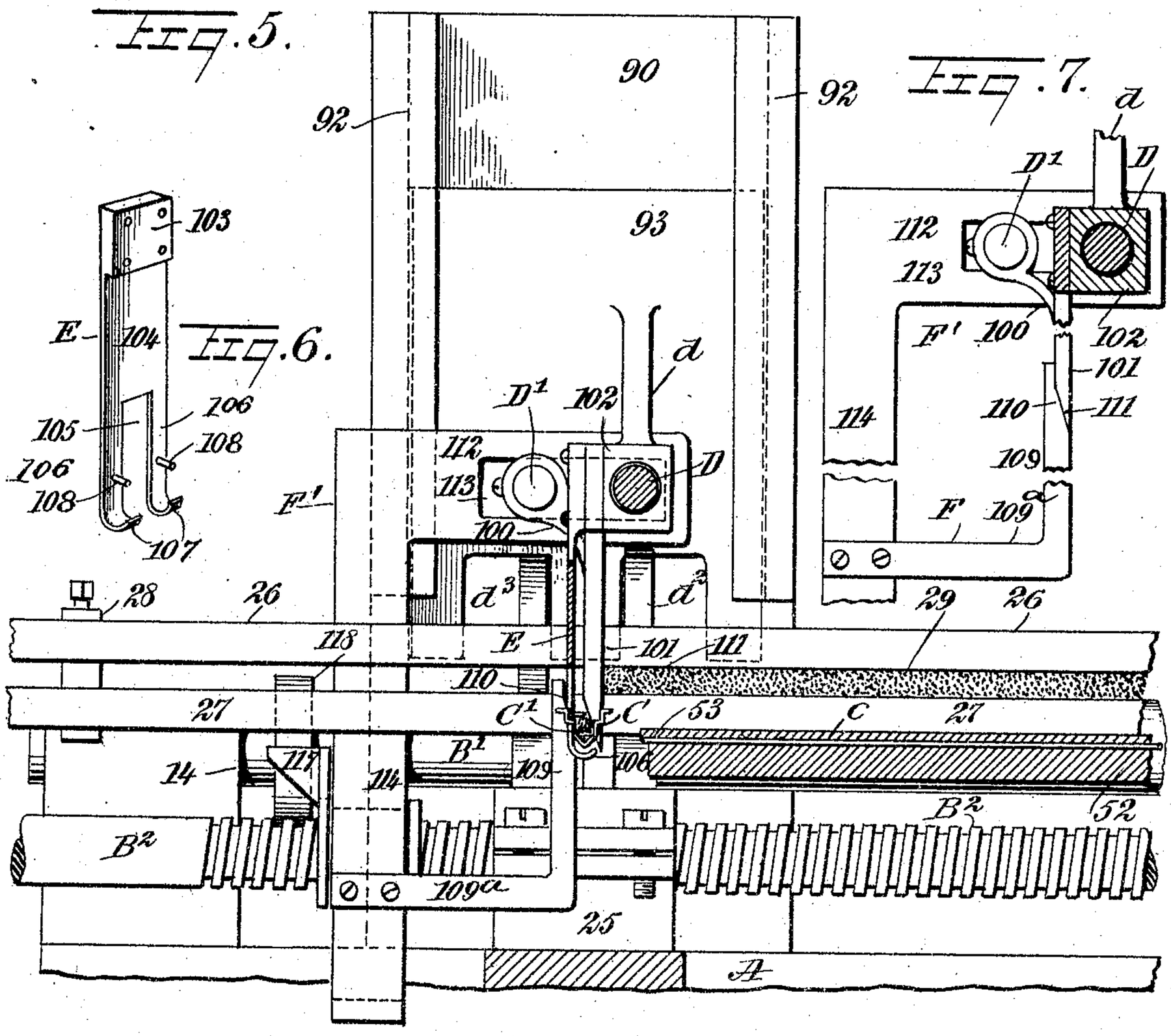


Fig. 6.

Fig. 7.

Fig. 8.

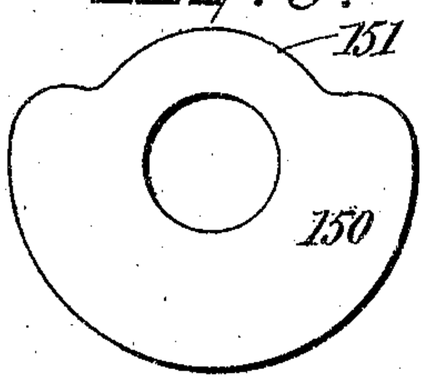


Fig. 9.

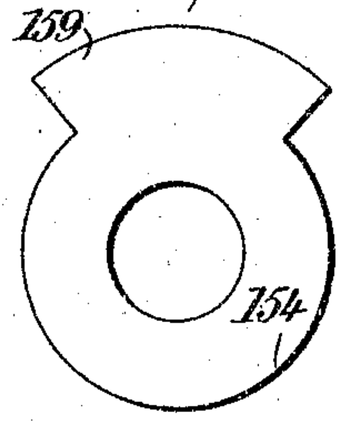


Fig. 10.

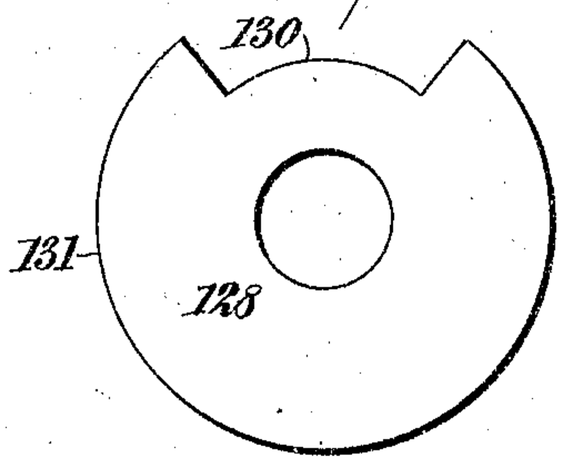
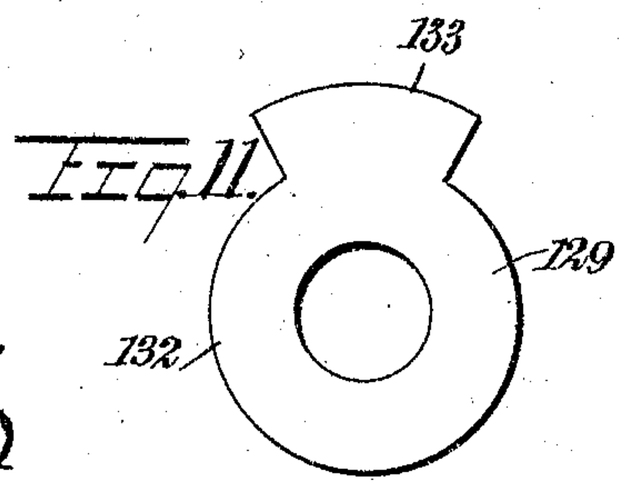


Fig. 11.



WITNESSES:

H. W. Walker

J. Wedderburn

INVENTOR

Clair Whitney Smith

BY Munn & Co

ATTORNEYS.

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C. W. SMITH.

MACHINE FOR PLACING BRUSH MATERIAL IN BRUSH BACKS.

APPLICATION FILED JULY 25, 1903.

9 SHEETS—SHEET 6.

Fig. 12.

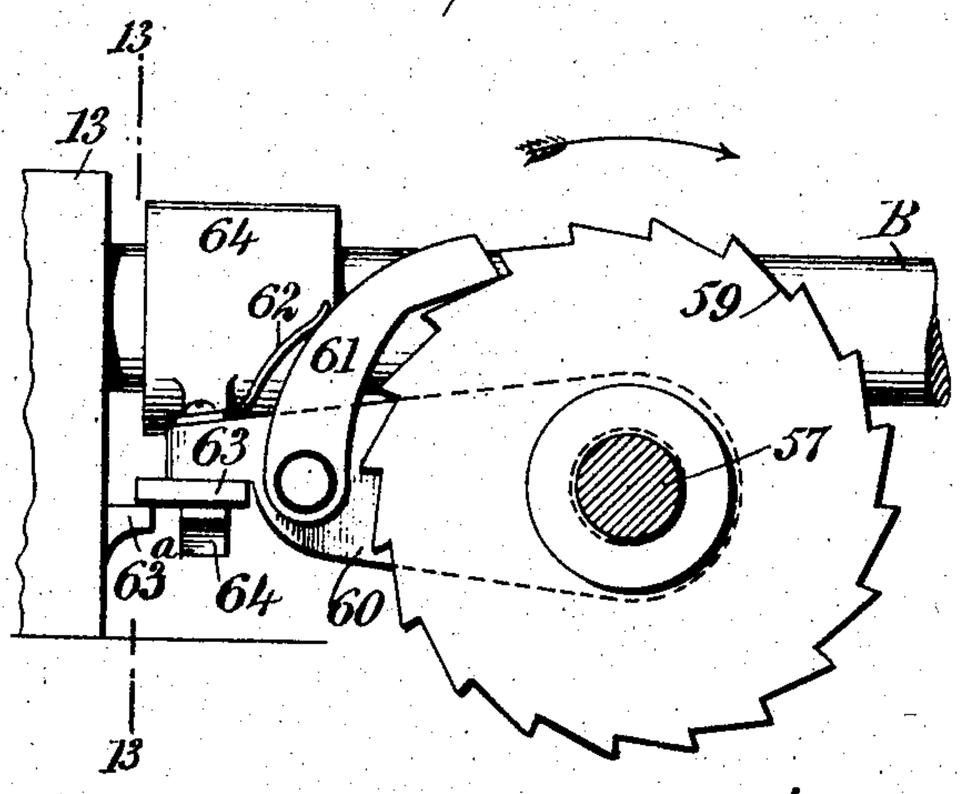


Fig. 13.

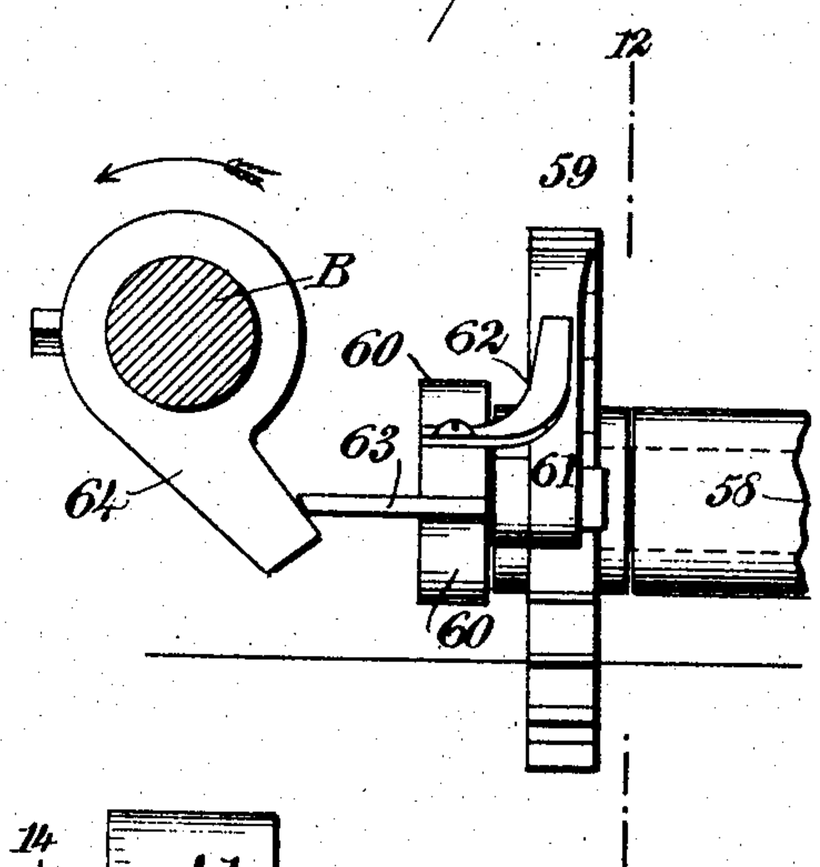


Fig. 14.

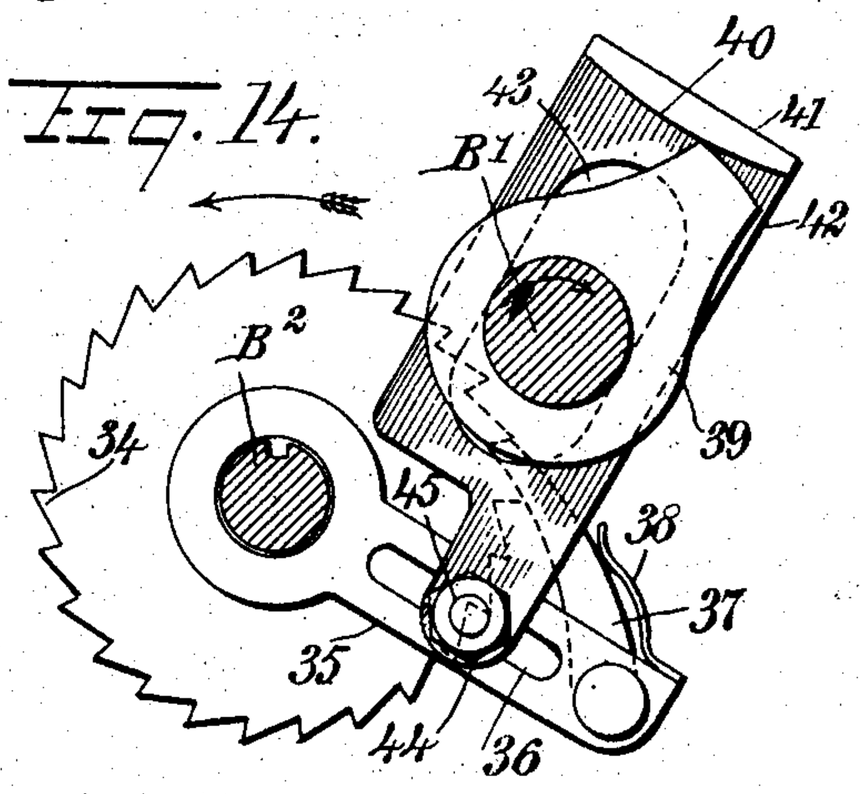


Fig. 15.

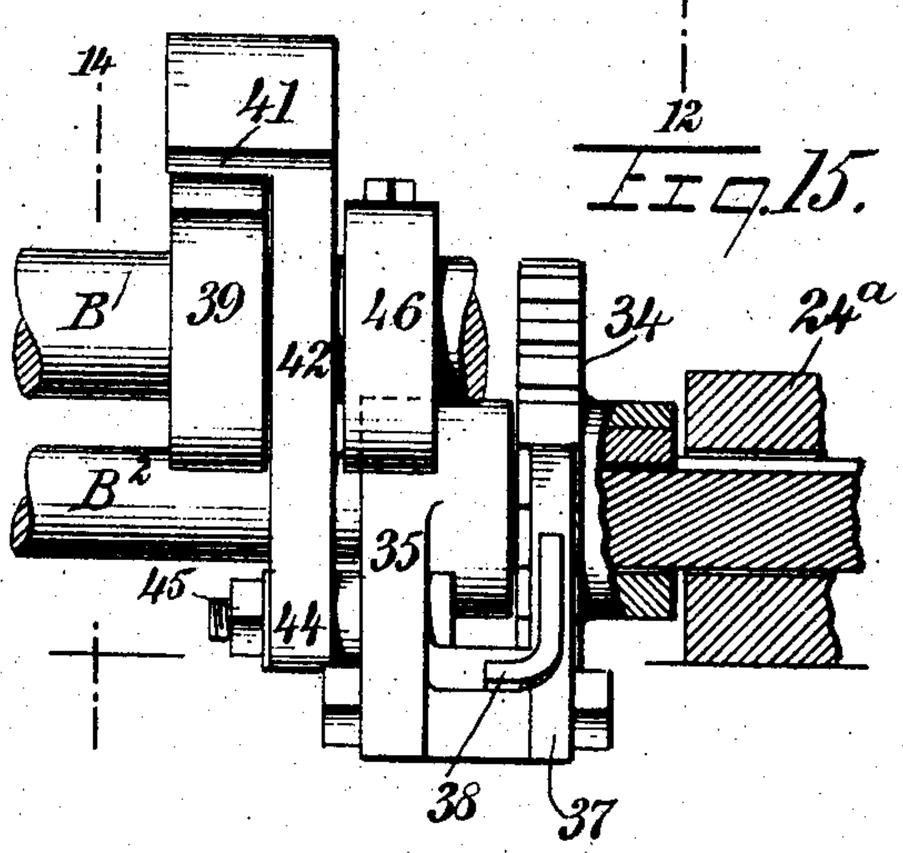
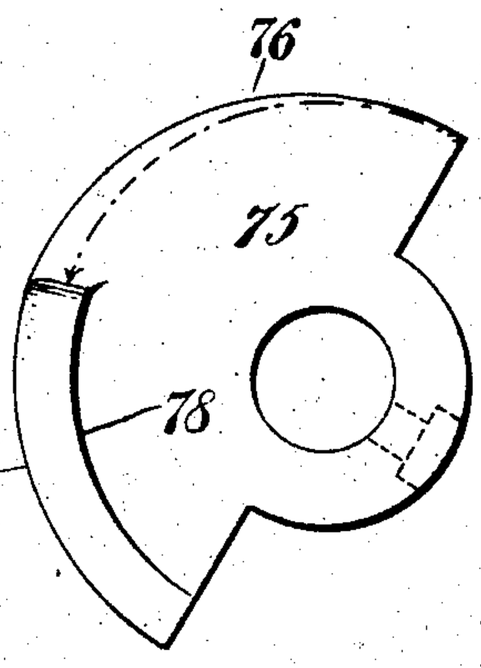


Fig. 16.



WITNESSES:

H. Walker

Fred. A. Ker

INVENTOR

Clair Whitney Smith

BY Munn & Co.

ATTORNEYS.

No. 780,825. PATENTED JAN. 24, 1905.

C. W. SMITH.

MACHINE FOR PLACING BRUSH MATERIAL IN BRUSH BACKS.

APPLICATION FILED JULY 25, 1903.

9 SHEETS—SHEET 7.

Fig. 17.

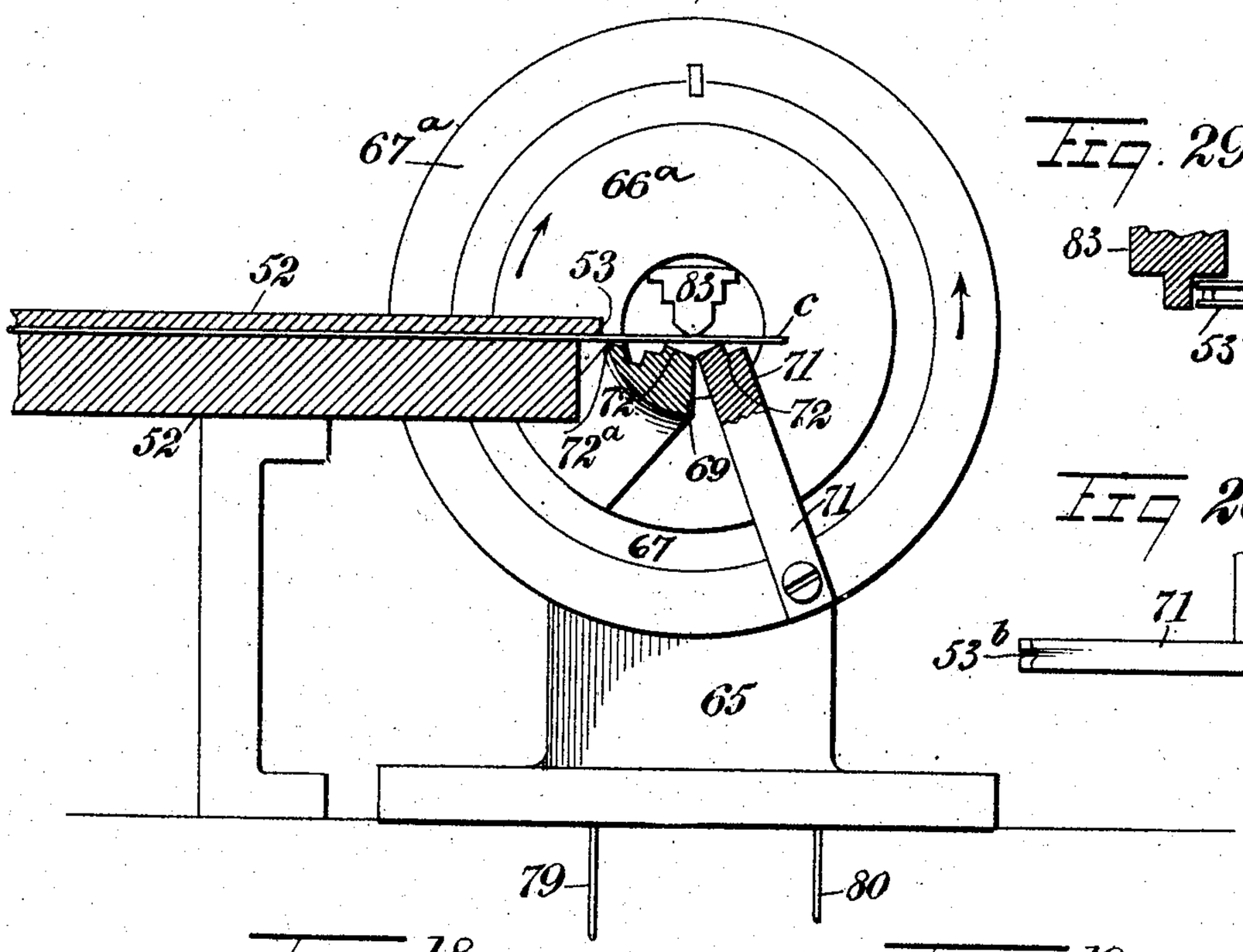


Fig. 29.

Fig. 20.

Fig. 18.

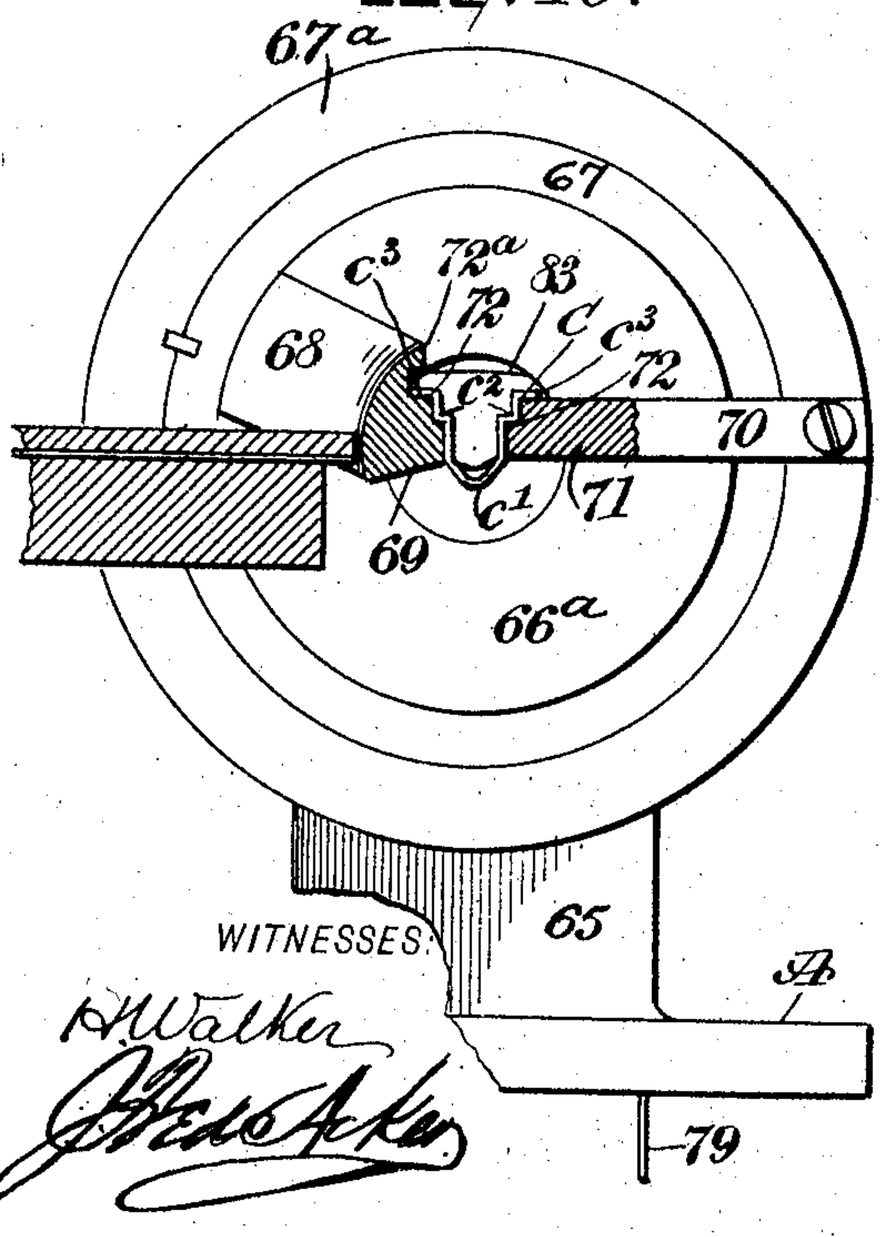
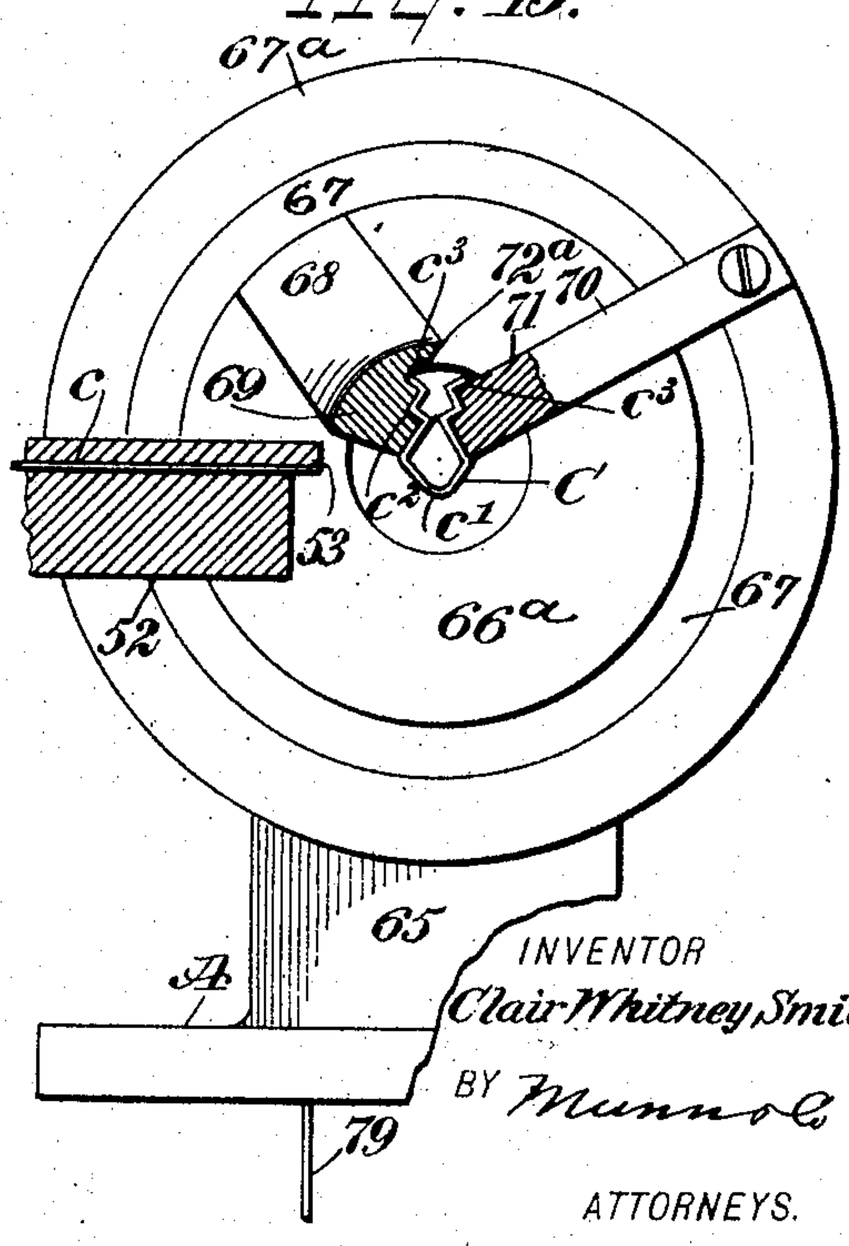


Fig. 19.



WITNESSES:

A. Walker

Fred A. Ackerman

INVENTOR

Clair Whitney Smith

BY Munn & Co.

ATTORNEYS.

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No. 780,825. PATENTED JAN. 24, 1905.

C. W. SMITH.

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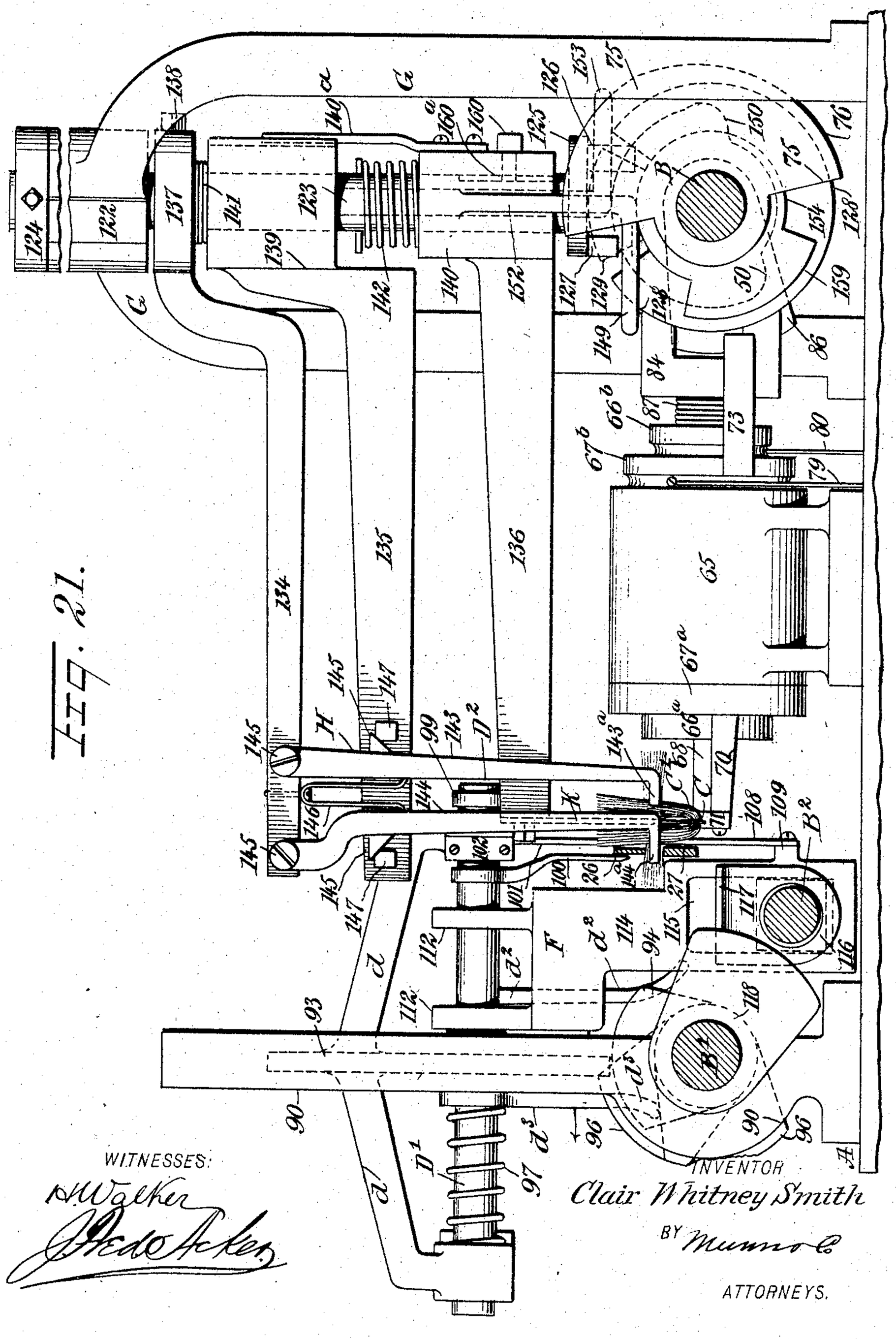
APPLICATION FILED JULY 25, 1903.

9 SHEETS—SHEET 8.

FIG. 21.



WITNESSES:

H. M. Walker

Fred Ackers

INVENTOR

Clair Whitney Smith

BY Munn & Co.

ATTORNEYS.

PHOTO-LITHOGRAPHED BY SACKETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

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9 SHEETS—SHEET 9.

Fig. 22.

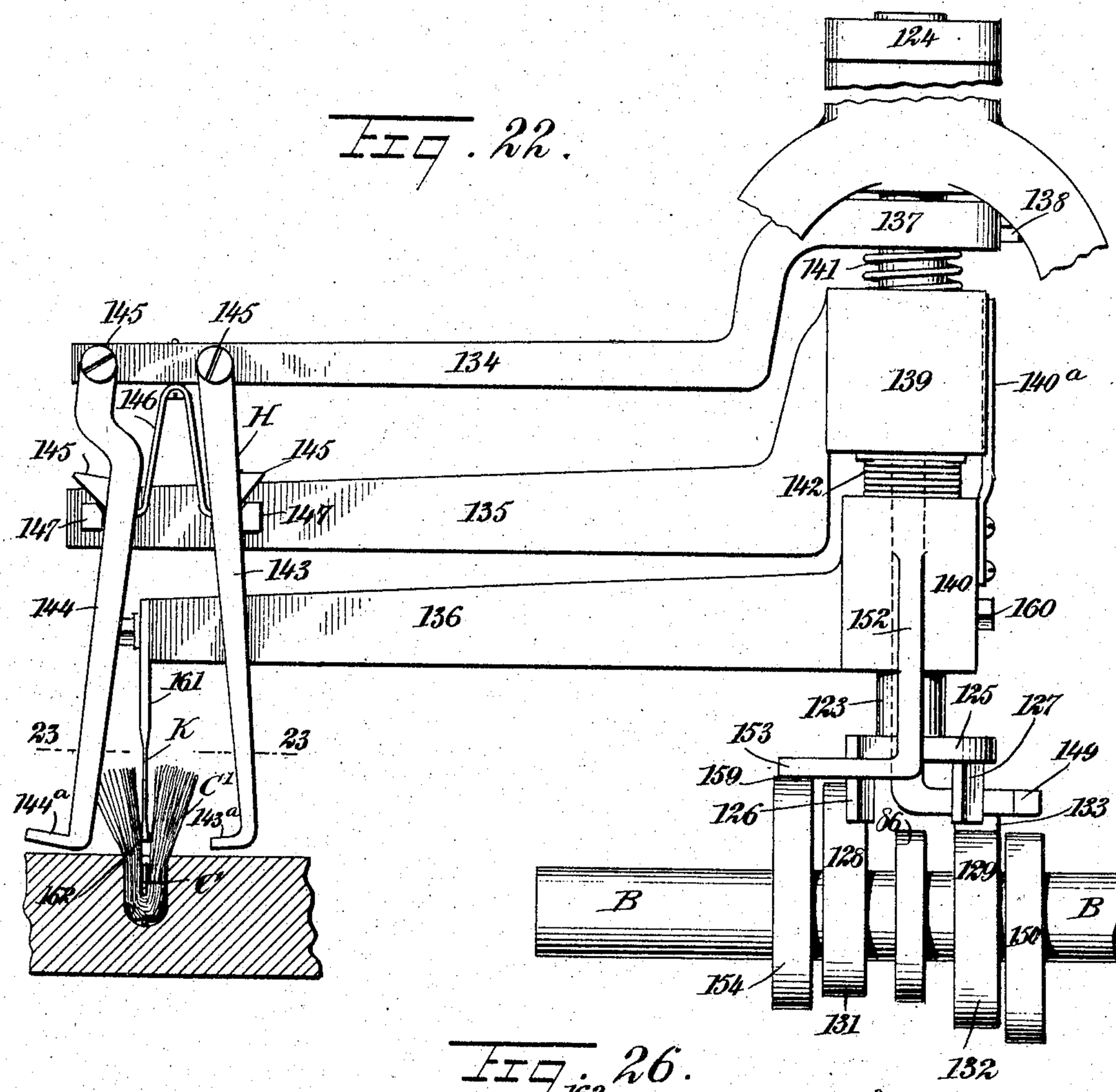


Fig. 26.

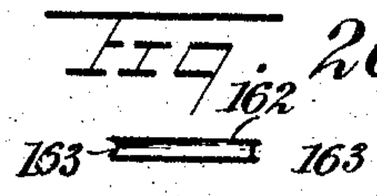


Fig. 25.

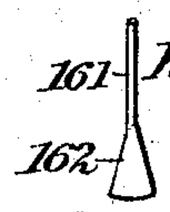


Fig. 23.

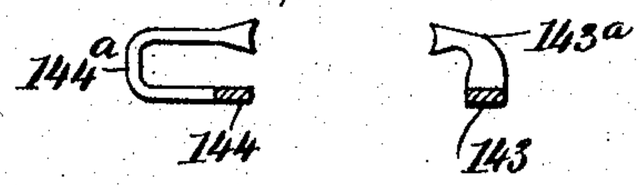
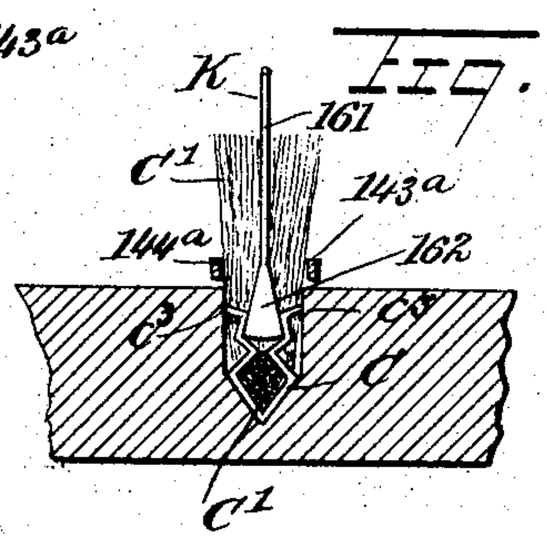
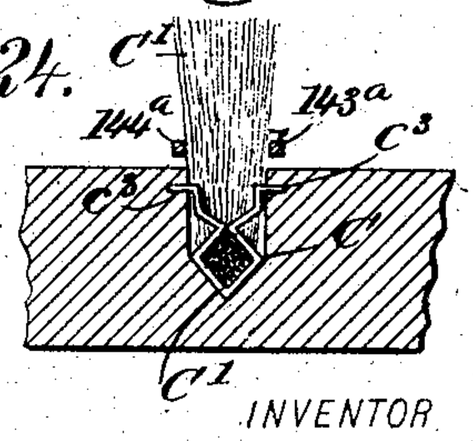


Fig. 24.





WITNESSES:

H. Walker

E. Fred C. Acker.

INVENTOR

Clair Whitney Smith

BY Munn & Co

ATTORNEYS.

No. 780,825. Patented January 24, 1905.

UNITED STATES PATENT OFFICE.

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

MACHINE FOR PLACING BRUSH MATERIAL IN BRUSH-BACKS.

SPECIFICATION forming part of Letters Patent No. 780,825, dated January 24, 1905.

Application filed July 25, 1903. Serial No. 166,973.

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 Brush Material in Brush-Backs, of which the following is a full, clear, and exact description.

The object of the invention is to provide a machine for placing brush material in brush-backs, which machine is practically automatic in its action throughout and wherein the brush-back is manually presented to receive the brush material, and to so construct the machine that it will separate bunches or tufts of brush material from the mass contained in the general receiver and which will convey the separated tufts or bunches to staples previously cut by the action of the machine and placed in receiving position, and to provide an especially-constructed fork or equivalent device which will act to force the brush material into the said staple, together with means for closing the staple over the bunch or tuft at a point between the ends of the bunch, the said fork serving two purposes—first, to deliver a bunch or tuft to a staple and after the closing or clamping means have acted upon the staple to comb the brush material upward from the staple; and another purpose of the invention is to provide nippers which engage with the combed bunch or tuft of brush material and hold the same in its combed position for a predetermined length of time.

A further purpose of the invention is to provide mechanism whereby the combed and nipped tuft or bunch of brush material and accompanying staple will be automatically swung or carried to the operator when the latter is standing near the machine, enabling the operator to present a suitably-bored brush-back to the prepared tuft or bunch of brush material to receive the bunch or tuft in a bore in the back, which bore may be diagonal or straight, the presentation of the brush-back being manually performed, thus enabling the operator to adjust the back relative to the tuft or bunch to be received and as may be required by the character and disposition of the opening or bore in the brush-back adapted to receive the bunch or tuft.

Another purpose of the invention is to provide means for forcing a portion of the staple, clamp, or clip holding a bunch or tuft of brush material outwardly and into the body of the brush-back, thus firmly anchoring the tuft or bunch of brush material to the brush-back through the medium of its clamping-staple, and, furthermore, to provide at such time for the withdrawal of the expanding or setting device employed in connection with the staple from engagement with the staple and brush material and to also provide for the removal of the nippers from the tuft or bunch secured in the brush-back, admitting of the said brush-back in which the bunch or tuft has been placed to be immediately withdrawn from engagement with all parts of the machine.

A further purpose of the invention is to provide means automatically operated for again carrying the tuft or bunch carrying mechanism to the general receiver for the brush material to separate therefrom another tuft or bunch.

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 side elevation of the machine. Fig. 2 is a plan view of the same. Fig. 2[a] is a cross-section through the drive-shaft, illustrating a modified form of the carrier for the brush material. Fig. 3 is a cross-section, on an enlarged scale, taken practically on the line 3 3 of Fig. 2. Fig. 4 is a horizontal section taken substantially on the line 4 4 of Fig. 3. Fig. 5 is a longitudinal section taken practically on the line 5 5 of Fig. 3. Fig. 6 is a detail view of the fork adapted to operate upon the brush material to place the same in a clamp or staple and to brush the material upward from the staple, so that the material may be readily placed in a brush-back. Fig. 7 is a cross-sectional view of the needle employed in

connection with the brush material and parts adjacent to the said needle. Figs. 8, 9, 10, and 11 are detail views of the operating-cams. Fig. 12 is a cross-section of the wire-feed mechanism, taken practically on the line 12 12 of Fig. 13. Fig. 13 is a section taken substantially on the line 13 13 of Fig. 12. Fig. 14 is a cross-section of the feed mechanism for the brush material, the section being taken practically on the line 14 14 of Fig. 15. Fig. 15 is a sectional side elevation of the device shown in Fig. 14. Fig. 16 is a detail view of one of the wire operating or forming cams. Figs. 17, 18, and 19 are sectional side elevations of the wire or staple forming mechanism, illustrating the successive steps of the said mechanism in forming from a length of wire a staple to receive brush material. Fig. 20 is a detail view of one of the staple-formers proper. Fig. 21 is a side elevation of the bunch or tuft carrying mechanism, the drive-shafts and the feed-shaft for such mechanism being shown in transverse section. Fig. 22 is a view of the bunch or tuft carrying mechanism illustrated in Fig. 21, showing the bunch or tuft in position in the brush-back, the carrying mechanism being released from the same. Fig. 23 is a cross-section through the nippers employed in connection with the bunch or tuft of brush material, the section being on the line 23 23 of Fig. 22. Figs. 24 and 25 illustrate successive positions of the nippers for the brush material and the staple separating or fixing device, which device is adapted to force a staple to holding position in a brush-back, and thereby anchor the brush material thereto. Fig. 26 is a bottom plan view of the staple separating or driving device. Fig. 27 is a detail side view of the feed-shaft for the brush material and a section through the journal-box for the said shaft. Fig. 28 is a fragmentary plan view showing the especial arrangement of the needle adapted to operate in connection with the brush material, the separator, the said brush material, and the pressing and combing fork for the said brush material, and the relative position of the said parts one to another; and Fig. 29 is a detail view illustrating the application of shields to the female dies.

A represents the base-frame of the machine, comprising a bed 10 and suitable standards 11, together with horizontal extensions 12 from the sides of the end portions of the bed, as is shown in Fig. 2. On the extensions 12 at one side bearings 13 are suitably placed, in which the main drive-shaft B is mounted to turn, and on the extensions at the opposite sides of the base-frame a shaft B′ is mounted to turn in suitable bearings 14, the shaft B′ being driven from the shaft B. The main drive-shaft B is provided with a driving-pulley 15 at one end, having a clutch-face for engagement with a clutch 16, mounted to slide upon and turn with the said shaft B, the driving-pulley 15 being loosely mounted on the said shaft. The said clutch 16 is operated by a shifting-lever 17 in the customary manner, the lever being pivoted upon a shaft located in a bracket 18, suitably supported by the base. The shaft to which the lever 17 is attached is operated through the medium of a foot-lever 18^a, leading to what may be termed the "front" end of the machine, or that end of the machine where the brush-back is to be presented to receive the brush material. The pulley 15 is driven by the usual belt 19, connected with any source of power, and at the pulley end of the drive or main shaft B a gear 20 is secured. This gear meshes with a similar gear 21 at the corresponding end of the driven shaft B′, as is shown in Fig. 2.

At that side of the bed of the base-frame which is opposite the driven shaft B′ auxiliary horizontal members 22 are formed, and on these members suitable plain bearings or journal-boxes 24^a are constructed. In these bearings or journal-boxes 24^a a feed-shaft B^2 is mounted to freely turn. This feed-shaft B^2 is provided between its ends with an exteriorly-threaded section 23, and, as is particularly shown in Fig. 27, this threaded portion of the feed-shaft is held to turn in a box 24, similarly threaded and provided with a removable cap 25, so that when the feed-shaft has been made to travel as far as it can in direction of the forward end of the machine the said cap 25 may be removed and the said shaft be simply pushed back to its normal position. This feed-shaft B^2 is adapted to carry the support for the brush material, and such support, as is shown in Fig. 3, consists usually of upper and lower plates or strips 26 and 27, arranged in the same horizontal plane and connected by clamps 28, as is best shown in Fig. 1, which clamps may be of any suitable formation.

The brush material 29 is evenly laid between the two supporting plates or strips 26 and 27, and in the arrangement of the brush material between the supporting plates or strips 26 and 27 the material is made to extend much farther beyond the inner faces of the said supports than beyond their outer faces, as is best shown in Fig. 4, so that although the said brush material 29 is firmly held horizontally and in even order transversely of the supports 26 and 27 said brush material when occasion may require may be more readily removed from the supports than if the supports were at the central transverse portion of the material. These supports 26 and 27 are provided with downwardly-extending arms 30, attached to the upper support 26, and the lower portions of these arms 30 are provided with extensions 33, loosely mounted on the plain surface of the feed-shaft B^2, being held in position on the said shaft by collars 31, secured to the shaft at each side of the extensions 32 of the arms. Each extension 32 of an arm 30 is pro-

vided with a foot-section 33, extending below the feed-shaft B^2 to an engagement with the base-frame A, as is shown in Fig. 3, so that the arms 30 are prevented from dropping or moving in direction of either side of the machine, while the said arms are perfectly free to move with the said feed-shaft as the feed-shaft is turned.

The feed-shaft B^2 is adapted to have intermittent rotary and end movement, and said movements are brought about through the mechanism shown in Figs. 1 and 2 and in detail and on a larger scale in Figs. 14 and 15, wherein it will be observed that a ratchet-wheel 34 is loosely splined on the feed-shaft B^2, adjacent to one of the bearings 24^a, and adjacent to the said ratchet-wheel 34 an actuating-arm 35 is loosely mounted on the said feed-shaft B^2, which arm has a longitudinal slot 36 produced therein, and at its rear or outer end, facing the driven shaft B', a dog 37 is pivoted to the arm, held by a spring 38 in engagement with the teeth of the ratchet-wheel 34, as is particularly shown in Fig. 14.

On the driven shaft B' a cam 39, preferably pear-shaped, is secured, and this cam 39 is adapted to engage at intervals with the convexed surface 40 of a flange 41, located at one end of a striking-plate 42, the said striking-plate having a longitudinal slot 43 produced therein, through which slot the driven shaft B' passes, and the opposite end 44 of the striking-plate 42 is preferably reduced in width and is adjustably connected with a suitable bolt and nut 45 with the arm 35 at its slotted portion, so that the throw of the dog 37 brought about by the action of the driven shaft B' may be operated as desired so as to cause the said feed-shaft to have greater or less rapid end movement at each action of the dog 37. The striking-plate 42 is prevented from sliding lengthwise of the shaft B' by reason of the cam 39 being secured to the shaft at one side of the plate and a collar 46 secured to the shaft at the opposite side of the plate.

I employ a staple C, preferably made of wire, in connection with each tuft or bunch of brush material separated from the general mass held between the supports 26 and 27. These staples are made from a wire *c*, which is fed from the rear end of the machine in a forward direction, the wire *c* being upon a reel 47, shown supported in suitable standards 48 at the aforesaid rear end of the machine. This wire *c* is of suitable gage, and it is passed through stationary guides 49, located upon the longitudinal block 50, secured to the upper surface of the base-frame adjacent to the feed-shaft B^2, as is shown in Fig. 2, and the said wire likewise passes between roller-guides 51, also shown in Fig. 2. After the wire leaves the forward guides 49, said guides serving to take the kinks out of the wire, the said wire passes through the tube 52, (shown in Figs. 2 and 17,) and this tube at its forward end, which is adjacent to the forward end of the machine, is provided with a shoulder 53 where the wire leaves the tube, as is shown in Fig. 17, and the said shoulder 53 is made sharp, so as to assist in cutting the wire in suitable lengths to form staples.

The wire is fed through the medium of two feed-rollers 54 and 55, located one above the other, as is shown in Fig. 1, immediately at the rear of the conducting-tube 52, and the shafts of both rollers 54 and 55 are journaled in a bearing 55^a on the base-frame, as is shown in Fig. 2. The shaft of the upper roller 54, however, passes only sufficiently through the bearing 55^a to receive a gear 56, the said gear meshing with a corresponding gear on the shaft 57 for the lower feed-roller 55, and this shaft 57 is journaled at its inner end in a bearing 58, secured to the base-frame of the machine, as is shown in Fig. 2.

The feed mechanism is driven from the drive-shaft B in substantially the following manner: A ratchet-wheel 59 is secured on the shaft 57 at its inner end, as is shown in Figs. 12 and 13, and on the same shaft 57, adjacent to the ratchet-wheel 59, an arm 60 is loosely mounted, which arm carries a dog 61, adapted for engagement with the teeth of the ratchet-wheel 59, the dog being held in such engagement by a spring 62. The arm 60 at its lower or free end is provided with a foot 63, limited in its downward movement by a stud 63^a, extending from the bearing 13 for the main shaft, as is shown in Figs. 2 and 12, and on the main driving-shaft B a cam 64 is secured, which cam is adapted for lifting engagement with the foot 63 of the arm 60, so that during the rotation of the main drive-shaft 60 the cam intermittently imparts movement to the shafts of the feed-rollers through the medium of its cam and the arm and ratchet-wheel above mentioned, and as soon as the cam passes the foot 63 the arm 60 drops down again to its normal lower position. (Shown in Fig. 12.)

The wire is cut to form staples C, and the staples are fashioned in the following manner, special reference being had to Figs. 17, 18, and 19: At the forward or operating end of the bed 10 of the main frame a cylindrical bearing 65 is secured transversely to the bed, as is shown in Fig. 2, and, as is illustrated in Fig. 3, cylinders 66 and 67 are mounted to turn one upon the other in the said bearing.

At the ends of the cylinders which face the feed-shaft B^2 flanges 66^a and 67^a are formed, the flanges 66^a of the inner cylinder 66 extending beyond the flanges 67^a of the outer cylinder 67, and at the opposite ends of the cylinders collars 66^b and 67^b are respectively removably secured.

An arm 68 is carried outward from the flange 66^a of the inner cylinder 66, and said arm carries a female die 69, preferably segmental in cross-section. At the correspond-

ing end of the outer cylinder 67 a second arm 70 is secured, which carries a second female die 71. Normally, as is shown in Fig. 17, these dies are at angle to each other below the projecting end of the wire *c* from which the staple C is to be formed and below the central portion of the chamber in the inner cylinder 66. At each side of each female die a shield 53[a] is secured to prevent the wire from slipping laterally from the dies, as is shown in Fig. 29, or the said female dies may be simply provided with grooves 53[b] for that purpose, as is shown in Fig. 20, or both the shields and grooves may be employed.

In the normal position of the female dies an upper outer edge of the die 69 is just below and in cutting relation to the shoulder 53 at the forward end of the wire-conducting tube 52. The cylinders 66 and 67 are adapted to revolve in opposite direction, and consequently the female dies have circular movement to and from each other, moving upward to form the staple C and downward after the staple is formed and clamped around a bunch or tuft of brush material. The working faces of both female dies are provided, preferably, with two stepped surfaces 72, and the female die 69 has a third stepped surface 72[a], sharpened to constitute a cutting-surface. At the initial upward movement of the die 69 the cutting-surface 72[a] in passing the cutting-shoulder 53 of the wire-conducting tube 52 will cut the extended end of the wire into a length sufficient to form a staple therefrom.

The female dies 69 and 71 act in conjunction with a male die 83, which is at the outer end of a rod or bar 82, mounted to slide freely in the chamber of the inner cylinder 66. (See Fig. 3.) As is shown in Fig. 17, this male die is more or less of triangular form at its bottom edge and is widest at its top, while at each side corresponding steps are formed adapted to mate with the two steps on the female dies, as is shown in Figs. 17 and 18, so that when the three dies are brought into the position shown in Fig. 18, the first working position of the dies, the cut strip of wire *c* is formed into a staple C, which staple has a more or less U-shaped lower portion *c'*, corresponding outwardly-extending shoulders c^2 intermediate of the ends of each limb, and oppositely and outwardly extending upper flanges c^3, as is also shown in Fig. 18. As soon as the staple C is formed the male die 83 is drawn away from the staple and within the inner cylinder 66 by a mechanism to be hereinafter described in order that a tuft or bunch of brush material separated from the general mass of such material may be forced into the staple to be clamped thereby.

The cylinders 66 and 67 are simultaneously revolved in opposite directions by mechanism best shown in Figs. 2 and 4, wherein it will be observed that at the ends of the cylinders facing the main drive-shaft B a rocker-arm 73 is carried from a side of the collar 67[b] on the outer cylinder 67 in direction of the main shaft B. A similar rocker-arm 74 is carried in an opposite direction from the opposite side of the collar 66[b] on the cylinder 66, and each of the said rocker-arms 73 and 74 engages with a cam 75, secured on the said main shaft B. One of these cams is shown in detail in Fig. 16, wherein it will be observed that the cams are segmental, their peripheral surfaces 76 being in the same arc; but upon the inner face of each cam a riser 78 is located in the form of a tapering rib, and in operation when the dies are in their normal or first position (shown in Fig. 17) the rocker-arms 73 and 74 will be at a shouldered portion of the cams to which they belong, and as the cams revolve the rocker-arms will ride first on the edges of the cams and then on their side faces, carrying the rocker-arms upward and causing the cylinders 66 and 67 to be simultaneously rocked in opposite directions, bringing the female dies to the position shown in Fig. 18, or to their second position, wherein the staple is formed. As the cams 75 continue to revolve the rocker-arms 73 and 74 engage with the risers 78 on the cams 75, and the said rocker-arms are carried farther upward, causing the cylinders 66 and 67 to carry the female dies to the third position, (shown in Fig. 19,) wherein they act to close the lower portion of the staple tightly around the tuft or bunch of brush material and press the upper portion of the cylinder inward around a spreader adapted when withdrawn to force the flanges c^3 of the staple into the brush-back, all of which will be hereinafter fully set forth.

After the female dies have performed their work the rocker-arms 73 and 74 leave the working surfaces of the cams and the cylinders 66 and 67 are turned to restore the female dies to the normal position by attaching ropes, cords, chains or cables respectively to the collars 67[b] and 66[b], as is shown in Fig. 4. These cords or cables 79 and 80 extend downward at opposite sides of the collars and are provided with weights 81 at their lower ends. Therefore as soon as the rocker-arms are free the weighted cords or cables return the cylinders, turning them in opposite directions.

The male die is operated in the following manner and as is illustrated in Fig. 3 and 4, wherein it will be observed that the carrying-rod 82 of the male die is attached to a box 84, having horizontal sliding movement on the main drive-shaft B, and a cam 86, secured to the said shaft B, operates in said box and by engagement with the outer end wall 85 of the box forces the latter outward, thereby withdrawing the male die from the finished staple and bringing it within the cylinder 66, which action takes place just after the female dies have reached the second position. (Shown in Fig. 18.) When the cam 86 leaves the rear wall 85 of the said sliding box, the male die is

returned to working or normal position by a spring 87, coiled around the rod or bar 82 between the sliding box 84 and the sliding cylinder 66, the spring being placed under tension when the male die is drawn back, as is shown in Fig. 3.

The means for separating the brush material between the supports or carriers 26 and 27 to produce a tuft or bunch will now be described and also the especial means employed to force the separated or detached bunch into a staple and for combing the brush material upward after having been clamped by the staple.

An upright frame 90 is secured to the main frame A near the forward end adjacent to the forward box 90^a for the driven shaft B′, and, as is shown in Figs. 3, 4, and 21, the lower portion of the frame is outwardly curved to clear the shaft and yet permit the upper portion of the frame to extend over the shaft. This upright frame 90 is provided with an opening 91, extending from a point near the top to the bottom and with longitudinal slideways 92 at the side portions of its inner face, in which ways 92 a plate or slide 93 is mounted to have vertical movement, adapted to be raised by a cam 94 on the driven shaft B′, as is shown in Figs. 1, 3, and 21; but when the slide is raised by the cam the slide drops by gravity.

Two preferably parallel horizontal shafts D and D′ are mounted for rotary and end movement in the slide 93, and both shafts extend beyond both sides of the slide. The shaft D extends farther inward than the shaft D′. In fact, the shaft D at its inner end extends over and beyond the inner faces of the supports for the carriers 26 and 27 for the brush material, while the inner end of the shaft D′ is at or near the outer face of the carriers 26 and 27. Both shafts are mounted in independent hangers d and d', which extend from the slide 93.

The shaft D is adapted to move inward and the shaft D′ in an opposite direction, or outward, and each shaft D and D′ is provided with a downwardly-extending finger, the finger on the shaft D being designated as d^2 and the finger on the shaft D′ is designated as d^3.

The shafts D and D′ are simultaneously moved in opposite directions by the action of cams 95 and 96, mounted on the driven shaft B′, as shown in Figs. 1, 3, and 21, which cams extend in opposite directions from the shaft, so as to operate in opposite directions on the shaft-fingers with which they are adapted to engage, and the cams 95 and 96 are preferably located one at each side of the cam 94 for the slide 93.

After the shifting fingers d^2 and d^3 are released by the cams 95 and 96 the shafts D and D′ are returned to their normal position by springs 97 and 98, suitably placed on the shafts, as shown in Figs. 2, 3, 4, and 21. A separating-finger is secured at the inner end of each shaft D and D′, which fingers extend downward from the shaft and are designated as 99 and 100. They are so bent between the shafts that their lower portions are straight and transversely opposite each other, as is shown in Figs. 3 and 28.

By reason of the difference in the length of the shafts D and D′, which may be termed "separating-shafts," one separating-finger will be at the inner and the other at the outer side of the supports or carriers 26 and 27 for the brush material, as is shown in Fig. 4, and in the normal position of the shafts D and D′ the separating-fingers will be quite near to the carriers, as is also shown in Fig. 4. The separating-fingers 99 and 100 are adapted to act in conjunction with a needle 101, which is utilized to part enough of the brush material from the mass 29 to form a tuft or bunch C′, and at proper time the separating-fingers 99 and 100, which enter the mass of brush material with the needle, are carried in opposite directions by the action of the separating-shafts D and D′ and insure a complete separation of the bunch of brush material from the mass and a perfect withdrawal of the bunch of material from the carriers 26 and 27.

The needle extends downward from a head 102 on the hanger d for the separating-shaft D, as is shown in Fig. 28, and on the same head the upper end of a fork E is secured between the needle 101 and the separating-finger 99 at the inner end of the separating-shaft D, as is also best shown in Fig. 28. The fork, which is shown in detail in Fig. 6, has a double function, serving to force the central portion of the tuft or bunch C′ of the brush material into the open staple C waiting to receive it and then to comb the ends of the tuft or bunch upward after the bunch or tuft has been locked or clamped in the staple. The fork E comprises a thickened upper section 103, which is attached to the head 102, and a body-section 104 of thin and pliable metal, preferably steel, having a longitudinal slot 105 in its lower portion, and each member 106 thus formed terminates in an upwardly-extending hook 107, while at a proper distance above each hook 107, on the same side of the body of the fork, a pin 108 is located. As the slide 93 drops the needle 101 passes through the material 29, fed forward by the action of the feed-shaft B^2, at a predetermined distance from the advanced end of the mass of material 29 and at a point near the inner face of the carriers 26 and 27, as is shown in Fig. 4, thereby parting a tuft or bunch C′ from the mass of brush material, which bunch will be immediately over the staple C already formed, while the supporting-fingers 99 and 100 pass through the material at each side of the needle 101, as is also shown in Fig. 4. The fork E is also necessarily carried down with the needle, be-

ing attached to the same support, and as the needle descends the hooks of the fork upon engaging with the tuft or bunch formed spring outward sufficiently to permit the tuft or bunch of brush material to occupy a position upon the hooks 107 and below the pins 108. As the fork E travels farther downward the pins 108 force the central portion of the tuft or bunch into the open staple, held at such time between the female dies, the male die having been withdrawn, until the bunch is firmly pressed into the bottom portion of the staple, since the fork can pass the staple, owing to the slot 105 in the fork, as is particularly shown in Fig. 3, after which the staple is clamped around the tuft or bunch by the final upward movement of the female dies, as has been mentioned and as has been shown in Fig. 19, but not until the wire-spreader above referred to and to be hereinafter described has entered the staple, as is shown in Fig. 24.

In connection with the slide 93 and the needle 101 I employ what I denominate a "front" stock-piece F for a dual purpose—first, to prevent the mass of material 29 from becoming loose or scattered at its forward or delivery end as the needle is carried to a point above the mass, and, second, to gage the amount of material to be contained in the tuft or bunch C'. Therefore the front stock-piece must move up and down with the needle and have lateral movement to and from the needle.

As is best shown in Figs. 5 and 7, the front stock-piece consists of an angular arm the vertical member 109 whereof is adapted for engagement with the needle and is provided with an upwardly-inclined surface 110 to meet a correspondingly-inclined surface 111 at the lower portion of the needle. The horizontal member 109^a of the arm is secured to the inner face of the vertical member 114 of a carriage F', (shown best in Figs. 5, 7, and 21,) the upper horizontal member 112 of which carriage is preferably of skeleton construction and is provided with slots 113, through which slots the separating-shafts D and D' extend, so that the carriage will have sliding movement on the shafts D and D' and will also move up and down with the slide 93. The vertical member 114 of the carriage F' is provided with an elongated opening 115 at its lower portion adapted to receive and slide upon a box or nut 116, extending through the opening and having flanges at its ends, as is shown in Figs. 4, 5, and 21. The box or nut 116 is interiorly plain, and the screw-section of the feed-shaft B^2 passes through it. The box or plain nut 116 is made in two sections connected by screws or their equivalents, so that the box or nut may have more or less frictional engagement with the shaft in order that as the material 29 is being fed forward the feed-shaft B^2 will cause the front stock-piece to move to an engagement with the needle by reason of its frictional contact with the nut, occupying then the position shown in Fig. 7. Just before the descent of the needle the front stock-piece is moved away from the needle a distance approximately corresponding to the desired thickness of the tuft or bunch of brush material, so that the material for the bunch or tuft is held between the needle and the front stock-piece, as is shown in Fig. 5. The latter horizontal movement is accomplished by forming a cam-surface 117 on the nut or box 116, as is shown in Fig. 5, to be engaged by a cam 118, secured upon the driven shaft B', which cam overcomes the frictional engagement of the nut or box 116 with the screw-section of the feed-shaft B^2. As the nut or box 116 can be slid along the feed-shaft B^2, it is evident that the distance the front stock-piece can travel to and from the needle can be readily regulated, and consequently the thickness of the tuft or bunch.

In Fig. 2^a I have illustrated a construction wherein at the proper time the supports or carriers 26 and 27 for the brush material may be rocked or inclined downward by reason of a cam-surface 119 being formed on the driven shaft D', which cam-surface engages with arms 120, extending from the end supports 30 for the carriers, the carriers being returned to normal position after the tuft or bunch is drawn out through the action of springs 121 secured to the carrier-supports and engaging with the under or plain surface of the shaft B'. This arrangement is employed when the material is of a very heavy character and brings the carriers 26 and 27 sufficiently downward to admit of the material, no matter how stubborn when formed in the bunch or tuft, to be withdrawn readily and cleanly from the carrier. This construction may be provided for all machines, being used only when needed.

I will now describe the mechanism employed for carrying and operating the wire-spreader or the device for fastening the staples clamping the tufts or bunches to the brush-back and for nipping the clamped and stapled bunches or tufts when the latter are combed up, which mechanism also serves to carry the perfected bunches or tufts to the operator at the front of the machine and controls the opening and closing of the nippers, the vertical movement of the wire-spreader, and the transfer of the spreader from an inactive position at the front of the machine to an entering position over an open staple containing a tuft or bunch.

A turret-frame G is located at the front of the machine upon that side upon which the main drive-shaft B is located. In fact, the drive-shaft passes loosely through the turret-frame. At the top of the turret-frame a bearing 122 is formed, and in the said bearing the upper end of a vertical or transfer shaft 123

is mounted to turn, being provided with a collar 124 at its upper end, and the lower end of the vertical or transfer shaft, which is free, is over and a predetermined distance above the main shaft, as is shown in Fig. 3. At the lower end of the vertical or transfer shaft 123 a horizontal head 125 is securely fastened or integrally formed, having opposing downwardly-extending lugs 126 and 127. The lug 126 is adapted to be operated upon by a cam 128, secured on the main drive-shaft B, while the lug 127 is operated upon by a cam 129, also secured upon the main drive-shaft, which cams are shown in detail in Figs. 10 and 11, wherein it will be observed that the cam 128, which is adapted to turn the shaft so as to swing the mechanism thereon toward the operator or toward the front of the machine, has a peripheral surface 131 of the same radius, interrupted only by a segmental recess or depression 130, while the cam 129, which is adapted to turn the shaft 123 from the operator and bring the parts carried by the shaft over the open staple into which the bunch or tuft has been forced, is shown smaller than the opposite operating-cam 128, and the cam 129 has a peripheral surface 132, interrupted at one point by a segmental peripheral riser 133.

In fixing the cams 128 and 129 on the main driving-shaft the riser 133 of the cam 129 is opposite the depression or recess 130 in the cam 128, so that when the riser of the cam 129 engages the lug 127 of the head 125 of the transfer-shaft 123 the opposing lug 126 on the head of such shaft will be in the recess or depression 130 of the cam 128. The vertical transfer-shaft 123 is adapted to carry nippers H and a wire-spreader K, the nippers being adapted to grip the bunch or tuft when combed up by the fork E at the upward movement of the slide 93 and to hold the tuft or bunch in position while it is being carried to the operator to be received in a hole in the brush-back. The spreader K, as has been stated, is adapted to fix the flanges c^3 of the staples in the back of the brush after the staples and parts of the bunches or tufts carried thereby have been received in the apertures or holes in the back of the brush.

The spreader K differs from all others of its kind in that instead of being forced downward to effect a fastening of a staple in a brush-back the staple is fastened in the brush-back at the upward, outward, or withdrawal movement of the spreader. To the above end the transfer-shaft 123 carries three arms—an upper arm 134, a lower arm 136, and an intermediate arm 135—the said arms being in alinement or one above the other, and all of these arms are moved forward or rearward together at corresponding movements of the transfer-shaft 123. The upper arm 134 is a nipper-carrying arm, the intermediate arm 135 is a nipper-operating arm, and the lower arm 136 is the carrying-arm for the wire-spreader K. The upper or nipper-carrying arm 134 is provided with an integral or attached sleeve 137, usually secured tightly to the transfer-shaft 123 by a set-screw 138 or its equivalent, and a corresponding sleeve 139 is attached to or made integral with the nipper-operating arm 135, while a similar sleeve 140 is attached to or made integral with the carrying-arm for the wire-spreader K. The sleeves 139 and 140 are connected with the shaft 123 by means of feathers or their equivalents, so that the arms 135 and 136, while they cannot turn on the shaft 123, are capable of vertical or sliding movement on the shaft.

A spring 141 is shown interposed between the collar 137 of the nipple-carrying arm 134 and the upper edge of the sleeve 139 of the nipper-operating arm 135, and this spring 141 acts in a downward direction to accentuate the downward movement of the nipper-operating arm, the said arm being raised to place the spring 141 under tension by means to be hereinafter described. A spring 142 is likewise provided for the supporting-arm 136 of the wire-speader bearing against the opposing surfaces of the two sleeves 139 and 140, and the spring 142 serves to force the supporting-arm 136 for the wire-spreader downward when the wire-spreader is to be introduced into an open staple.

In order that the two sleeves 139 and 140 and the arms 135 and 136, connected therewith, shall move together at all times, a key 140^a is usually attached to the sleeve 140 of the wire-spreader-supporting arm, which key 140^a fits loosely in a keyway 141, made in the sleeve 139, for the nipper-operating arm.

Instead of the two sleeves 139 and 140 being feathered on the upright or transfer shaft 123 the upper sleeve 139 may be loosely mounted on the shaft, held from turning by the key 140^a, which yet permits the said sleeve to move lengthwise of the shaft, in which event the lower sleeve 140 is held in place, yet is free to slide on the shaft by passing a set-screw 160 through the sleeve 140 and into a groove 160^a, produced in the shaft 123, as is shown in Fig. 21.

The nippers H comprise two opposing members 143 and 144, pivoted by screws 145 or otherwise to the free end of the upper or nipper-carrying arm 134, as is shown in Figs. 21 and 22. The member 143 of the nippers H is provided with a substantially L-shaped foot 143^a, as is best shown in Fig. 3, while the opposing member 144 is provided with a horizontally-located and substantially U-shaped foot 144^a. This latter formation is given in order that the foot of the member 144 of the nippers may readily pass through the space between the upper and lower supports or carriers 26 and 27, as is shown in Fig. 21. The

foot-sections of the nippers are adapted to engage with the brush material secured in a staple after the said material has been brushed upward by the upward movement of the fork E, and said gripping contact with the members of the nippers is illustrated in Fig. 21 and likewise in Figs. 24 and 25.

Each member 143 and 144 of the nippers is provided with a triangular projection 145 from its upper edge, where the said members cross the nipper-operating arm 135, and the bottom of the projections or lugs 145 is upwardly and outwardly inclined. The members of the nippers H are normally separated by means of an interposed spring 146, secured to the nipper-carrying arm 134, and the inclined edges of the lugs 145 of the members of the nippers engage with blocks 147, secured to a face of the nipper-operating arm 135, so that when the nipper-operating arm 135 is carried upward the blocks 147 coming in contact with the inclined edges of the lugs 145, carried by the members of the nippers, serve to carry the said members in direction of each other and close the foot-sections against a tuft or bunch, firmly gripping and holding the same. When, however, the said nipper-operating arm drops downward, the spring 146 serves to spread the members of the nippers and disconnect the foot-sections of the said members from the bunch or tuft, as is shown in Fig. 22, and the downward movement of the nipper-operating arm 135, which is mainly through gravity, is assisted by the action of the spring 141.

The nipper-operating arm 135 is operated upward at proper time in the following manner: As is best shown in Fig. 3, an auxiliary arm 148 is carried downward from the sleeve 139 of the said nipper-operating arm, and at the bottom of this auxiliary arm 148 a horizontally-located foot 149 is formed, which is approximately of angular formation, so that one member of the said foot will be constantly over a cam 150, secured on the shaft B, as is shown in Fig. 22, no matter whether the nipper-operating arm is in an upper or in a lower position. This cam 150 is shown in Fig. 8, being of segmental construction and having an extended operating peripheral edge and an intermediate dead surface 151. While the foot 149, connected with the nipper-operating arm, is over this dead surface, the nipper-operating arm is in its lower position, being raised to its upper position when the true segmental peripheral surface of the cam engages with the said foot 149.

At the opposite side of the sleeve 140, connected with the wire-spreader-supporting arm, an auxiliary supporting-arm 152 is projected downward, terminating in a horizontal foot 153, which faces in an opposite direction to the foot 149, just mentioned, and both of the said feet 149 and 153 are of substantially the same formation. The foot 153, connected with the wire-spreader arm 136, is located over a cam 154, which is secured to the said main shaft B, which cam 154 is formed as is shown in Fig. 9, being of segmental formation of the same radius throughout, interrupted only at its periphery by a riser 159, and when this riser 159 engages with the foot 153 the supporting-arm 136 for the wire-spreader K is carried upward; but while the foot 143^a is over the true peripheral portion of the said cam 154 the spreader-supporting arm 136 is in its lowest position, (shown in Fig. 21,) being dropped to such position by gravity and through the assistance of the spring 142.

The wire-spreader is best shown in Figs. 22, 24, 25, and 26 and consists of a body-section 161, which is attached to the free end of its supporting-arm 136, and a bottom substantially wedge-shaped section 162, having a marginal groove 163 therein. Just as soon as the staple has been formed and the tuft or bunch has been forced into the staple the shaft 123 is turned by the action of the cam 129 away from the operator, thus bringing the wire-spreader over the staple, with the triangular or wedge-shaped bottom section 162 in such position that transversely the said bottom or spreading section of the spreader will have its side edges facing in direction of the sides of the staple. While the spreader is being carried to this position its supporting-arm 136 is in its upper position and the nipper-operating arm 135 is in its lower position; but as soon as the spreader arrives over the staple its supporting-arm 136 is released by its cam 154, and the bottom or spreading section of the spreader enters the staple, as is shown in Fig. 24, and at this time the female dies are brought to their third position and clamp the upper portion of the staple upon the bottom or spreading section of the spreader, the limbs of the staple at the top entering the side grooves 163 in the said lower portion of the spreader, while the bottom portion of the staple is clamped around the tuft or bunch. The fork E now moves upward to comb the tuft or bunch upward, and the cam 151 then acts to carry the nipper-operating arm upward, closing the nippers on the bunch or tuft. Just at this time, with the nippers and spreader in the position described, the cam 128 acts to turn the shaft 123 toward the operator, the nippers taking the tuft with them. A brush-back suitably bored is then presented, preferably by hand, to the tuft or bunch and pressed up against the same until the secured portion of the tuft or bunch, together with a staple, has entered the desired hole in the brush-back. At such time the cam 154 acts to carry up the spreader-arm 136, as is shown in Fig. 22, whereupon the spreader is withdrawn from tuft and the staple, and upon such withdrawal the wedge-shaped lower portion 162 of the spreader forces the flanged portions c^3 of

the staple in opposite directions, embedding them in the brush-back at opposite sides of the hole in which the bunch is received, thus securely fastening the staple in place and securing the bunch or tuft in position.

It will be observed that the flanges of the staple are so forced into the brush-back that in order to pull out the tuft or bunch from the back of the brush it would be necessary for a considerable amount of the wood or material of the brush-back to be torn away. It is also obvious that by fastening the staple in the brush-back at the withdrawal action of the spreader but little or no strain need be sustained by the party holding the brush-back. It is also obvious that the material can be placed in a very small hole and that to completely fill the same, or small material may be securely fastened in a large hole, and that comparatively little power is required to effect a complete fastening of the staple to the brush-back, whereas considerable force is required and a large opening is necessary when a spreader or equivalent device for fastening a staple has clenching action downward or in direction of the brush-back. As soon as the spreader is withdrawn and at just about the time it is withdrawn the nippers are released from engagement with the tuft or bunch.

The general operation may be stated as follows: The brush material is fed out simultaneously with the withdrawal of the front stock-piece from the needle, and the wire is fed out to its proper length. The male die is now moved toward the female dies, and the female dies move upward in opposite directions, one of them cutting the projecting section of the wire, and the said female dies assume their second position, forming a staple upon the male die from the cut section of the wire, whereupon the male die recedes. The needle now descends, also the fork and the separating-fingers for the brush material, whereby a tuft or bunch is formed and is forced into the open staple, all of which is done while the shaft 123 is turning away from the operator to bring the wire-spreader over the staple. The wire-spreader is now dropped into the staple and the female dies assume their third position, locking the staple firmly around the bunch or tuft and more or less tightly around the wire-spreader, and the separator-shafts act to force the separating-fingers in opposite directions, completely separating the bunch or tuft from the supports or carriers 26 and 27. Next, through the upward movement of the slide 93 the hooks of the fork E comb the free portions of the tuft or bunch upward, and at about the same time the front stock-piece closes up against the needle and rises with it and the fork and the separating-fingers. The nippers now close upon the combed bunch or tuft and grip the same, and the female dies return to their normal or first position. The shaft 123 now swings toward the operator or the front of the machine, carrying the tuft or bunch with it held by the nippers and with the spreader in the tuft or bunch and the staple. The brush-back is presented by hand or by any of the means commonly known in the art, and when the tuft or bunch has been received in the brush-back the wire-spreader is withdrawn from the staple, fastening or anchoring the latter in the brush-back, and as soon as the spreader is withdrawn the nippers release their hold and the shaft 123 is ready to again turn inward.

It will be observed that the action of the machine is mechanical and automatic throughout from the first to the last operation in preparing a staple, securing a tuft in the staple, and presenting the secured tuft to a brush-back. The manual application of the brush-back to the machine, however, is much to be preferred for obvious reasons.

It will be observed that the male and female dies have common centers, and it is also obvious that when the spreader is constructed and acts as in my machine the spreader can be made comparatively light, whereas when a staple-fastening device operates downward or in a reverse direction to the spreader shown it is necessary that the fastening device should be made very heavy and that a solid support should be provided for the brush-back. It is further obvious that the staple is placed with relation to the spreader with a positive mechanical movement, thereby preventing any mishap or misplacement, rendering the application of the staple under all conditions of action accurate and sure, as should the staple be not properly and accurately placed to receive the tuft and the spreader all the other operations are of no avail.

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

1. In a machine for placing tufts in brush-backs, a staple-forming mechanism, mechanism for forming a tuft and forcing the tuft into a staple, a spreader adapted to enter the staple above the tuft, means for compressing the staple upon the tuft and spreader, means for effecting the entry of the stapled tuft with the spreader in a brush-back, and means for withdrawing the spreader, as set forth.

2. In a machine for placing tufts in brush-backs, mechanism for forming and stapling a tuft, and an anchoring device for anchoring the stapled tuft in the apertures of a brush-back, the anchoring device being adapted to enter the staple above the tuft whereby it will have an anchoring action while being withdrawn from the stapled tuft, as set forth.

3. In a machine for placing tufts in brush-backs, a mechanism for forming and stapling a tuft, an anchoring device adapted to enter the staple above the tuft and having spreading action in the staple of the tuft while the lat-

ter is in a brush-back and it is being withdrawn from the brush-back, and means for automatically operating the anchoring device and the tuft-forming and stapling mechanism, as described.

4. In a machine for placing tufts in brush-backs, a wire-feed mechanism, dies for cutting the wire in lengths and forming the cut lengths into staples, a tuft-forming device, and means for forcing the tuft into the staple, the staple-forming dies serving also to compress the staple on the tuft, as described.

5. In a machine for placing tufts in brush-backs, means for forming and compressing a staple, means for forming a tuft and inserting the same into the staple, and a staple-spreader adapted to be inserted in the staple above the tuft, the staple being first formed and subsequently compressed around the tuft and spreader by the staple-forming means, as set forth.

6. In a machine for placing tufts in brush-backs, means for forming and compressing a staple, means for dividing the brush fiber and inserting the divided fiber into the staple, the staple being first formed and subsequently compressed around the brush fiber, a spreader mounted upon a rotatable support and having vertical movement, which spreader is adapted to enter the staple above the inserted tuft prior to the compressing of the staple, and means substantially as described, for withdrawing the spreader from the staple, whereby at such time to force opposing members of the staple in opposite directions for the purpose described.

7. In a machine for placing tufts in brush-backs, mechanism for forming and stapling a tuft, a spreader, and means for locating the spreader in the staple above the tuft and before the staple is closed on the tuft and then withdrawing it from the staple, as described.

8. In a machine for placing tufts in brush-backs, means for inserting a tuft into a staple, a spreader adapted to enter the staple after it has received the tuft, devices for clamping the staple around the tuft and the spreader, and mechanism, substantially as described, for withdrawing the spreader, which at its withdrawal expands the staple above the tuft without affecting the clamping engagement of the staple with the said tuft, as described.

9. In a machine for placing tufts in brush-backs, means for applying a staple to a tuft, a spreader having an enlarged lower end around which the staple is clamped, and means for inserting the spreader in the staple before the stapled tuft is inserted in a brush-back and for withdrawing the spreader after the stapled tuft has been placed in a brush-back, as and for the purpose described.

10. In a machine for placing tufts in brush-backs, means for placing a tuft in a staple, a spreader having a wedge-shaped lower end, means for inserting the spreader in the staple above the tuft, means for closing the staple around the tuft and around the wedge-shaped section of the spreader, and means for withdrawing the spreader from the staple, whereby at such time to force the upper portions of the staple outward or in opposite directions, as described.

11. In a machine for placing tufts in brush-backs, means for placing a tuft in a staple, a spreader having a wedge-shaped lower end, adapted to be temporarily confined in the staple above the brush material, means for closing the staple around the tuft and around the wedge-section of the spreader, nippers adapted to engage with the tuft above and at opposite sides of the staple, means for withdrawing the spreader from the staple, whereby at such time to force the upper portions of the staple outward or in opposite directions, and means for releasing the nippers from engagement with the said tuft after the withdrawal of the spreader therefrom, as set forth.

12. In a machine for placing tufts in brush-backs, means for placing a tuft in a staple, a spreader adapted to be inserted in the staple above the tuft, a compressing device for compressing the staple upon the tuft and spreader, means for swinging the stapled tuft with the spreader in the staple above the tuft to one side, and means for withdrawing the staple to expand the same above the tuft, as specified.

13. In a machine for placing brush-tufts in brush-backs, a support, cylinders mounted to turn one upon the other in opposite directions within the support, female dies carried by the cylinders, and a male die having sliding movement within the inner cylinder, to and from the working faces of the female dies, as specified.

14. In a machine for placing tufts in brush-backs, oppositely-movable female dies having their working faces in opposition, a male die having a working surface corresponding to the working surfaces of the female dies, the male die having movement to and from the female dies, means substantially as described, for simultaneously moving the female dies to predetermined positions and timing the movements of the said female dies, and independent mechanisms for moving the male die to the female dies in one position of the latter, and withdrawing the male die from the female dies, as specified.

15. In a machine for placing tufts in brush-backs, a wire-guide, a feed for the wire, and a staple-forming mechanism comprising female dies mounted to move in opposite directions, one of which female dies is provided with a cutting-surface adapted to sever the wire in a length suitable for a staple when the wire is fed over the female dies, and a male die upon which the staple-wire is bent by the female dies, the male die having movement to

and from the female dies and independent mechanisms for controlling the movements of the male and the female dies, as described.

16. In a machine for placing tufts in brush-backs, a mechanism for feeding brush fiber, a tuft-divider acting upon said fiber, a staple-forming device, a device for forcing a tuft into the staple, a spreader adapted to initially enter the staple above the brush fiber, means for clamping the staple upon the brush fiber and around the spreader, a device for brushing up the clamped fiber, and means for withdrawing the spreader to expand the staple, as described.

17. In a machine for placing tufts in brush-backs, a mechanism for feeding brush fiber, a tuft-divider acting upon the fiber, a wire-feed, a combined wire-cutter, and staple-forming mechanism, a device for forcing a tuft into the staple and brushing the projecting portions of the tuft upward, a spreader initially entered into the staple above the tuft, means for clamping the staple upon the tuft and around the spreader, nippers arranged to grasp the stapled tuft, rotatable mechanism carrying the spreader and the nippers, and means substantially as described for operating the spreader and nippers supports, as set forth.

18. In a machine for placing tufts in brush-backs, a spreader for a staple of a tuft, comprising a body and a tapering spreading-section widest at its bottom, as described.

19. In a machine for placing tufts in brush-backs, a spreader for a staple for a tuft, comprising a body and a tapering wedge-shaped spreading-section, widest at its bottom and provided with a marginal groove, as described.

20. In a machine for placing tufts in brush-backs, a carrier for brush fiber, a feed for the carrier, a slide operating transversely with relation to the carrier, a parting-needle for the brush fiber, carried by the slide and adapted to separate a tuft from the mass of such fiber, separating-fingers adapted to cleanly divide the tuft from the mass of brush-fiber and draw said tuft cleanly from the carriers, and means for moving the separating-fingers laterally in opposite directions, as described.

21. In a machine for placing tufts in brush-backs, a carrier for brush fiber, a feed for the carrier, a slide operating transversely with relation to the carrier, a parting-needle for the brush fiber, carried by the slide and adapted to separate a tuft from the mass of such fiber, separating-fingers adapted to cleanly divide a tuft from the mass of brush fiber and draw said tuft cleanly from the carriers, means for moving the separating-fingers laterally in opposite directions, a front stock-piece, movable with the slide, and adapted in one direction for engagement with the needle and in another position to be spaced from the needle, as specified, and mechanism for moving the front stock-piece to and from the needle.

22. In a machine for placing tufts in brush-backs, a carrier for brush fiber, a feed for the carrier, a slide operating transversely with relation to the carrier, a parting-needle for the brush fiber, carried by the slide and adapted to separate a tuft from the mass of fiber, separating-fingers adapted to cleanly divide the tuft from the mass of brush fiber and draw said tuft cleanly from the carriers, means for moving the separating-fingers laterally in opposite directions, a front stock-piece movable with the slide and adapted in one position for engagement with the needle and in another position to be spaced from the needle, and mechanism controlled by the feed device, for moving the stock-piece to and from the needle.

23. In a machine for placing tufts in brush-backs, carriers for brush fiber, a feed device for the carriers, a slide arranged for movement at an angle to the path of movement of the carriers, tuft-separators carried by the slide and adapted to act upon the fiber in the carriers, a staple-forming device, and a fork carried by the slide having pressure and brushing members for the tuft, the pressure members being adapted to force the tuft into the staple and the brushing members to brush the projecting portions of the tuft upward away from the staple, as set forth.

24. In a machine for placing tufts in brush-backs, a carrier for brush fiber, a parting-needle operating to separate the brush fiber into tufts while in the carrier, and a front stock-piece serving as an abutment for the fiber in the carrier and to gage the thickness of the tuft, which front stock-piece is movable with the needle and has independent movement to and from the needle, as described.

25. In a machine for placing tufts in brush-backs, a carrier for brush fiber, comprising parallel bars, clamps for the bars, a feed-shaft, a feed connection between the feed-shaft and carrier, and a slide operating at an angle to the path of the carrier, a parting-needle, and separating-fingers.

26. In a machine for placing tufts in brush-backs, a carrier for brush fiber, consisting of parallel bars, clamps for the bars, a feed-shaft, a feed connection between the feed-shaft and carrier, a slide operating at an angle to the path of the carrier, a parting-needle, separating-fingers, a combined pressure and combing device carried by the slide and arranged to act upon the brush fiber, and means substantially as described, for rocking the carrier downward when the material carried thereby is subjected to the combined pressure and brushing device, and for automatically restoring the carrier to its normal position after the said pressure and brushing device is operated, as set forth.

27. In a machine for placing tufts in brush-backs, means for forcing a tuft into a staple, means for clamping the staple on the tuft,

and means for brushing the ends of the tuft upward after it has been clamped in the staple, as set forth.

28. In a machine for placing tufts in brush-backs, means for clamping a staple upon a tuft of brush fiber, and a reciprocating device for forcing a tuft into a staple when moving in one direction and prior to the staple being clamped upon the tuft, and brushing the ends of the tuft upward when moving in the other direction and after the staple has been clamped upon the tuft, as described.

29. In a machine for placing tufts in brush-backs, means for clamping a staple upon a tuft of brush fiber, and a reciprocating fork having each of its members terminating in a hook, and provided above the hook with a pin, as described.

30. In a machine for placing tufts in brush-backs, means for applying a staple to a tuft, a spreader device, means for placing the spreader in the tuft while in the staple and before the staple is clamped thereupon, a swinging device for gripping the stapled tuft and swinging it in position to enter an aperture of a brush-back, and means for withdrawing the spreader after the stapled tuft has been inserted in the aperture of the brush-back, as described.

31. In a machine for placing tufts in brush-backs, a feeding device, a tuft-forming device, means for applying a staple to the tuft, a spreader, means for placing the spreader in the tuft while in the staple and before the staple is clamped thereupon, swinging nippers for grasping the stapled tuft and swinging it in position to enter an aperture in a brush-back, and means for withdrawing the spreader after the stapled tuft has been inserted in the aperture of the brush-back, as described.

32. In a machine for placing tufts in brush-backs, a feeding device, means for cutting off a length of wire and forming it into a staple, means for forming a tuft and placing the same in the staple, a spreader, means for placing the spreader in the tuft and while in the staple, the staple-forming means also serving to compress the staple upon the tuft and spreader, swinging nippers for grasping the stapled tuft and swinging it in position to enter an aperture of the brush-back, and means for withdrawing the spreader after the tuft has been inserted in the aperture of the brush-back, as described.

33. In a machine for placing tufts in brush-backs, a staple-forming mechanism, mechanism for forming a tuft and placing it in a staple, a spreader adapted to enter the staple above the tuft, the staple-forming mechanism also serving to compress the staple upon the tuft and spreader, nippers for gripping the tuft above the staple, a swinging device carrying the spreader and nippers, means for withdrawing the spreader, and mechanism for releasing the nippers after the withdrawal of the spreader, as set forth.

34. In a machine for placing tufts in brush-backs, means for stapling a tuft, a swinging support, nippers carried by the support for engaging the tuft above the staple to carry the stapled tuft to a position to enter a brush-back, and means for releasing the nippers after the stapled tuft has entered the brush-back, as set forth.

35. In a machine for placing tufts in brush-backs, means for placing a tuft in a staple, a spreader adapted to enter the staple above the tuft, means for compressing the staple upon the tuft and spreader, a swinging and sliding support carrying the spreader, nippers for gripping the tuft above the staple, a swinging and sliding support carrying the nippers and swinging in unison with the spreader-support, and means for withdrawing the spreader, as set forth.

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.