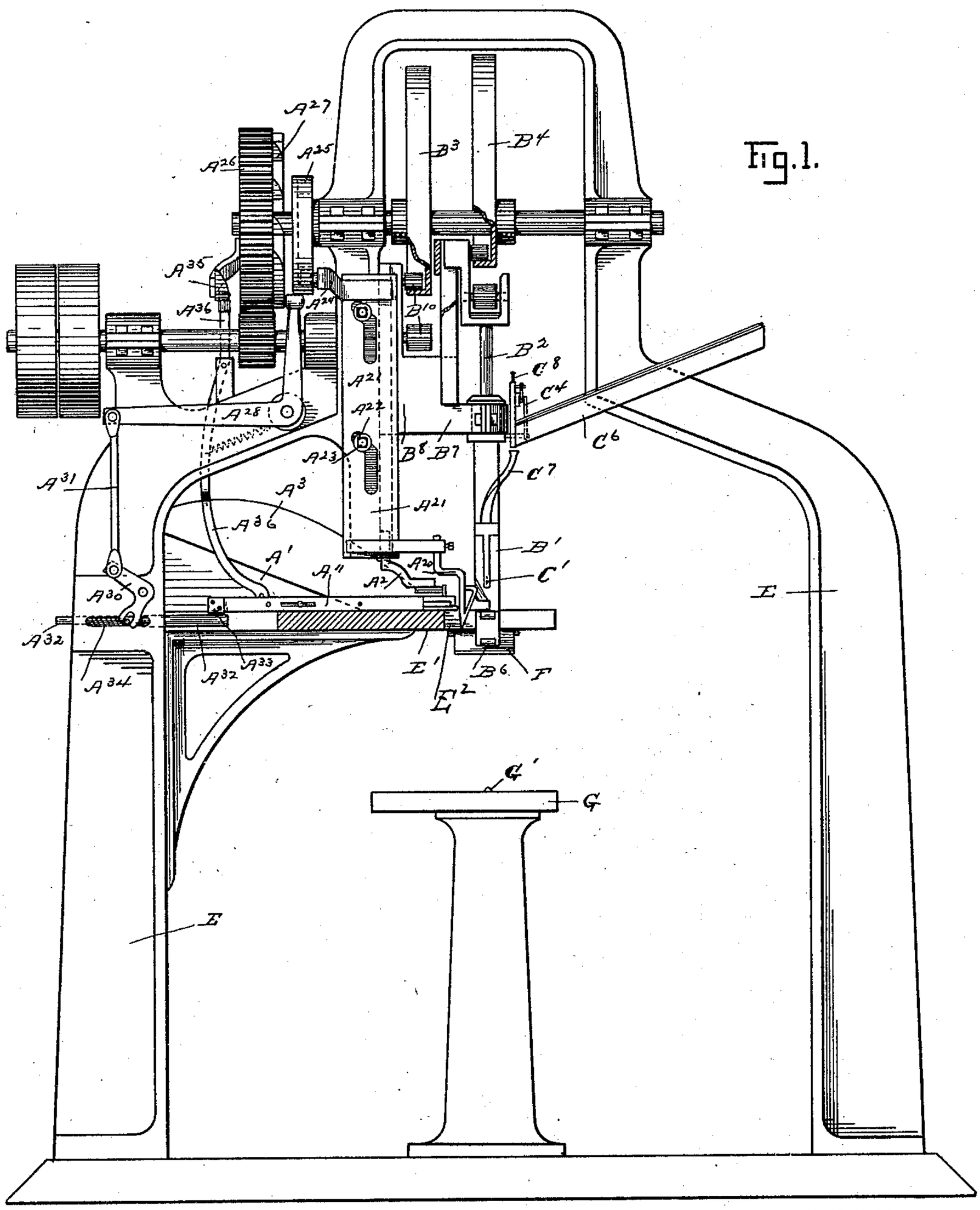
(No Model.) 7 Sheets—Sheet 1.

# W. C. READ.

## BRUSH MACHINE.

No. 596,715. Patented Jan. 4, 1898.

Fig. 1.

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## BRUSH MACHINE.

No. 596,715. Patented Jan. 4, 1898.

Fig. 2.

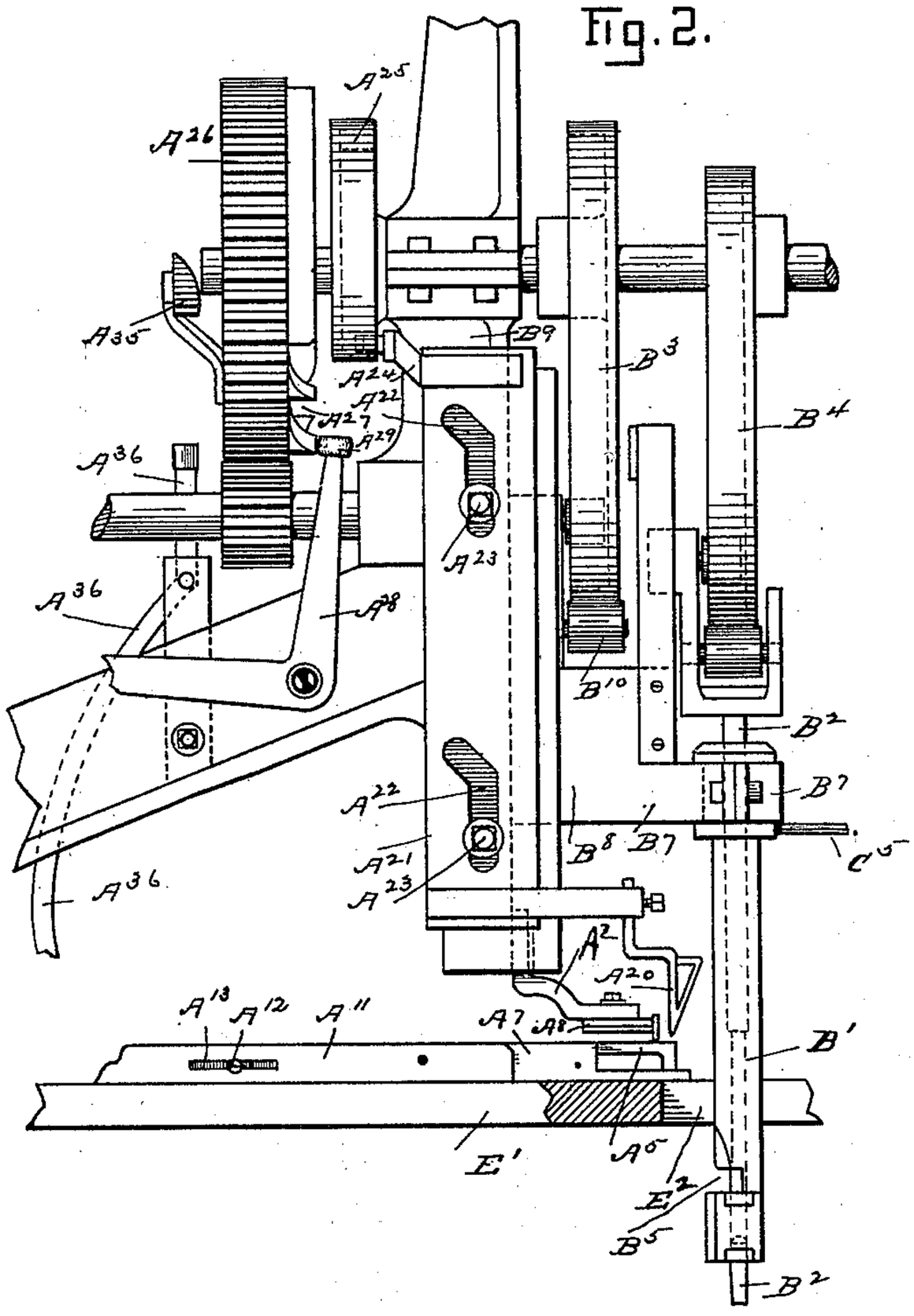
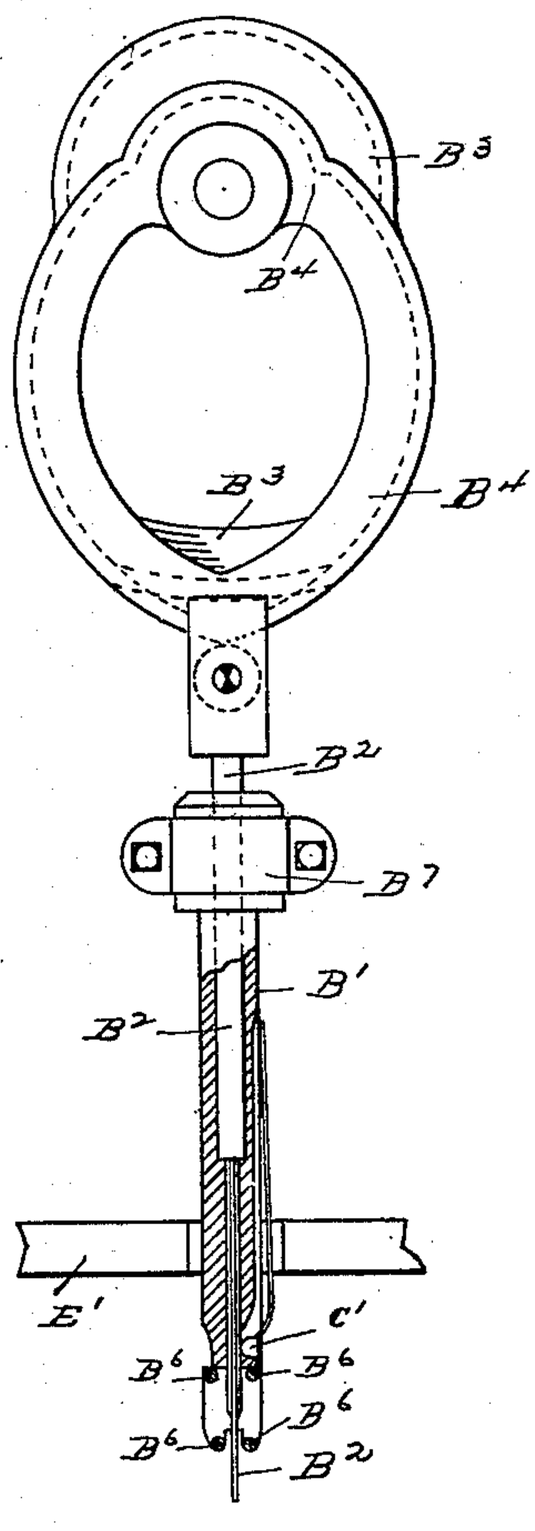



Fig. 3

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## BRUSH MACHINE.

No. 596,715. Patented Jan. 4, 1898.

Fig. 4.

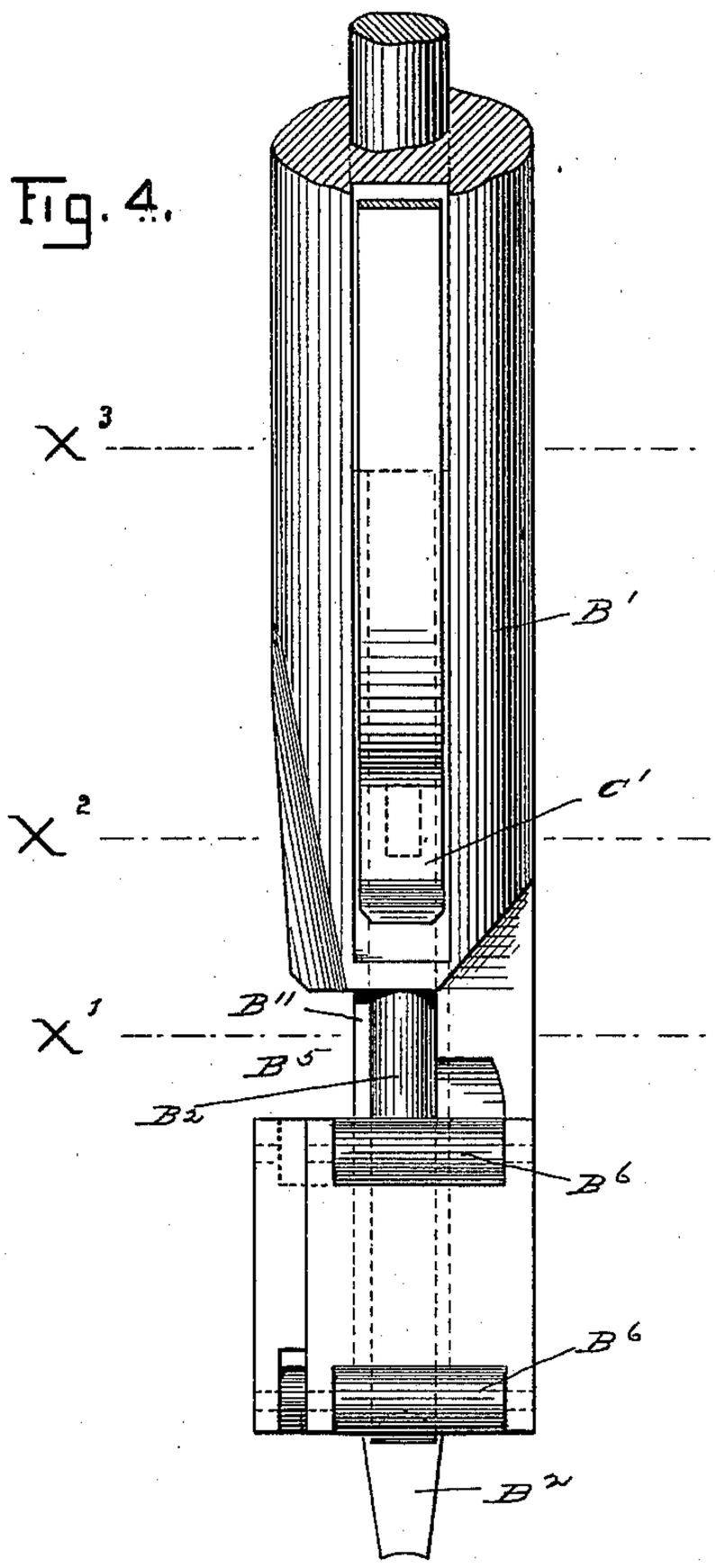



Fig. 5.

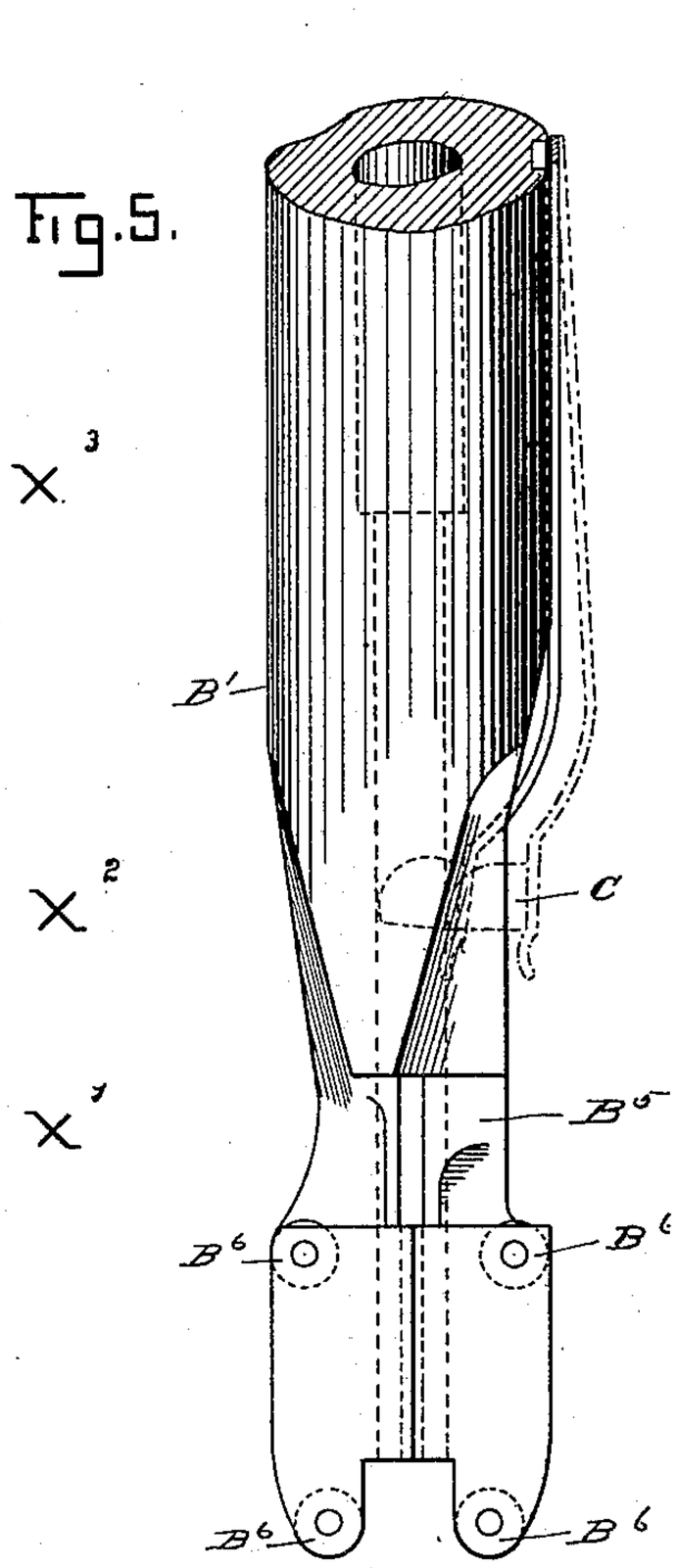



Fig. 6.

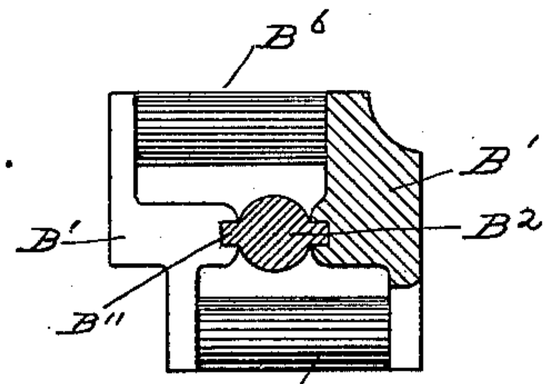



Fig. 7.

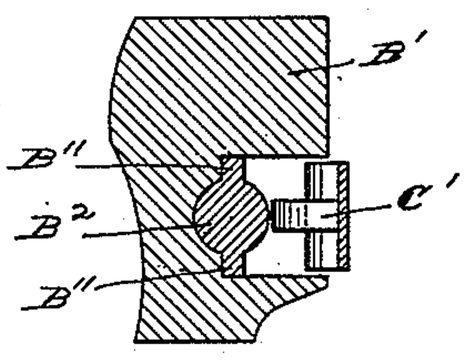
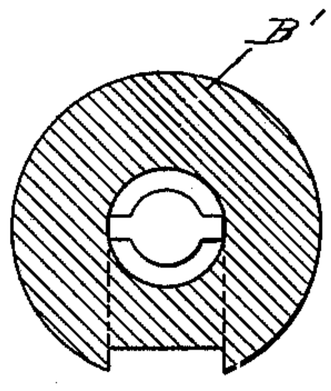



Fig. 8




WITNESSES

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## BRUSH MACHINE.

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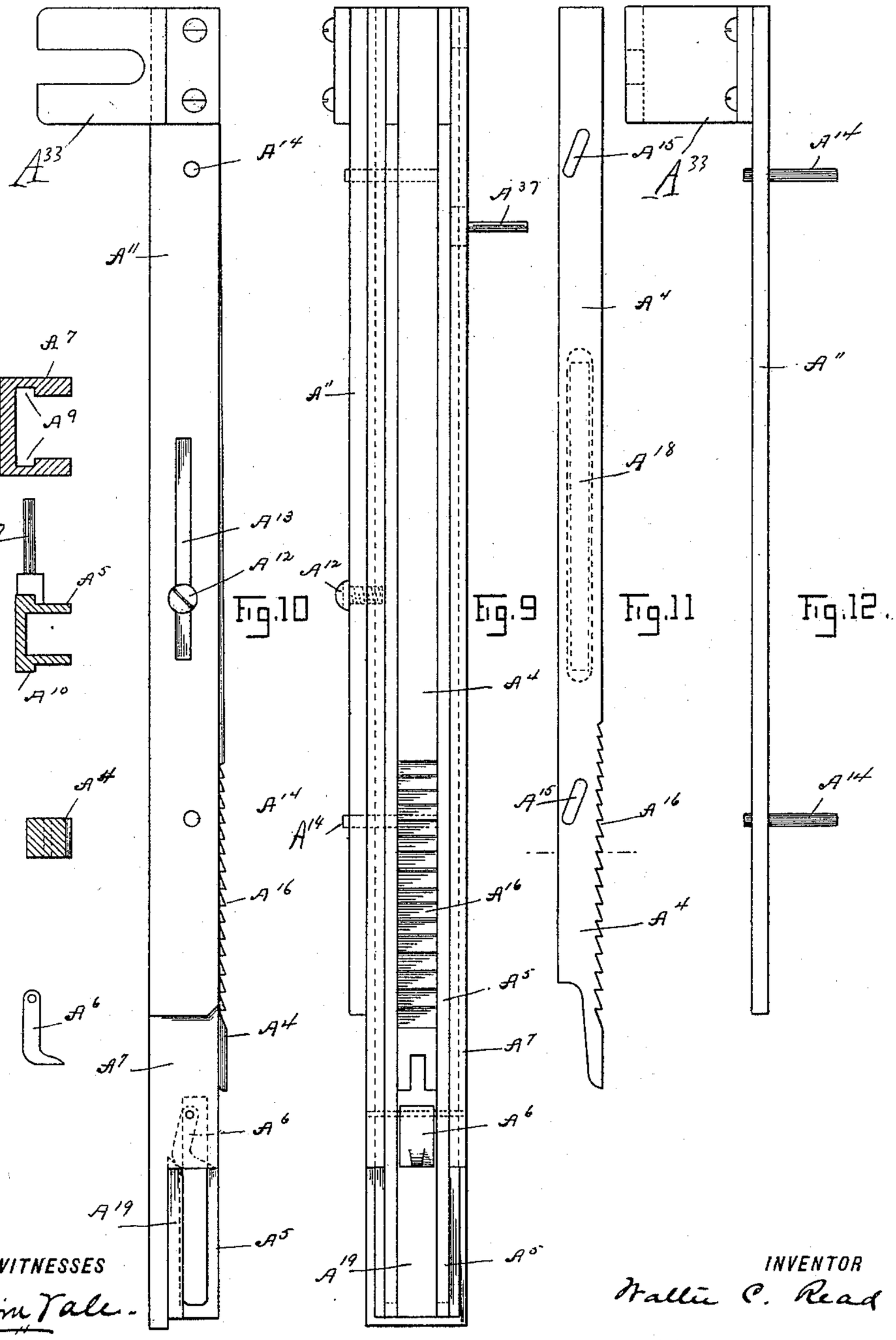


Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 10

Fig. 9

Fig. 11

Fig. 12

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## BRUSH MACHINE.

No. 596,715. Patented Jan. 4, 1898.

Fig. 17.

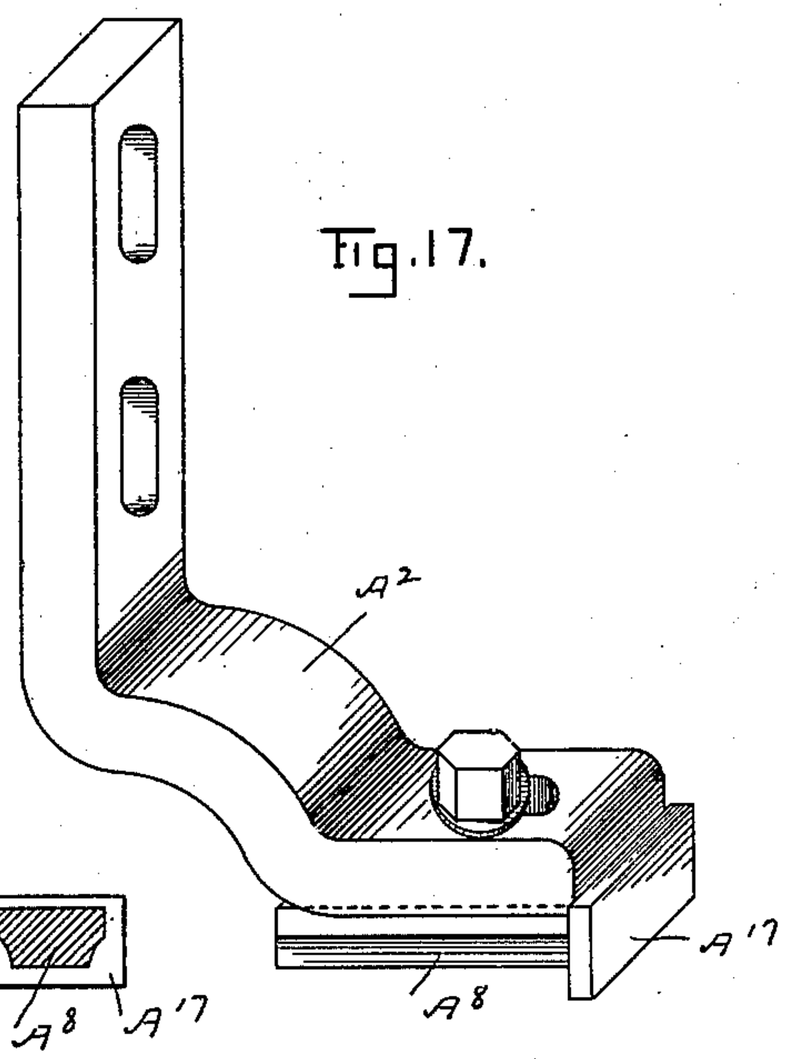


Fig 18.

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## BRUSH MACHINE.

No. 596,715. Patented Jan. 4, 1898.

Fig. 19.

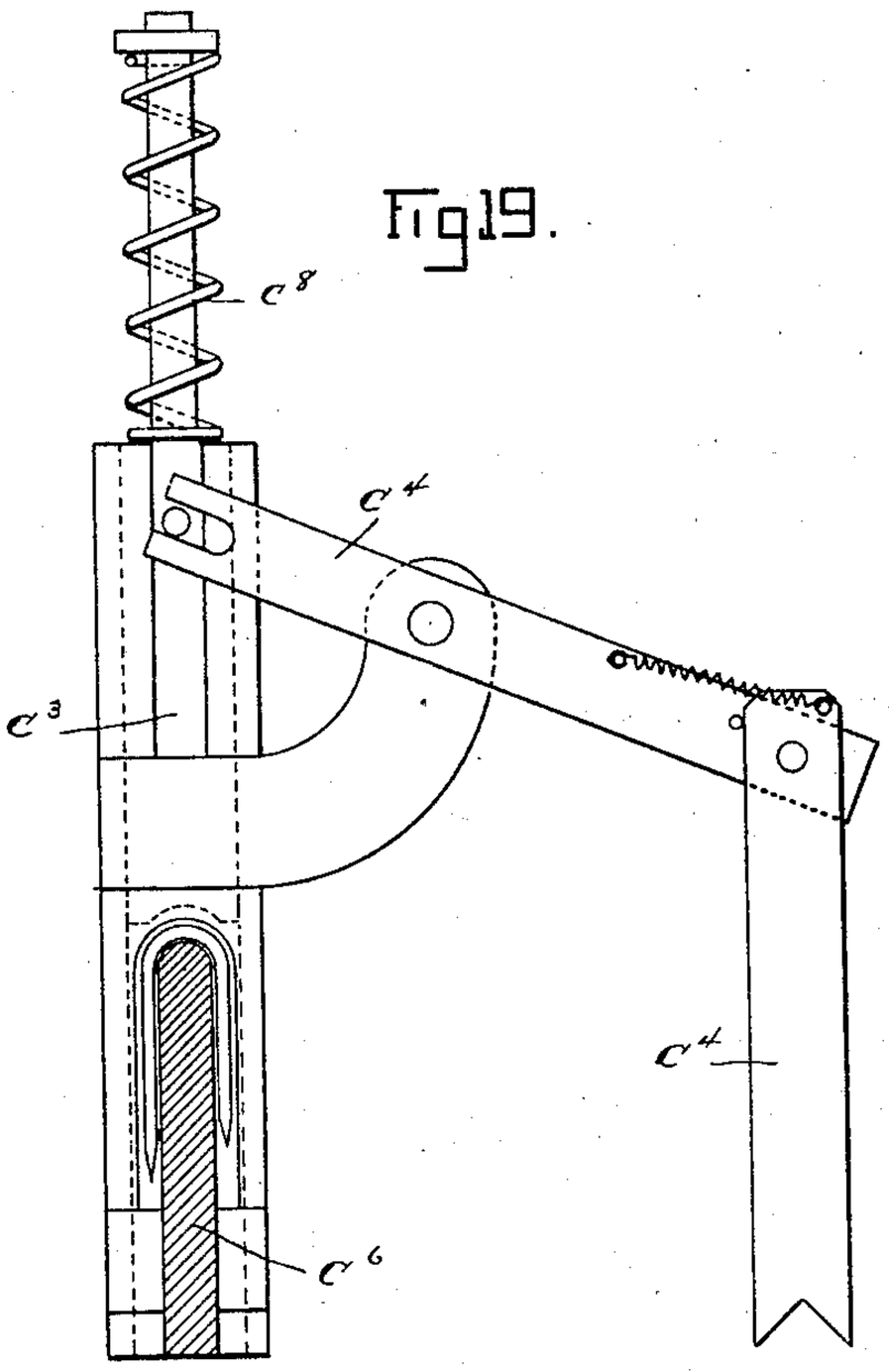
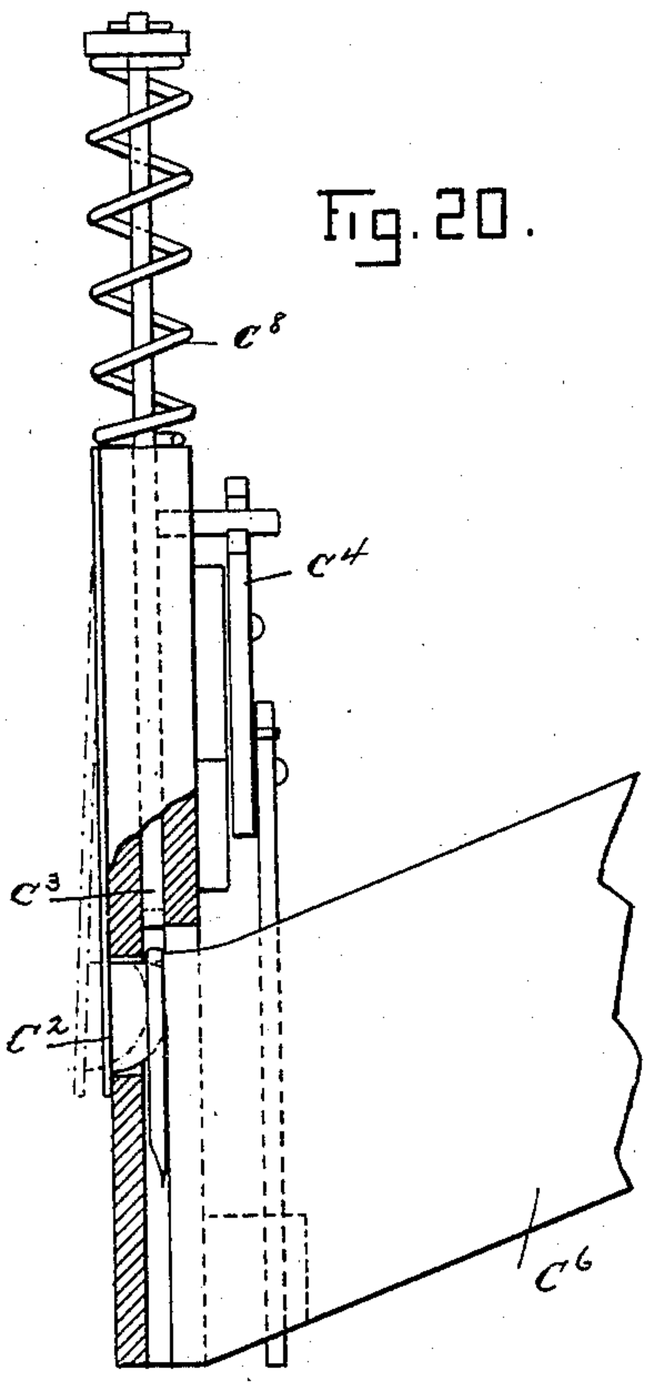



Fig. 20.

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## BRUSH MACHINE.

No. 596,715. Patented Jan. 4, 1898.

Fig. 21

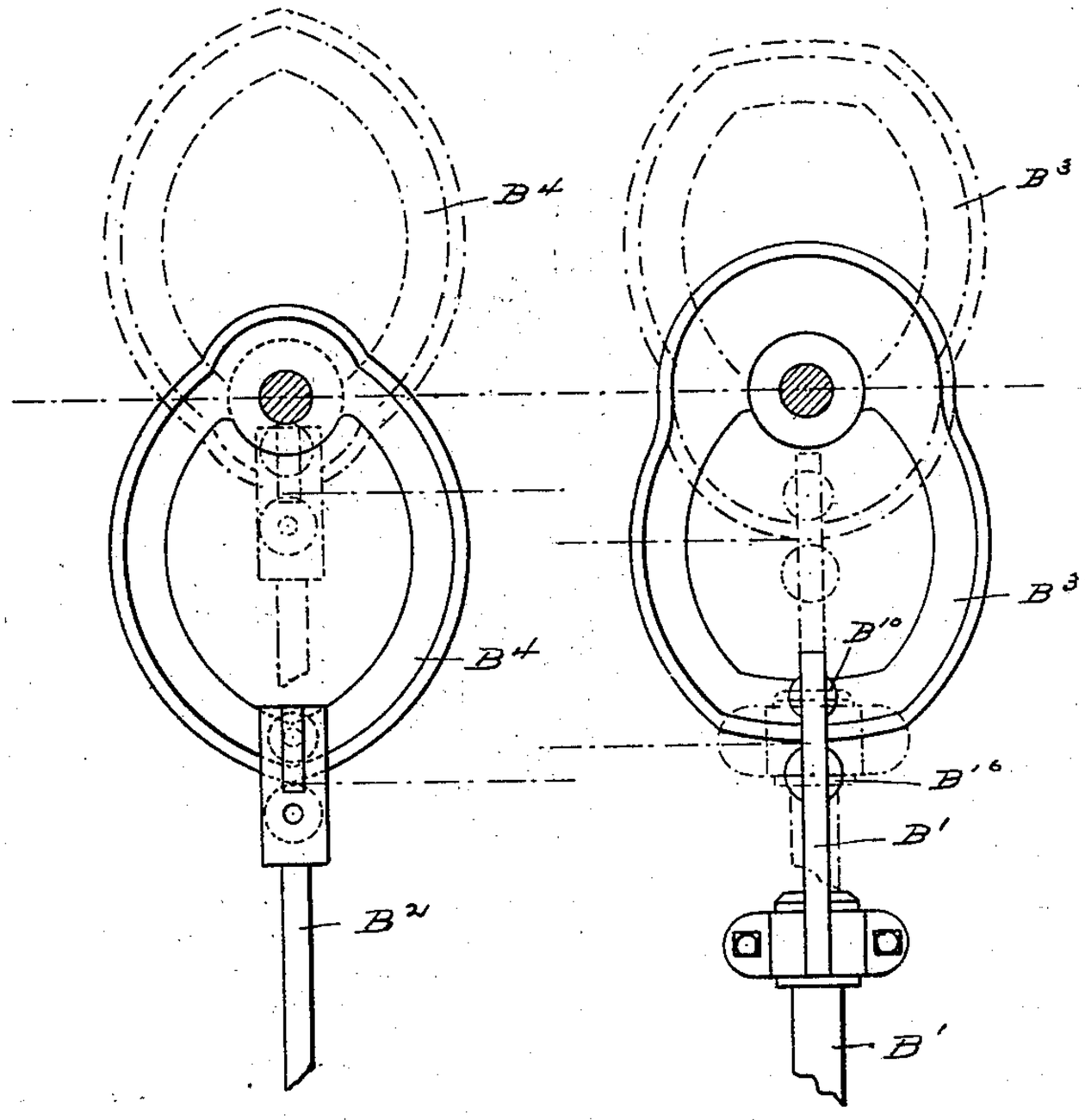
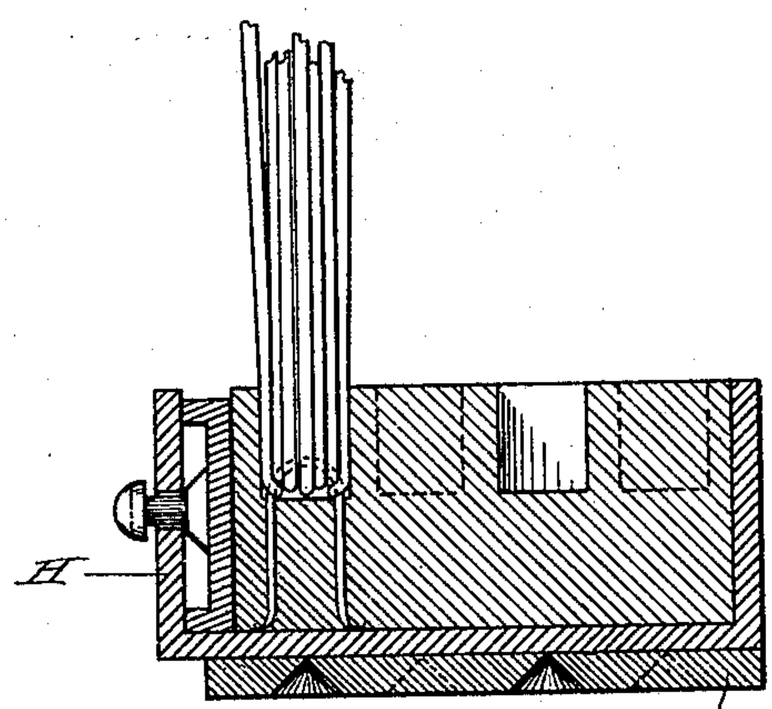



Fig. 22.

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# UNITED STATES PATENT OFFICE.

WALTER C. READ, OF OAKLAND, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE CLINCH BROOM MANUFACTURING COMPANY, OF CALIFORNIA.

## BRUSH-MACHINE.

SPECIFICATION forming part of Letters Patent No. 596,715, dated January 4, 1898.

Application filed August 6, 1896. Serial No. 601,908. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER C. READ, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Machines for Making Brushes; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to improvements in machines for making brushes, and more particularly to that class of machines for making brushes from ratan or other heavy material.

The objects which are sought to be attained by this invention are, first, rapidity and cheapness of manufacture of the brushes; second, regularity in the size and shape of the tufts of fibrous material of which the brush is composed, and, third, certainty of securing the tufts in position. These objects I attain by the herein-described invention, which consists in providing a feeding mechanism to sort out and deliver the material, in providing a driving mechanism to force the fastenings for the tufts into the back of the brush, and in providing a driving mechanism to operate the different above-mentioned mechanisms in harmony.

In the drawings, Figure 1 is a side elevation of the invention. Fig. 2 is an enlarged detail, in side elevation, of the driving mechanism. Fig. 3 is an enlarged detail of the plunger and cam for forcing the fastenings for the tufts. Fig. 4 is an enlarged detail, in side elevation, of the end of the plunger and driving-rod. Fig. 5 is an enlarged detail, in front elevation, of the same, the driving-rod being removed. Fig. 6 is a detail in cross-section taken on the line X′ X′ in Fig. 4. Fig. 7 is a detail in cross-section taken on the line $X^2$ $X^2$ in Fig. 4. Fig. 8 is a detail in cross-section taken on the line $X^3$ $X^3$ in Fig. 4. Fig. 9 is a detail in plan of the bunching mechanism. Fig. 10 is a side elevation of the same. Fig. 11 is a detail side elevation of the stuffing-bar of the bunching mechanism, the dotted lines showing a flat bowed spring, which is set in a slot, likewise shown in dotted lines in the opposite side of the said stuffing-bar. Fig. 12 is a detail in plan of the driving-plate of the stuffing-bar. Fig. 13 is a cross-section in detail of the casing for the bunching mechanism. Fig. 14 is a cross-section of the thrusting-bar of the bunching mechanism. Fig. 15 is a cross-section of the stuffing-bar shown in Fig. 11. Fig. 16 is a detail in side elevation of the separating-trigger of the bunching mechanism. Fig. 17 is a detail in perspective of the feed-gage. Fig. 18 is a cross-section of the shoe of the feed-gage. Fig. 19 is a detail in front elevation of the staple-feed. Fig. 20 is a side elevation of the same. Fig. 21 is a comparative view in elevation of the cams for operating the bending and fastening mechanism, and Fig. 22 is a cross-section of the brush made by this invention incased in its registering-templet.

The article for the manufacture of which this invention is particularly designed is a brush the tufts of which are composed of ratan or other heavy material. These tufts are secured in a block or back prepared with a series of holes bored partly through the block, the fastening consisting of staples. The staples are clenched after being driven through the block to prevent their falling out or loosening.

For convenience of description, with reference to the drawings, the various groups of instrumentalities for the accomplishing certain functions are given a common letter, while each distinct part or device of the groups is assigned a distinguishing numeral in conjunction with the common letter. Thus the bunching mechanism, the function of which is to separate the required quantity of material to form the tufts from the stock and feed the same, is given the common letter A, while the mechanism which receives, bends, and fastens the tufts in the block or back is given the common letter B, to the delivering mechanism for the fastening devices is given the common letter C, to the driving mechanism by which power is imparted to the various above-mentioned mechanisms is given the letter D, and to the frame and stationary parts the distinguishing letter E is assigned.

The stock or ratan is placed on the operating-table E′ and the ends are rested on the

inclined tracks A′, which are slanted toward the feed-gage $A^2$, so as to carry the stock forward against the heel of the same. The stock is maintained in line by two side or check boards $A^3$. To separate the stock so as to form the tufts or bunches forming the tufts is the office of the stuffing-bar $A^4$, thrusting-bar $A^5$, and separating-trigger $A^6$. (Shown in Figs. 9 to 16.)

The casing $A^7$, in which the stuffing-bar, thrusting-bar, and trigger operate, is fastened stationarily to the feed-table E′ and its upper edges rest a short distance under the foot $A^8$ of the feed-gage, separated therefrom the thickness of a single strand of the ratan being handled. In slots $A^9$, formed inside the said casing, are extended the flanges $A^{10}$ of the thrusting-bar $A^5$. This bar is channeled, as shown at Fig. 14, to receive the stuffing-bar $A^4$. The upper edges of the sides of the thrusting-bar are flush with those of the casing and are extended under the entire length of the foot $A^8$ of the feed-gage. It is upon these upper edges of the thrusting-bar that the required amount of stock to form the tufts are deposited by the stuffing-bar $A^4$.

In its operation the stuffing-bar is reciprocated rapidly in the channel of the thrusting-bar $A^5$. In this operation it is actuated by the connecting-plate $A^{11}$, which is engaged to the driving mechanism, which produces the reciprocating action, as hereinafter described. The plate $A^{11}$ is secured in position on the casing $A^7$ by the flat-headed screw $A^{12}$, the shank of which is extended through the slot $A^{13}$ in the said plate, which acts as a guide to maintain the same in line. The stuffing-bar $A^4$ is engaged by the pins $A^{14}$, which are extended through elongated slots in the side of the casing and thrusting-bar and inserted in the inclined slots $A^{15}$ $A^{15}$ in the stuffing-bar. When now the plate $A^{11}$ is driven back and forth, the stuffing-bar is given the double action of beating back and forth lengthwise of the channel in the thrusting-bar, and also that of being raised above the upper edges of the casing $A^7$ during its forward movement and of being lowered below the said edges during the backward movement. These latter actions are imparted by the connections of the pins $A^{14}$ in the inclined slots $A^{15}$, for the reason that as the plate $A^{11}$ is drawn back the pins $A^{14}$ are drawn to the rear and highest part of the slots $A^{15}$, and the pins being operated on a level it will be seen that the bar is depressed when the pins engage the rear end of the slots. The reverse action and effect are produced on the forward thrust of the stuffing-bar. The purpose of this raising and lowering the stuffing-bar in its forward and rearward movement is to carry it freely under the stock in receding and to raise it to engage the stock in moving forward. For this latter purpose it is provided with the ratchet-teeth $A^{16}$, which are inclined forward. These teeth come up under the stock as it lies in front of the feed-gage and engage the lowermost pieces of ratan and forces them forward under the foot of the feed-gage, where it leaves them in a layer the thickness of a single strand as it is receded, being dropped to deposit them on top the upper edges of the thrusting-bar. This action is repeated four times in rapid succession, thus insuring the filling of the space under the foot of the feed-gage. The material which is thus carried under the feed-gage is limited in its forward movement by the toe-plate $A^{17}$, which extends down to near the upper surface of the thrusting-bar too close to pass the ratan. To insure the raising and lowering of the stuffing-bar prior to its movement in either backward or forward direction, there is let in the side of it the spring $A^{18}$, which is bowed in form and bears against and produces a slight friction on the side of the channel of the thrusting-bar sufficient to steady its action and cause the pins $A^{14}$ to pull to the extremities of the slots $A^{15}$ before advancing or receding the bar. When the material has been forced into position under the gage, the thrusting-bar is drawn suddenly back. In doing so the separating-trigger $A^6$ is forced upward and caused to extend its point through the brush material. The trigger is mounted in the sides of the casing $A^7$ and extends forward, having a shoulder rounded underneath to receive the raised portion $A^{19}$ of the thrusting-bar. This raised portion when driven under the said shoulder raises the point of the trigger and holds it so until the thrusting-bar has been advanced, when the said trigger again drops to permit the material to be stuffed forward against the toe-plate $A^{17}$. As the ratan is of nearly the same size it will be seen that practically the same number of strands of the material are divided off by the trigger at each operation. When the thrusting-bar is withdrawn, as described, the material which has been separated by the trigger will be dropped in front of the said bar and on the forward thrust will be carried to the limit of the forward movement. Here the material lies until moved forward by the advancing-forks $A^{20}$ into the throat of the bending and fastening mechanism. The advancing forks $A^{20}$ are attached to the ends of guide-plates $A^{21}$, which are mounted in guides on either side of the upright portion of the frame forming the runway for the bending and fastening mechanism. The mounting consists in forming the angular slots $A^{22}$ $A^{22}$, the upper portion of which is set at an angle to the perpendicular, and in setting in these slots guide-pins $A^{23}$ $A^{23}$, having large flat heads to hold the plates in position. By means of this mounting the forks are given a preliminary downward stroke, which sinks the forks behind the material which has been advanced by the thrusting-bar, as described, while the latter part of the stroke causes the pins $A^{23}$ to impinge upon the inclined portion of the slots and force the said forks forward to either side of the plunger B′ of the bending and fastening mechanism. To permit these forks to de-

scend, the feed-table E′ is provided with the opening $E^2$. The plates $A^{21}$ are connected by a yoke $A^{24}$, which is provided with a lug carrying a friction-roller which is extended into a cam-slot in the face of the eccentric wheel $A^{25}$, mounted on the driving-shaft of the machine, from which shaft the various driving mechanisms are operated.

The thrusting-bar and the stuffing-bar above described are both operated from the wheel $A^{26}$, on the opposite sides of which are mounted suitable cams. The series of cams $A^{27}$ operate the connecting mechanism to produce the rapid reciprocation of the stuffing-bar, as described. The connecting mechanism consists in the bent lever $A^{28}$, which is fulcrumed in the frame of the machine and which is provided at the one end with the friction-roller $A^{29}$, which bears on the raised cam-flange on the wheel $A^{26}$. At the free end this lever is connected to the one arm of the bell-crank lever $A^{30}$ by means of the connecting-rod $A^{31}$. The other arm of bell-crank $A^{30}$ is forked to straddle a pin set out from the plunger-rod $A^{32}$, which is likewise engaged by the forked extension $A^{33}$ on the plate $A^{11}$, which is connected with the stuffing-bar, as described. About the plunger-rod $A^{32}$ is mounted a spiral spring $A^{34}$, the tension of which is exerted between a bearing of the said plunger-rod and the rod itself and produces the effect on the connections of forcing the end of the lever $A^{28}$, having the friction-roller $A^{29}$, against the cam-flange on the wheel $A^{26}$. By means of this arrangement of the parts when the wheel $A^{26}$ revolves the end of the lever having the roller $A^{29}$ drops into the depressions between the cams $A^{27}$ as they are presented and permits the spring $A^{34}$ to drive the plunger $A^{32}$ and stuffing-bar forward to be immediately withdrawn by the roller $A^{29}$, traveling up the inclined side of the next succeeding cam $A^{27}$, over which it rides to produce another forward thrust of the stuffing-bar. This continues until the roller is carried on to the long raised surface of the flange, in which position the stuffing-bar is receded and depressed.

The driving connections for the thrusting-bar are operated by the cam $A^{35}$, which is bracketed out from the opposite side of the wheel $A^{26}$, and the cam-surface is turned toward the wheel. Fulcrumed on the frame of the machine is the lever $A^{36}$, the upper end of which extends into the path of the cam $A^{35}$ and is adapted to be deflected thereby. The lower end of the lever $A^{36}$ is forked and straddles the pin $A^{37}$, which is extended from the side of the thrusting-bar. (See Fig. 14.) To maintain the lever $A^{36}$ in position normally, there is provided a spring which returns the parts to their normal position immediately the end of the lever has passed over the cam. The action of this lever is to draw the thrusting-bar backward while the action of the spring advances it. The position of the cam $A^{35}$ is such as to cause the action described, as to the thrusting-bar, to follow after the stuffing-bar has come to a rest. Thus it will be seen the stock is separated into the required quantities by the joint operations of the stuffing-bar, the separating-trigger, and the thrusting-bar; also when so separated the bunches are delivered into the bending and fastening mechanism by the advancing-forks.

The bending and fastening mechanism consists of the plunger B′ and driving-rod $B^2$, together with their driving mechanisms, the cams $B^3$ and $B^4$. It is into the throat $B^5$ in the plunger B′ that the material for the tufts is forced or carried by the advancing-forks $A^{20}$ after being separated, as described. In advancing these bunches they are forced into the throat and held in against the farther wall thereof to squeeze the material to allow the legs of the fastening-staples to pass to either side of the bunches as they are brought down by the driving-rod $B^2$. In its operation the driving-rod $B^2$ is lifted above the latch C′ and is driven below the end of the plunger to near the bottom of the holes into which the staples are driven. Upon the end of the latch C′ the staples are successively carried to be taken off by the driving-rod in its descent. While the plunger B′ is maintained stationary by the cam $B^3$, the driving-rod $B^2$ is depressed to drive the fastening-staple over the bunch and down between the rollers $B^6$ $B^6$, bending the ends of the bunch upward. In this position the plunger and driving-rod descend together until the end of the plunger rests just above the block forming the back of the brush. At this point the plunger is arrested, but the driving-rod continues to the full limit of its stroke, driving the staple into the holes provided in the block and through the same.

The plunger B′ is mounted in the end of the bracket $B^7$, which is extended from the bed $B^8$. The bed $B^8$ is mounted in guide-slots in the upright portion $B^9$ of the frame. In slots formed in the face of this upright portion $B^9$ the bed $B^8$ is guided in its movement as it is raised and lowered by the cam $B^3$, to which it is connected by the pins provided with the friction-rollers $B^{10}$ $B^{10}$, which extend over and under the flange forming the said cam. By means of this engagement the plunger is raised and lowered directly by the cam and according to the curvature of the same.

The driving-rod is guided in a perforation extending lengthwise through the plunger B′. It is engaged by the cam $B^4$ by a construction similar to that between the cam $B^3$ and bed $B^8$. At the lower end the driving-rod is reduced in size and the reduced portion is provided with side flanges $B^{11}$, guide-slots being provided in the plunger to receive them. The spread of these flanges is equal to the spread of the fastening-staples used in this machine, so that the staples are likewise guided by the slots in the plunger as they are being driven down the same.

When the tufts have been fastened in the

block, the two sides are drawn in between the rollers $B^6$ $B^6$, the driving-rod having ascended above the throat $B^5$. The openings or passage-ways to either side of the driving-rod $B^2$, when down between the rollers $B^6$, are staggered—that is, they are thrown to either side of the driving-rod, as shown in Fig. 6 of the drawings. By means of this construction the tufts are drawn out to either side or given a fan-like spread which prevents the bunching of the tufts. This forms a more solid facing of the tufts and thereby produces an even brush.

The staples by which the tufts are fastened are delivered in the path of the driving-rod as the same is raised above the latch C′, ready to be carried down by it on its descent. The mechanism by which this successive delivery of the staple is accomplished consists of the inclined guide-rod $C^6$, over which the staples are straddled and down which they run. At the bottom of the incline they are prevented from further travel by the spring $C^2$, the head of which is adapted to receive and hold a single staple only. The end of this spring, which holds the staples, rests in the path of the plunger $C^3$, which is mounted on the end of the lever $C^4$. The lever $C^4$ is fulcrumed on the frame E of the machine and the end is protruded into the path of the pin $C^5$, set out from the side of the plunger B′. When the plunger B′ is raised, the pin $C^5$ strikes under the lever $C^4$ and raises the outer end thereof, depressing the inner end, carrying the plunger $C^3$, and causing it to impinge upon the end of the spring $C^2$ and thrusting it outward to permit the staple carried by it to drop into the guide-chute $C^7$ on the plunger B′. This chute is twisted or straight, as the requirement of the feed demands, in order to guide the staple into the guide-slots in which the driving-rod $B^2$ operates within the plunger. When the one staple is extracted from the end of the spring $C^2$, the plunger $C^3$ takes the place of the spring and prevents the travel of the staples carrying the succeeding staple from the guide-rod $C^6$. As the plunger B′ is carried down and the lever $C^4$ is released from engagement with the pin $C^5$ the spiral spring $C^8$ raises the plunger $C^3$ from the path of the staples and allows the spring $C^2$ to return to its normal position and receive the succeeding staple. The staples are placed on the guide-rod $C^6$ by hand as they are exhausted.

It is to prevent the interference of the tufts which have been fastened in place with those being secured that I have provided the apron F. This is hinged as a door under the table E′ and in the path of the plunger B′. It is maintained in a raised position by a spring, which is coiled about the hinge-pin. The apron F is sufficiently long to reach a little below the ends of the tufts of the brush as they stand upward on the blocks on the table G. The holes in the block being fed from the one end the last-fastened tufts are caught by the apron F and pushed back out of the way of the descending plunger B′.

In order that the plunger B′ and driving-rod $B^2$ may direct the staple directly in the holes in the block, the templet H is provided. This templet serves the double purpose of holding the blocks as the tufts are being fastened therein and of clenching the points of the fastening-staples after or as they are driven through the blocks. The back of the templet is provided with a series of depressions adapted to fit over the registering-point G′ on the operating-table G. These depressions are made to exactly register with the perforations in the block, so that whenever a block held within the said templet is rested over the registering-point G′, with one of the depressions in the templet fitted over the point, then a hole in the block is in exact line to receive a staple and tuft from the plunger B′.

Having thus described this invention, I claim—

1. In a brush-making machine, in combination with a hopper to receive the stock in a loose condition, of a mechanism to extract the said stock from the hopper, a mechanism to spread the stock in a layer, the thickness of a single strand thereof, a mechanism to divide the stock as thus spread into equal divisions, a mechanism to advance successively the said divisions to a receiving mechanism, a receiving mechanism into which said divisions are compressed, a mechanism to deliver suitable fastening devices over the said divisions in the path of a driving mechanism, and a driving mechanism to strike upon the said fastening device to force the same, and the bunch to which it is attached, through an aperture in the receiving mechanism, substantially as described.

2. In a brush-making machine, in combination with a hopper to receive the stock in a loose condition, of a mechanism to extract the said stock from the hopper, the thickness of a single strand thereof, a mechanism to divide the stock when thus separated into equal divisions, a mechanism to advance successively the said divisions to a receiving mechanism, a receiving mechanism into which the bunches are compressed, a mechanism to deliver suitable fastening devices over the said divisions in the path of a driving mechanism, a driving mechanism to strike upon the said fastening device, adapted to force the ends of the same into and through the back of the brush, and a suitable device to turn the ends of the fastening device when extended through the said back and while in engagement with the said driving mechanism, substantially as described.

3. In a brush-making machine in combination with a hopper to receive the stock in a loose condition, and deliver the same to an extracting mechanism, of a mechanism to extract the said stock from the hopper in a layer the thickness of a single strand thereof, a

mechanism to divide the stock while in the layer into successive equal divisions, a mechanism to advance successively the said divisions to a receiving mechanism, a receiving mechanism into which the said divisions are delivered and compressed in a bunched form, a mechanism to deliver suitable fastening devices over the said divisions in the path of a driving mechanism, a mechanism adapted to move said receiving mechanism to the back of the brush, a stationary holder for the back of the brush, and a driving mechanism adapted to force the ends of the said fastening device, into and through the back of the brush and against the said stationary holder, substantially as described.

4. In a brush-making machine a feeding mechanism therefor adapted to extract the stock from a hopper or receptacle, consisting of parallel guides raised above the bottom of the hopper or receptacle so that the strands of the stock will lie across the said guides, a ratchet-tooth-shaped reciprocating rod operating between the said guides, and provided with devices to lower it on its backward stroke and raise it in its forward stroke, below and above the upper edge of the said guides, and a foot or guard attached to the frame of the machine and extending toward the said guides, and a separator operating at regular intervals to advance separately a predetermined quantity of the stock spread out between the said shoe or guard and the said guide, substantially as described.

5. In a brush-making machine a feeding mechanism therefor, consisting of parallel guides mounted in the bottom of the hopper or receptacle for the said stock to receive the strands thereof across the said guides, a ratchet-toothed reciprocating rod operating beside the said guides, suitable devices to raise and lower it in its forward and backward strokes respectively, a foot or guard to form the stock advanced by the said reciprocating rod into a layer, a separator to extend through the said layer under the said foot, to detach a regular and ascertained quantity therefrom, a delivering mechanism to advance the stock so detached in the form of a bunch, substantially as described.

6. In a brush-making machine, a feeding mechanism therefor consisting of parallel guides mounted in the bottom of the hopper or receptacle for the said stock to receive the strands thereof, a stationary foot or guard resting over the forward end of the said guides, a reciprocating ratchet-toothed stuffing-bar operating between the sides of the said guides to advance the stock into the space between the said guides and guard, a mechanism to withdraw the said guides from under the forward end of the said guard to permit the stock to drop into the path of the same and to advance immediately to its forward position, and a separating device operating in unison with the said guides to be raised as the same is receded and lowered as it is advanced to prevent more than the predetermined quantity of stock falling into the path of the said guides, substantially as described.

In testimony whereof I have hereunto set my hand this 28th day of July, 1896.

WALTER C. READ.

Witnesses:
E. F. MURDOCK,
CHAS. E. KELLY.