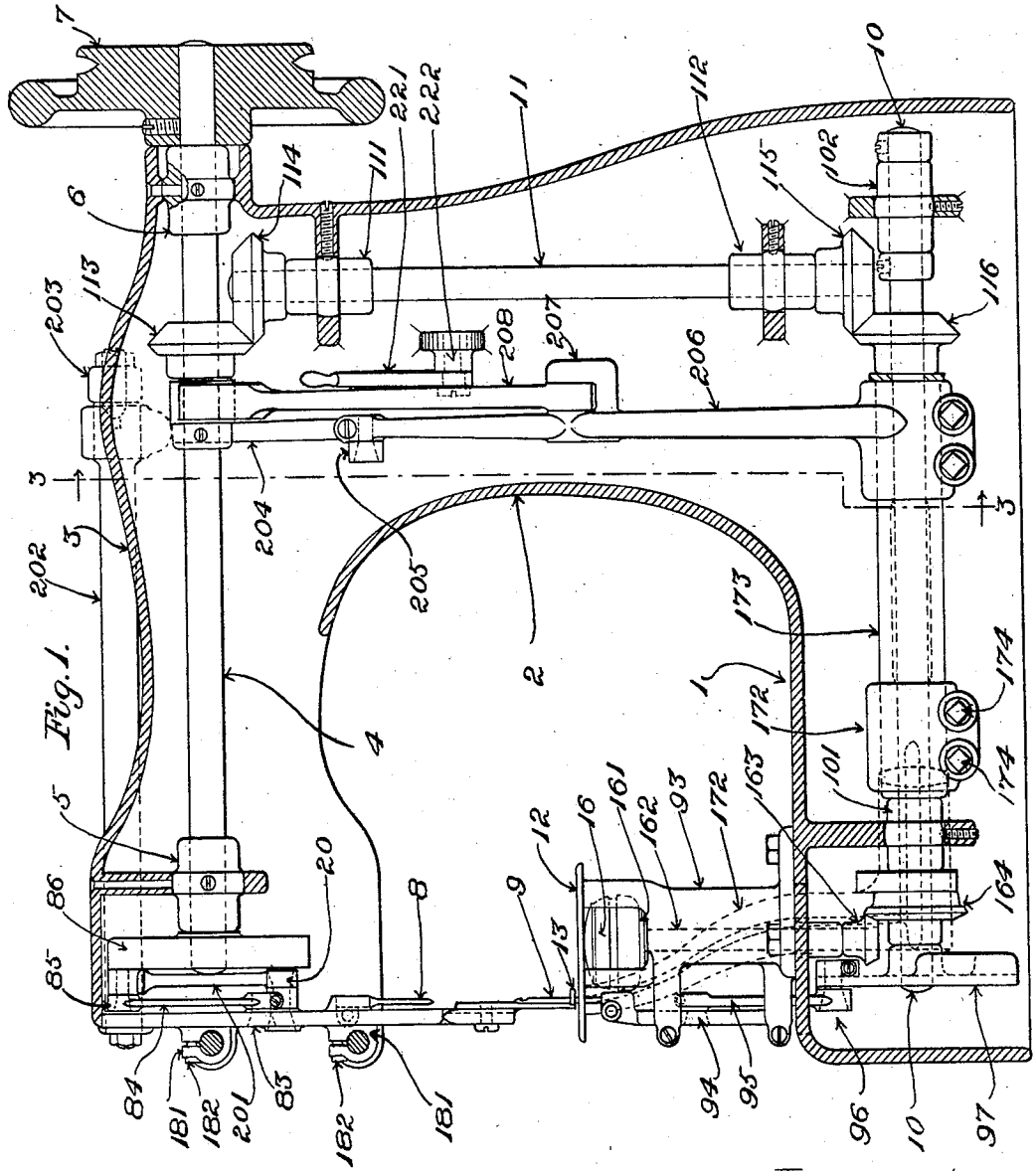
No. 860,733. PATENTED JULY 23, 1907.

H. H. CUMMINGS.

FEEDING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED SEPT. 23, 1903.

3 SHEETS—SHEET 1.



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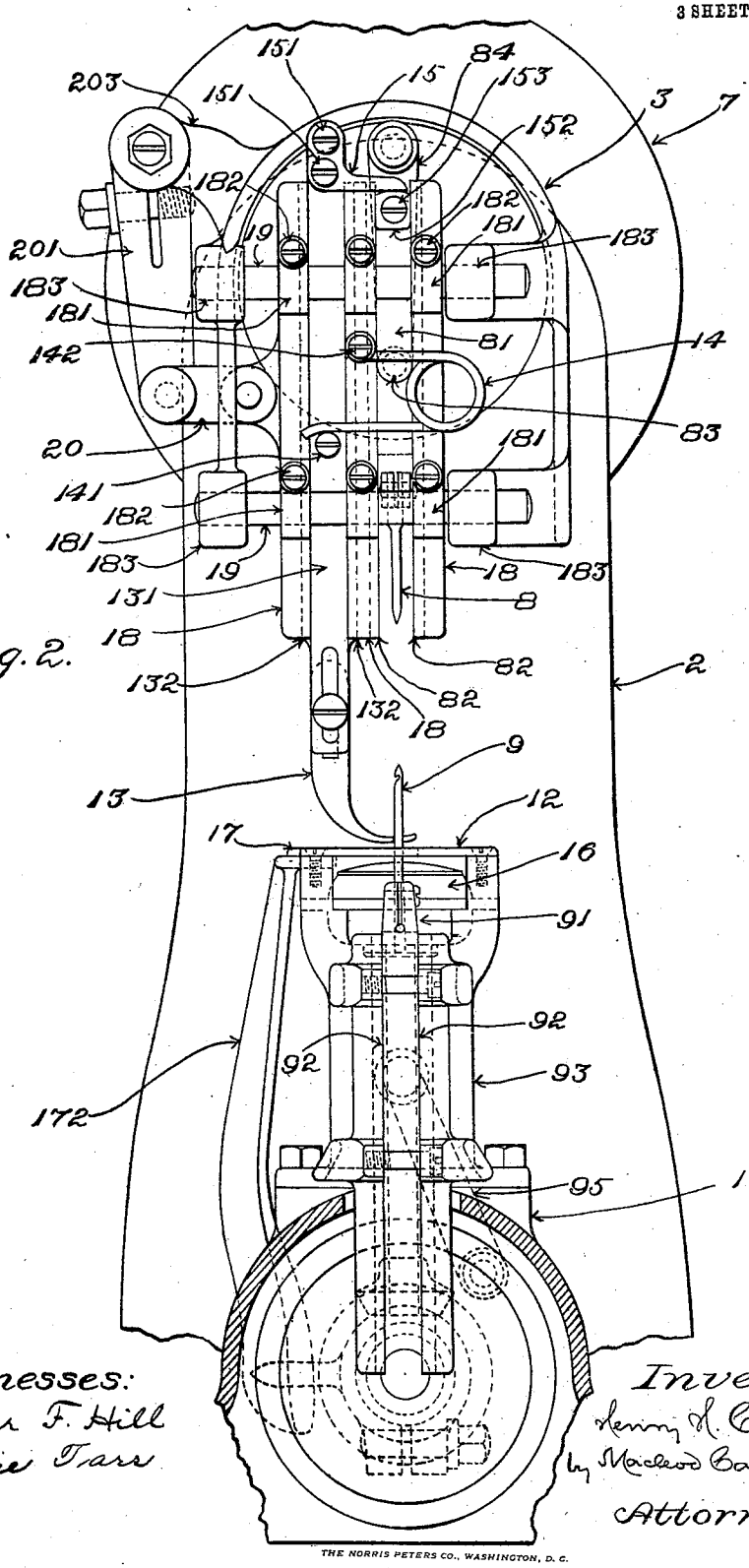


Fig. 2.

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3 SHEETS—SHEET 3.

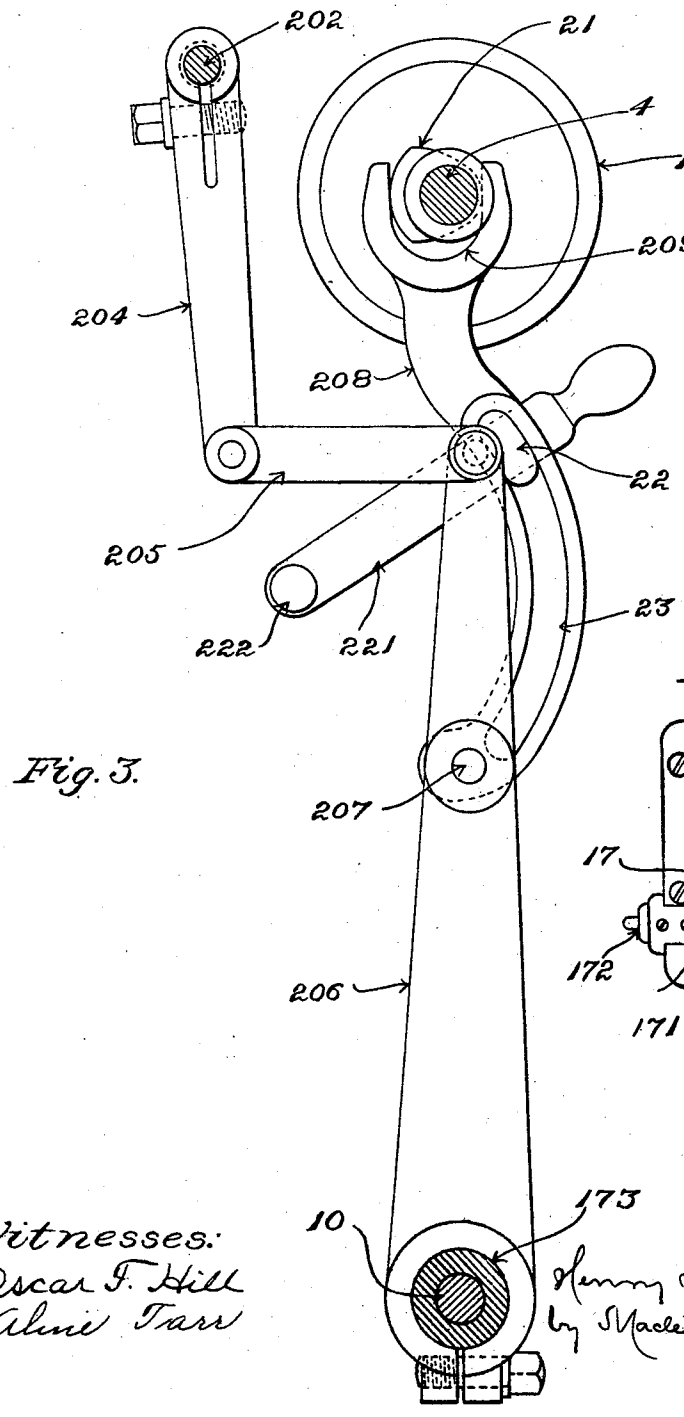
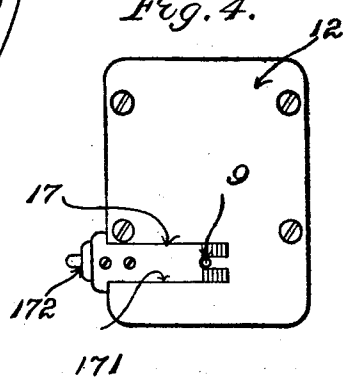


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY H. CUMMINGS, OF MALDEN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNION LOCK STITCH COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

FEEDING MECHANISM FOR SEWING-MACHINES.

No. 860,733. Specification of Letters Patent. Patented July 23, 1907.

Application filed September 23, 1903. Serial No. 174,260.

To all whom it may concern:

Be it known that I, HENRY H. CUMMINGS, a citizen of the United States, residing at Malden, in the county of Middlesex, State of Massachusetts, have invented a certain new and useful Improvement in Feeding Mechanism for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention has reference to hooked needle sewing machines, and, in part, to machines of the type in which a rotating loop-taker, which may be a shuttle, coöperates with the hooked needle.

The invention relates in general to the feeding arrangements of such machines.

The first part of the invention has relation, more particularly, to machines in which the awl or needle, at the time of the feed, is in the material being stitched and moves in the direction of the feed. In some machines of such class the bar carrying the awl or needle is mounted to slide endwise in guides which are provided in a head hung from a pivot at its upper end. Swinging movement of the head about a pivotal point or axis has the drawback or disadvantage that the awl or needle in swinging changes its angle or inclination with respect to the stock or material while within the latter, in consequence of entering the same at an inclination thereto and being swung into a vertical position before being withdrawn, or vice versa. This change in the angle or inclination of the awl or needle while occupying a hole which has been pierced through the said stock or material operates to enlarge or distort such hole, as well as spring or bend the awl or needle. The enlargement or distortion of the hole mars the appearance of the finished work. The springing or bending of the awl or needle results frequently in breakage of the latter. When working upon stock or material of considerable total thickness in two or more layers, the change in the angle or inclination of the awl or needle occurring as above explained at the time of the feed-movements frequently causes one layer of the said material to advance more rapidly than another.

The object, in general, of the first part of the invention is to produce a sewing machine having an overhanging head moving in the line of the feed but free from the disadvantages which are incident to a pivotally mounted head.

The remaining parts of the invention have relation to the construction of the movable head and its supporting means, and to means, in conjunction with a loop-taker rotating on an upright axis, for operating a feed-dog.

In the accompanying drawings the invention is shown embodied in a machine in which the awl-bar is mounted in guides in the overhanging movable head, but it will be understood that the invention is applicable in some cases to sewing-machines in which the needle-bar is thus mounted.

In the drawings, Figure 1 shows certain of the essential portions of the said sewing machine, the fixed supporting and inclosing casing being represented in vertical section in a plane extending parallel with the rotating shafts. Fig. 2 is a view of the said machine in elevation looking at the left hand end in Fig. 1, the representation being on an enlarged scale and portions being broken away in order to show certain parts more clearly as well as to reduce the amount of space which is occupied by the figure. Fig. 3 is a view in vertical section along the line 3, 3, of Fig. 1, looking in the direction which is indicated by the arrows adjacent the ends of the said line. Fig. 4 is a detail view showing the work-support and feed-dog in plan.

The fixed casing of the machine comprises the lower portion or base 1, the upright portion or post 2, and the overhanging arm or goose-neck 3. The driving shaft 4 is supported in suitable bearings 5 and 6 within the arm 3, and is represented as provided with a combined pulley and fly-wheel 7.

At 8 and 9, respectively, are the usual awl and hooked needle. These last are arranged to work from opposite sides of the material being operated upon.

At 81 is the awl-bar, and at 91 is the needle-bar. The awl-bar is fitted to guides or ways at 82, 8 2, and moves endwise therein in usual fashion, and the needle-bar is fitted to guides or ways at 92, 92, and moves endwise therein. In the present instance the awl is arranged above and the needle below, and the guides or ways 82, 82, for the awl-bar are provided in a head which is mounted at the outer end of the overhanging arm 3, while the guides or ways 92, 92, are provided in connection with a post or standard 93 which is mounted upon and attached to the base 1. For the purpose of actuating the awl-bar and awl, a stud 83 carried by the awl-bar has connected therewith the lower end of a link 84, the latter being at its upper end connected with a crank-pin 85 which is carried by the disk 86 fast upon the driving-shaft 4. For the actuation of the needle-bar and needle, a stud 94 carried by the needle-bar has connected therewith the upper end of a link 95, which latter, at its lower end, is connected with a crank-pin 96 on a disk 97, the latter being fixed upon the outer end of a rotating shaft 10 which is mounted in bearings 101, 102, in the base 1 of the machine, and driven from the shaft 4 through suitable connections. The said connections, in the present instance, comprise an upright shaft 11 which is conveniently supported in bearings at 111, 112, miter-gears 113, 114, by which the upper end of the said shaft 11 is geared to the shaft 4, and miter-gears 115, 116, by which the shaft 11 at its lower end is

geared to the shaft 10. A suitable work-rest or work-support is shown at 12 upon the upper end of the post or standard 93.

At 13 is a presser-foot, it being attached to the lower end of the presser-bar 131, the latter being fitted to guides or ways at 132, 132, in the head of the machine. For the purpose of depressing the presser-foot 13 against the upper surface of the work resting upon the work-rest or work-support 12, a coil-spring 14 is shown, the said spring having one end of the same engaged with the head of a screw 141 projecting from the presser-bar 131, and the other end thereof engaged with a fixed screw 142 which is applied to the head of the machine. The screw 142 constitutes an abutment from which the spring 14 reacts with a tendency to force the presser-bar and presser-foot downward. For the purpose of automatically lifting the presser-foot from the work at the time of each rise of the awl, a finger 15 is shown attached to the upper end of the presser-bar 131 by means of screws 151, 151. The said finger 15 projects laterally from the presser-bar in front of the awl-bar 81, and a projecting block 152 is fastened to the front side of the awl-bar by a screw 153, the said block being carried into contact with the finger 15 by the rising movement of the awl-bar, and acting against the said finger to lift the presser-foot out of contact with the work just before the awl and awl-bar complete their upward movement.

In practice, the needle 9 will be supplied with thread by means of devices of well-known character, not herein shown, which thread will be drawn through the work by the descent of the needle for the production of stitches. I have shown the needle 9 as arranged to co-operate with a rotary loop-taker, herein a shuttle, at 16, which is located below the work-rest or work-support 12. The said shuttle is operated by a shuttle-driver 161, Fig. 1, upon the upper end of a short upright shaft 162, the latter having fixed upon its lower end a bevel gear 163 which is in mesh with a bevel-gear 164 that is fast upon the lower horizontal shaft 10, the shuttle being thereby driven from the said shaft 10.

The foregoing features are not in themselves of the gist of the invention, and in practice may be varied in different respects, without involving departure from the spirit of the invention.

In carrying the invention into effect, the head to which the awl-bar and presser-bar are applied is mounted in guides with which the overhanging arm or goose-neck 3 is provided. The said head is arranged to slide back and forth horizontally in a right line for the purposes of the feed. Thereby the awl is enabled to occupy a vertical position while in the material being stitched, without change of angle or inclination during the feed-movement, whereby the awl is relieved of strain which would tend to bend or break the same, and enlargement of the awl-hole in the said material is obviated. I have devised a novel construction of head, it comprising, essentially, the three vertical bars 18, 18, 18, placed parallel with one another, and the horizontal slide-bars 19, 19. The slide-bars are fitted to holes which extend horizontally through projecting portions 183, 183, at the outer end of the arm or goose-neck 1, and are adapted to move endwise therethrough, thus providing for horizontal movements of the head back and forth in the direction of the feed. The vertical bars 18, 18, 18, are provided with split sockets, as at 181, 181, which latter fit upon the slide-bars 19, 19. The said sockets are furnished with clamping screws, 182, 182, by means of which they are contracted upon the slide-bars so as to secure the vertical bars fixedly in position upon the slide-bars at the required distances apart. The awl-bar and presser-bar are placed intermediate the vertical bars 18, 18, 18, one of the latter intervening between the awl-bar and presser-bar. The edges of bars 18, 18, 18, are shaped to fit those of the awl-bar and presser-bar, and constitute guides or ways therefor.

I employ a feed-dog 17, which is arranged at the same side of the material to be stitched as the needle and the shuttle, to act against the surface of the material to be stitched which is opposite the surface with which the presser-foot engages. In operation, during the feed-movement the said material is clamped between the presser-foot and the feed-dog, and these two are caused to move forward in the direction of the feed in unison with the awl for the purposes of the feed. Through the coöperation of the presser-foot and feed-dog with the awl in feeding the material which is being stitched, the awl is relieved of a large portion of the strain which is incident to the feeding operation. The feed-dog 17 works in a slot 171 which is formed in the work-rest or work-support 12, and is carried by a bent arm 172 that extends upward from a sleeve 173 that is fitted upon the shaft 10 between the bearing 101 and the miter gear 116. For the purpose of connecting the arm 172 with the sleeve 173 the said arm is formed with a split hub or socket that is adapted to fit upon the exterior of the sleeve, the said hub or socket having at opposite sides of the slit or opening thereof lugs to which are applied screws 174, 174, by means of which the hub or socket may be contracted upon the sleeve 173 so as to secure the arm firmly in place upon the sleeve. In the operation of the machine the sleeve 173 is rocked upon the shaft 10, by means which presently will be described, and thereby the required movements are communicated to the arm 172 and the feed-dog 17.

The sleeve 173 is mounted loosely upon an intermediate portion of the lower shaft 10, the latter having applied to its left-hand extremity in Fig. 1 the gearing by which the rotary loop-taker or shuttle is actuated, and the crank-disk from which the needle-bar and needle are actuated. In order to clear the said gearing and crank-disk, as also the post 93 and the guides for the needle-bar, the arm 172 is extended outwardly from the sleeve 173 and shaft 10 a distance somewhat greater than the projection of the post, and then laterally with relation to the post and gearing, etc., thereby locating its upper portion to the left in Fig. 2 of the post and the work-support. This positions the upper end of the said arm properly for supporting and operating the feed-dog within the slot 171 of the work-support 17.

As will be clear from the foregoing, for the purposes of the feed, the head carrying the awl-bar and awl, and the presser-bar and presser-foot, and the arm carrying the feed-dog, are caused to move in unison in the direction of the feed. The means of occasioning the required movements in unison may vary in practice, but preferably I employ the instrumentalities which I have shown in the drawings. In the latter, one of the ver-

tical bars 18 of the head has pivotally connected therewith one end of a link 20, see Fig. 2, the other end of which link is connected pivotally with an arm 201 depending from a rock-shaft 202, Fig. 1. The said rock-shaft is mounted upon supports at 203, 203, projecting from one side of the overhanging arm 3, and is provided with a second arm 204, shown in Figs. 1, and 3, which is connected by means of a link 205 with the upper end of an arm 206. The said arm 206 is mounted upon the sleeve 173, aforesaid, carrying the supporting arm 172 for the feed-dog 17, and arm 206 is made fast upon sleeve 173 by means of a split socket and clamping screws, as shown in Figs. 1 and 3. By means of arms 204, 206, and link 205, the rockshaft 202 and sleeve 173 are connected with each other so as to compel them to rock or oscillate in unison. For the purpose of causing the said rock-shaft and sleeve to rock or oscillate, the arm 206 has connected pivotally thereto at 207 the lower end of an actuating lever 208. The upper extremity of this lever 208 is slotted or forked, and embraces a cam 21 that is fast upon the shaft 4. This cam 21 vibrates the lever 208, which last actuates the arm 206 to transmit movement to the head and feed-dog. The actuating lever 208 is provided with an adjustable fulcrum which may be shifted in order to enable the length of the feed movements to be varied. Thus, a block 22 is fitted to a slot 23 in the lever 208, the said block 22 being pivotally mounted upon an arm 221 that is pivoted at 222 to the upright portion 2 of the casing. By moving the arm 221 either up or down by hand, as may be required, the action of the lever 208 in transmitting movement to the parts which are operated therefrom may be varied in order to secure the desired rate of feed. It will be perceived that the upper and lower feeds are adjusted in unison by means of one adjusting device. The rock-shaft 202 and sleeve 173 constitute in effect rockers with which, respectively, the transversely movable head and the feed-dog, respectively, are connected.

As already has been indicated herein, the invention is equally as applicable in the case of a needle-feed mechanism as in that of an awl-feed mechanism. For the purposes of the invention the awl and needle are equivalents. Therefore, although in order to avoid alternativeness of expression I make reference to only the awl in my claims, I regard in general a feed-mechanism in which the needle is the element which assists in effecting the feed of the stock or material being stitched as embraced fully within the scope of the invention that is covered by the claims.

I claim as my invention:—

1. In a sewing-machine, the combination with a needle and needle-carrier reciprocating in a fixed path at one side of the material operated upon, an awl and awl-bar working at the opposite side of the said material, and a presser and presser-bar, of a head having guides for the awl-bar and presser-bar and mounted to hold the awl in all its positions parallel with the needle, and means to reciprocate the said head in the line of the feed.

2. In a sewing-machine, the combination with a needle, an awl, a needle-carrier, an awl-carrier, a work-support, a feed-dog in conjunction with the said work-support, a presser coacting with said feed-dog at the opposite side of the material therefrom, and a presser-bar, of a head above the said work-support, having guides for the presser-bar and one of the said carriers, and mounted to hold the named part which is carried by the said carrier parallel in all its positions with the named part that is carried by the opposite carrier, and means to guide the later carrier in a fixed path at its side of the material.

3. In a sewing-machine, the combination with an awl, a needle, a needle-carrier, an awl-carrier, a work-support, a feed-dog in conjunction with said work-support, a presser coacting with the said feed-dog at the opposite side of the material therefrom, and a presser-bar, of a head having guides for the presser-bar and one of the said carriers, and mounted to hold the named part which is carried by the said carrier parallel in all its positions with the named part that is carried by the opposite carrier, means to guide the latter carrier in a fixed path at its side of the material, and a rocker provided with an upwardly extending arm having the said feed-dog fixedly attached thereto.

4. In a sewing-machine, the combination with a work-support, a feed-dog in conjunction with the said work-support, a needle and needle-carrier reciprocating in a fixed path, an awl and awl-bar, and a presser and presser-bar, of a head having guides for the awl-bar and presser-bar and mounted to hold the awl in all its positions parallel with the needle, and means to reciprocate the said feed-dog and head in the line of the feed.

5. In a sewing-machine, the combination with a needle and needle-bar reciprocating in a fixed path, an awl and awl-bar, a presser and presser-bar, a head having guides for the awl-bar and presser-bar and mounted to hold the awl in all its positions parallel with the needle, and means to reciprocate the said head in the line of the feed, of a feed-dog, and a rocker provided with an upwardly extending arm having the said feed-dog fixedly attached thereto.

6. In combination, the fixed frame provided with guides, the movable head comprising, essentially, the upper and lower transverse slide-bars fitted to the said guides and the vertical bars provided with guideways and separately mounted parallel with one another upon the said slide-bars, means to reciprocate the said head transversely, a presser-bar and tool-bar mounted, respectively, in the said guideways, and the presser-foot and tool carried by the said bars, respectively.

7. In combination, the fixed frame provided with guides, the movable head comprising, essentially, the transverse slide-bars fitted to the said guides, and the vertical bars provided with guideways and mounted parallel with one another upon the slide-bars, and also provided with clamping sockets engaging the slide-bars, means to reciprocate the said head transversely, a presser-bar and tool-bar mounted, respectively, in the said guideways, and the presser-foot and tool carried by the said bars, respectively.

8. In a sewing-machine, in combination, a loop-taker rotating on an upright axis, a horizontal rotating shaft, gearing intermediate the said loop-taker and shaft to rotate the loop-taker from the shaft, a sleeve mounted upon the said shaft, means to oscillate the said sleeve, an arm carried by the sleeve and extending laterally past the said gearing and loop-taker, and a feed-dog actuated by the said arm.

9. In a sewing machine, in combination, a hooked needle, a loop-taker, rotating on an upright axis, a horizontal rotating shaft, gearing intermediate said loop-taker and shaft and means for operating the needle from the said shaft, a sleeve mounted upon the shaft, means to oscillate the said sleeve, an extension from the sleeve projecting laterally with relation to the gearing and loop-taker, and a feed-dog actuatetd by the said extension.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY H. CUMMINGS.

Witnesses:
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WILLIAM A. COPELAND.

Correction in Letters Patent No. 860,733.

It is hereby certified that in Letters Patent No. 860,733, granted July 23, 1907, upon the application of Henry H. Cummings, of Malden, Massachusetts, for an improvement in "Feeding Mechanism for Sewing-Machines," an error appears in the printed specification requiring correction, as follows: In line 68, page 3, the word "later" should read *latter;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of August, A. D., 1907.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.