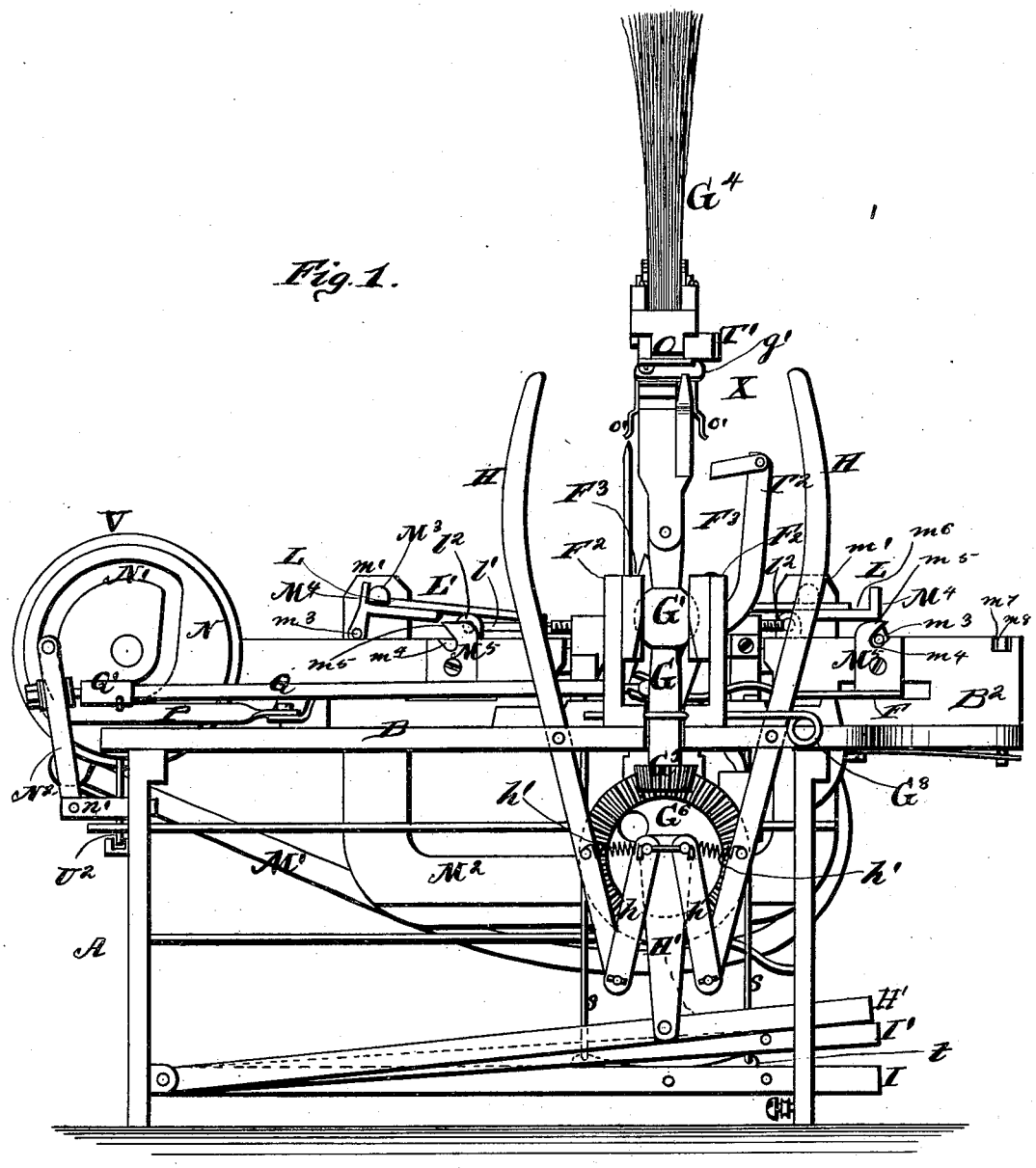
6 Sheets—Sheet 1.

# C. E. LIPE.

## BROOM-MACHINE.

No. 189,240. Patented April 3, 1877.

Fig. 1.




WITNESSES

Robert Everett

George E. Upham

INVENTOR.

Charles E. Lipe.

Gillmore, Smith & Co.

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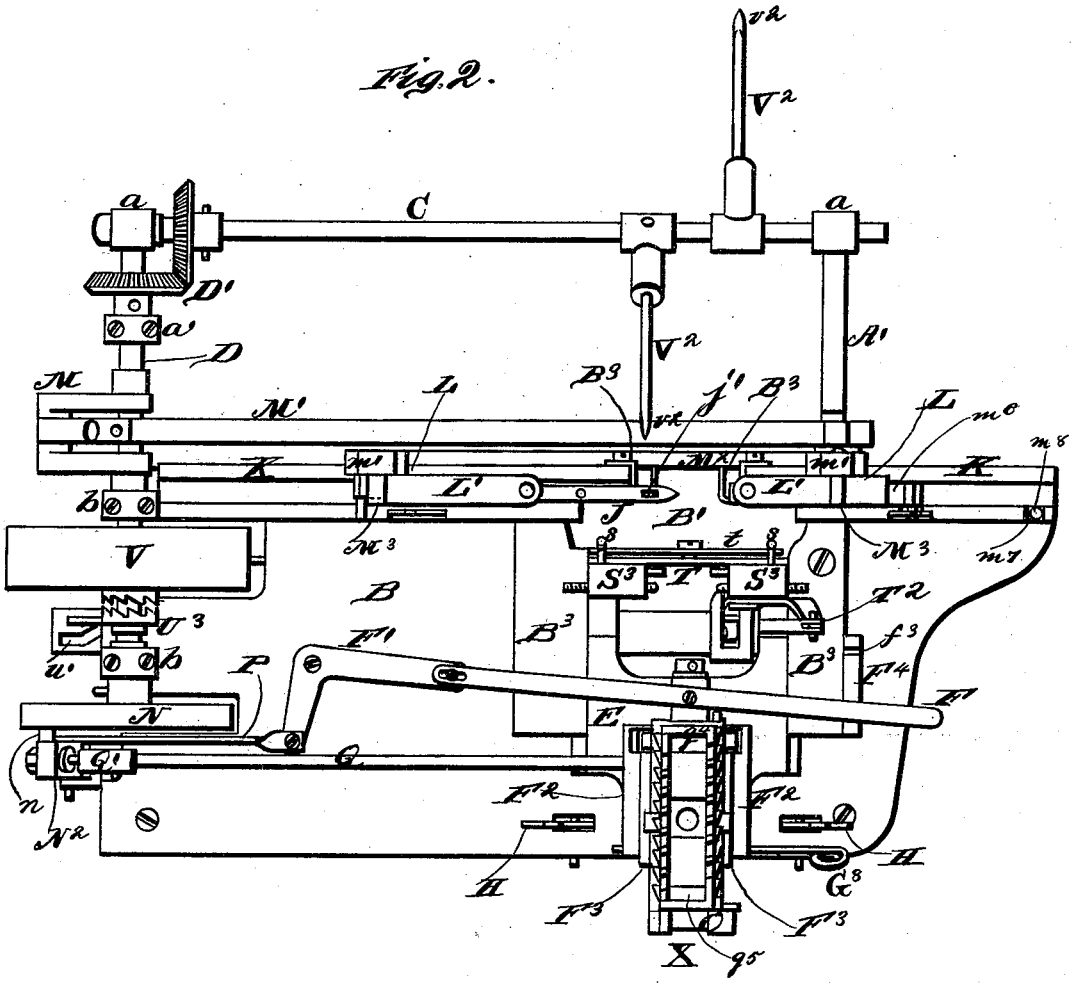
Fig. 2.




WITNESSES

Robert Ewett

George E. Upham.

INVENTOR.

Charles E. Lipe.

Gillmore, Smith & Co.

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# C. E. LIPE.

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Fig. 4.

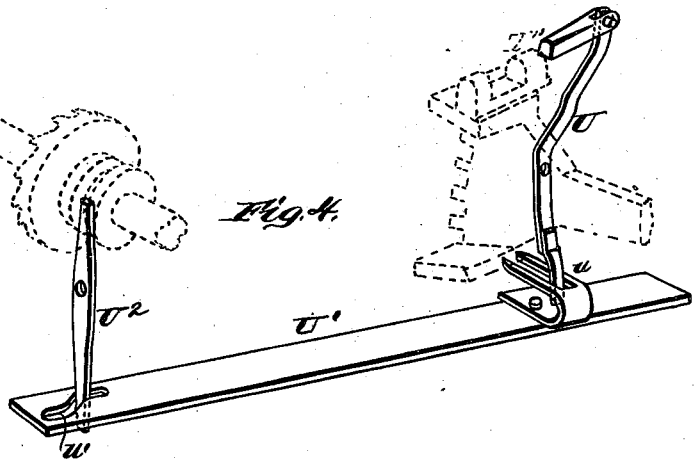
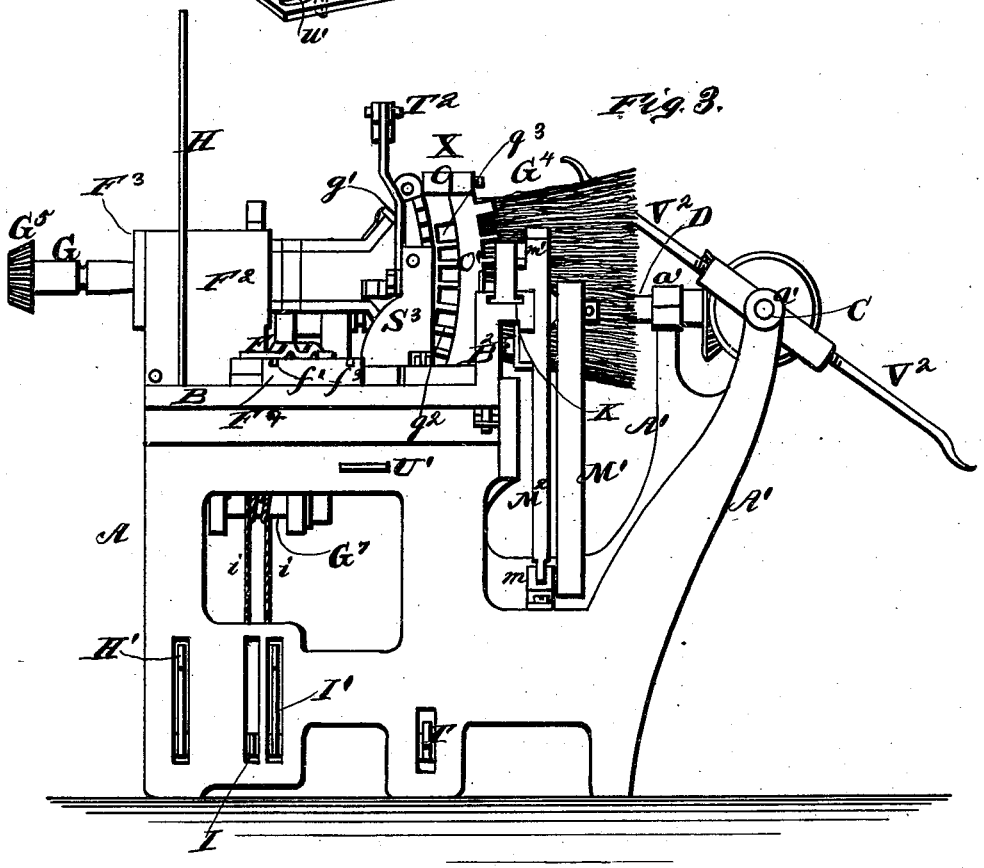



Fig. 3.




WITNESSES

Robert Everett

George E. Upham.

INVENTOR.

Charles E. Lipe.

Gilmore & Smith & Co.

ATTORNEYS.

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C. E. LIPE.

BROOM-MACHINE.

No. 189,240. Patented April 3, 1877.

Fig. 5.

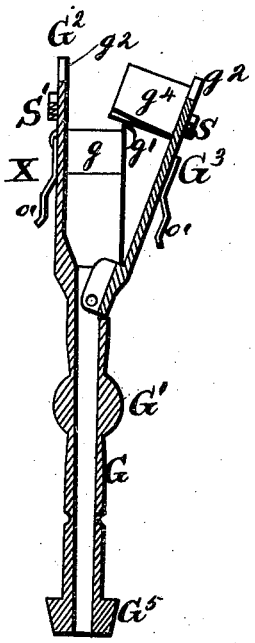


Fig. 6.

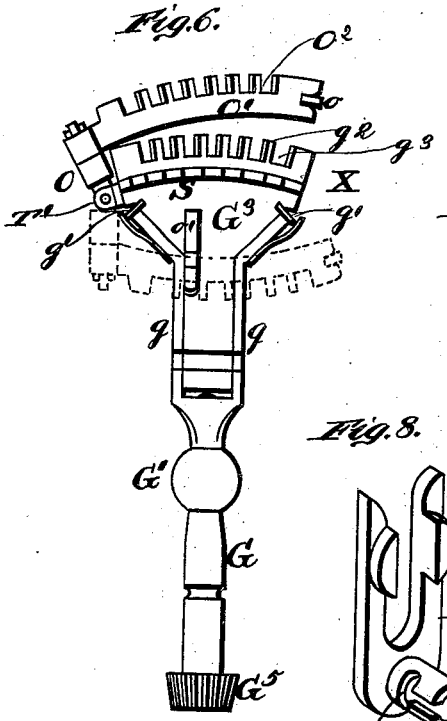


Fig. 7.

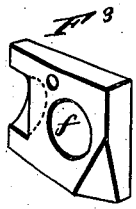


Fig. 8.

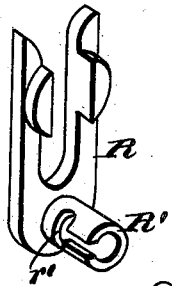


Fig. 9.

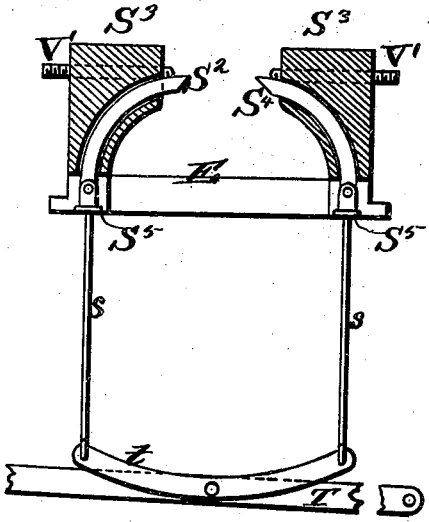


Fig. 10.

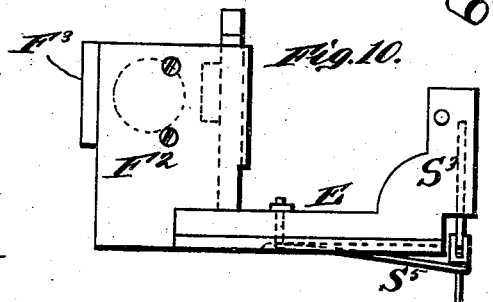
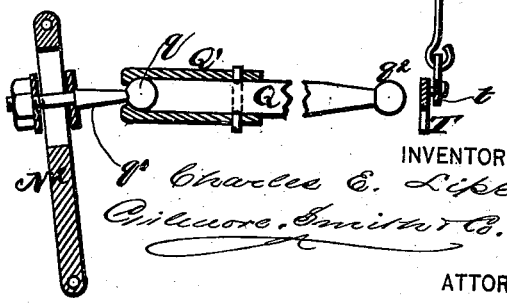


Fig. 11.



WITNESSES

Robert Everett

George C. Upham.

INVENTOR.

Charles E. Lipe.

Gilmore, Smith & Co.

ATTORNEYS.

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# C. E. LIPE.

## BROOM-MACHINE.

No. 189,240. Patented April 3, 1877.

Fig. 12.

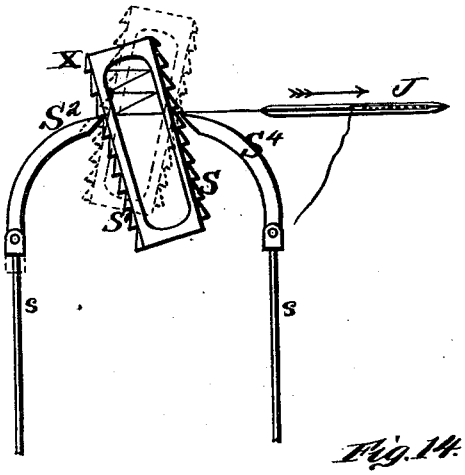
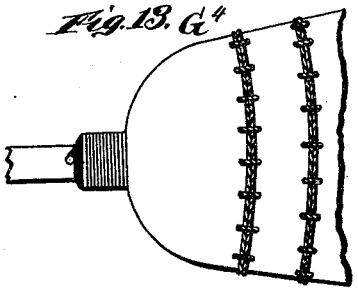
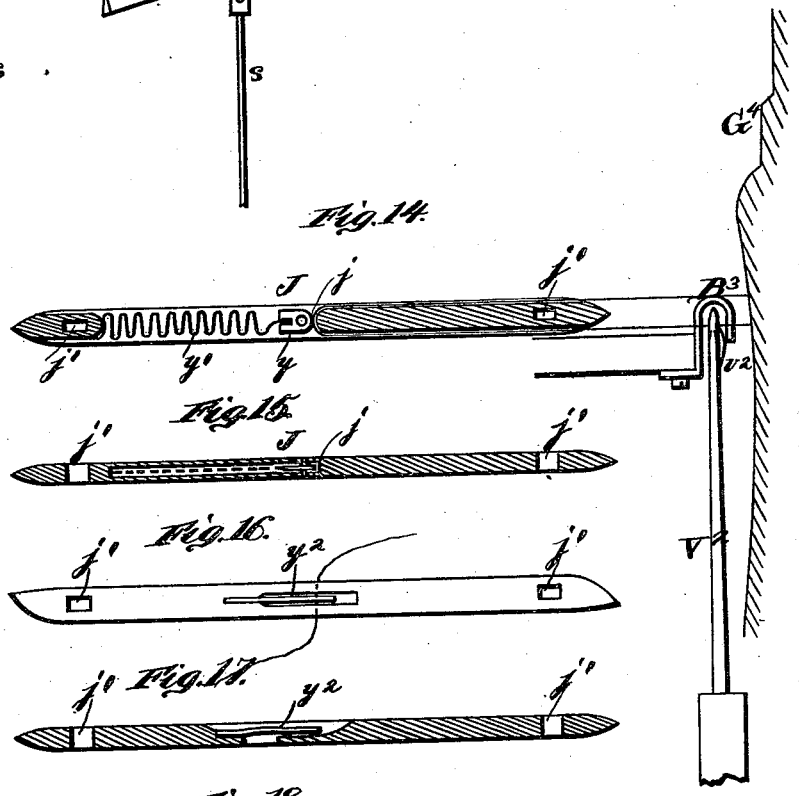
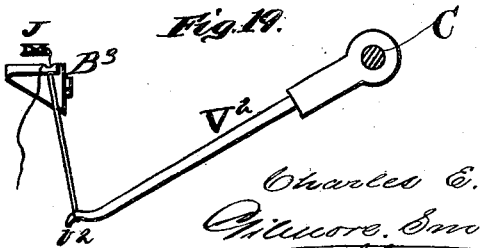



Fig. 13. G4






WITNESSES

Robt Everett

George E. Upham.

INVENTOR.

Charles E. Lipe.

Wilmore, Sweitzer & Co.

ATTORNEYS.

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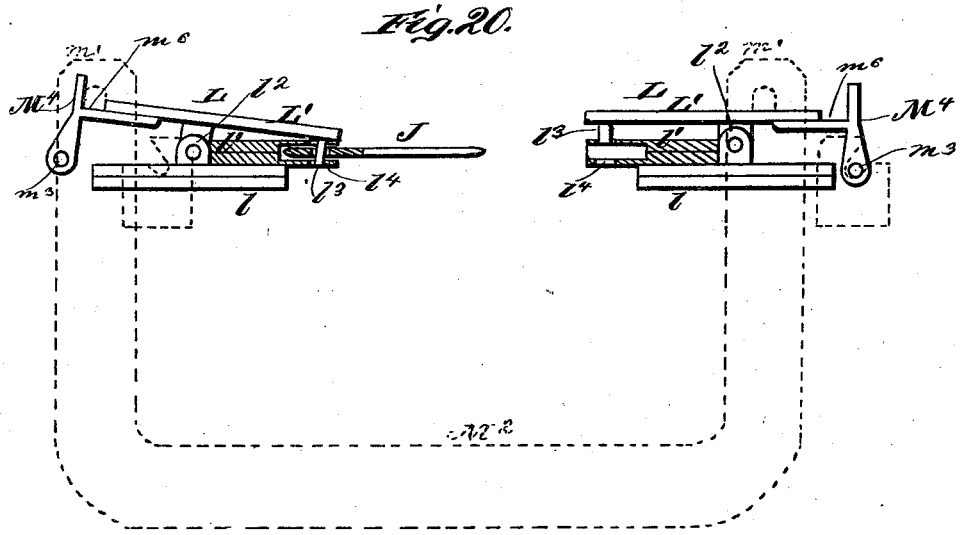
# C. E. LIPE.

## BROOM-MACHINE.

No. 189,240. Patented April 3, 1877.

Fig. 20.



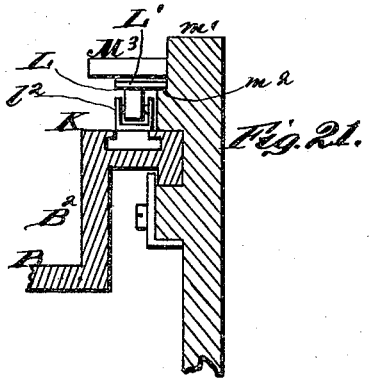




Fig. 21.

Fig. 22.

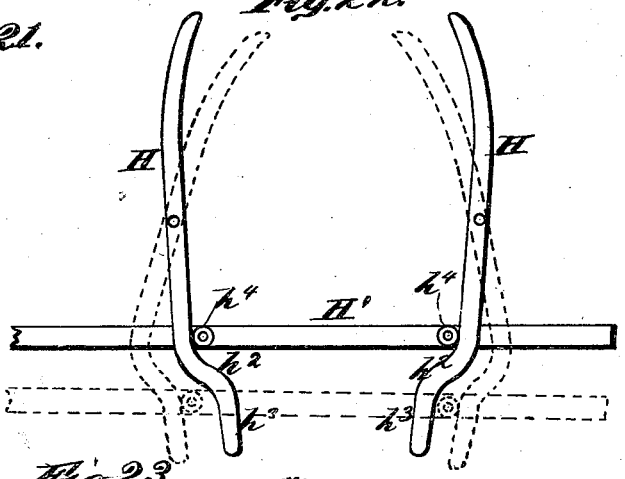
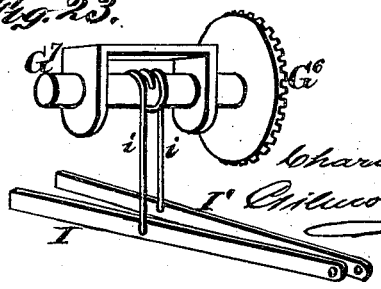



Fig. 23.




WITNESSES

Robt Ewett

George E. Upham.

INVENTOR.

Charles E. Lipe.

Pillsbury, Smith & Co.

ATTORNEYS.

# UNITED STATES PATENT OFFICE.

CHARLES E. LIPE, OF ILION, ASSIGNOR OF TWO-THIRDS OF HIS RIGHT TO EDWARD D. BRONSON, OF AMSTERDAM, AND ALPHONSO WALRATH, OF FORT PLAIN, NEW YORK.

## IMPROVEMENT IN BROOM-MACHINES.

Specification forming part of Letters Patent No. **189,240**, dated April 3, 1877; application filed March 10, 1877.

*To all whom it may concern:*

Be it known that I, CHARLES E. LIPE, of Ilion, in the county of Herkimer and State of New York, have invented a new and valuable Improvement in Broom-Sewing Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a side elevation of my broom-sewing machine, and Fig. 2 a plan view of the same. Fig. 3 is a front view thereof. Fig. 4 is a perspective detail view. Figs. 5, 6, 7, 8, 9, 10, 11, 12, and 13 are detail views of my machine. Figs. 14 and 15 are sectional views of the needle. Figs. 16, 17, and 18 are views of a modification of the needle. Figs. 19, 20, 21, 22, and 23 are also detail views of my broom-sewing machine.

The chief object of this invention is to provide mechanism for sewing brooms by an operation similar to the method of hand-sewing now generally practiced.

The said invention includes, first, certain mechanism for pressing and holding the broom while it is being stitched; second, certain devices for winding the band on the said broom preparatory to stitching; third, certain mechanism for passing through the broom the needle and so much of the thread as is needed for the stitch; fourth, certain take-up mechanism for drawing through the broom the surplus thread which is to be used in succeeding stitches; fifth, feeding devices for giving the proper motions to the broom after each stitch; sixth, mechanism for automatically stopping the machine at the completion of the stitching of each band; seventh, mechanism for changing the position of the broom, so as to present in succession the several bands to the sewing mechanism.

In the accompanying drawings, A designates the supporting-frame of my machine, and B the bed or table upheld thereby. The front standards A′ A′ of said frame A are extended obliquely upward and forward, and bearings *a a* are formed on their upper ends for the shaft C of the take-up mechanism, hereinafter described, which shaft is parallel to the front line of table B. One of said standards is also provided with an additional bearing, *a′*, for one end of driving-shaft D, which is parallel to one end of said bed or table B, and turns in bearings *b b*, raised above the latter.

The middle part of said bed or table B is recessed from the front inward at $B^1$, to leave room for moving the broom while the latter is undergoing stitching. On each side of the entrance to this recess or space $B^1$ a flange, $B^2$, is raised along the front of said bed or table, and back from said flanges $B^2$, and along the sides of said recess $B^1$, extend two guide-blocks, $B^3$, which are formed on the top of said bed or table, and suitably channeled on their inner faces.

In these guides slides a broom carriage, E, which is adjusted forward and backward by means of a horizontal lever, F, which is pivoted thereto at its middle, and also pivoted by one end to the end of a horizontal elbow-lever, $F^1$. On the rear part of said sliding broom-carriage are formed two raised blocks, $F^2$, provided with detachable inner pieces $F^3$, one being shown in detail in Fig. 7, which have on their faces concavities *f f*, that, together, constitute a socket for a ball, $G^1$, formed on a hollow broom-holding spindle, G. Said spindle is provided at its upper end with a broom-holding vise, X. The jaws of said vise are of proper form to give the required shape to the broom, and one of them (marked $G^2$) is made in one piece with said spindle, and provided with rigid flanges *g g*, between which the other jaw, $G^3$, sets when the said vise is closed upon the broom. The lower end of said jaw $G^3$ is pivoted between said flanges *g g*, and the upper part of the said jaw $G^3$ is provided with flanges $g^4$ $g^5$, which set above flanges *g g*. Said jaws are held together (when the vise is closed) by means of pivoted spring-pressed catches $g^1$ $g^1$. In order to separate the said jaws $G^3$ and $G^2$, for the removal of one broom and the introduction of another, the said spring-catches $g^1$ $g^1$ are forced back by hand; but they are beveled, so as to open automatically when the said jaws are forced together upon the broom $G^4$. The construction of said vise is shown in detail in Figs. 5 and 6.

This closing of said vice is effected by two

closing-levers, H H, which are pivoted by their middle parts, so as to work toward and from each other in slots in the bed or table B. The lower ends of said levers are connected by upwardly and inwardly converging links or toggle-arms *h h*, the upper ends of which are pivotally attached to an upwardly-extending arm of a treadle, H′, which is pivoted at its rear to one of the rear standards of supporting-frame A. Springs $h^1$ $h^1$ connect the upper ends of said links or toggle-arms *h h* with said closing-levers H H. By depressing the free end of said treadle the curved upper ends of said closing-levers are forced together like a pair of jaws, closing the vise. When the pressure is removed therefrom, springs $h^1$ $h^1$ draw the lower ends of said levers together, spreading the upper ends thereof, so as to leave sufficient room for the said vise to turn therein.

Instead of the vise-closing mechanism above described, the following modification (shown in Fig. 22) may be employed: Vise-closing levers H H are extended down below said treadle H′, their lower ends being formed each into two inclines, $h^2$ and $h^3$, the former being quite abrupt, the latter much more gradual. These inclines are inward and downward, and those on each lever correspond to those on the other. Treadle $H^1$ is provided with rollers $h^4$ $h^4$, which bear against the inside of said levers. When said rollers press against the upper inclines $h^2$ the upper ends of said closing-levers are brought quickly toward one another, into the position where the greatest pressure is required. The action of rollers $h^4$ $h^4$ against the less abrupt inclines $h^3$ $h^3$ applies this pressure gradually but effectively.

When the broom $G^4$ is held in the vise above described the band or bands are wound about the brush part of it by means of the following devices: On the lower end of broom-holding spindle G is formed a bevel-pinion, $G^5$, which meshes with a bevel-gear wheel, $G^6$, on a small shaft, $G^7$, journaled in bearings attached to the under side of bed or table B.

This small shaft $G^7$ is rotated by means of cords *i i*, which extend, respectively, to treadles I $I^1$, pivoted to the rear part of supporting-frame A. The arrangement of said parts is such that when one of said treadles is depressed the broom is rotated in one direction; when the other treadle is depressed the broom is rotated in the other direction. No springs are required, as the depression of each treadle suffices to raise the other. The thread forming the band is first passed through the broom, and then wound around it by the above-described rotation of the latter. It is then drawn through again and broken off.

The band being on the broom, it next becomes necessary to sew it to its place. To accomplish this it is necessary to withdraw a catch, $G^8$, which holds spindle G in an upright position, and to turn said spindle forward and downward into a horizontal position, ball $G^1$ and its socket being the pivot. This pivotal point is also the center of the circle of which the curved lines of the stitches form a part. The jaws $G^2$ $G^3$ are provided on top with oblique lugs $g^2$ $g^2$, which alternate with openings or indentations $g^3$ $g^3$, which form passage-ways for the needle J to penetrate said broom $G^4$. Said needle is double-pointed, being threaded in the center through eye *j*, and perforated near each end at *j′ j′*. The sides of said needle are longitudinally grooved, to let the thread lie along them as said needle is drawn backward and forward through the broom.

The said needle is operated by the following devices: On the tops of flanges $B^2$ are guideways K, in which run needle-carriers L. Each of these needle-carriers consists, first, of a metal slide, *l*, on the inner end of which is a needle-case, $l^1$, open on its inner end to receive the needle already described. At the rear of this case are raised lugs $l^2$, between which a needle-holding bar, L′, is pivoted. On the bottom of the front or inner end of said bar L′ is a stud or tooth, $l^3$, which is adapted to work down through a perforation, $l^4$, in needle-case $l^1$, and through one of the perforations *j′* in needle J, when the said perforations $l^4$ *j′* are made to register. This occurs whenever the said needle is shifted from one carrier to another, and the correspondence of the said motions is effected as follows:

A double crank, M, on the main shaft D, already described, operates a bent connecting rod or bar, $M^1$, which is pivotally attached at its other end to a large U-shaped yoke, $M^2$, which is guided at the bottom by a guide, *m*, supported by a frame, A. The upper ends of said yoke are provided with guide-blocks $m^1$, which extend over guideways K, and on top of which are small shoulders $m^2$, each end having a guide-block and shoulder. Each of said ends has also a rearwardly-extending flat-bottomed stud or bar, $M^3$. This stud or bar slides over the top of needle-holding bar L′. The latter is supported at its outer end by a T-shaped casting, $M^4$, which has its long arm rigidly attached to said needle-holding bar and its short arms vertical. Attached to or formed on the lowest part of said casting is a pin or stud, $m^3$, which rides backward and forward upon one of the flanges of guideway K. When in this position, casting $M^4$ and the outer end of bar L′ are tipped up, so as to force tooth $l^3$ downward through one of the perforations *j′* in needle J, and hold it there until said stud or pin $m^3$ slides down into an oblique slot, $m^4$, in the rear flange of guideway K. This slot extends downward and toward the broom $G^4$, and is guarded by a slotted plate, $M^5$, which is set into said guideway, and has a hook or stop-piece, $m^5$, that prevents the stud $m^3$ from passing beyond it.

The outer end of needle-holding bar L′ does not extend quite to the vertical part of casting $M^4$, so that there is a small space, $m^6$, be-

tween them. When flat-bottomed stud or bar $M^3$ begins to move forward, it rests in this space $m^6$, and it is pressed against the rear end of bar L′ by the forward movement of yoke $M^2$, so as to move inward with it the entire needle-carrier L; but when stud $m^3$ strikes against the incline of stop-piece $m^5$, and passes down into the slot $m^4$, the said stud passes out of said recess upon the falling outer end of bar L′, and moves forward over the same independently of said carrier. The falling of said outer end of said needle-holding bar L′ releases the needle; and said bar is held out of accidental engagement with the latter by the pressure of said stud or bar $M^4$, carried by yoke $M^2$ upon the rear end of said bar. While so held, the projecting edge of said bar rests upon shoulder $m^2$, already described.

As both the needle-carriers and their attachments are constructed correspondingly in every respect, and as the operation of the yoke $M^2$ and its appurtenances is the same upon both, it follows that the reciprocatory motion of said yoke will operate said carriers alternately; and the above-described devices cause the empty carrier to remain open until the needle is presented thereto, while the carrier holding the needle is not allowed to relinquish the same. All this is effected by positive pressure. The operation is similar to that of a pair of hands drawing the double-ended needle to and fro through the broom.

To remove the needle from the machine, slide the carrier holding it back until the stud $m^3$ is over recess $m^7$ in one of the flanges of guideway K. Then force down said stud into said recess against the resistance of a spring-pressed rod, $m^8$, which ordinarily fills the same. There will then be no obstacle to the withdrawal of the needle.

On the inner end of each guideway K is a bent thread-guide, $B^3$, which has its surfaces rounded, so as not to cut the thread while the latter is being fed to the needle.

In sewing the bands to the broom it is necessary to make the needle pass through the latter alternately on opposite sides of the band. To accomplish this I give the broom a forward-and-backward reciprocatory motion by means of the following devices: On main shaft D is a wheel or disk, N, having on its rear face a cam-groove, $N^1$, which engages with a stud, $n$, on the upper end of an upright bar, $N^2$, that is pivoted at its lower end to a bracket, $n'$, secured to frame A, and thereby gives inward and outward oscillation to the same. This motion is communicated, by means of a connecting-bar, P, to elbow-lever $F^1$, already described. The movement of this elbow-lever rocks the lever F backward and forward, and thus causes broom-carriage E to similarly reciprocate within its guides. The other end of said lever is provided with a tooth or catch, $f^1$, which sets into one of a series of notches, $f^2$ $f^3$, in a block or notch-plate, $F^4$, upon bed or table B. Said tooth or catch $f^1$ then constitutes the fulcrum for said lever F. This lever may also be used to adjust said carriage forward or backward the distance between the bands when it is desired to sew more than one band upon the broom. In this case the lever F is shifted from one of said notches $f^1$ $f^2$ to one of the others, the end connected with elbow-lever $F^1$ being then the fulcrum end.

To allow the sewing of a second band, the detachable jaw of the broom-holding vise is provided with a hinged block, O, to which two curved bars, $O^1$, are pivoted. Said bars are provided on top with indentations $O^2$, to allow the passage of the needle, said indentations being arranged like those on the vise. Said bars may be turned against the sides of the broom, and fastened by a catch or hook, $o$. They are then in position for the broom to be sewed. When not needed, they may be turned backward. Block O is then turned downward, and bars $O^1$ are caught under suitable plates or catches $o'$ on the sides of the said broom-holding vise. As many of said pairs of bars are employed as the number of bands on the broom in excess of one.

The said broom held in said vise is automatically raised through the space between the guideways K K by means of the following devices, in order to enable the needle to sew the broom entirely across from edge to edge. To the upper end of pivoted bar $N^2$ is clamped a small horizontal shank, $q^1$, bearing at its inner end a ball, $q$, which turns in a socket in a sleeve, Q′, rigidly secured on a pitman or operating rod, Q. The other end of said pitman Q (shown in detail in Fig. 11) is provided with another ball, $q^2$, which slips into a sleeve or tube, R′, formed on a U-shaped broom-rocker, R. Said rocker R receives the broom-holding spindle when the latter is turned forward and downward, as shown. Sleeve or tube R′ is at right angles to pitman Q, and the end of said sleeve is closed by a detachable plug, $r$, a side opening, $r'$, allowing the requisite play. On the sides of the broom-holding vise already described are two racks or series of ratchet-teeth, S $S^1$, one on each side. These ratchet-teeth are adapted to engage with curved pawls $S^2$ $S^4$, Figs. 9 and 12, which work through corresponding channels in guide-blocks $S^3$, carried on the front part of broom-carriage E. These pawls are pressed into such engagement by springs $S^5$, one of which is shown in Fig. 10. They are also connected, by rods $s$ $s$, to a yoke, $t$, which is attached to a treadle, T, pivoted to frame A. By depressing said treadle said pawls are drawn within blocks $S^3$, and the broom-holding vise is thus allowed to descend to its lowest position. The said yoke allows the said pawls to act independently of each other, as required in the operation hereinafter described.

The upper end of each pawl has a horizontal movement, while the lower end thereof has a vertical one. By this method of construction they are well adapted to be con-

trolled by the foot-treadle without the use of intermediate pieces to change the direction of the motion. These pawls perform a double office, and act alternately. They support the broom as close as possible to the point where the thrust of the needle is received, and, together with the ratchets on the side of the broom-holder, form the vertical feed. The peculiar action of the feed, wherein the weight of the broom and broom-holder is taken advantage of, is as follows: It will be observed that the broom is always in a slanting position when the stitch is made, as shown in Fig. 12. Suppose the needle and thread to have passed through the broom in the direction of the arrow, the broom being supported by pawl $S^2$ on one side of said broom. The broom now begins to turn in the opposite direction; but the opposite pawl and ratchet prevent that side from being depressed, and the weight is transferred to said opposite pawl, $S^4$, which acts as a fulcrum to elevate another ratchet above pawl $S^2$, the broom being virtually revolved about the point of the pawl. The needle will now enter the broom at the same point where it left the latter, but will proceed in an opposite diagonal direction through said broom, as shown in Fig. 12, and emerge at a point the length of a stitch from where it entered on that side. As the broom is again reversed, pawl $S^2$ again acts as a fulcrum, the opposite side of said broom is elevated, and the needle proceeds as before.

The shape of rocker R allows the broom-holding spindle to move freely upward on its pivot during said feeding operation, without passing beyond reach of said rocker. The broom is always presented to the needle at the same angle, which would not be possible if said rocker interfered with its motion.

On the side of the broom-holding vise, at that part thereof which is the top when the same is turned down for sewing, is a lug or projection, $T^1$, which engages with a pivoted pawl or arm, $T^2$, on a shifting-lever, U, when said broom has been sewed entirely across. Said lever is pivoted to one of the blocks $S^3$, and its lower end engages with a shifting-bar, $U^1$, either directly or through a slotted attachment, *u*. The other end of said bar has in it a cam-groove, *w'*, which vibrates transversely a lever, $U^2$, pivoted by the middle in a slot in frame A. The upper end of said lever shifts a clutch-collar, $U^3$, feathered on driving-shaft D, so as to engage the same with a corresponding toothed clutch formed on the side of loose driving-wheel V whenever lever $T^2$ is thrown forward; but when projection $T^1$ forces the upper end of said lever backward, as stated, clutch $U^3$ is thrown out of engagement with said driving-wheel, and the latter revolves freely without operating any part of the machine.

Pawl or arm $T^2$ will yield when struck by the vise, as the latter rocks away from it, so as not to interfere with the motion of said vise.

To prevent the broom-support R from being strained by the thrust of the needle against the broom, stops $V^1$ $V^1$ are fixed to the inner sides of blocks $S^3$ $S^3$. These stops brace the vise against the thrust of the needle from whichever side it comes.

As different vises may be used with this machine, having their passages for the needle arranged at different intervals, it becomes necessary to vary correspondingly the throw of pitman Q. To accomplish this the pivot-bar $N^2$ is slotted vertically near its upper end, so that shank $q^1$ may be slipped up or down in said slot, and clamped at any point by means of nuts and washers, or any suitable means of attachment.

The loose thread carried by the needle is drawn through the broom by means of take-up arms $V^2$ $V^2$, carried by shaft C, which is turned by driving-shaft D, by means of a bevel-gear connection, D'. Said arms have hooks $v^2$ at their ends for catching the thread, and they operate alternately through the thread-guides $B^3$ on each side of the broom.

The needle J is provided with a spring-tension, consisting of a movable block, *y*, which is pressed by a spring, $y^1$, against the thread as it passes through the eye *j*. A part of the needle is recessed to receive the spring and block within it. The construction of said needle is shown in Fig. 14.

A modification of said needle and tension is shown in Figs. 16, 17, and 18, in which a flat spring, $y^2$, is employed, pressing upon the thread. Fig. 16 shows a further modification, in which the points of the needle are beveled more on one side than on the other, the predominant bevel being on opposite sides of the respective points.

Various other modifications may be made of the different parts of my apparatus without departing from the spirit of my invention.

It will be observed that the broom has three distinct motions after each passage of the needle: first, a short longitudinal motion; second, a rocking motion; third, a vertical motion. These motions are all simultaneous, and are all essential to the proper presentation of the broom for the next stitch.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a broom-sewing machine, a rocking broom-holding vise provided with alternating ratchet-teeth on its sides, in combination with vertically and horizontally movable pawls, substantially as and for the purpose set forth.

2. A broom-holding vise, in combination with devices whereby the oscillation of said vise causes the same to climb upward step by step, substantially as and for the purpose set forth.

3. In a broom-sewing machine, a moving broom-holding vise, in combination with shifting mechanism, whereby, when the sewing is completed, the driving-wheel is thrown out of gear, substantially as and for the purpose set forth.

4. In a broom-sewing machine, a broom-holding vise provided with a tripping-lug, in combination with a clutch-shifting lever having a pivoted pawl or arm, substantially as and for the purpose set forth.

5. In a broom-sewing machine, a shaft having two rotary take-up arms, that operate alternately on each side of the broom, substantially as and for the purpose set forth.

6. In a broom-sewing machine, the combination of two needle-carriers with a double-pointed needle, each of said needle-carriers being provided with a tooth that catches into a perforation in said needle, substantially as and for the purpose set forth.

7. The combination, with a guideway having an oblique slot and stop-piece, of a needle-carrier having a hinged needle-holding bar, and a stud adapted to engage with said stop and slot, substantially as and for the purpose set forth.

8. The combination of a sliding needle-carrier, having a pivoted needle-holding bar and a recess behind the same, with a yoke, operated by the driving-shaft, said yoke having a pressure stud or arm, substantially as and for the purpose set forth.

9. The combination of pawls $S^2$ with a treadle and suitable connections, substantially as and for the purpose set forth.

10. Blocks $S^3$, provided on the inside with studs or blocks, for bracing against the thrust of the needle, in combination with rocker R and broom-holding vise, substantially as and for the purpose set forth.

11. The combination of a cam-grooved disk or wheel with a system of levers and a broom-carriage, whereby a rapid intermittent backward and forward motion is given to the broom, substantially as and for the purpose set forth.

12. The combination, with the broom-carriage, of a lever, either end of which may be made the fulcrum at will, substantially as and for the purpose set forth.

13. In a broom-sewing machine, a rocking broom-vise, in combination with a sliding broom-carrier, substantially as and for the purpose set forth.

14. In a broom-sewing machine, a broom-holding vise, in combination with a U-shaped rocker, a cam on the driving-shaft, and suitable connections, substantially as and for the purpose set forth.

15. In a broom-sewing machine, a pivoted broom-holding device, in combination with a U-shaped rocker, the side vise being adapted to slide up and down in said rocker, substantially as and for the purpose set forth.

16. In combination with a broom-holding vise, a pair of pivoted levers, in combination with a treadle, whereby said vise can be closed at will, substantially as and for the purpose set forth.

17. A broom-holding vise having a bevel-geared spindle, in combination with a bevel-geared shaft, and two treadles, connected by cords to said shaft, substantially as and for the purpose set forth.

18. A broom-holding vise, in combination with mechanism for rotating the same, substantially as and for the purpose set forth.

19. A broom-vise, in combination with clasps for holding together its two parts or jaws when released from the pressure of the closing-levers, substantially as and for the purpose set forth.

20. In a broom-sewing machine, a broom-holding vise, in combination with a carrier, the two being connected by a universal joint, substantially as and for the purpose set forth.

21. In a broom-sewing machine, a broom-holding vise provided with double-hinged supplemental clamps, substantially as and for the purpose set forth.

22. A double-pointed needle provided with an inserted tension-spring, substantially as and for the purpose set forth.

23. The combination of a driving-shaft with a take-up shaft at right angles thereto, the two being connected by suitable gearing, substantially as and for the purpose set forth.

24. The combination of a connecting-yoke with two needle-carriers, which are alternately opened and closed thereby, substantially as and for the purpose set forth.

25. The combination of a connecting-yoke with two needle-carriers, which are alternately moved inward and outward thereby, substantially as and for the purpose set forth.

26. In a broom-sewing machine, the combination of two rotating take-up arms with two thread-guides, one being arranged on each side of the broom, substantially as and for the purpose set forth.

27. The combination of a broom-holding vise with two needle-carriers and a needle.

28. In a broom-sewing machine, a rocking broom-holding vise, in combination with two revolving take-up arms.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

CHARLES E. LIPE.

Witnesses:
C. H. McEWEN,
EUGENE W. JOHNSON.