(Model.) 4 Sheets—Sheet 1.

# W. H. CARR & F. W. OSTROM.

## BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 303,361. Patented Aug. 12, 1884.

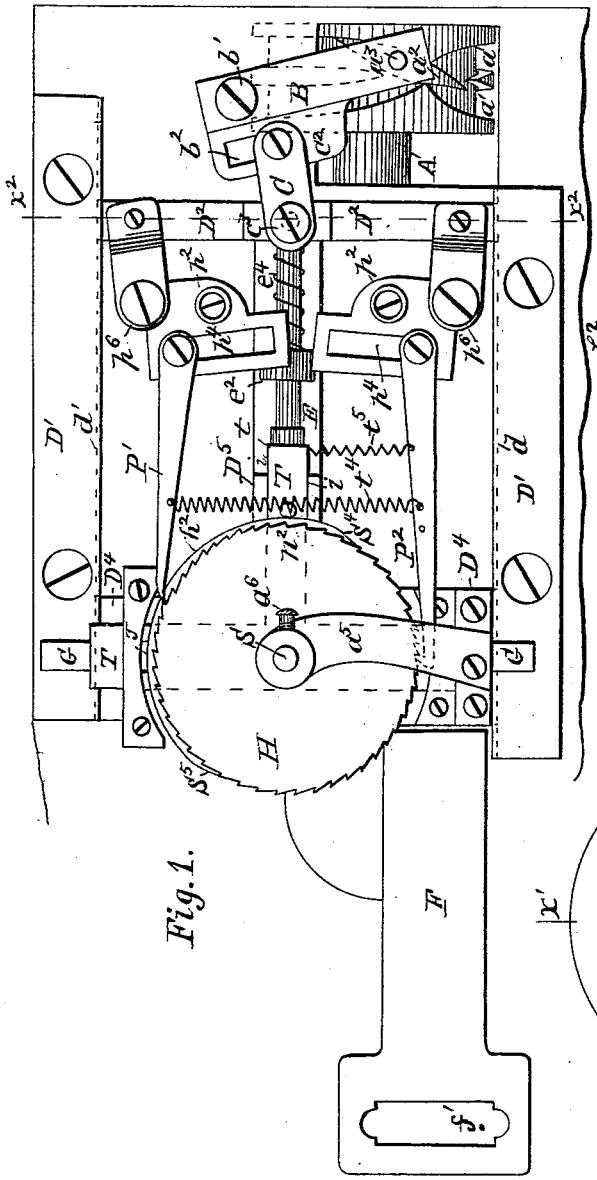

Fig. 1.

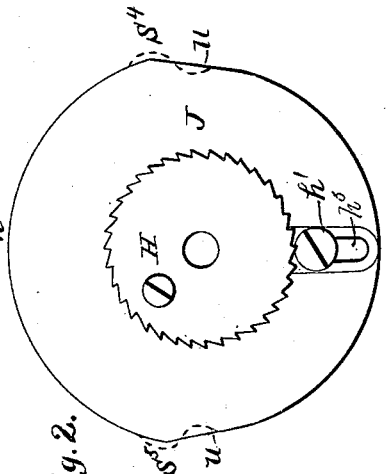

Fig. 2.

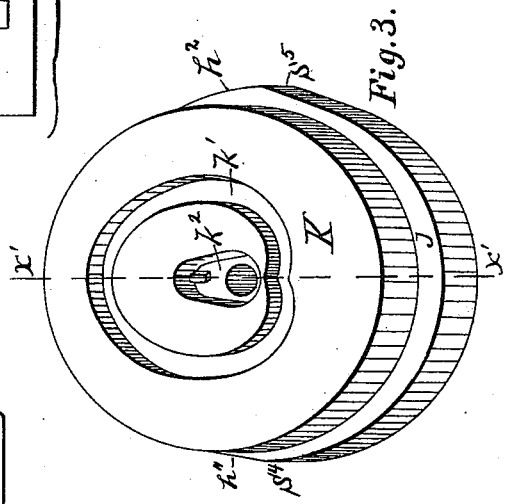

Fig. 3.

Witnesses:
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Charles S. Brimhall

Inventors:
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Freeland W. Ostrom
by W. E. Hagan
their Attorney

(Model.) 4 Sheets—Sheet 2.

# W. H. CARR & F. W. OSTROM.

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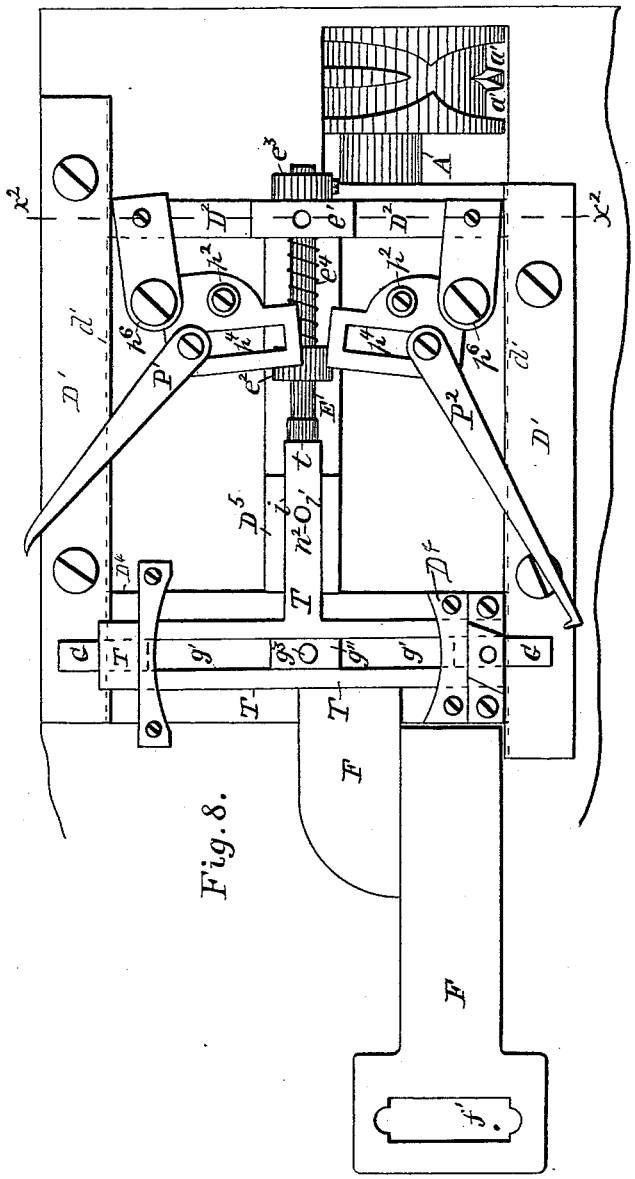

Fig. 8.

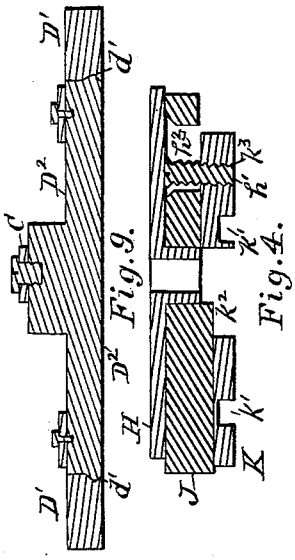

Fig. 9.



Fig. 4.

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(Model.)

4 Sheets—Sheet 3.

# W. H. CARR & F. W. OSTROM.

## BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 303,361. Patented Aug. 12, 1884.

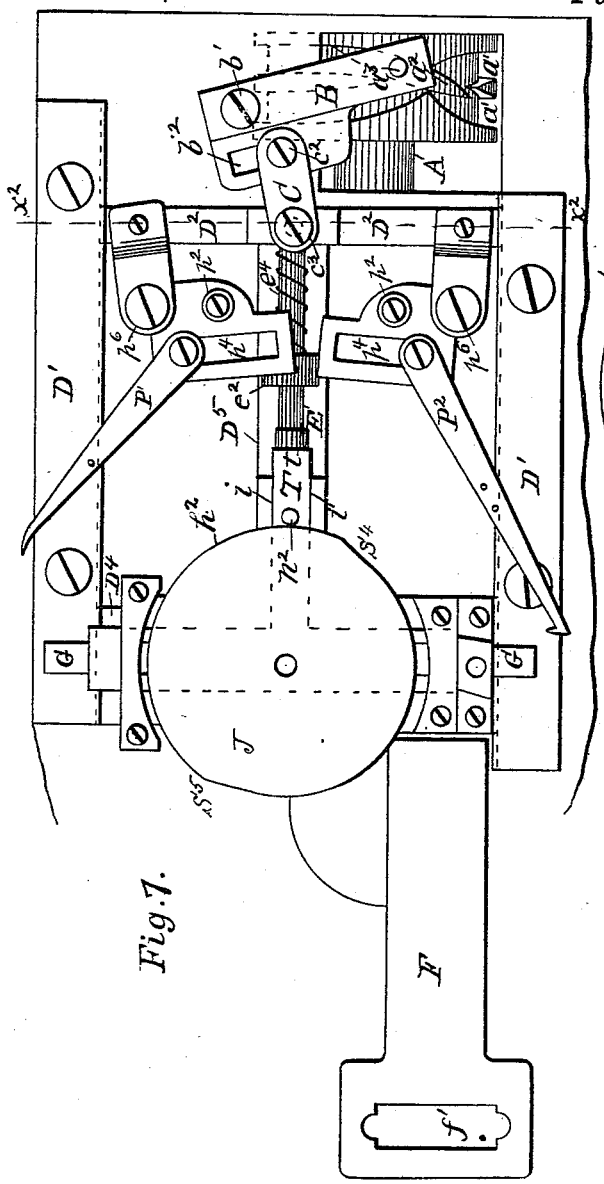

Fig. 7.

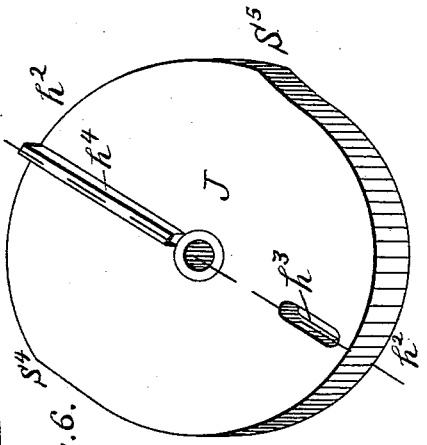

Fig. 6.

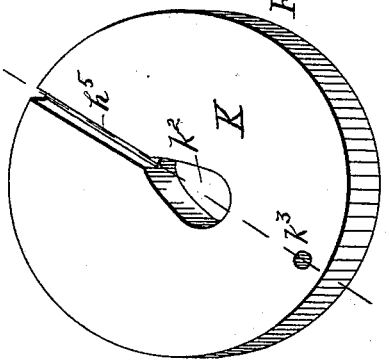

Fig. 5.

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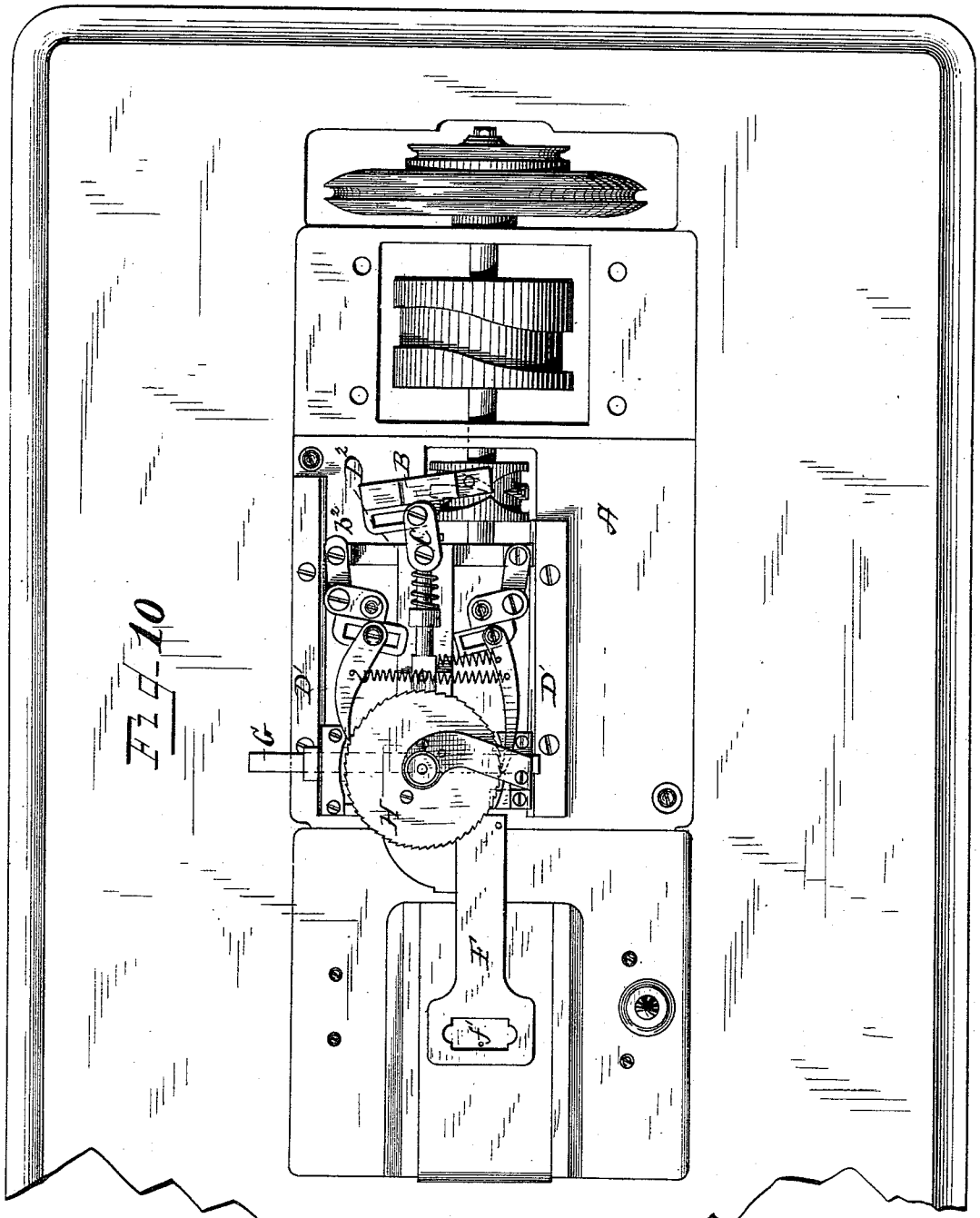
(Model.)

4 Sheets—Sheet 4.

# W. H. CARR & F. W. OSTROM.

## BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 303,361. Patented Aug. 12, 1884.

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# UNITED STATES PATENT OFFICE.

WILLIAM HENRY CARR, OF LANSINGBURG, AND FREELAND W. OSTROM, OF TROY, NEW YORK; SAID CARR ASSIGNOR TO SAID OSTROM.

## BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 303,361, dated August 12, 1884.

Application filed June 1, 1882. (Model.)

*To all whom it may concern:*

Be it known that we, WILLIAM HENRY CARR, of the village of Lansingburg, county of Rensselaer, and State of New York, and FREELAND W. OSTROM, of the city of Troy, State and county aforesaid, have jointly invented a new and useful Improvement in Button-Hole Attachments for Sewing-Machines, of which the following is a specification.

Our invention relates to those attachments to sewing-machines which are actuated to move the fabric around and beneath the needle to sew the sides and ends of a button-hole, and more particularly to that kind of devices belonging to this class which are constructed with a cloth-carrying mechanism arranged to vibrate and move the fabric back and forth beneath the traverse of the needle in a T-form guide-bar to sew the sides of the button-hole, and with which the fabric-carrying mechanism and guide-bar are connectedly moved outwardly and inwardly to sew each of the ends of the button-hole.

Forming a part of this specification are four plates of drawings, containing ten figures, and in all of which illustrations the same designation of parts by letter-reference is used.

Figure 1 shows a plan view of the mechanism and its connection with a cross cam-groove on the driving-shaft of the machine by which it is actuated. Fig. 2 shows a plan view of the ratchet-wheel and a peripheral cam-wheel, the latter being beneath the former, the ratchet-wheel being shown smaller in proportion than in the other illustrations, to better illustrate the manner of connecting a cam-grooved wheel to the under side of the peripheral cam-wheel by means of a slot formed in the latter and a set-screw. Fig. 3 is a perspective of the under side of a cam-grooved wheel and peripheral cam-wheel, these parts being shown as removed from their attachment, turned over, and somewhat enlarged in proportion to better illustrate them. Fig. 4 is a diametrical vertical section taken through the ratchet-wheel, peripheral cam-wheel, and cam-grooved wheel. Fig. 5 illustrates in perspective the upper side of the cam-grooved wheel separated from its attachment. Fig. 6 shows in perspective the under side of the peripheral cam as appearing when separated from its connection with the other parts and turned over. Fig. 7 shows in a plan view the mechanism with the ratchet-wheel removed, the position of the T-form guide-bar being indicated by a dotted line, the pawls which actuate the ratchet-wheel being thrown back. Fig. 8 is a plan view of the mechanism with the ratchet-wheel, peripheral cam-wheel, cam-grooved wheel, switch-lever, and connecting-bar removed. Fig. 9 is a vertical section taken on the line $x^2$ $x^2$ of Figs. 1, 7, and 8. Fig. 10 is a plan view of a portion of a sewing-machine table, showing the arrangement of the attachment relative to the main shaft of the sewing-machine.

The several parts of which our invention is composed and the ordinary parts of a sewing-machine with which they connect are designated by letter-reference as follows:

The letter A indicates the sewing-machine shaft; $a'$ $a'$, the ordinary cross-grooved cam secured thereto, and $a^3$ the switch.

The letter B indicates the lever to which the switch is pivoted at $a^2$ at one end and at the other end at $b'$. Said lever is pivoted to a stud on the table, this lever having formed in an offset on its side the slot $b^2$. When the shaft A is turned, this lever is caused to reciprocate on its pivotal connection made with the table at $b'$.

The letter C indicates a connecting-bar constructed to receive and transmit reciprocating motion from the lever B by being connected with the latter in the slot $b^2$ by means of a pivot and set-screw at $c^2$, with the measure of its received and transmitted motion regulated by the relative position at which one of its ends is pivotally placed in the slot $b^2$, the other end of this connecting-bar being pivoted to the cross-head $D^2$ at $c^3$, the center of the attachment.

The letters D′ D′ indicate the frame sides in which the vibrating or reciprocating parts of the mechanism move, the guideways being formed on the inner sides of this frame, as designated at $d'$ $d'$ in Fig. 9, and in Figs. 1, 7, and 8 by the dotted line $d'$ $d'$.

The letter $D^2$ indicates one of the cross-heads of the reciprocating mechanism, to a pro-

jection on which the connecting-bar C is pivoted. $D^4$ is the cross-head at the opposite end of the reciprocating mechanism. Both of these cross-heads move in the guides $d'$ $d'$, when the cross-heads and the parts with which they connect are reciprocated by means of the connection made with the bar C. The cross-heads $D^2$ and $D^4$ are centrally connected by the bar $D^5$, and this latter has formed in it longitudinally a guideway for the short arm of the T-form bar T, the lines of this guideway being indicated by the letters *i i*. The short arm of the T-form bar, as indicated at *t*, as an extension or rod, E, which has a shoulder or collar, $e^2$, and encircling the extension between the said collar and the cross-head $D^2$ is a spiral spring, $e^4$, which acts to force the said frame T in one direction—viz., to force the pin $n^2$ thereon against the largest part of the cam-wheel—and the extent of movement of the frame T under the action of the said spring being limited by a stop, $e^3$, shown as an adjustable nut placed on the extension or rod E, as shown in the drawings.

The letter F denotes the cloth-carrier, and $f'$ the opening for the vertical passage of the needle. The cloth-carrier is connected to the under side of the guide-bar G, which is constructed to move back and forth in the bar T in a slot in the top, and a groove in the bottom or under side of said bar, a portion of the latter being projected upwardly within the slot, the latter being indicated at $g'$ $g'$, and the upward extension of the guide-bar being indicated at $g''$, with the cam-pin thereon, by which the guide-bar and connected carrier are actuated, is designated at $g^3$. This attachment of the cloth-carrier and guide-bar and the construction of the groove in the bottom and the slot in the top of the bar T, and also that of the cam-pin attached to the bar and connected carrier, is the same as that shown and described in the application of William Henry Carr, filed in the Patent Office on the 24th day of December, 1881, Serial No. 48,652, and relating to button-hole attachments to sewing-machines.

The letter H indicates a ratchet-wheel, and S its vertical shaft secured to the arm $a^5$ by the set-screw $a^6$.

The letter J designates a cam-wheel, having in its perimeter the cam-surface $h^2$, and at $h^3$ a slot that is radially placed in said wheel J, and at $h'$ a set-screw. On the under side of this peripheral cam-wheel there is constructed from center to circumference an outwardly-projected tonguing-piece, indicated at $h^4$. (See Fig. 6.)

The letter K designates a disk-wheel, which has upon its under side a heart-shaped cam-groove, $k'$, which is eccentrically formed thereon. The center of this wheel K is slotted for the passage of the vertical shaft S at $k^2$, and its upper surface is grooved radially at $h^5$ to receive the tonguing-piece $h^4$ on the peripheral cam-wheel J. This cam-grooved wheel K is tapped and threaded at $k^3$ to receive the set-screw $h'$ on the cam-wheel J, and this wheel K is not attached to the shaft S, but to the under surface of the peripheral cam-wheel J, as before described, by means of the tonguing-piece $h^4$ and the set-screw on the latter wheel, and the groove and tap-hole in the top of the cam-grooved wheel K. As these two wheels are thus connected, the measure of eccentricity at which the heart-shaped cam-groove $k'$ acts may be varied. The cam-pin $g^3$ on the cloth-carrier guide-bar and the connected cloth-carrier F are moved back and forth by the engagement of this cam-pin $g^3$ with the heart-shaped cam-groove $k'$, when the wheel in which the latter is constructed rotates, and these features of construction and arrangement are the same herein as those shown and described in the application of William Henry Carr, filed December 24, 1881, and before alluded to, our improvement thereon, as herein shown, relating to these features of construction, being the method of increasing or diminishing the distance traveled by the cam-groove and the engaging-pin on the carrier-guide by varying the eccentricity of the cam-groove $k'$, and thus to make a longer or shorter button-hole with the same device.

The peripheral cam-wheel J has constructed upon its perimeter the cam-surface $h^2$, the terminal ends of which, as designated at $S^4$ and $S^5$, are curved inwardly and gradually to join another portion of the wheel's circumference which is nearer to the rotating center of the wheel than the surface $h^2$. Upon the short arm of the bar T there is constructed a projecting cam-pin, $n^2$, which, when the wheel J is rotated at intervals, engages with the cam-surface $h^2$ at $S^4$ to force the bar T and the connected cloth-carrier toward and against the force of the spring $e^4$, arranged on the bar E between the cross-head $D^2$ and the fixed collar or shoulder $e^2$, and to so hold these connected parts in position while the wheel J is turning and the cam $h^2$ and the pin $n^2$ are in engagement. When this engagement ceases and the pin $n^2$ on the bar T commences to move along on the inwardly and gradually curved surface $S^5$, the spring $e^4$ forces the cloth-carrying mechanism back to its former position as the wheel continues to turn, until in its rotation the pin $n^2$ and cam $h^2$ again commence to engage, when said cam moves the connected parts against the force of the spring, as before described. The relative measure of distance as to how far the cloth-carrying mechanism shall be moved back and forth by the cam $h^2$ and the pin $n^2$, and where forced back to after the latter have ceased to engage, is regulated by the stop $e^3$, before described, on the end of the bar E.

The ratchet-wheel H is actuated to turn one or more teeth at every revolution of the sewing-machine shaft by means of its reciprocating engagement with the push-pawl P′ or the hook-pawl $P^2$, or by both combined. The

pawls P′ and P² are made adjustable in the measure of their pawl engagement with the teeth of the ratchet-wheel by means of their attachment in the slots $p^4$, constructed in the angular levers $p^2$ $p^2$, to one of which each pawl is pivoted, the angular levers being also pivoted to the studs on the table designated at $p^6$. Thus by moving the pivoted ends of the pawls outwardly or inwardly at their pivotal connection with the slots $p^4$ the measure of motion communicated to the ratchet-wheel H at each revolution of the sewing-machine shaft may be increased or diminished. Where two pawls are employed, they are connected by a spiral spring, as shown at $t^4$. Where but one is used, a single spring is connected with the pawl, as indicated at $t^5$.

It will be observed by reference to Figs. 1, 7, 8, and 10 of the drawings that the attachment is built over the main shaft of the sewing-machine in such a manner that a greater portion—about two-thirds—of the width of the frame-work of the attachment will be on one side of the main shaft, and that the switch-lever B is arranged over the cam-wheel on the main shaft, and is pivotally connected to the center of the cross-head $D^2$ by the bar or link C, so as to secure a center draft on the movable parts of the attachment, thereby doing away with the intermediate lever required to make the connection, as heretofore.

Connectedly these several parts constituting our invention operate in the following manner: As the whole mechanism, consisting of the cloth-carrier, connected sliding bar G, bar T, cam-grooved wheel, peripheral cam-wheel, and ratchet-wheel, together moving by means of the connected cross-heads $D^2$ $D^4$ in the slides $d'$ $d'$, are caused to reciprocate through connection with the driving-shaft, as before described, the fabric held by the carrier is reciprocatingly moved over the aperture made in the table-plate for the descent of the needle, so that the latter makes a puncture at the end of each movement in reciprocating, and intermediately forms a stitch. While this is being done in repeated sequence, the ratchet-wheel being actuated to turn, by reason of its pawl engagement, also moves the peripheral cam-wheel and the attached wheel which has on its under side the heart-shaped cam-groove $k'$, and within the latter the cam-pin $g^3$, which is on the carrier-guide G, and also the connected carrier and fabric, so as to thus form a row of stitches along the side of the button-hole while this cam-pin $g^3$ is thus being moved along and in one side of the heart-shaped cam-groove. When this has been done, and while the cam-pin $g^3$ is passing the flattened end of the heart-shaped groove $k'$, the peripheral cam $h^2$ on the wheel J, as the latter rotates, begins to engage with the pin $n^2$ on the bar T, and so as to move the mechanism and fabric from the top of the line of stitching already sewed on one side of the button-hole around the end beneath the needle's traverse to sew this end in passing. After this has been done, and while the cam-pin $g^3$ is being returned along and through the other side of the heart-shaped cam-groove as the wheel K turns, the mechanism thus connected is held in position against the force of the spring $e^4$ on the bar E, and the fabric moved in return to sew the remaining side of the button-hole. When this has been done, and the pin $n^2$, by the rotation of the wheel J, commences to pass the curve $S^5$, the spring $e^4$ forces back the mechanism, and while the pin $n^2$ is passing the curve $S^5$ of the cam $h^2$ the fabric is moved so as to sew the remaining end.

If desired, the curves $S^4$ $S^5$ may be constructed of a reversing double-ogee form, as indicated by the dotted lines $u$ $u$ at Fig. 2, to eyelet the ends of the button-hole.

When it is desired to increase the length of the button-hole, the cam-grooved wheel K is diametrically moved outwardly on the line of its adjustable connection with the lower side of the wheel J, the latter being attached to the ratchet-wheel, and actuated to turn with the latter on the vertical shaft S, thus moving outwardly the cam-grooved wheel K and increasing its eccentricity and the distance to which it moves the cam-pin $g^3$ on the carrier-guide. This eccentricity can be reduced by moving inwardly on the line of its attachment the cam-grooved wheel. The engaging cam-pin $g^3$ then moves a shorter distance, and consequently a shorter button-hole is made. As the heart-shaped cam-groove made diametrically adjustable to the combined peripheral cam-wheel and ratchet-wheel, arranged to turn together on the same vertical shaft, will, in combination with an engaging-pin, $n^2$, on the short arm of the bar T, and a cam-pin on the carrier-guide when actuated by the ratchet-wheel to intermittently turn, move the fabric so within the line of the needle's traverse as to sew the sides and ends of a button-hole. We do not limit our invention of this combination of elements as arranged to its further combination with the spring $e^4$ on the bar E, employed to regulate the measure of distance between the rows of stitches forming the side of the button-hole.

The distance between the two rows of stitches forming the sides of the button-hole may be increased by screwing outwardly the stop $e^3$ on the end of the bar E, and the width between said rows reduced by running inwardly this stop $e^3$ on the bar E.

As the ratchet-wheel and the peripheral cam-wheel must be connected and constructed so as to move together on the same vertical shaft, they may, if desired, be made in one piece instead of two parts, as we have shown and described them as formed, provided substantially the same relative adjustment of the cam-grooved wheel is produced and the equivalent construction of the peripheral cam retained.

Having thus described our invention, what

we claim, and desire to secure by Letters Patent, is—

1. In an attachment to sewing-machines for sewing button-holes, the combination of an attached ratchet-wheel and peripheral cam-wheel, constructed so as to be actuated to turn together upon the same vertical shaft, a wheel having on its under side a heart-shaped cam-groove, and constructed to be diametrically adjustably secured to the under surface of the combined peripheral cam and ratchet-wheel, and a cam-pin on the fabric-carrier guide constructed to engage with said heart-shaped cam-groove, substantially as and for the purposes herein described and set forth.

2. In an attachment to sewing-machines for sewing button-holes, the combination of a combined ratchet-wheel and peripheral cam-wheel, a vertical shaft constructed for the latter to turn on, a wheel having on its under side a heart-shaped cam-groove, and which last-named wheel is constructed to be diametrically adjustably secured to the under side of said combined ratchet-wheel and peripheral cam-wheel, a cam-pin in the cloth-carrier guide, constructed to engage with said heart-shaped cam-groove, and a cam-pin on the short arm of the bar T, constructed to engage intermittently with said peripheral cam-wheel, as and for the purposes herein set forth.

3. In mechanism for sewing button-holes, the combination of a ratchet-wheel and a peripheral cam-wheel constructed to turn together on the same shaft, means to move them, the bar T and cam-pin thereon adapted to be intermittingly engaged and moved by the said peripheral cam-wheel, a cloth-clamp actuated thereby, a spring to move the said bar T against the action of the said cam-wheel, and an adjustable stop to determine the amount of movement of the said bar by the said spring, substantially as and for the purpose described.

4. In an attachment for sewing button-holes, the peripheral cam-wheel, a cloth-clamp, and its actuating-bar T, provided with a cam-pin adapted to be acted upon by the said cam-wheel, combined with a spring to move the said bar in one direction, and an adjustable stop to determine the extent of movement of the said cloth-clamp and bar T under the action of the said spring, substantially as described.

Signed at Troy, N. Y., this 24th day of May, 1882.

WILLIAM HENRY CARR.
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Witnesses:
CHARLES S. BRINTNALL,
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