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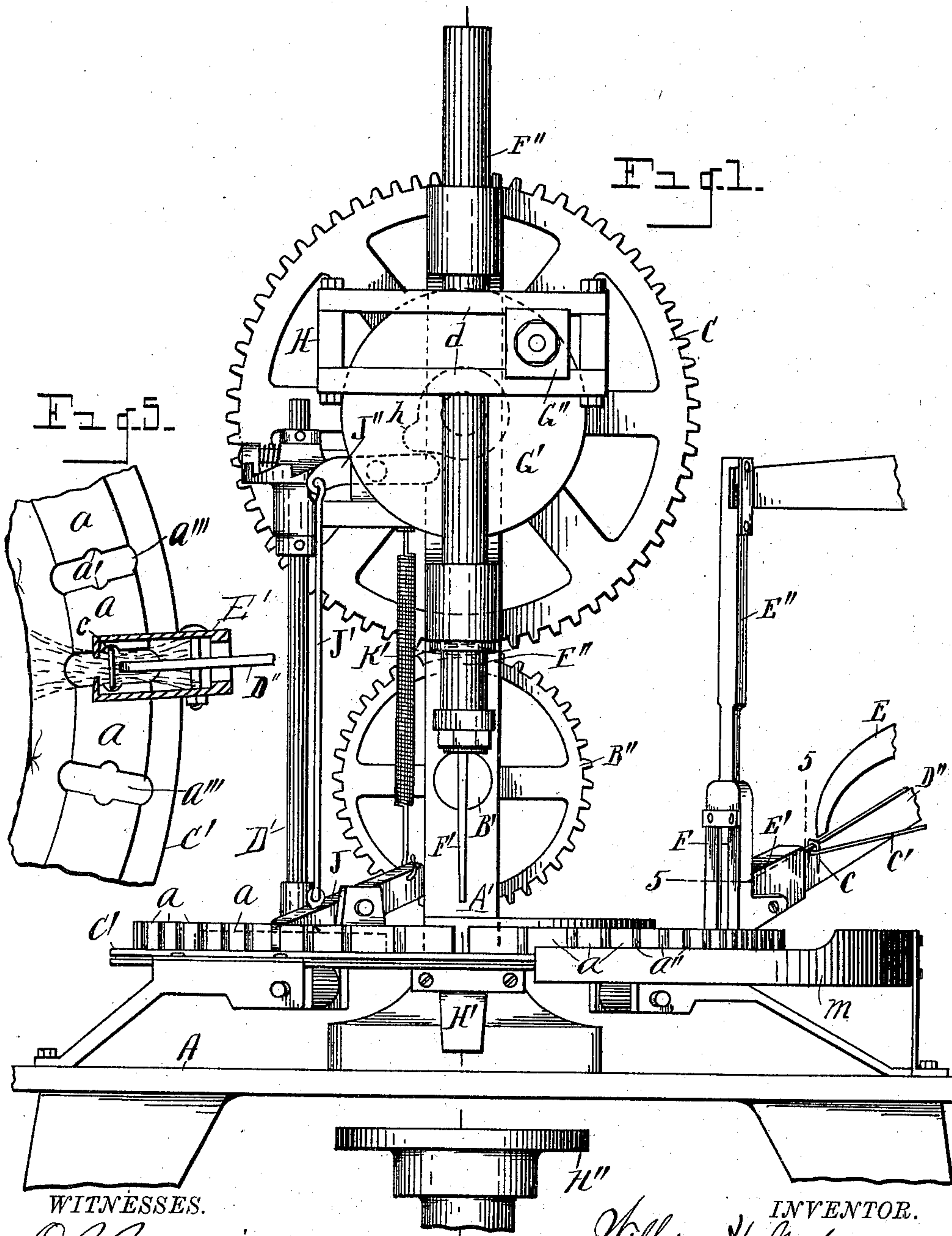
Patented May 30, 1899.

W. H. GATES.
BRUSH MAKING MACHINE.

(Application filed Mar. 4, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES.

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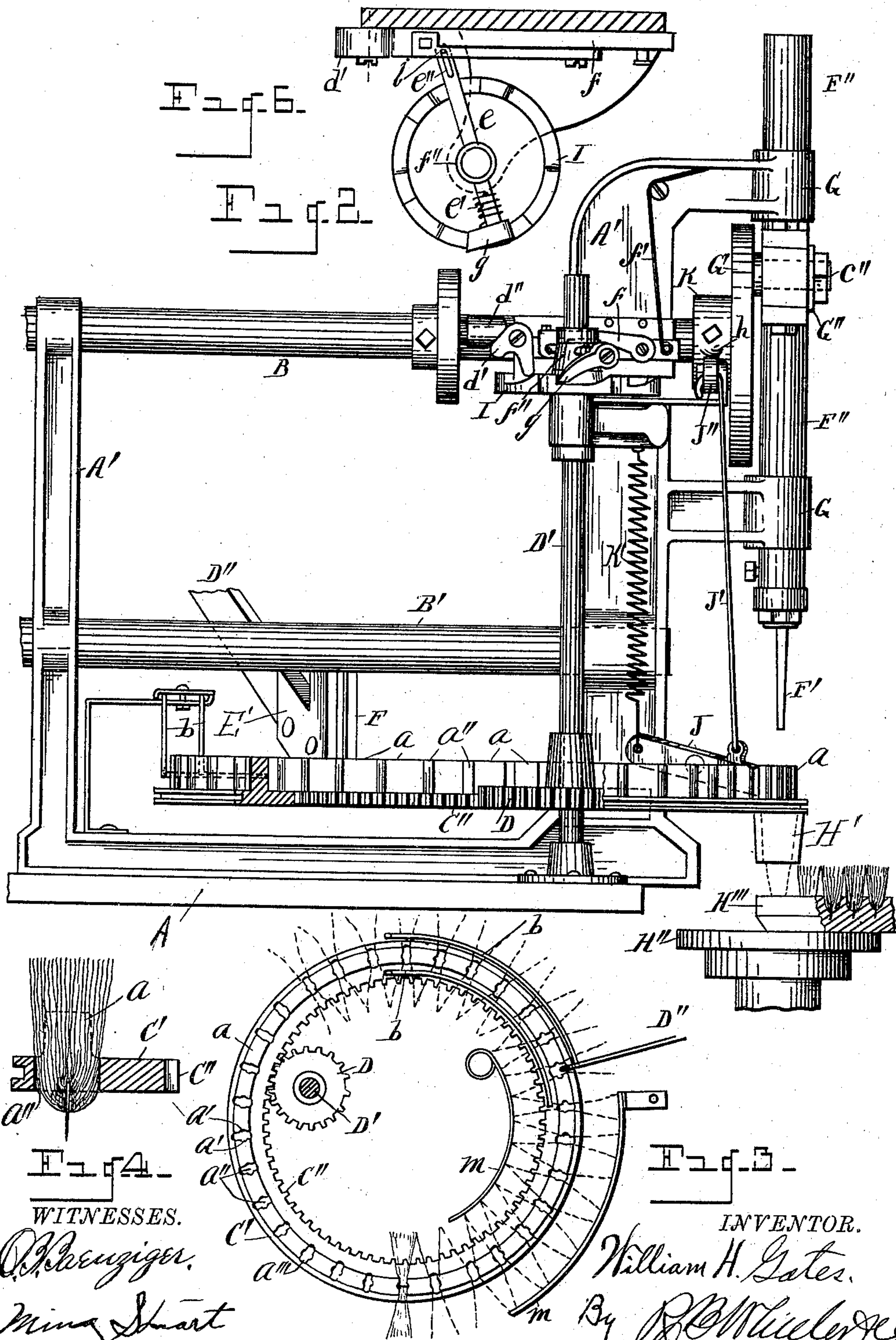
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UNITED STATES PATENT OFFICE.

WILLIAM H. GATES, OF DETROIT, MICHIGAN.

BRUSH-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,755, dated May 30, 1899.

Application filed March 4, 1899. Serial No. 707,732. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. GATES, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Brush-Making Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

15 This invention relates to new and useful improvements in machines for making brushes; and it consists in the construction and arrangement of parts hereinafter fully set forth, and pointed out particularly in the claims.

20 The objects of the invention are to produce a machine in which rapidity of operation is attained as well as efficiency and in which the stock is fed into a carrier at one point, is straddled by a confining-staple at another point, and at a third point is forced by a reciprocatory plunger, together with the confining-staple, into the cells or receiving-sockets of the brush-block. At the same time the stock is enabled to be fed into the machine so as to form tufts of uniform size, which in their passage to the plunger which forces them into the brush-block are maintained in perfect position with their ends between curved parallel guides, which insures a perfect presentation of the stock to the plunger, and a consequent perfect filling of the sockets of the brush-block. These objects are attained by the mechanism illustrated in the accompanying drawings, in which—

40 Figure 1 is a front elevation of my improved machine, parts being broken away. Fig. 2 is a side elevation of Fig. 1 with a portion of the driving-shafts broken away, as well as a portion of the rotary carriage, to more clearly show formation of parts. Fig. 3 is a reduced plan in detail of the rotary carriage, its driving-pinion, and the circular guides for the tufts of stock of which the brush is formed. Fig. 4 is an enlarged sectional view through a portion of the carriage, showing the folded stock therein and the embracing-staple pre-

paratory to being forced into a cell in the brush-block. Fig. 5 is an enlarged detail in plan of a portion of the carriage and a horizontal section through the discharge end of the staple-feeding device, as on line 5 5 of Fig. 1, showing position of staple as it stands astride of the stock within the carrier. Fig. 6 is a plan view in detail of the mechanism employed for imparting an intermittent motion to the carriage.

Referring to the letters of reference, A designates the bed of the machine, upon which the supporting-uprights A' are mounted. Journaled in said uprights are the upper and lower horizontal shafts B and B', respectively. Upon the lower shaft is a gear-wheel B'', which meshes with a gear C upon said upper shaft. The machine is driven through the medium of a pulley (not shown) mounted upon the lower shaft.

C' designates a carriage or carrier in which the stock is placed in independent divisions, which form the separate tufts of the brush, and wherein said stock is carried under the staple-feeding device to receive the staple which secures each individual tuft in the brush-block and under the reciprocatory plunger which forces each division of said stock or tuft into cells of the block of the brush. This carriage is shown in circular form adapted to rotate about a fixed center. I would have it understood, however, that I do not wish to limit myself to a rotary carriage, as a straight reciprocating carriage may be employed. Mounted upon the upper face of this rotary carriage are a number of adjacent blocks *a*, set distant from each other, so as to form open spaces between them, and provided in their adjacent ends with concavities *a'*, adapted to receive and guide the staple in its passage therebetween. Formed through said carriage between the series of dividing-blocks *a* are the apertures *a''*, through which the tufts of stock are forced into the brush-block below.

Upon the inner face of the circular carriage C' is an internal gear C'', with which a pinion D meshes. This pinion is driven to impart motion to said carriage through the rotation of the vertical shaft D', upon which said pinion is mounted, said shaft being in turn

driven by mechanism to impart an intermittent motion thereto and to the carriage, as hereinafter described.

The rotary carriage, which conveys the divisions of stock or tufts under the staple-feeding device and the reciprocatory plunger, stands slightly above the table of the machine and rotates in a horizontal circle. The stock is fed into said carriage between the dividing-blocks *a*, the space between which determines the quantity of stock for each tuft. The point of the feeding of said stock into the carriage is just in advance of the curved spring-pressure arms *b*, which stand on either side of the dividing-blocks *a* and are curved concentric with the circle described by said carriage. The stock passes under these arms and by them is retained in the division between the dividing-blocks until presented to the point where the staple is supplied thereto.

The staples *c* are fed downward upon an inclined guide-bar *D'*, the end of which terminates at a point above and in line with the recess *a'* in the adjacent faces of the dividing-blocks *a*, which recesses receive the opposed legs of the staple and hold it therein astride of the tuft of bristles lying in the space *a'''* between said dividing-blocks, as clearly shown in Fig. 5. As the staples are fed downward upon the inclined bar *D'* they are arrested by a spring *c'*, from which they are successively released by a discharge-arm *E*, (see Fig. 1,) which is operated by any suitable means (not shown) to successively force the staples downward upon said bar past said spring into the housing *E'*, into which the lower end of said bar extends. The staple continuing its descent down said bar drops from the lower end thereof into the recesses *a'* between the blocks *a* of the carriage and directly in the path of the vertically-reciprocating plunger *E''*, which is operated to reciprocate vertically, by means not shown, in a vertical way *F* and is so directed as to engage the head of the staple *c* and force it downward astride of said tufts, so that its head shall stand approximately on a plane with the upper faces of the blocks *a*. A further rotation of the carriage will bring the tufts, with the staples astride thereof, into alinement with the plunger *F'*, carried by the vertically-reciprocating shaft *F''*, which is mounted in suitable brackets *G*, carried by the upright of the frame. A vertically-reciprocatory motion is imparted to this shaft through the medium of the crank-pin *c''*, projecting from the disk *G'*, carried on the outer end of the shaft *B*. Said crank-pin is journaled in a sliding journal-box *G''*, adapted to slide horizontally between the parallel guides *d* of the rectangular frame *H*, carried by said shaft *F''*, whereby through the rotation of the shaft *B* a vertically-reciprocatory motion is imparted to the shaft *F''*.

Attached to the fixed portion of the frame of the machine below the carriage *C'* is a de-

pending tubular guide *H'*, which is adapted to register with the openings *a''* through said carriage between the dividing-blocks *a* and with the plunger *F'*, carried by the shaft *F''*.

In the operation of the machine upon the descent of the plunger *F'* the tuft of stock lying thereunder between the dividing-blocks *a* of the carriage is engaged by said plunger at the point where the staple sits astride of said tuft, so that said staple and the tuft of stock are carried downward through the aperture *a''* in the carriage and through the guide-tube *H'*, within which the tuft of stock is folded upon itself, said plunger forcing the tuft of stock and its accompanying staple into a cell in the brush-block *H'''*, which is held upon a suitable supporting-table *H''*, immediately in line with the lower end of the guide-tube *H'*, as clearly shown in Fig. 2, the plunger in its descent forcing the staple into the block of the brush, and thereby securely retaining the tuft of stock within the cell of the brush-block into which it is directed. The movement of the carriage *C'* is such that upon the raising of the plunger *F'* the carriage is caused to present a succeeding tuft of stock to said plunger, so that upon each downward stroke thereof a tuft of stock is carried into a cell of the brush-block and secured therein.

The movement of the carriage which presents succeeding tufts of stock to the reciprocating plunger must necessarily be intermittent, as said carriage must be at rest while the plunger is passing downward to carry the tuft of stock therethrough and into the brush-block below. To impart this intermittent motion to said carriage, I employ the mechanism shown more clearly in Figs. 2 and 6, which mechanism consists of a gravitating dog *d'*, pivoted to a fixed portion of the frame, one arm of which projects into the path of a lug *d''*, carried by the shaft *B*. The opposed member of said dog engages the end of a slide *f*, adapted to reciprocate horizontally in a suitable guideway in the frame. Attached to one end of said slide is a spring *f'*, adapted to return it after a movement in one direction has been imparted thereto by said dog. Mounted upon the upper end of the vertical shaft *D'* is a loose collar *f''*, from which project the fixed radial arms *e* and *e'*. The outer end of the arm *e* is provided with a slot *e''*, through which a pin *i*, carried by the slide *f*, is adapted to pass, so as to effect a jointed connection between the end of said arm and said slide. The opposite arm *e'* is provided with the spring-actuated pawl *g*, adapted to engage a circular rack *I*, fixed upon the shaft *D'*. By this arrangement just described the engagement of the lug *d''* on the shaft *B* with the dog *d'* will swing said dog and move the slide *f* longitudinally, thereby imparting a partial rotation to the collar *f''* through the medium of the arm *e*, which is connected with said slide. This movement of said collar will swing the arm *e'*, carried thereby, and cause the pawl *g*, mounted on the outer end of said

arm, to engage a notch of the rack I and impart movement thereto, thereby turning the shaft D' and rotating the carriage C' a given distance, which distance is sufficient to bring
 5 a succeeding tuft of stock into the path of the reciprocatory plunger F'. When the lug d'' on the shaft B shall have passed the dog d', the spring f' returns the slide f, thereby rotating the collar f'' backward and swinging
 10 the pawl g into position to engage a succeeding notch of the circular rack I in readiness for a succeeding operation. This mechanism for imparting movement to said carriage is so timed as to operate the carriage only when
 15 the plunger F' is raised and to cause said carriage to remain at rest while said plunger is executing its vertical movement.

When the carriage C' is at rest, it is necessary to lock it securely against movement, so
 20 as not to interfere with the perfect operation of the plunger F' when carrying the tufts of stock downward through said carriage and into the cells of the brush-block. To effect this locking of said carriage, a pivoted arm J
 25 is employed, the outer end of which is adapted to enter between the blocks a of said carriage, as clearly shown in Figs. 1 and 2. Attached to the outer end of the arm J is a rod J', the upper end of which is pivoted to the outer
 30 end of a centrally-pivoted lever J'', whose inner end projects into the path of the high point h of an eccentric collar K, mounted upon the shaft B, so that as said shaft rotates the lever J'' is successively actuated to raise the
 35 outer end of the locking-arm J from between the blocks a of said carriage, thereby releasing said carriage, so that it may move. Upon the passage of the high point of the eccentric collar the lever J'' is released, when the spring
 40 K', attached to the inner end of the locking-arm, will raise said end thereof, thereby throwing downward the outer end of said arm into a space between the blocks a of the carriage, locking said carriage, and at the same time
 45 returning the rod J' and the lever J'' to their normal position. It will be understood that these parts are so timed in their operation as to effect a locking of the carriage while the plunger F' is making its stroke and to release
 50 said carriage to permit a further movement thereof when the plunger is raised.

It will now be understood that in the operation of this machine the stock is fed into the divisions of the carriage between the blocks a,
 55 immediately in advance of the curved spring-pressure arms b, under which said stock passes, as shown in Fig. 3, and which confine the stock securely within the spaces between said blocks a. In this position the stock passes
 60 under the housing of the staple-feeding mechanism, where the staples are placed astride of the tufts or divisions of said stock. Continuing, the tufts of stock are carried between the curved guides m, which are concentric with
 65 said carriage and stand on either side thereof. These guides engage the projecting ends of

the tufts of stock, so that the ends thereof will project evenly from the spaces between the blocks of the carriage. When the tufts
 70 of stock by the movement of the carriage shall have been placed in the path of the reciprocatory plunger F', said plunger will force each succeeding tuft of stock downward through the carriage into the brush-block, as before
 75 described, the operator moving the block so as to present a new cell therein for each stroke of the plunger.

By reason of the fact that the feeding of the stock, the feeding of the staples, and the setting of the tufts of stock into the cells of
 80 the brush-block occur at three different points greater rapidity of operation is possible than where all of these operations occur at one point, whereby this machine is adapted to be
 85 run at a high rate of speed, enabling a greater number of brush-blocks to be filled.

Having thus fully set forth my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a brush-machine, the combination
 90 with the main frame of the traveling carriage adapted to convey the stock from which the brush-tufts are formed, means for supplying staples to said stock in the carriage, the reciprocatory plunger operating in the path of said
 95 carriage and adapted to engage the stock carried thereby and force said stock into the brush-block, and means for operating said plunger.

2. In a brush-machine, the combination
 100 with the main frame of the movable carriage having divisions therein for the reception of stock, means for retaining the brush-stock within said divisions of the carriage, means for feeding staples to the stock in the carriage, a
 105 reciprocatory plunger operating in the path of said carriage adapted to engage the stock carried thereby and force it into the brush-block, means for operating said plunger and means
 110 for imparting an intermittent motion to said carriage.

3. In a brush-machine, the combination
 115 with the main frame of a movable carriage carrying blocks upon its upper face a suitable distance apart forming divisions for the reception of the brush-stock, apertures through said carriage between said dividing-blocks, means for feeding staples to the stock on the carriage, the reciprocatory plunger adapted
 120 to pass through the apertures in the carriage between said blocks and to carry the stock therewith into the brush-block below said carriage and means for operating said plunger.

4. In a brush-machine, the combination
 125 with the main frame of the traveling carriage having divisions thereon for the reception of stock and apertures therethrough between said divisions, means for feeding staples to the divisions of stock in the carriage, a reciprocatory plunger and means for operating it,
 130 said plunger adapted to engage the stock and staple and force them through the apertures

of said carriage and into a brush-block supported below said carriage.

5. In a brush-machine, the combination with the main frame of the movable carriage having divisions therein for the reception of the brush-stock, apertures through said carriage between said divisions, spring retaining-arms for confining the brush-stock within said divisions, curved guides for engaging the opposite ends of the stock in the carriage to maintain it in proper position, means for feeding staples astride of the divisions of stock in the carriage, a reciprocatory plunger adapted to pass through the apertures in the carriage and to carry therewith the staple and brush-stock lying in said divisions and force said stock into the brush-block supported below said carriage and means for operating said plunger.

6. In a brush-machine, the combination with the main frame of the circular carriage adapted to rotate about its own axis, said carriage having brush-stock-retaining divisions therein and apertures therethrough between said divisions, curved spring-arms lying on each side of said divisions to retain the stock therein, curved guides concentric with said carriage for ending said stock, means for feeding staples astride of the divisions of stock in the carriage, a reciprocatory plunger adapted to pass through the apertures in the carriage and carry the stock and staple therewith into the brush-block below, means for operating said plunger, means for imparting an intermittent motion to said carriage, means for locking said carriage against motion, and

means for releasing said carriage to permit it to move.

7. In a brush-machine, the combination with the main frame of the circular carriage carrying divisions for the reception of the brush-stock, gear-teeth upon the inner circle of said carriage, a vertical shaft carrying a pinion engaging said gear-teeth, a circular rack fixed upon said vertical shaft, a rotary collar upon said shaft having a pawl engaging said rack, an arm projecting from said collar, a slide engaging said arm, a pivoted dog engaging said slide, a shaft carrying a projecting lug adapted to engage said dog whereby by the rotation of said last-named shaft an intermittent motion is imparted to said carriage.

8. In a brush-machine, the combination with the main frame of the movable carriage having dividing-blocks upon its surface a suitable distance apart forming spaces for the retention of the brush-stock, means for imparting an intermittent motion to said carriage, a pivoted arm one end of which is adapted to enter between the blocks of said carriage, a spring attached to the opposite end of said arm, and means for intermittently actuating said arm to raise the end thereof from between the blocks of said carriage.

In testimony whereof I sign this specification in the presence of two witnesses.

WILLIAM H. GATES.

Witnesses:

MINA STUART,
E. S. WHEELER.