No. 846,583. PATENTED MAR. 12, 1907.

W. G. LIEBIG.

BRUSH MAKING MACHINE.

APPLICATION FILED FEB. 26, 1906.

4 SHEETS—SHEET 1.

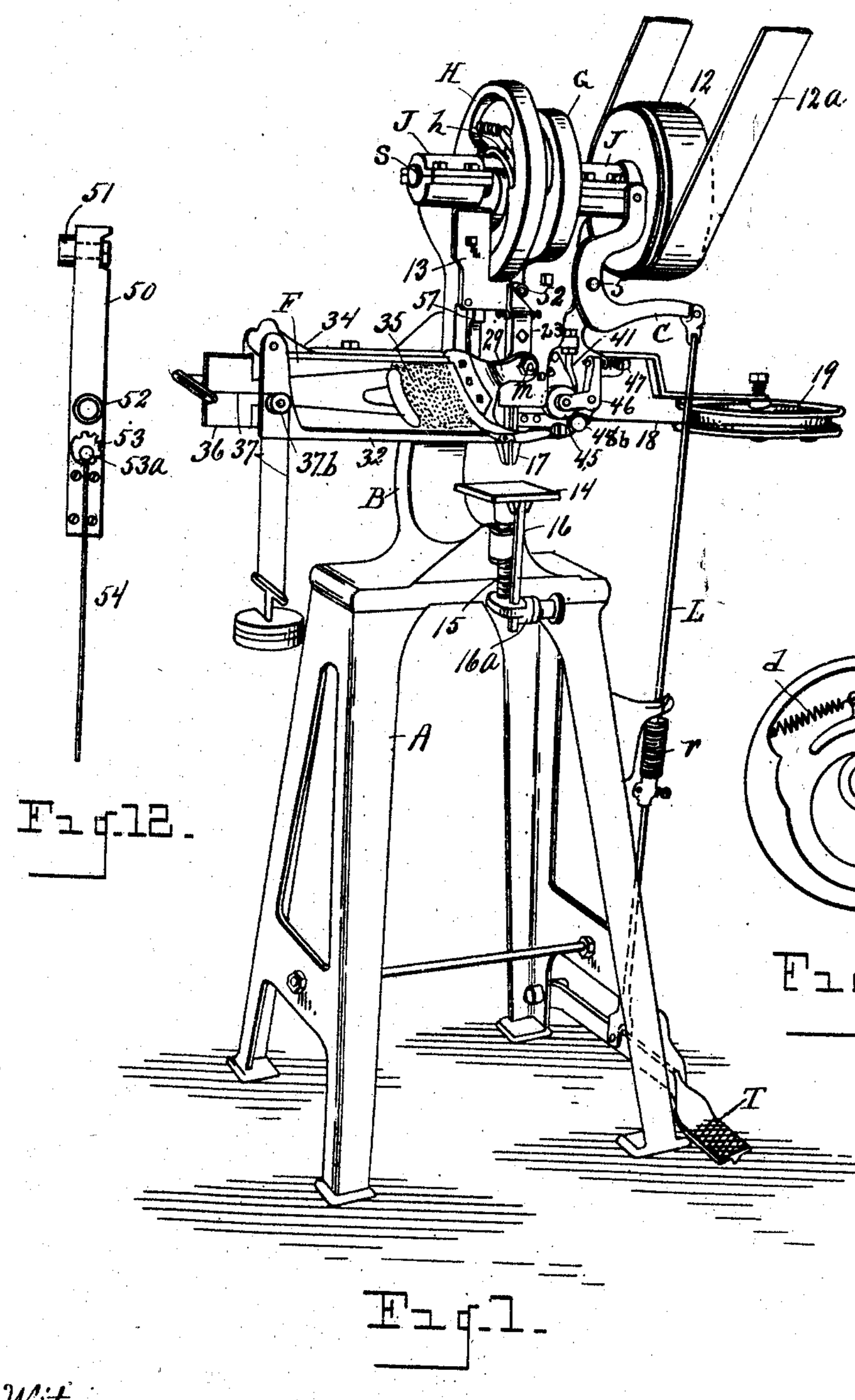

Fig. 12.

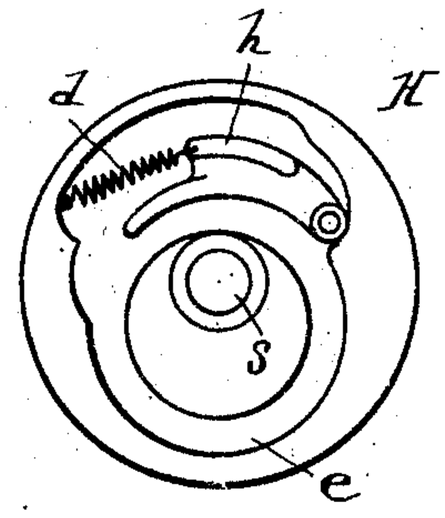

Fig. 11.

Fig. 1.

—Witnesses.—
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4 SHEETS—SHEET 2.

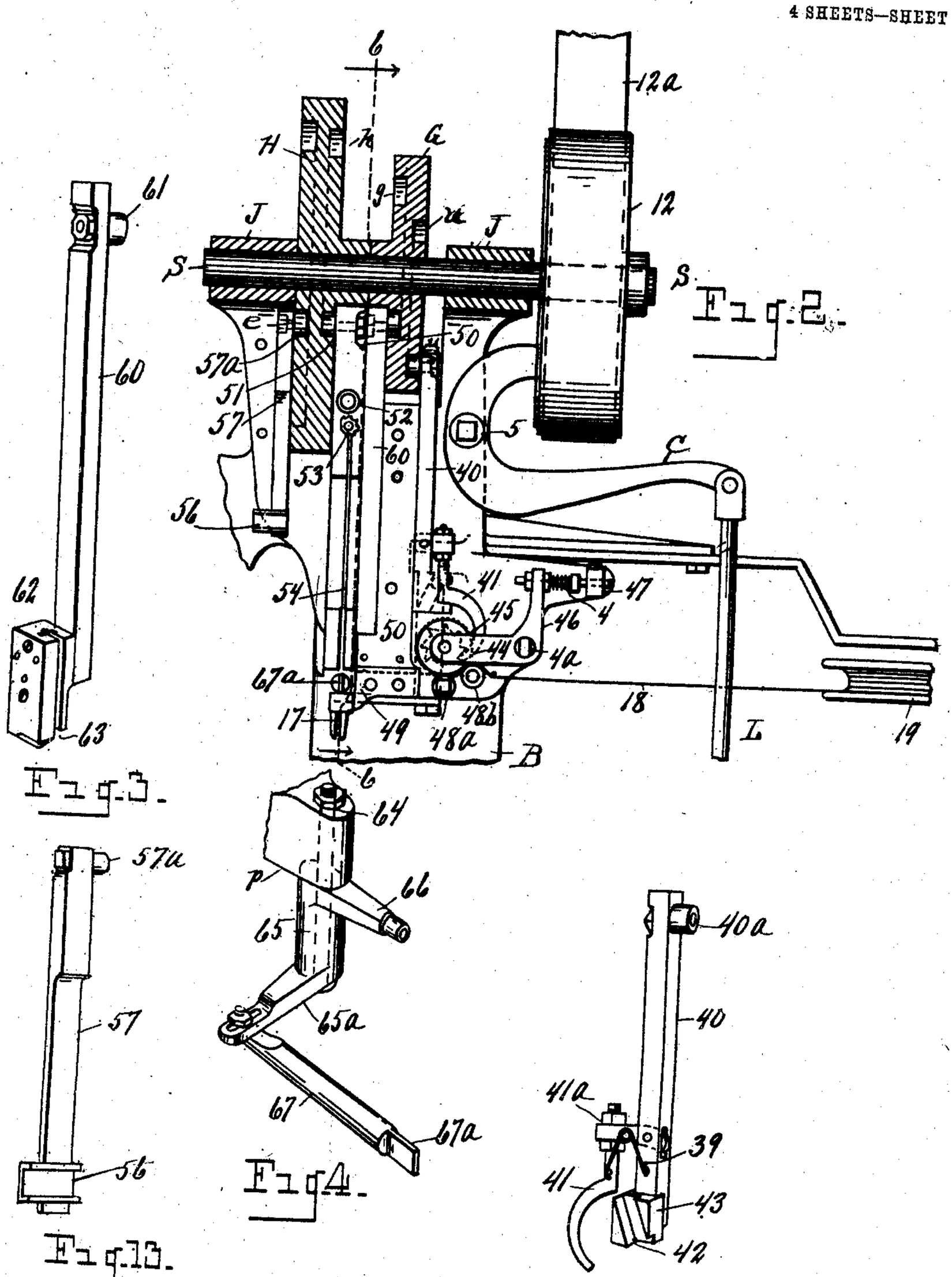

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 13.

Fig. 5.

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4 SHEETS—SHEET 3.

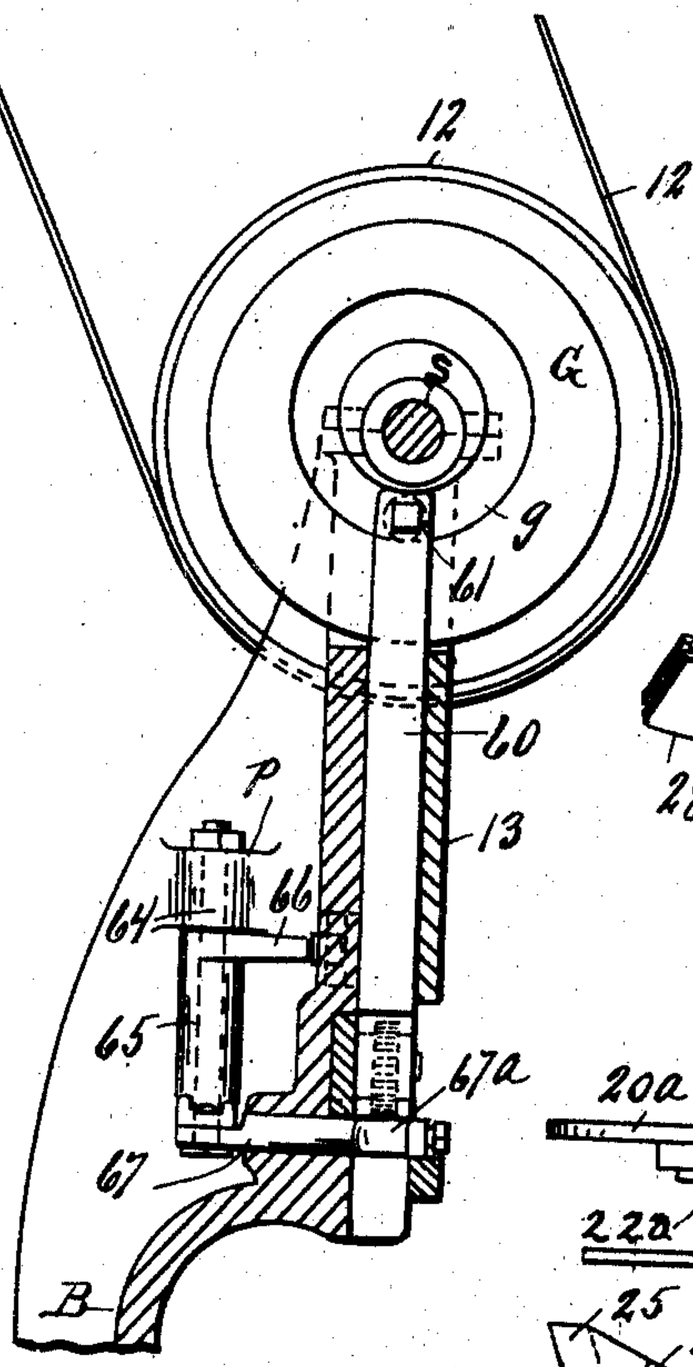

Fig. 6

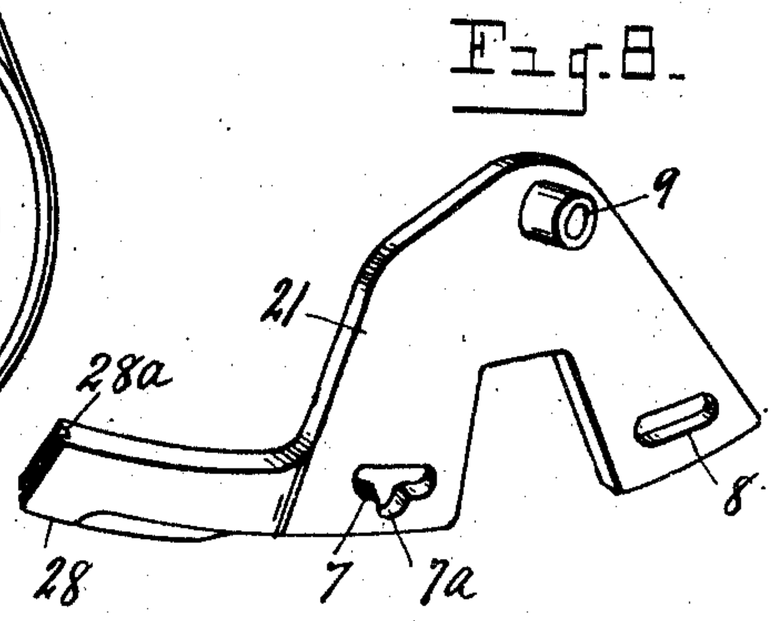

Fig. 8.

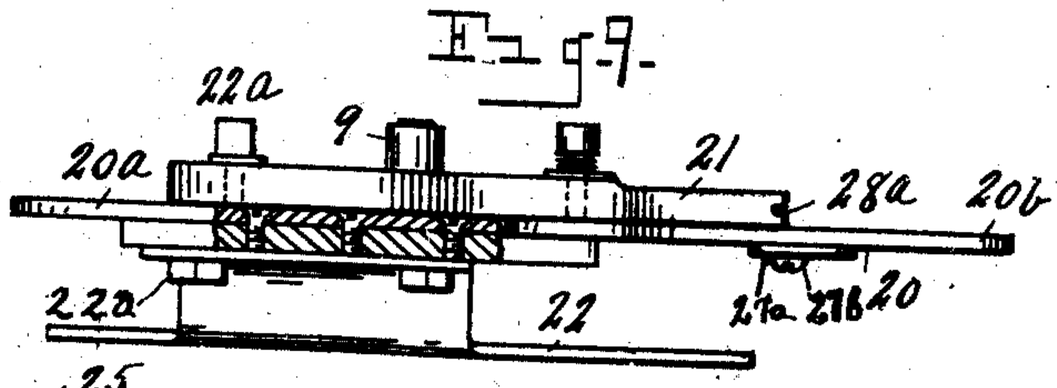

Fig. 9.

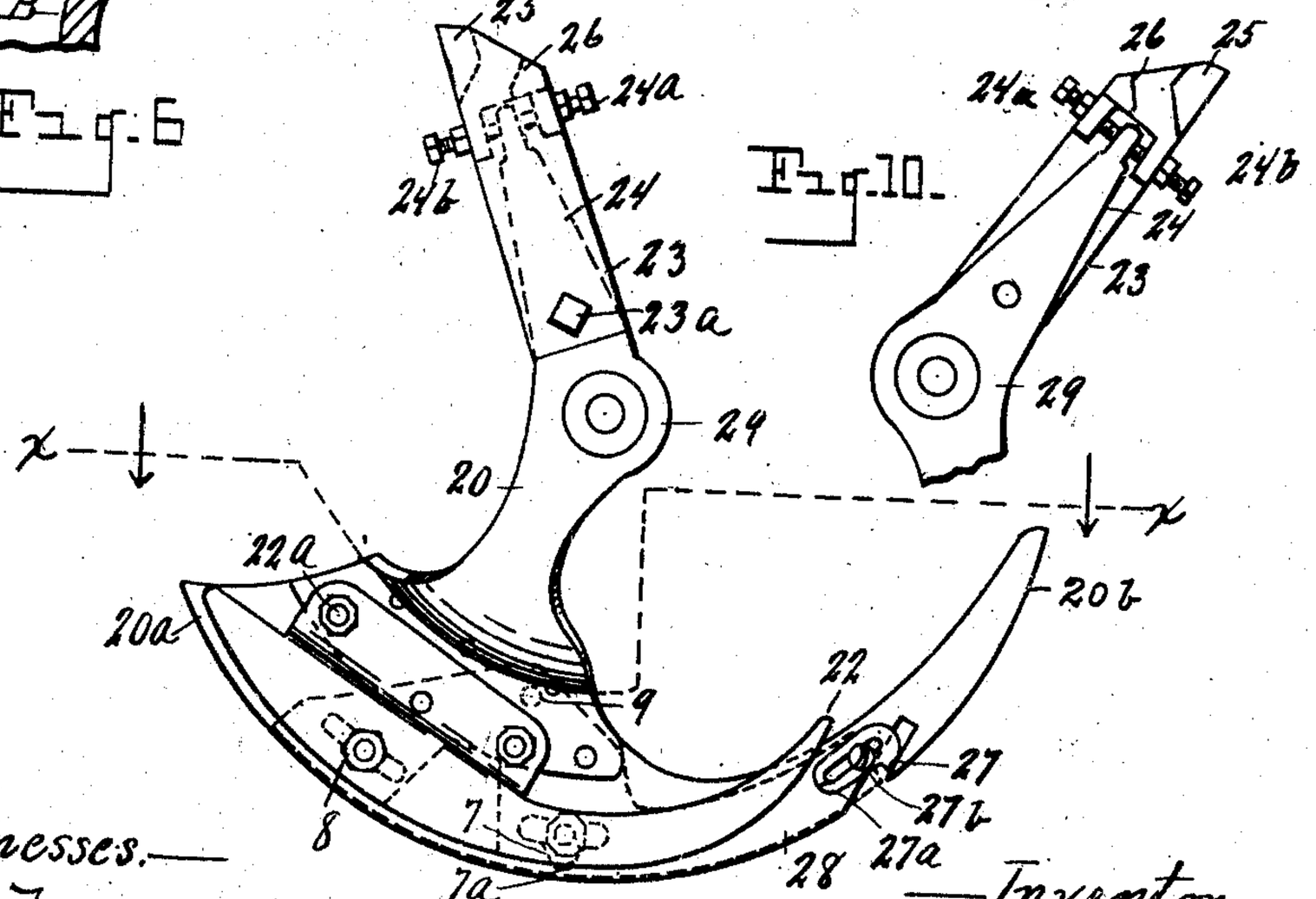

Fig. 7.

Fig. 10.

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4 SHEETS—SHEET 4.

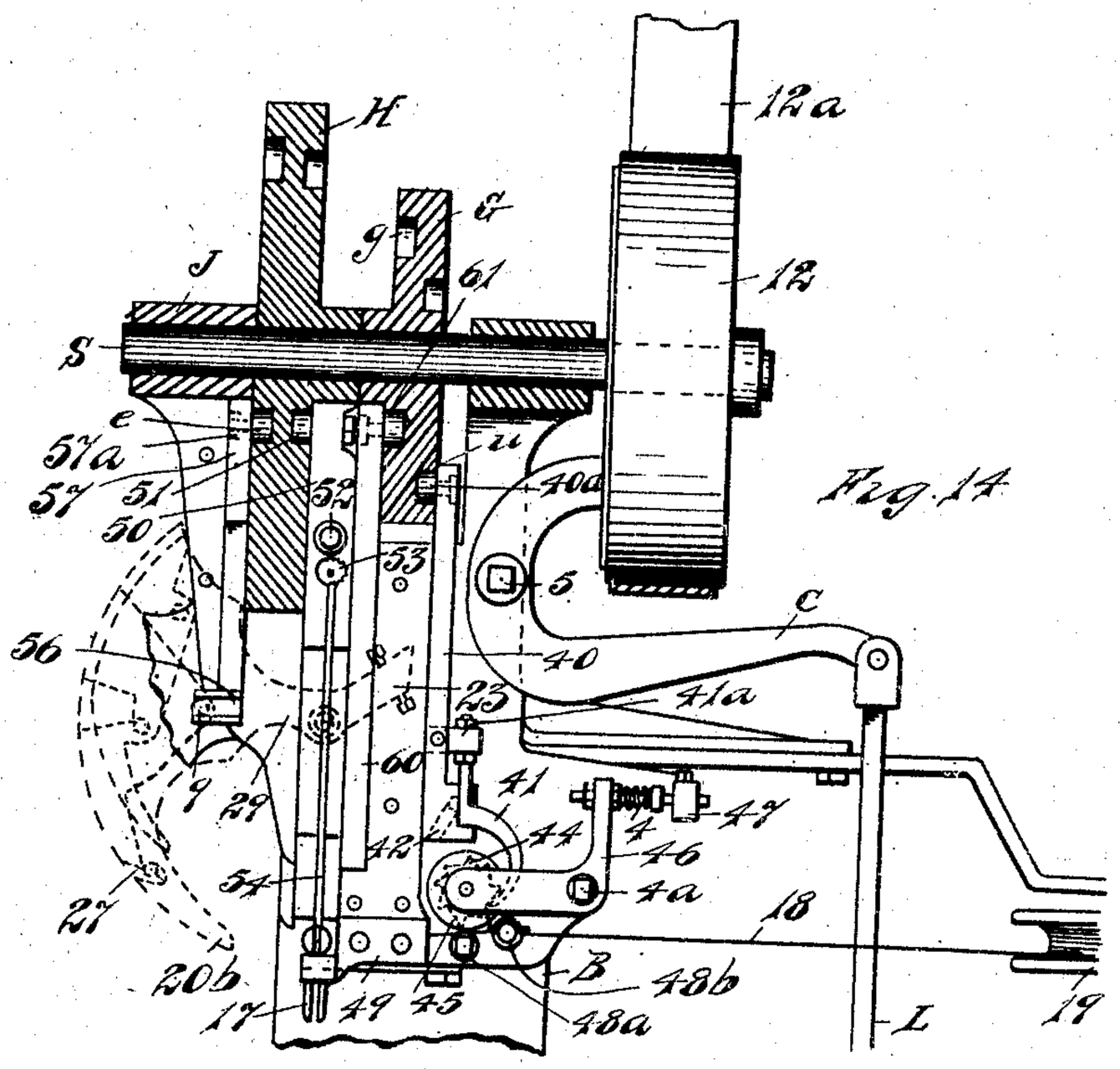

Fig. 14.

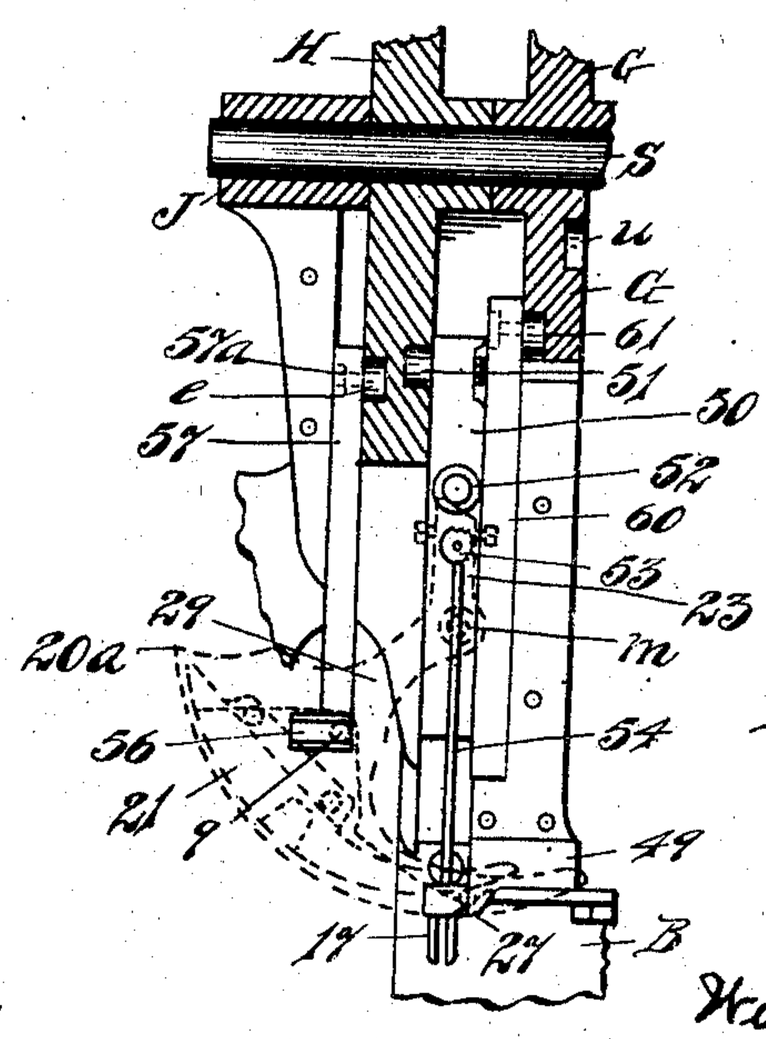

Fig. 15.

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM G. LIEBIG, OF DETROIT, MICHIGAN.

BRUSH-MAKING MACHINE.

No. 846,583. Specification of Letters Patent. Patented March 12, 1907.

Application filed February 26, 1906. Serial No. 302,965.

To all whom it may concern:

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

This invention relates to brush-making machines, and has for its object an improved machine in which the exact quantity of bristles which it is desired shall constitute each tuft in the brush is automatically gathered from a receptacle in which these bristles are stored in a mass and carried to the base of the machine, there to be engaged by a staple that has been contemporaneously and automatically made from a strand of wire. From this point the staple straddling the tuft of bristles is driven into the brush-back and the tuft thus secured thereto.

The device of this application is in the nature of an improvement over that disclosed and claimed in my copending application, Serial No. 284,788, filed October 28, 1905, title, "Brush-making machines," the improvements lying in the direction of simplicity and compactness of working parts, and consequently reorganization of some of the details of the mechanism. Like the device hereinabove referred to, this machine operates automatically, except as regards the placing of the brush-back in proper position to have the staple driven into it.

The machine is fully illustrated in the accompanying drawings, in which—

Figure 1 is a perspective of the entire machine. Fig. 2 is a front elevation, partly in section, of the working parts of the machine, the inclosing cover-piece being removed to show the relation and working of the various slides which it covers and holds in place. Fig. 3 is a view of the staple-former. Fig. 4 is a perspective of the anvil-actuating device. Fig. 5 is a view from the rear of the lever, whose function it is to retract the anvil and feed the wire forward. Fig. 6 is a sectional elevation at right angles to that shown in Fig. 2 along the line 6 6 in that figure and looking toward the right as indicated by the arrows. Figure 7 is a side view of the carrier and its attached pieces. Fig. 8 is an enlarged view of the slide-plate 21. Fig. 9 is a plan view of the carrier seen from above, taken along the line $x\,x$ of Fig. 7 and looking in the direction of arrows there shown. Fig. 10 is a detail view of the reverse side of the upper portion of the carrier member to that shown in Fig. 7. Fig. 11 is an elevation of the left-hand side of the cam-wheel H shown in Fig. 1. Fig. 12 is an elevation of the driver and its regulating feed-roller, together with the slide-bar which carries and actuates it. Fig. 13 is a view of the slide-bar whose reciprocation actuates the picker or bristle-carrier. Fig. 14 is an elevation of the front of the machine with the covering-plate removed, showing the relative position of the vertically-reciprocating trackway whereby actuation is imparted by means of the pin 9 with the carrier, whose position is shown in dotted lines. Fig. 15 is a view similarly in elevation of a part of the same elements illustrated in Fig. 14, showing the relative position of the parts when the rotation of the cam-wheel has moved the reciprocating slide to its lowermost point of travel and with the pin 9 at the opposite end of the horizontal trackway from that shown in Fig. 14.

A indicates the supporting or base portion of the device, from which rises an overhanging arm B, which carries most of the working parts of the mechanism. The topmost portion of this arm B is formed to constitute a bearing J for the horizontal shaft S, from which all of the working parts receive their actuation and to one end of which is connected the driving-wheel 12, which is actuated by the belt 12^a. This driving-wheel is thrown into and out of operative connection with the shaft S by means of the clutch C, which is pivoted at 5 to a portion of the arm B and which is actuated by means of the link L by pressure upon the treadle T. When the operator releases the pressure of his foot from the treadle, the rise of the link member L, and consequently the disengagement of the clutch mechanism, is brought about by the upward pull of the spring *r*. Above the central portion of the machine on the shaft S are mounted two cam members G and H, each face of each of which is provided with suitable cam tracks or races, whose contour and relative position with respect to one another has been made a matter of careful previous adjustment. Into each of these cam-races projects an antifriction-roller, as

51, which is mounted on a pin at the upper end of a vertical slide-bar, as 50, which is contained in a proper slideway and reaches downward to engaging position with the part of the mechanism which it is particularly designed to actuate. The extreme right-hand one of these slides 40, engaging in the cam-race *u* on the right-hand face of the wheel G, is actuated vertically as the wheel rotates by the engagement of its antifriction-roller 40ª in the cam-race. From the lower end of the slide 40 projects a bracket 41ª, in which is pivoted a pawl 41, which on each downward stroke of the slide engages with its lowermost point the teeth of a cog-wheel 44, which is fixed to one face of the wire-advancing wheel 45, which in turn is pivoted to one end of the lever 46. The lever 46 moves around its pivot-pin 4ª, which extends into the body portion of the machine and has its horizontal portion (that carrying the wheel 45) kept pressed firmly downward by the pressure of the spring 4 against the upper end of its vertical portion, the spring 4 being regulated as to its pressure by a nut which rests against the fixed lug 47. The periphery of the wheel 45 is serrated so as to frictionally engage the wire 18, which is uncoiled from the spool 19 and passes between its periphery and the pivoted rollers 48ª and 48ᵇ on its way to the staple-forming mechanism, the pressure of the spring 4 making the engagement of the periphery of the wheel 45 against the wire a very positive one. The diameter of the wheel is made a matter of very careful previous calculation, the diameter chosen being regulated by the size of wire used in order that at each throw of the wheel caused by the engagement of the pawl 41 against the cog-wheel 44 the exact length of wire desired may be advanced. The greater the size of the wheel 45 the greater is the length of each advancement of wire, since the arc through which the wheel turns at each stroke is the same. The return of the pawl 41 to a position of alinement, as near as may be, with the slide 40 after each stroke against the cog-wheel is provided for by the spring 39. (Shown in Fig. 5.)

After passing the wheel 45 and the rollers 48ª and 48ᵇ the wire passes on beyond the edge of the block 49 and into the track, wherein the staple-former 60 reciprocates. This staple-former is actuated similarly to the slide 40 by engagement of its antifriction-roller 61 in the cam-race *g* of the wheel G. As it descends it engages the exposed length of wire, shears it off from the rest of the length by engagement of its cutting-face against the block 49, and continuing on its way down presses it over the projecting part 67ª of the anvil 67, which projects from the rear of the machine through a suitable slot in the arm B into the path of the staple-former 61 during the portion of each cycle of its movements. Its rear end is connected by means of a bolt with the slotted end of one arm 65ª of the bell-crank lever 65, which is held in place by the screw or bolt 64, which extends vertically therethrough and through a lug *p* on the rear of the machine. The other arm 66 of this bell-crank lever has its free end shaped to engage in the oblique slot 42, which is in the rear face of the block 43 and which is fixed to the lower end of the slide 40, whose downward movement causes the arm 66, engaging, as it does, in the vertical slot 42, to be moved to the left, thus causing the part 67ª of the anvil to be projected into the path of the staple-former 60, as hereinbefore described. Similarly the upper or retractile movement of this slide 40 causes the arm 66 to move toward the left, thus causing the retractile movement of the anvil 67 after its function (the formation of the staple over the part 67ª) has been accomplished. The positioning of the cam-races on the two faces of the wheel G determines the exact timing desired on these two parts.

Engaging in the cam-race *e* in the left-hand face of the cam H, looking at the machine as it appears in Fig. 1, is the antifriction-roller 57ª of the slide-bar 57, whose vertical reciprocation, controlled by the rotation of the cam-wheel H, actuates the picker or carrier member 29, which is mounted on pin *m*, which projects from the facing-plate 13, and from the inner face of the slide-plate 21 of which projects a pin 9, which engages in the horizontal trackway 56, formed by the lower portion of this slide-bar 57, as shown particularly in Figs. 2 and 13, and because of the pivoting of the carrier 20 at *m* cau as it to move back and forth in the trackway 56 and about the pin *m* as a center, its entire range of movement being somewhat less than ninety degrees. The peripheral edge of this carrier 20 engages against the forward and exposed face of a store of bristles 35 contained in the feed-box F, which is suitably supported by a portion of the overhanging arm B. The store of bristles is constantly pushed forward by the follower 36, which is under pressure of the weighted cord 37, which engages over the rollers 37ᵇ on the side piece 32 of the feed-box. The stock of bristles may be replenished any time by raising the cover 34, which is pivoted to the side parts 32 and forcing back the follower as far as is necessary to furnish the space required for the extra bristles.

As shown in Figs. 7 and 9, the carrier or picker 29 consists, essentially, of three parts, the central body portion 20, the slide-plate 21, and the supplemental piece 22. This last piece 22, which is held to the outer face of the body portion 20 of the carrier by bolts 22ª, of course moves at all times with the carrier and serves to keep smooth and in alinement the bristles remaining in the feed-

box by engagement more or less against another portion of their length midway between the central portion (which is engaged by the periphery of the carrier itself) and the ends of the bristles.

On the reverse face of the carrier from that occupied by the supplemental piece 22 is a slide-plate 21, which is held to the body portion 20 of the carrier by bolts, which, though fixed with respect to the body portion, permit a sliding movement of the plate 21 with respect to the carrier within the limits permitted by the slots 7 and 8, through which they engage, the large flattened heads of the bolts reaching past the edges of the slots and engaging against the outer face of the plate 21 to hold it against the body of the carrier. In Figs. 7 and 8 it will be noted that the slot 7 is of trefoil shape in order to impart to the plate and the carrier as a whole irregular motion (which will be hereinafter referred to) when the tuft of bristles is deposited adjacent to the newly-formed staple. The forward end 28 of the slide-plate 21 is formed to provide the terminal notch 28^a, which when the carrier is at the lowest extremity of its movement forms one side of the lower portion of the staple-guide, and one leg of the newly-formed staple passes along and is guided by this notch in its downward movement. On the upstroke of each movement a tuft of bristles of the size desired is gathered by the notch 27, which is located about a third of the way between the toe portion 20^b and the heel portion 20^a of the part 20 of the carrier. The size of this notch for the purpose of determining the amount of bristles to be taken at each movement of mechanism is regulated by the piece 27^a, which is held in position by a bolt 27^b. At the commencement of the downward motion of the carrier the first movement is of the slide-plate 21, because of the engagement of the pin 9 in the raceway 56. This causes the slide-plate 21 to move forward before the body portion of the carrier is actuated and causes its forward end 28 to slide across and close the notch 27. When the slide 21 has moved so far as the limits of the slots 7 and 8 permit, its motion is then imparted to the body portion 20 of the carrier, which in turn moves forward until the lower limit of its movement is reached. Similarly, the initial portion of the upward movement of the part 57 is communicated first to the slide-plate 21, causing the notch 27 to be opened again. Just at this period the knife-carrying slide 50 is depressed by the engagement of its antifriction-roller 51 in the cam-race *k* on the reverse face of the cam-wheel H. The roller 52, carried on its face, engages first against the inclined projection 25 on the upper end 23 of the carrier 29. Passing from thence it next engages forcibly against the projection 26, both of which jolts cause the bristles to be shaken out of the notch and free to be moved downward, together with the staple, which has meantime been moved and which now straddles the tuft. The relative position and angle of the two projections 23 and 24 on the head of the carrier is regulated by the screws 24^a and 24^b, which engage through the top of the part 24, whose inner end is pivoted to the portion 23 at 23^a. The exact timing of the impact between the roller 52 and the projections 25 and 26 is thus regulated. This jolting of the carrier and sliding of the plate 21 with respect to the body portion 20 causes the body portion 20 to drop downward with respect to the plate 21, resulting in the forward end 28 of the plate 21 being pushed upward and out of engagement over the notch 27, thus effecting the release of the bristles.

In one portion of the left-hand face of the cam-wheel H is a yielding portion *h*, pivoted so that the portion of its periphery which faces toward the center and toward the shaft S is normally continuous with the fixed portion of the periphery of the cam-race *e*. It is yieldingly held in this position by the spring *d*, thus allowing for an irregularity in the movement of the antifriction-roller, which engages in the cam-race during a portion of each rotation and correspondingly affecting the oscillation of the carrier.

On the lower portion of the driver-carrying slide 50 is an eccentric wheel 53, part of whose periphery is toothed and the remainder is regularly circular. Against its lowermost portion the upper end of the driver 54 engages. In case the extreme lower portion of the staple-driver 54 is broken off, as is frequently the case, the substitution of a new driver may be avoided by moving the eccentric piece 53 around so that a higher, if not the highest, portion of its periphery—that is, the portion farthest from the pivot 53^a, which holds it in place—engages against the end, thus forcing it down so much farther.

The brush-backs are supported on the table 14, which is immediately below the depending portion 17 of the staple-forming mechanism. Its height and proximity thereto is regulated by the supporting-screw 15, and its angularity with respect to the tuft-inserting mechanism, whether perpendicular or otherwise, is determined by the arm 16, which is pivoted to its lower face and is regulated as to its height by the thumb-screw 16^a.

What I claim is—

1. In a brush-making machine, in combination with a driven shaft, a plurality of cam members carried thereby, a notched oscillatory bristle gatherer and carrier pivotally supported on the frame of the machine and adapted to select at each oscillation a specific quantity of bristles from a mass with which some portion of its periphery is in constant engagement, means engaging one of said cams whereby motion is imparted there-

from to the bristle gatherer and carrier, cam-actuated reciprocating means adapted to forcibly engage against a portion of said gatherer and carrier to effect the release of the tuft of bristles held by it at its intended point of delivery, means reciprocated by another of said cams whereby a staple is located over the released tuft, and means carried by said carrier-engaging means adapted to thereafter drive the staple and bristles into the brush-back, substantially as described.

2. In a brush-making machine, in combination with a driven shaft, a plurality of cam members carried thereby, the faces of each being provided with differently-arranged cam-races, a notched oscillating tuft-gatherer adapted to select from a store of bristles a predetermined quantity at each oscillation, means connecting said carrier and one of the cam members whereby the carrier is actuated, means for locating a staple over the tuft of bristles delivered by the carrier at the end of each stroke, and means actuated by one of said cam members whereby the carrier is jolted at the end of each oscillation to effect the release of the bristles, and the staple and tuft thereafter driven into the brush-back, substantially as described.

3. In a brush-making machine, the combination of means for feeding forward a mass of bristles in bulk, and an oscillatory gatherer and carrier comprising a body portion having some portion of its periphery in constant engagement with the mass of bristles, there being a bristle-carrying notch in its periphery adapted to select a predetermined quantity from the mass of bristles at each oscillation and to deposit the same at their intended point of delivery at a later phase of its oscillation, a slidable plate on one face of said body portion adapted, by movement along said face, to close said notch, and to be withdrawn from its closing position, at certain points in each cycle of operation of the carrier, and a fixed smoothing member projecting from the other face of said body portion, adapted to counteract by the engagement of its even periphery against the bristles, the displacing influence of the notched periphery of the body portion, substantially as described.

4. In a brush-making machine, a notched bristle-carrying member comprising a body portion adapted to engage with its periphery against the exposed side of a supply of bristles and to extract thereform a fixed quantity at each oscillation, a member slidably attached to one face of said body portion, adapted to coöperate with the periphery of said body portion in the operation of selecting and removing bristles, and a supplemental member fixed to said body portion and adapted to counteract the displacement and agitation of the stored bristles due to the engagement thereagainst of the periphery of the body portion by similar engagement thereagainst with its unbroken periphery, substantially as described.

5. In a brush-making machine, in combination with an oscillatory notched gatherer and carrier adapted to engage with its periphery against a supply of bristles in bulk and to select therefrom a specific quantity at each oscillation and carry the same to their point of deposit, reciprocating actuating means therefor, and a reciprocating member deriving its actuation from the same source as said reciprocating actuating means adapted to forcibly contact a projecting portion of said gatherer and carrier at a certain point in each oscillation to effect the release at the point of deposit of the selected quantity of bristles, substantially as described.

6. In a brush-making machine, in combination with a driven shaft, a plurality of cam members carried thereby, one of said cam members having a yielding raceway whereby irregularity of motion may be imparted at a specific point, a plurality of reciprocatory slides engaging said cams and deriving their actuation therefrom, one of said slides being adapted to feed a staple forward in position to be driven, a notched oscillatory gatherer and carrier adapted to engage against a mass of bristles in bulk and to select therefrom a specific quantity at each oscillation, said carrier deriving its actuation from another of said slides, and the subsequent ejection of the tuft being accomplished by the forcible engagement against a part of said carrier of a third slide, and means carried by the third slide adapted to engage the staple after a tuft has been located therebeneath and drive the same into the brush-back, substantially as described.

7. An oscillatory bristle-gatherer for a brush-making machine, having in combination a body portion provided with a notched periphery adapted to engage against a supply of bristles in bulk and to select and remove therefrom a certain quantity at each oscillation, a bristle-retaining member fixed to said body portion and engaging with its periphery the bristles remaining after each oscillation of the carrier, a sliding plate pivoted to said body portion and movable in a plane parallel thereto, adapted to coöperate with the notched periphery of the body portion in holding the bristles during a portion of each oscillation, an adjustable member at the other end of the carrier from its notched periphery fashioned to receive a jarring impact to effect the release of the bristles held in the slotted portion at their point of deposit and a reciprocating member adapted to sharply contact said adjustable member at a certain point in each cycle of operations, substantially as described.

8. A bristle gatherer and carrier, having

in combination a notched, oscillatory, bristle-engaging body portion adapted to automatically select and remove a tuft of bristles at each oscillation, a bristle-alining portion fixed to said body portion, and a plate slidably connected to said body portion and adapted to coöperate with it in the retention of the tuft of bristles during its period of transit from its storage location to its place of deposit, substantially as described.

9. In a brush-making machine, in combination with a rotary shaft, a plurality of cam members carried thereby, said cam members having differently-arranged races on each face, and there being one race provided with a yielding member whereby a faltering motion is imparted to a member engaging thereagainst, a notched oscillatory gatherer and carrier adapted to remove from a supply of bristles with which it is in engagement a specific quantity at each oscillation, means for causing the carrier to release the confined bristles at the desired point of deposit, means for locating a staple thereover, and interconnecting means between each of said members other than the shaft and cams, and a corresponding cam whereby each derives its actuation therefrom upon the rotation of said shaft, substantially as described.

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

WILLIAM G. LIEBIG.

Witnesses:

ALICE TOWNSEND,

WILLIAM M. SWAN.