

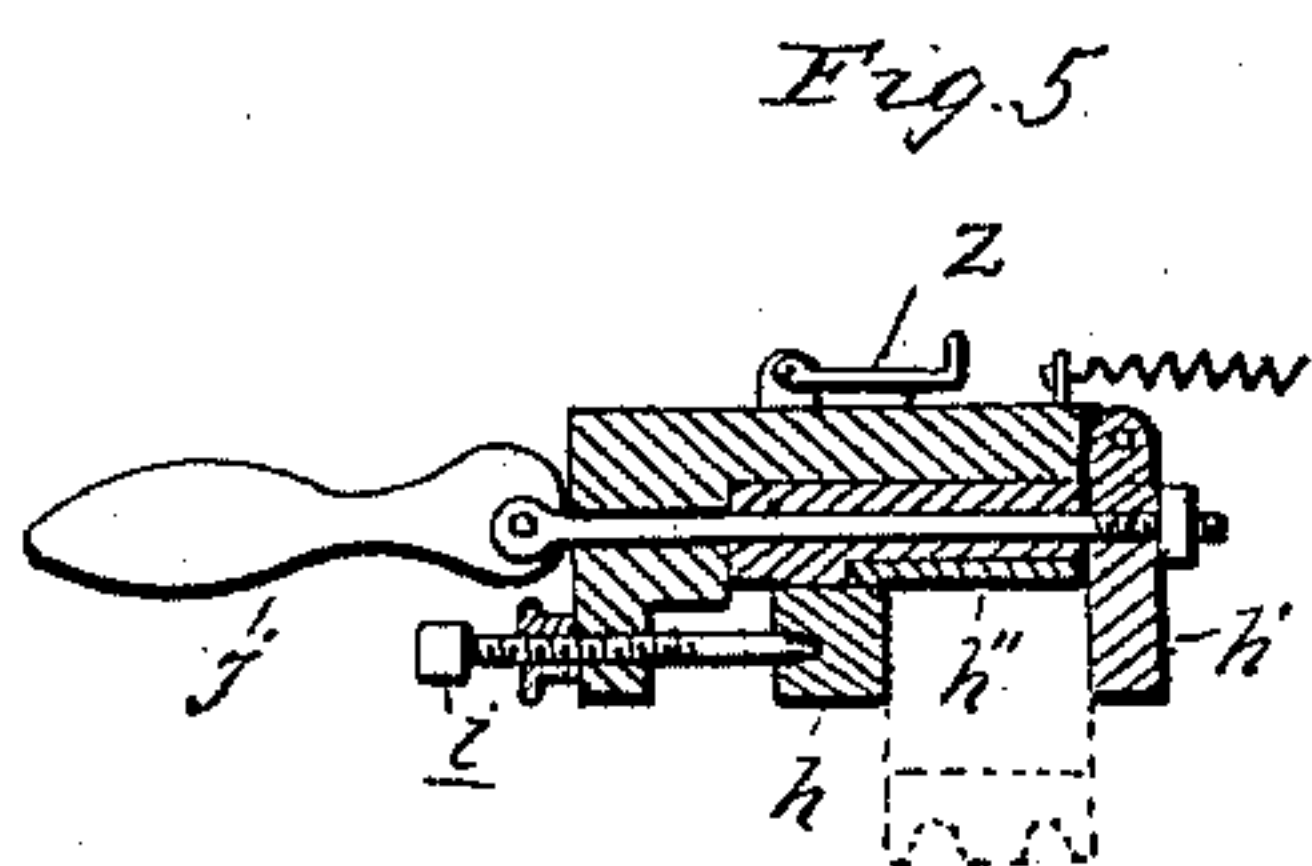
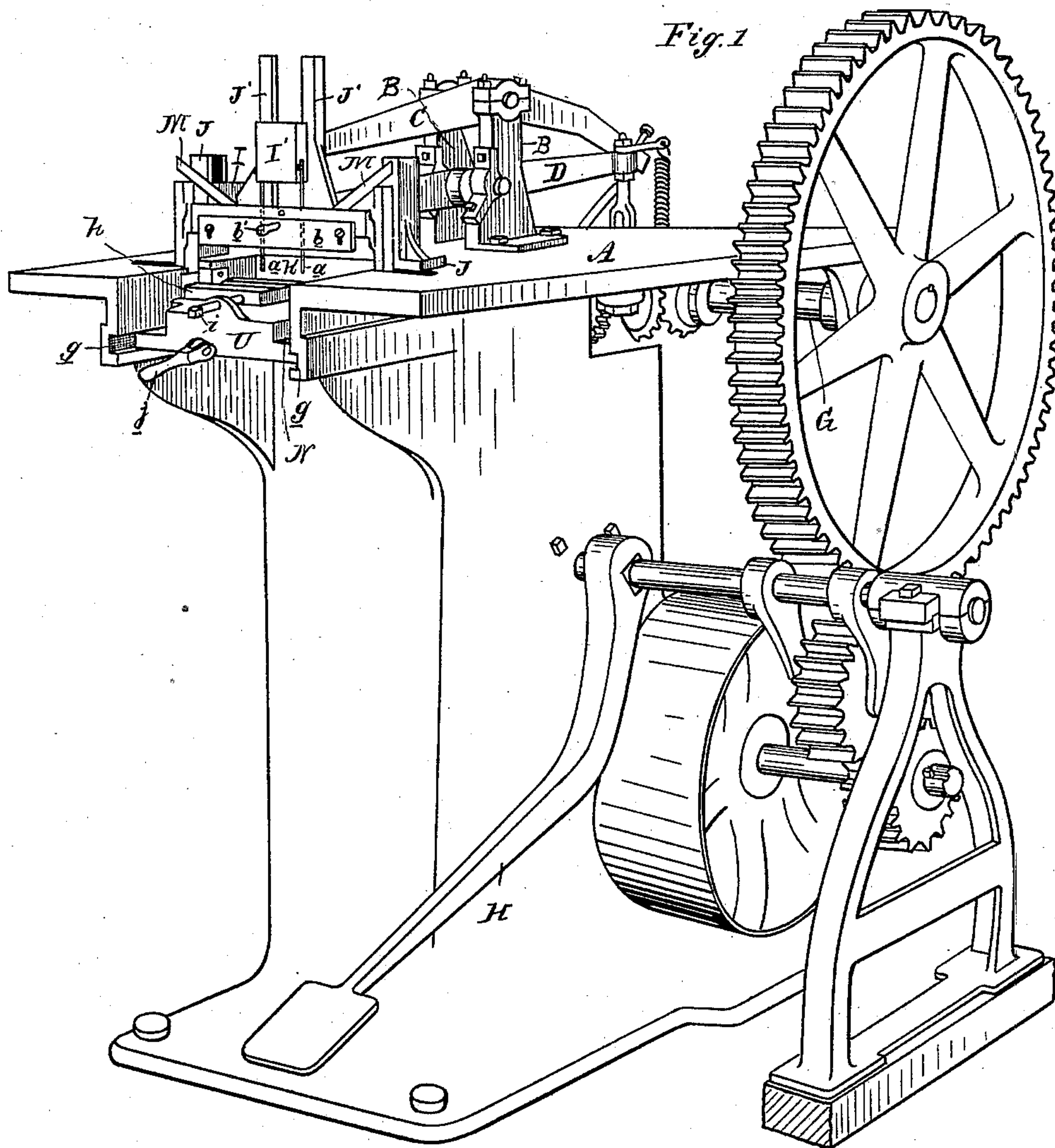
(No Model.)

3 Sheets—Sheet 1.

E. W. PORTER.
BRUSH MACHINE.

No. 396,954.

Patented Jan. 29, 1889.



Attest:
John Schuman.
J. Sprague

Inventor:
Edward W. Porter.
by his Atty.
Thos. J. Sprague

(No Model.)

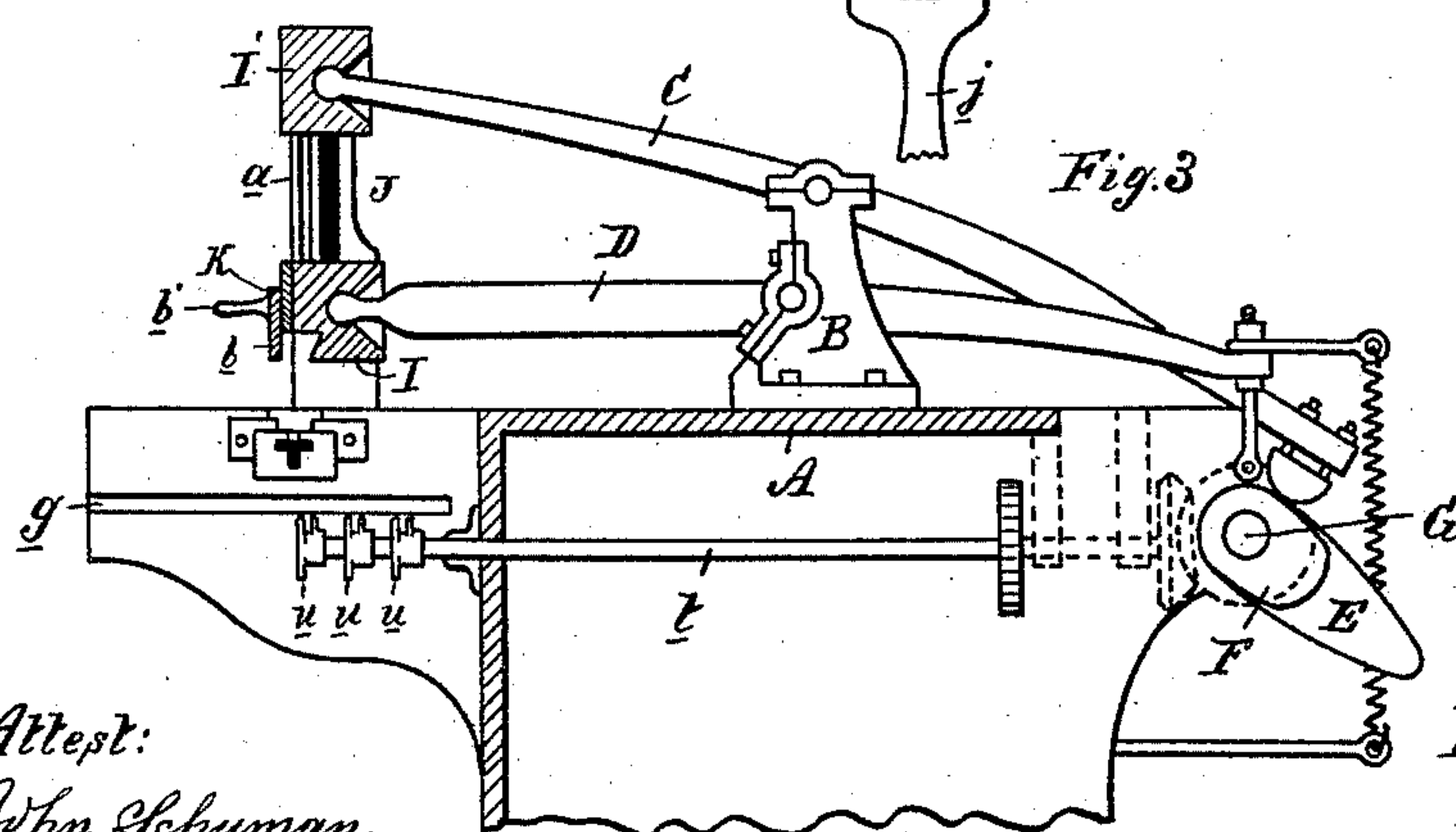
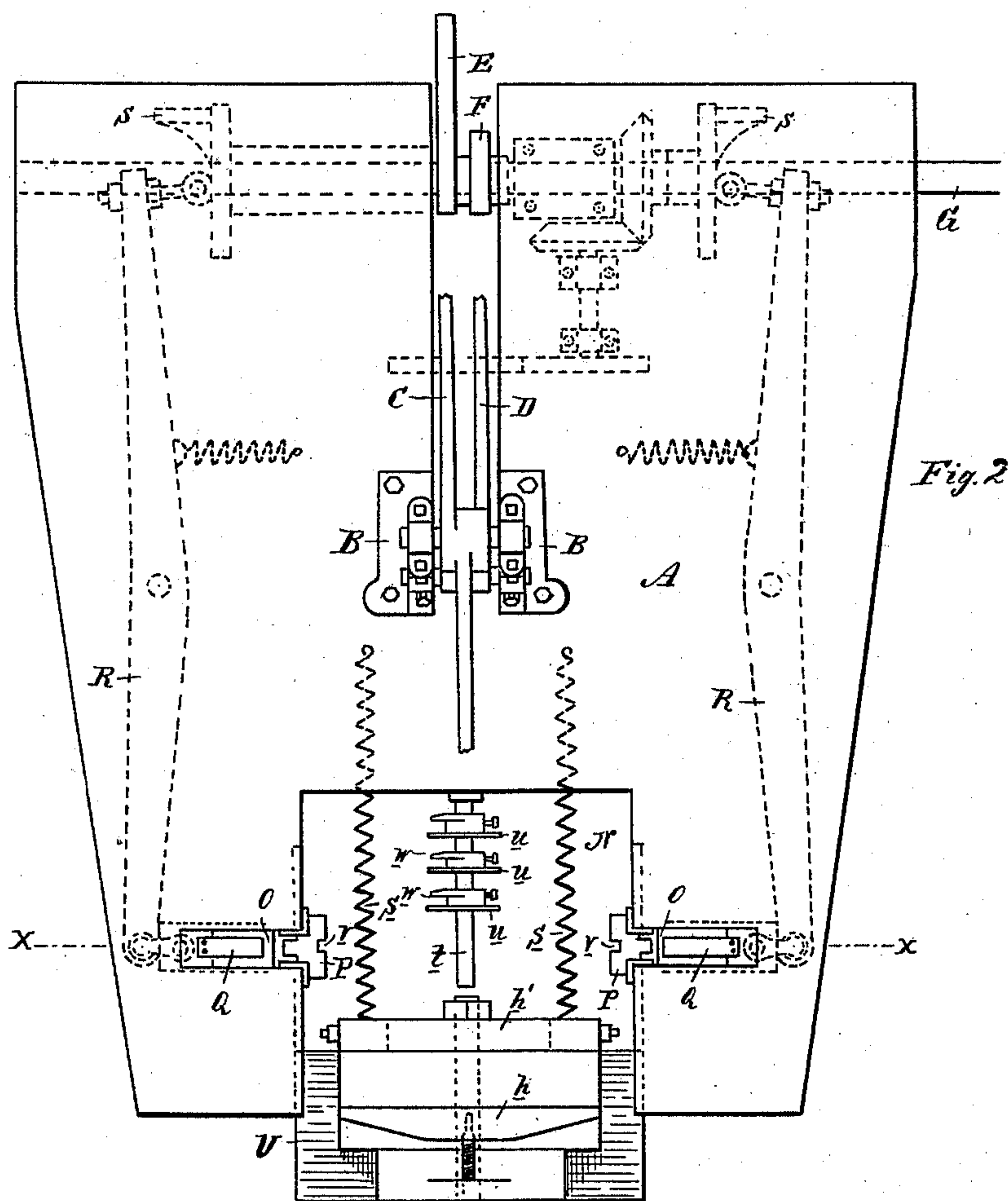
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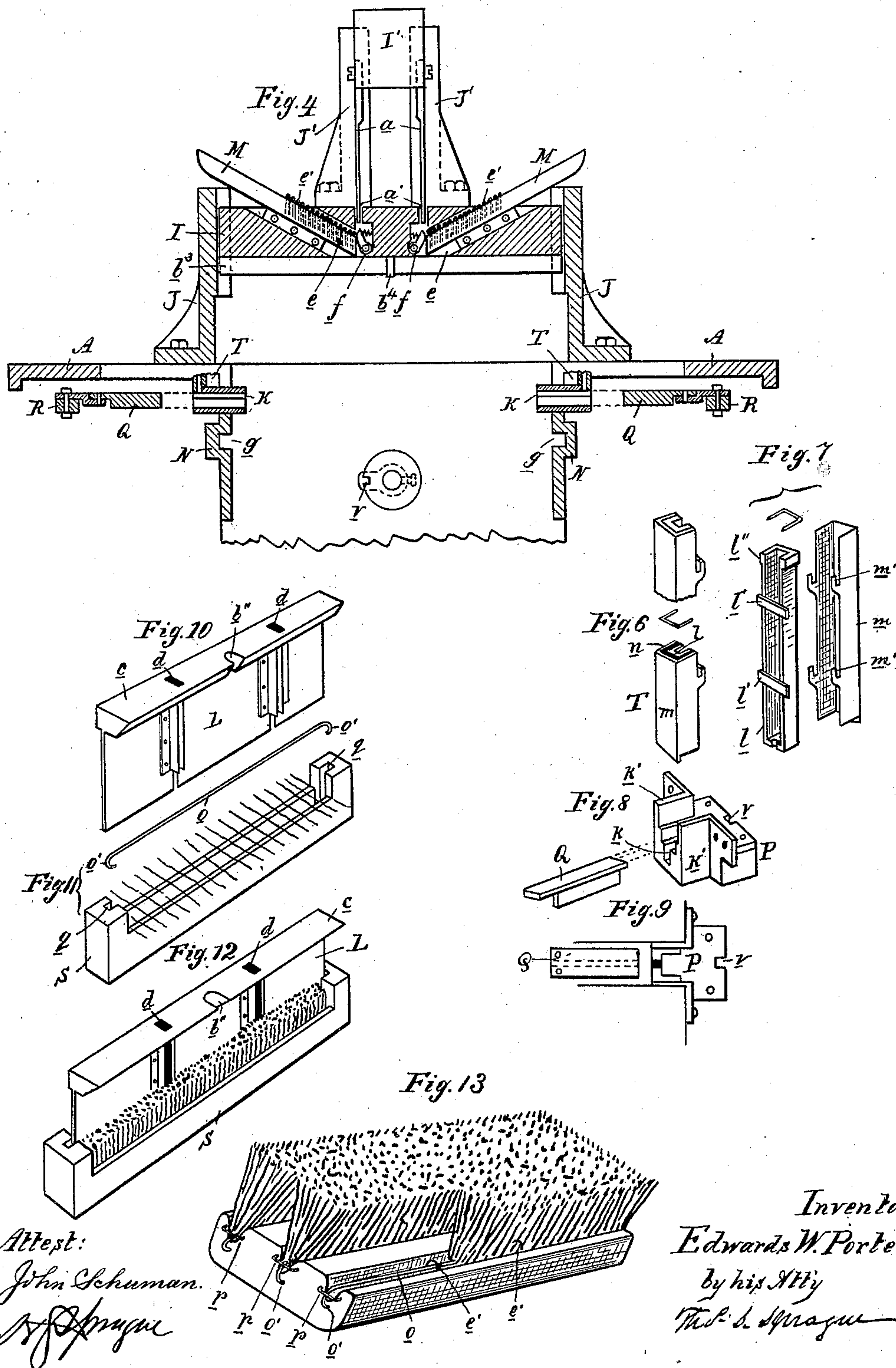
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UNITED STATES PATENT OFFICE.

EDWARDS W. PORTER, OF DETROIT, MICHIGAN, ASSIGNOR TO THE DETROIT
PATENT BRUSH COMPANY, OF SAME PLACE.

BRUSH-MACHINE.

SPECIFICATION forming part of Letters Patent No. 396,954, dated January 29, 1889.

Application filed December 1, 1886. Serial No. 220,384. (No model.)

To all whom it may concern:

Be it known that I, EDWARDS W. PORTER, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Brush-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

10 This invention relates to new and useful improvements in machines for making brushes; and it is more particularly designed for making brushes of that kind wherein the bristles are secured in a longitudinal channel
15 in the block by means of a longitudinal wire which doubles up the bristles in the middle and has its projecting ends bent over and driven into the ends of the block, and wherein wire staples are driven at suitable intervals
20 into the block to straddle said wire and prevent all displacement, said brush being substantially the invention of one D. A. McDonel, and for which a patent was granted him March 13, 1883, and numbered 273,867.

25 The invention consists in the construction and arrangement of various devices and their combination into a single organized machine for inserting and securing the bristles in the block, all as hereinafter more fully described
30 and claimed.

In the drawings which accompany this specification, Figure 1 is a perspective view of my machine looking at the front thereof. Fig. 2 is an enlarged plan with some of the top parts removed. Fig. 3 is a vertical central longitudinal section of the top portion of the machine. Fig. 4 is a vertical cross-section on line *x x* in Fig. 2. Fig. 5 is a longitudinal central section of the block-carriage. Figs.
35 6, 7, 8, 9, 10, 11, and 12 are detached views of parts indicated by letters of reference and specifically referred to hereinafter, such as the aperture guide-blocks, the driver, staple-holder, and follower. Fig. 13 is a perspective
40 view of a brush my machine is designed to manufacture, parts of the bristles being torn out to show the fastening-staple more fully.

A is a table supported by a suitable frame made, preferably, together in a single casting
50 and provided with suitable fastenings for attaching it to the floor. Upon this table are

secured the standards B, in which two levers, C D, are fulcrumed, one above the other, their forward ends being arranged to move in the same vertical plane, while their rear ends are
55 arranged to move in parallel vertical planes, so that each may be actuated independently of the other by the cams E F, respectively, said cams being secured on a shaft, G, placed near the rear end of the table, and provided
60 with suitable drive-gear, which may be thrown in and out of gear by the foot-lever H in a manner well understood. The lever D engages with its forward end into a cross-head, I, which is intermittently reciprocated in ver-
65 tical guides J, secured near the forward end of the table.

The lever C engages at its forward end into a cross-head, I', which intermittently reciprocates in vertical guides J', secured upon the
70 top of the cross-head I. The cross-head I' has detachably secured in suitable sockets therein the two staple-drivers *a a*, which project vertically downward and pass through slots *a'* in the cross-head I, as plainly shown
75 in Fig. 4. The cross-head I is provided upon its front face with a plate, *b*, movably secured thereon by set-screws engaging into slots, and provided with a handle, *b'*, all so
80 arranged that by means of the handle *b'* said face-plate may be easily raised and lowered by hand.

The cross-head I is also provided on its under side with an undercut mortise, *b³*, adapted to receive the head *c* of the follower L, (see
85 Figs. 10 and 12,) which latter is readily secured therein by raising the movable face-plate and lowering it again after the head of the follower is inserted into the mortise in its proper relative position, there being a guide-
90 pin, *b⁴*, Fig. 4, in said mortise and a corresponding notch, *b''*, Figs. 10 and 12, on the head of the follower, which parts have to be engaged whenever the follower is thus secured to its cross-head.
95

The follower L is in the form of a rectangular steel plate, to which the head *c* is secured, and is provided with vertical guide-apertures *d*, extending through it from top to bottom and registering with the staple-drivers
100 *a*, carried by the cross-head I'.

The guide-slots *a'* in the cross-head I,

through which the staple-drivers *a* pass, connect with laterally-inclined slots *e*, Fig. 4, and in these slots are secured the inclined rails *M*, upon which the little wire staples *e'* used by the machine are strung by hand, so as to ride on these rails and feed down the incline by their own weight.

At the bottom of each of the inclined rails *M* is placed a little spring-stop, *f*, which holds the staples in position on the rails, with the lowest staple of each series just underneath one of the staple-drivers, so that in the operation of the latter said staples will be pushed down through the cross-head *I* and through the apertures *d* of the follower into the brush-block placed underneath.

U is a sliding table engaging into suitable guide-grooves, *g*, in the sides of a recess, *N*, formed on the front side of the table *A* underneath the cross-heads *I I'*. This sliding table supports the brush-block, and it is to this end provided on its top with a clamping device, Figs. 2 and 5, consisting of the jaw *h*, which has an adjusting-screw, *i*, and a movable jaw, *h'*, hinged at its lower edge and connected with a cam-lever, *j*, which when turned down after inserting a brush-block between the two jaws clamps the same tightly between. By means of the adjustments provided for the jaws, and by means of exchangeable plates *h''* on the bottom of the clamp, the same can be adjusted to receive different-sized blocks.

The recess *N* connects with lateral recesses *O* upon opposite sides thereof, in each of which is arranged a staple-holder and a device for driving the staples laterally into the ends of the brush-block. These parts are shown in detached detail in Figs. 6, 7, 8, and 9, and are arranged and constructed as follows: An apertured guide-block, *P*, is secured at the mouth of each recess *O*, its T-shaped aperture *k* being adapted to guide the hammer or driver *Q*, which is of similar T-shape in cross-section, and is reciprocatingly actuated by means of a lever, *R*, fulcrumed to the table and engaging at its rear end with a cam, *S*, on the drive-shaft.

T is a staple-holder. (Shown detached in Fig. 6.) It consists of an outer and an inner shell *l m*, respectively, which are detachably secured together, Fig. 7 showing them separated. The inner shell, *l*, is made of sufficiently smaller cross-section than the outer shell to confine the staples in the space *n* formed between the respective walls of the two shells when secured together. This space *n* is open at the bottom and large enough to permit the staples to feed by gravity into the apertures *k* of the guide-blocks *P*, as hereinafter explained. By means of the cross-bars *l'* on the inner shell and the hooks *m'* on the outer shell the two shells are detachably secured together. The filling of the holder with staples is easily accomplished by taking the two shells apart, and after placing the staples astride the inner shell—as many as can be

placed side by side in a single row—then securing the outer shell over it again. The falling out of the staples at one end is prevented by a shoulder, *l''*, at the upper end of the inner shell, and at the opposite end the operator places his finger until he has secured the staple-holder into position. There are two of these staple-holders placed in vertical position, or nearly so, on the rear ends of the guide-blocks *P*. They are held in position by frictional engagement between the flanges *k'* of these guide-blocks, so that they may be readily placed in position or removed when required; but of course other suitable means for securing them detachably in this position may be provided. In Fig. 4 the lower end of each staple-holder is shown in vertical section in its proper relative position to the guide-block.

The space *n*, in which the staples are confined in the staple-holder, is made to communicate with the apertures *k* in the guide-blocks, so that the lowest staple contained in the staple-holder may drop into the upper portion of the aperture *k*, which is just wide enough to admit such staple and guide it, while the driver *Q* pushes it through such aperture into one end of the brush-block, as will appear more fully hereinafter.

In Fig. 13 a brush as manufactured by this machine is shown. It has three rows of bristles, each row being secured in its groove in the brush-block by a longitudinal wire, *o*, the ends of which are bent over and driven into the wood, then by two staples, *e'*, which straddle this longitudinal wire, and, further, by staples *p*, driven into the ends of the brush-block to confine each row of bristles endwise. The work of the machine consists in inserting the bristles and the longitudinal wires *o* into the grooves of the brush-block, in driving the ends of the wires *o* into the wood, and inserting and driving the staples *e' p* into their respective places. This work is done in the following manner: A sufficient amount of prepared stock to form a row of bristles is evenly distributed on a former, *S*. (Shown in Fig. 11.) Then a wire, *o*, previously prepared, as shown in the same figure, is laid on top of the stock and with its bent ends *o'* engaging into the guide-slots *q* in the former. Then with a follower, *L*, of the kind described the stock and the wire *o* are driven into the former, so as to cause the stock to double up, as shown in Fig. 12. In this shape the work is prepared for the further operation of the machine, to which the work is now transferred by securing the follower, with its appendage, to the cross-head *I*. The operator now imparts motion to his machine by means of the foot-lever *H*, and the cross-head *I* in descending brings the former *S* in contact with the brush-block clamped upon the sliding table. The former *S* being thereby arrested, the further movement of the cross-head forces the follower *L*, with the wire *o* and the stock, through the former *S* into the

brush-block, one of the grooves of which is adjusted to receive it. The cross-head I' also descends and carries the drivers *a* to each detachable lowest one of the series of staples on the rails M and forces such staple through the passage provided therefor in the cross-head I and follower L into the brush-head astride the wire *o*, as shown at *e'* in Fig. 13. The drivers Q, being actuated on at the proper time by the connections described, enter the apertures *k* in the guide-blocks P, and each one, finding the lowest staple in each staple-holder T thrown in its path, pushes such staple ahead and forces it into the end of the brush-block, as shown at *p* in Fig. 13. At the same time these drivers Q also force the bent ends *o'* of the wires *o* into the wood, so as to secure them firmly in position. As the bent ends *o'* of the wires *o* project a little distance beyond the ends of the brush-block before they are driven into the wood, the blocks P are provided with vertical grooves *v* to make room for such ends, and at the same time confine them, so that the drivers may properly force them into the brush-block.

To complete the brush it takes as many such operations of the machine as there are grooves in the brush-block, there being usually two or three. To make the required adjustment of the sliding table U perfectly automatic, so that the grooves in the brush-block are properly adjusted in relation to the follower and to the drivers and a new groove presented in succession as the work advances, I have provided the machine with the following device: Two coil-springs, *s s*, Fig. 2, are secured at one end to the frame of the machine and at the other end to the sliding table U. The tension of these springs is made to draw the table U into the recess N whenever it is free to act. A shaft, *t*, journaled to the frame of the machine, extends into the recess N below the sliding table, and has the circular stops *u* adjustably secured thereon by means of set-screws or otherwise. Each of these circular stops has a notch, *v*, (see Fig. 4,) cut in its periphery, and back of this notch is a guard-finger, *w*. To the under side of the table U is secured, by hinging, the stop *z* in such position that it will impinge with its downwardly-projecting head against the edge of any one of the disks *u*, except when it registers with the notch *v* in said disk, in which case the tension of the springs *s* is free to pull the table rearwardly. The shaft *t* receives motion from the shaft G by means of suitable intermediate connection, which revolves it at the same rate of speed.

The parts being thus constructed and arranged, their operation is intended to be as follows: At the starting position the sliding table is arrested by the impingement of its hinged stop *z* against the first circular stop until the revolution of said stop brings its notch to register with the hinged stop *z*. Then the tension of the springs *s* is free to act and pulls the carriage to the rear until it is ar-

rested by the second circular stop. Another revolution of the shaft permits the stop *z* to pass from the second circular stop in like manner to the third. These three positions of the sliding table are the ones required to present the brush-block in the proper position for the three successive operations required to finish a brush with three rows of bristles. The guard-fingers *w* behind the notch of each circular stop defer the rearward motion of the sliding table from one stop to the next just long enough to prevent the stop *z* from passing through more than one notch at a time, all said notches being in a straight line. The forward withdrawal of the table can be effected by the operator at any position of the table, as the hinging of the stop *z* permits it to pass over the circular stops. The distances apart between the circular stops correspond with the spacing of the grooves in the brush-block. When the brush-block has but two grooves, only two circular disks, *u*, are required. The most rearward groove of the brush-head as it is clamped on the table is the one with which the operation begins, and the work proceeds from the rear to the front, step by step. When the brush is completed, the operator grasps the handle *j*, and, simultaneously withdrawing the table to the front, actuates said handles to unclamp the completed brush, and, after removing it, clamps a new block in place.

The necessary changes to be made for different sizes of brushes in the adjustments provided for different parts of the machine are self-evident to any experienced workman, and where the parts are not for themselves adjustable, as is the case with the follower L and the former S, there may be different sets of such parts provided for.

To make the work of the machine more expeditious, I deem it preferable to conduct the preliminary steps, the result of which is the placing of the stock and of the longitudinal wire *o* into the former, as shown in Fig. 12, as an operation apart from this machine, the operator being then furnished with the work in the form mentioned as fast as he can take care of it, there being provided for this purpose a sufficient number of followers and formers and a simple machine to do this preliminary work.

What I claim as my invention is—

1. In a brush-machine, the combination of the following elements: a clamp for holding and supporting the brush-block in operation, vertically-actuated staple-drivers, horizontally-actuated staple drivers, automatic staple-feeds for the staple-drivers, and a reciprocating cross-head adapted to carry a detachable follower, all arranged to set and staple-fasten by their joint intermittent action a row of bristles, together with a longitudinal wire, into a longitudinal groove of the brush-block, substantially as described.

2. In a brush-machine, the combination of the following elements: a brush-clamp car-

ried by a table, an automatic step-by-step feed for said table, vertical staple-drivers, horizontal staple-drivers, automatic staple-feeds for the staple-drivers, and a vertically-reciprocating cross-head adapted to carry a detachable follower, all arranged to set a row of bristles, together with a longitudinal wire which holds said bristles, into each longitudinal groove of the brush-block and staple-
 10 fasten the wire, substantially as described.

3. In a brush-machine, the combination of a sliding table secured in a recess of the frame of the machine, of an automatic step-by-step feed for said table, of a clamp for clamping
 15 a brush-block upon said table, of two staple-drivers arranged to operate laterally against the opposite ends of the brush-block, of a cross-head carrying a detachable follower and arranged to operate vertically against the top
 20 of the brush-block, and of two staple-drivers carried by a second cross-head and arranged to operate vertically against the top of the brush-block through passages provided for the follower and in the cross-head which carries the follower, substantially as and for the
 25 purposes described.

4. In a brush-machine, the combination of the sliding table U, which carries the brush-block, the hinged stop z , secured to said table,
 30 the shaft t , the circular stops u , having notches v and guard-fingers w , and the tension-springs s , all arranged and operated to form a step-by-step feed, substantially as described.

5. In a brush-machine, the sliding table U, carrying the stationary jaw h , with adjusting-screw i , the hinged jaw h' , the removable bottom plate, h'' , and the cam-lever j , for operating the movable jaw, all arranged to form an adjustable clamp for the brush-block, sub-
 40 stantially as described.

6. In a brush-machine, the combination, with the staple-drivers a and the cross-head I, having the passages a' , of the follower L, having the passages d , substantially as described.

45 7. The staple-holder T, consisting of an outer and inner shell formed with cross-bars and hooks and detachably secured together

thereby, and forming a space, n , between their respective walls to hold the staples, substantially as described. 50

8. The combination of the guide-block P, having the horizontal aperture k , T-shaped in cross-section, the staple-holder T, detachably secured to the said guide-block and having the vertical space n , for holding the staples, 55 and the staple-driver Q, of corresponding cross-section with the aperture k in the guide-block and adapted to work therein, substantially as described.

9. In a brush-machine, the combination of 60 the stationary table or frame, a movable table supported in a recess of the frame and adapted to carry the brush-head, horizontally-apertured guide-blocks secured in lateral recesses in the frame upon opposite sides of the movable table, horizontally-movable staple-drivers 65 adapted to work through apertures in the guide-blocks, staple-holders adapted to feed the staples by gravity into the apertures of the guide-blocks, a cross-head movably secured in vertical guides above the movable table, vertical staple-drivers arranged to work through vertical apertures in the cross-head, inclined rails carried by the cross-head and arranged to hold and feed staples by gravity 75 into the vertical apertures of the cross-head, a follower and means for detachably securing it to the cross-head, passages through the follower through which the vertical staple-drivers work, and means for imparting a concerted intermittent movement to the staple-drivers and to the follower, substantially as described. 80

10. The combination of the apertured guide-blocks P, having the vertical notches r , and 85 the staple-drivers Q, T-shaped in cross-section and adapted to work through the apertures of the guide-blocks, substantially as described.

EDWARDS W. PORTER.

Witnesses:

H. S. SPRAGUE,
 J. PAUL MAYER.