No. 875,598. PATENTED DEC. 31, 1907.

W. N. PARKES.

BUTTONHOLE SEWING MACHINE.

APPLICATION FILED JAN. 13, 1900. RENEWID MAR. 5, 1903.

4 SHEETS—SHEET 1.

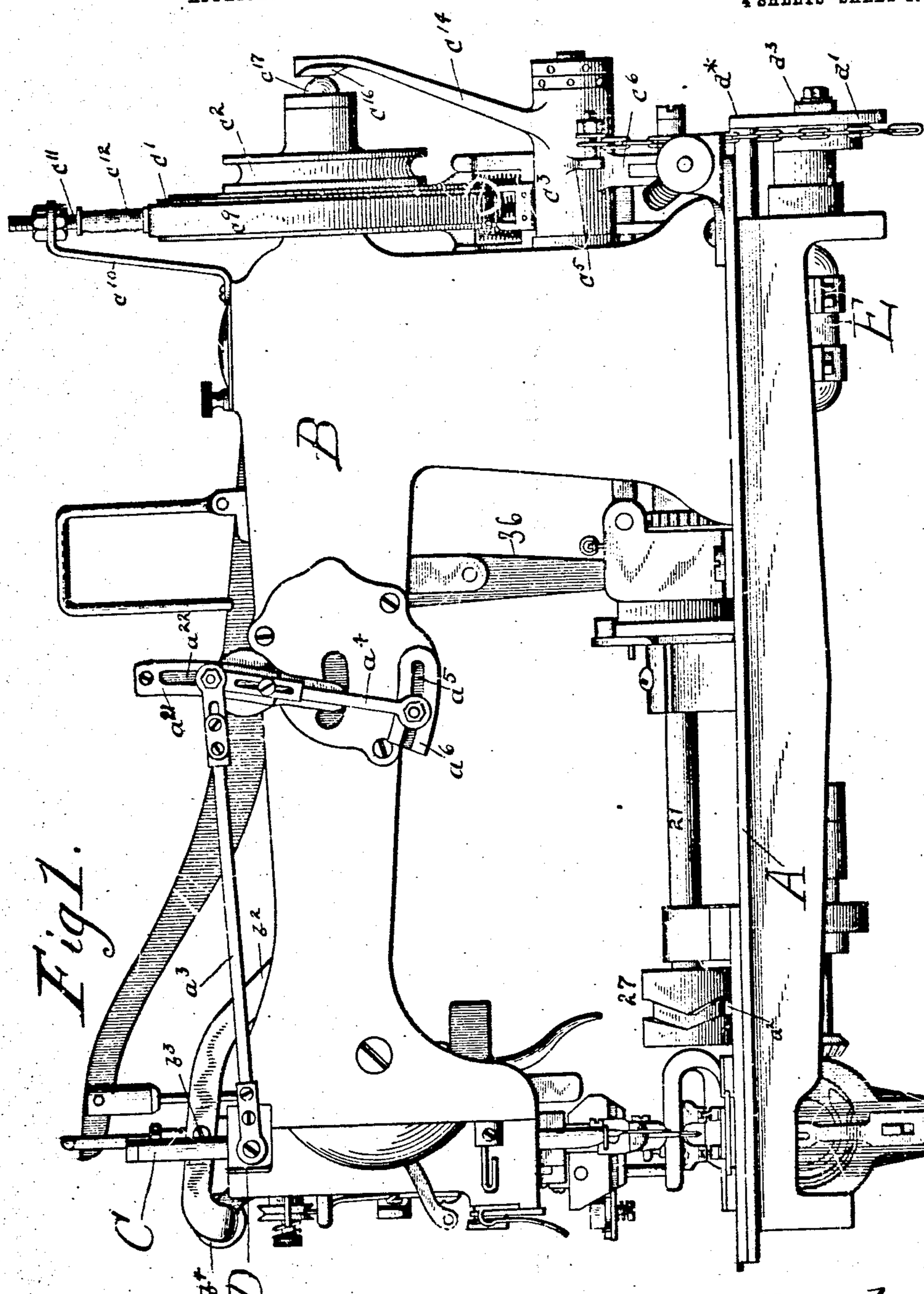

Fig. 1.

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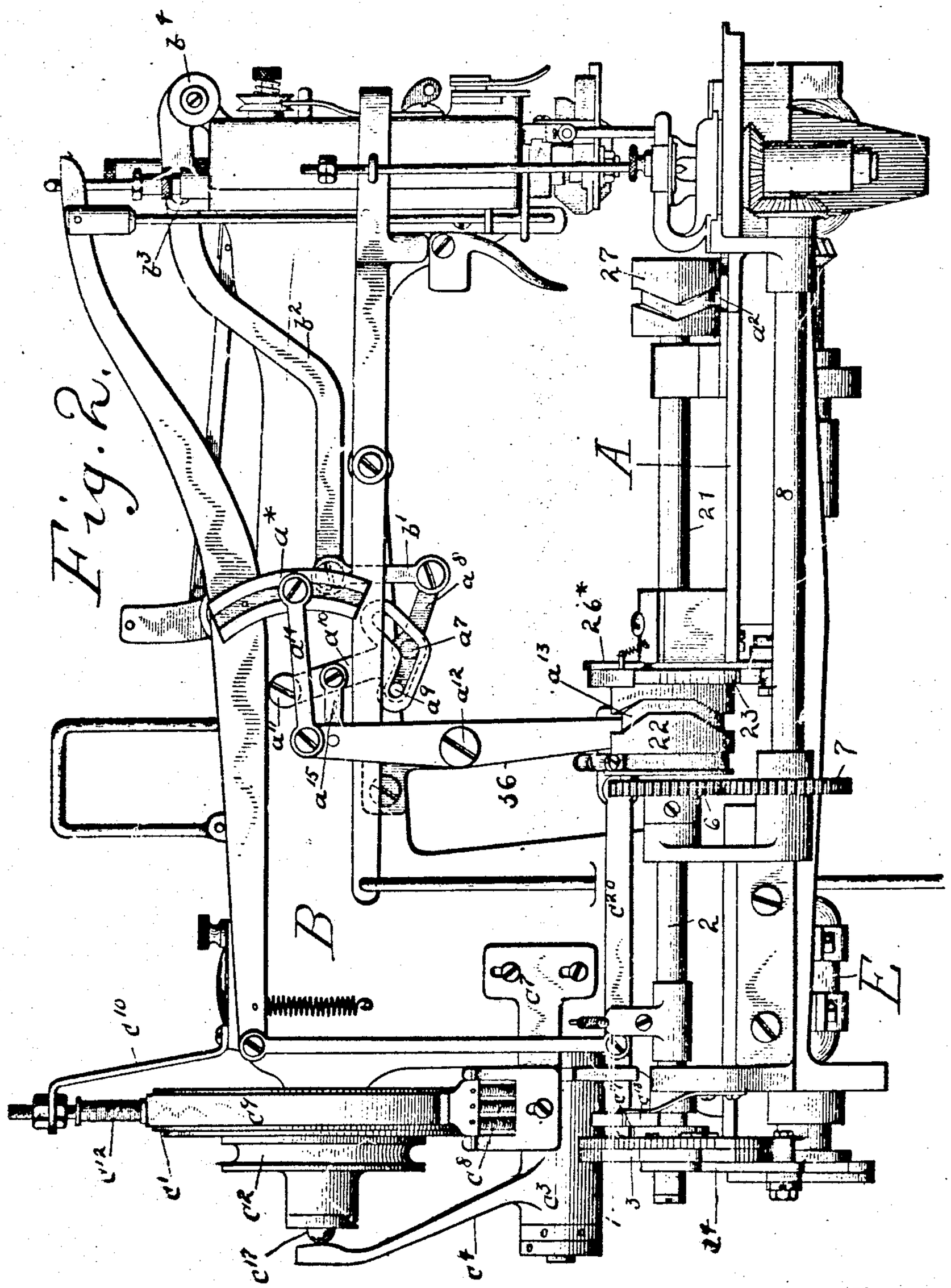

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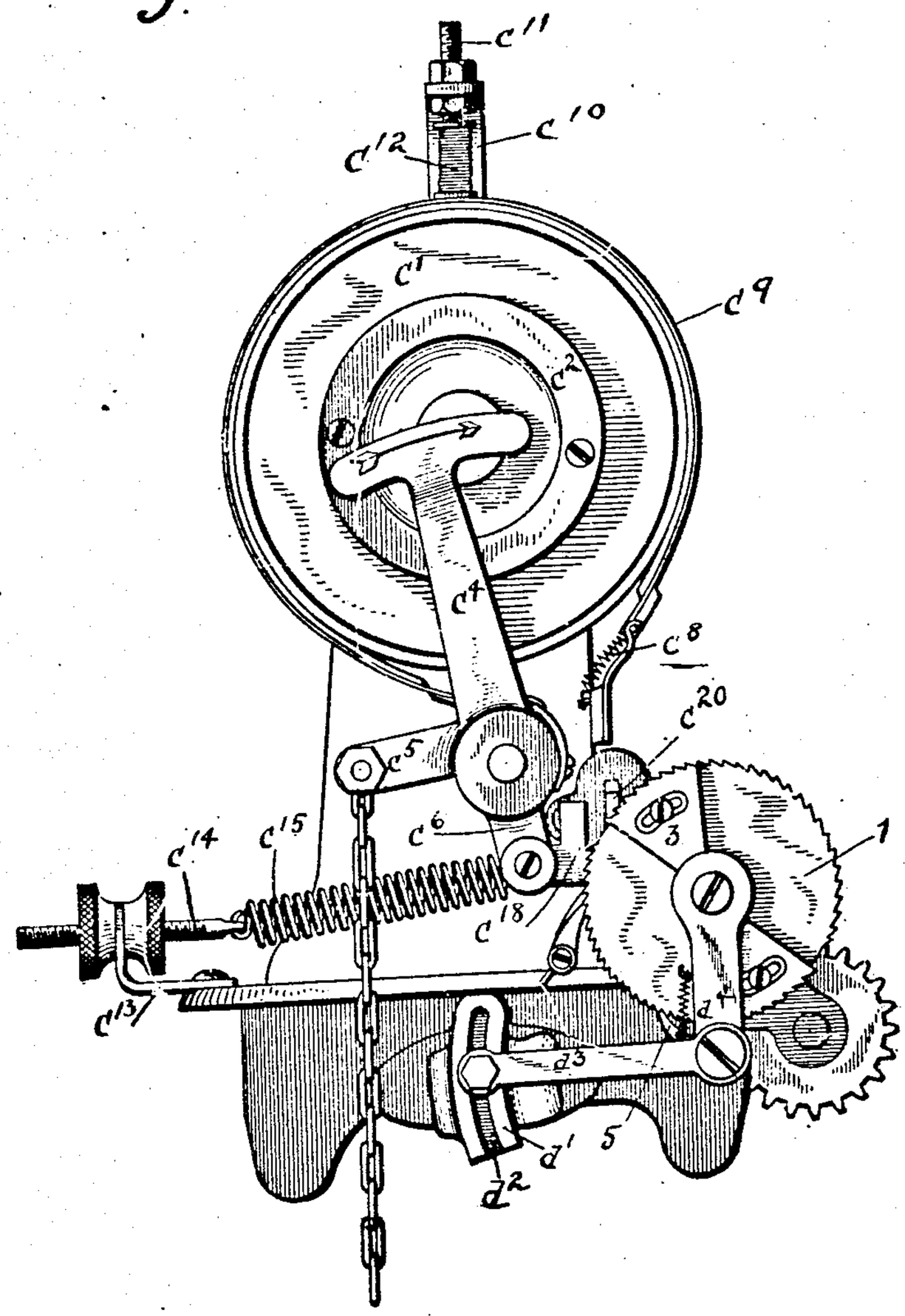
Fig. 3.



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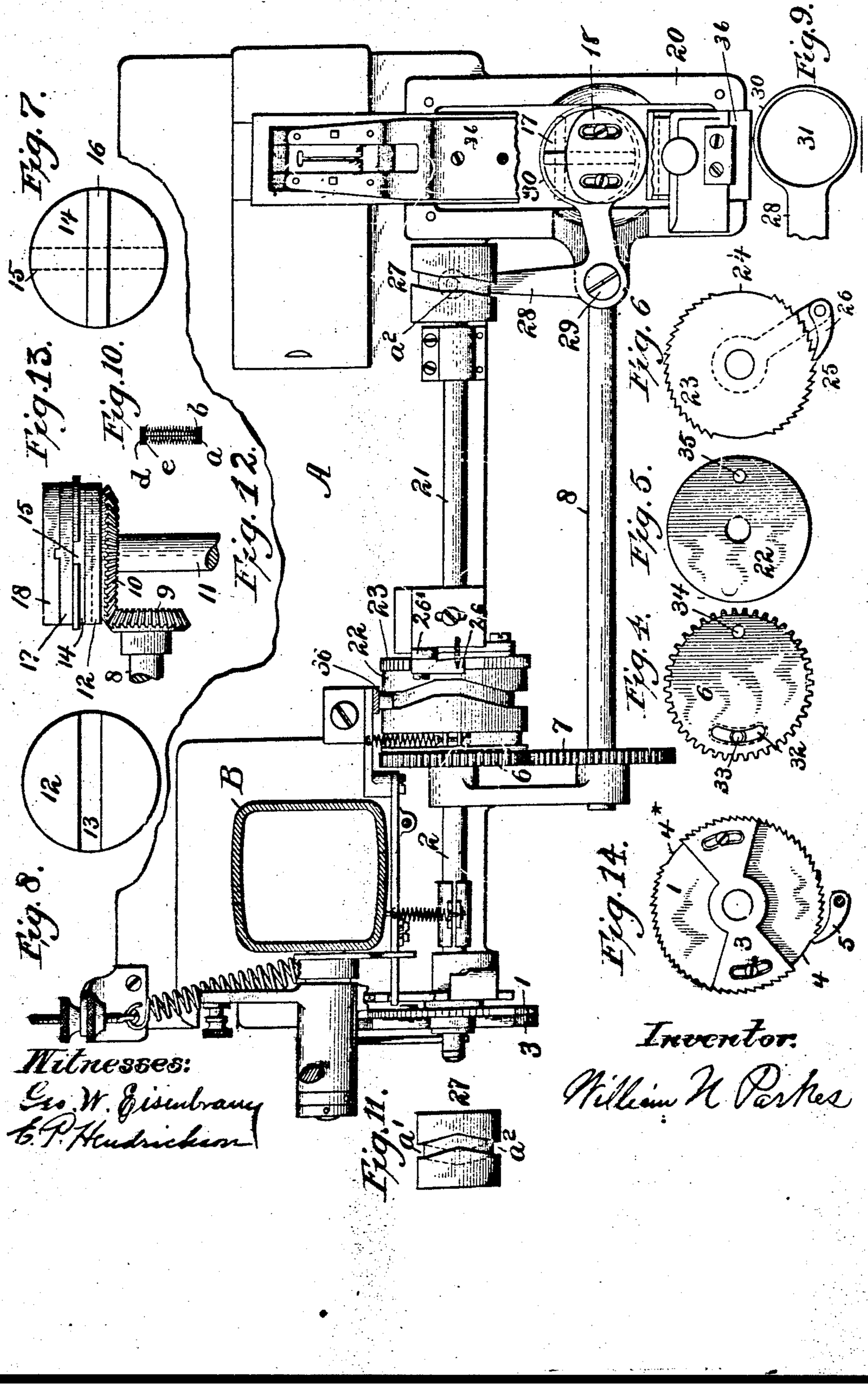

UNITED STATES PATENT OFFICE.

WILLIAM N. PARKES, OF NEW YORK, N. Y.

BUTTONHOLE-SEWING MACHINE.

No. 875,598. Specification of Letters Patent. Patented Dec. 31, 1907.

Application filed January 13, 1900. Serial No. 1,304. Renewed March 5, 1903. Serial No. 146,416.

To all whom it may concern:.

Be it known that I, WILLIAM N. PARKES, a citizen of the United States of America, residing at the borough of Brooklyn, New York city, county of Kings, and State of New York, have invented new and useful Improvements in Buttonhole-Sewing Machines, of which the following is a specification.

This invention relates to buttonhole sewing machines of the type which bind both sides and bar both ends of the buttonhole.

Preferably the invention is disclosed in connection with the buttonhole sewing machine covered by Patent No. 658,578, granted Sep. 25, 1900; but, it will be clear from the following description that this invention may be used in connection with other buttonhole sewing machines.

In my said former patent is shown and described mechanism for automatically changing the extent of the lateral movement of the needle to make the barring stitches across the end of the button-hole, and means for suspending the action of said mechanism during the stitching of the sides of the button-hole. During the time that the said mechanism acts to change the stitch forming mechanism for the making of the barring stitches, and during the making of the said barring stitches, the mechanism by means of which the work is moved to dispose the stitches along the sides of the hole is in action.

One of the main objects of my present invention is to provide means for automatically suspending the action of the mechanism by which the work is moved to dispose the stitches along the sides of the button-hole, during the time the barring or stitching is being done at the ends thereof. And in the present form of my invention this object is secured by suspending the action of the feed wheel by means of which said mechanism is operated.

In button-hole sewing machines the work is usually moved, to dispose the stitches along the sides of the button-hole, from the action of a revolving cam. In the present form of my invention this function is also secured from the action of a revolving cam, and simultaneously with the beginning of the stitching at the end of the button-hole, the action of the feed wheel is suspended as before noted, and the revolving movement of said cam is thereby suspended. After the stitching at one end of the button-hole has been completed the feed wheel again commences to act, and through it said cam commences to revolve, and the work is again moved from the action of the feed wheel. If the action of the feed wheel is suspended, as above noted, and the stitches then made at an end of the button-hole, said stitches will be piled on top of each other. This is objectionable because the barring stitches will be all anchored in the work at the same point, the number of stitches that can be made in the bar, and the strength of the same being thereby limited. For various other obvious reasons it is objectionable to drive the needle through the material a number of times at the same point. For example when a number of stitches are anchored at the same point in the work, an objectionable lump of thread is formed at said point, the needle may be thereby deflected from its proper course, or if it plunges through the mass of thread the needle or needle thread is liable to be broken.

Referring again to the objects of my invention it is noted that another important object is to suspend the action of the mechanism by means of which the work is moved for the length of the button-hole, to secure the advantages that result from such suspension, and at the same time avoid the above mentioned objectionable results of piling all the stitches on top of each other at the end of the hole. To this end, in my present invention, the action of the mechanism which is commonly called the feeding mechanism, is suspended simultaneously with the beginning of the stitching of an end of a button-hole, and at the same time the cam, by means of which the work is moved for the length of the button-hole, is bodily moved laterally as the stitching progresses at the end of the button-hole. And this movement of said cam causes a displacement between the work and the needle, by means of which the stitches at the end of the button-hole are disposed so they are not all piled on top of each other. An auxiliary cam acts to bodily move the cam that is usually called the feeding cam, and by this means the stitching at the end of the hole may be disposed as may be desired, just as they are along the sides of a button-hole. The construction of the auxiliary cam determines the disposition of said stitches at the end of the button-hole as will be seen in connection with the description of this mechanism.

In connection with the bodily movement

of the feed cam, and through it the movement of the work to place the stitches at the end of the button-hole, it is noted that this does not in any way effect the movement of said feed cam in feeding the work for the length of the button-hole. The feed cam, as before noted, is revolved when the sides of the button-hole are being stitched, and it is from the revolving movement of said cam that the work is moved to dispose the stitches along the sides of the hole, and from the time the movement of the feed wheel is suspended until it is started again the work is not moved from the action of said feed cam. It is by means of the bodily displacement of said feed cam, and thereby the displacement of the work-carrier, that the work is moved during the making of the stitches at the end of the button-hole.

In my before mentioned patent, means are provided for changing the amplitude of lateral movement of the needle at the end of the button-hole, and to shift laterally the working position of the needle for the purpose of changing the stitches from one to the other side of a button-hole. A ratchet wheel, that is mounted separately from the feed wheel, and actuated separately from the same is adapted to operate said means.

Returning again now to the object of my present invention, it is noted that an important object of the same is, to move the work during the time that the feed wheel is idle, from the action of said ratchet wheel, or from a part of the mechanism that is actuated by the same.

With these and other objects in view, as will appear hereinafter, my invention consists in the parts, improvements and combinations hereinafter described and claimed.

Referring to the drawings:—Figure 1, is a front elevation of a machine embodying my invention; Fig. 2, is a rear elevation; Fig. 3, is a rear end view of the same; Fig. 4, is a view of the side of the gear 6, next to the cam 22; Fig. 5, is a view of the end of the cam 22, next to the said gear 6; Fig. 6, is a side view of the "tacking" ratchet wheel 23; Fig. 7, is a bottom view of the slide disk 14; Fig. 8, is a top view of the disk 12; Fig. 9, is a detail showing an end of the bell crank lever 28; Fig. 10, is a diagrammatic view of a button-hole made on this machine; Fig. 11, is an elevation of cam 27, showing the formation of the cam groove a'; Fig. 12, is a top plan view of my invention; Fig. 13, is a side elevation of a part of the work-clamp actuating mechanism; and Fig. 14, is a side view of the work-clamp feed ratchet wheel.

In the drawings A designates the bed plate of the machine; B the overhanging arm, C the needle-bar, D the gate in which the needle-bar is mounted, and E the lower shaft of the machine. The needle-bar is mounted in a usual manner in the gate D which permits it to be reciprocated vertically and moved laterally. Usual means (not shown) are provided for operating the needle-bar vertically from the main shaft of the machine. On this main shaft intermediate its ends is attached a usual switch cam (not shown). On a suitable bearing, and transverse to the same in the arm B, of the machine, is journaled a shaft (not shown). To the forward end of the said shaft is fixed an eccentric, also not shown, and on the said eccentric is pivoted, between its ends, a lever a^{21} which is in engagement at its lower end with the aforesaid switch cam. To the other end of the said shaft is fixed an arm a^*. A way a^{22}, is formed in the lever a^{21}, and in the said way the end of a link a^3, is adapted to slide, which link, at its other end is attached to the needle-bar gate D. An adjustable link a^4, is at its upper end connected to the link a^3, and at its lower end to a way a^5, formed in a segment arm a^6, which arm is attached to the forward end of a shaft a^7, which is suitably mounted transversely to the arm B, the rear end of which shaft is shown in Fig. 2. To this rear end of the shaft a^7, is attached an arm a^8, on one end of which is mounted an anti-friction roller a^9, which is in engagement with a cam formed in the lower end of a cam lever a^{10} which is pivoted at a^{11} to arm B. A lever 36, is suitably pivoted at a^{12}, and at its lower end is in engagement, by means of an anti-friction roller, with a cam groove a^{13} formed in a cam 22. A link a^{14}, connects the upper end of the lever 36, with the segment arm a^*, and a link a^{15} connects the upper end of the lever 36 with the cam lever a^{10} as shown in Fig. 2.

When the machine is in operation the lever a^{21} receives a uniform vibratory movement from the action of the switch cam before mentioned and this vibratory movement is transmitted through the link a^3, to the needle-bar gate D and thus to the needle-bar C. The location of the end of the link a^3, in the way a^{22}, of the lever a^{21}, determines the extent of the said vibratory movement. The way a^{22}, is of sufficient length and so located that the end of the link a^3, can be moved over the pivot of the lever a^{21}. When in this position the link a^3, and the needle-bar will consequently have no vibratory movement.

When the lever 36, is oscillated the arm a^*, is oscillated and through it the shaft on which it is mounted and the eccentric which is on the other end of the said shaft is operated. This oscillation changes the vibrating position of the lever a^{21}, as more fully explained in the button-hole sewing machine patent above referred to. The extent of the oscillation of the arm a^*, and through it of the eccentric mentioned, is determined by the position of the end of the link a^{14}, with respect to the axis of the arm a^*. The arm a^6,

is oscillated by the lever 36, a uniform extent at the proper time in the stitching of a buttonhole through its connection with the said arm. The oscillation of the arm a^6, is for the purpose of automatically changing the position of the end of the link a^3, in the way a^{22}, of the lever a^{21}. The location of the end of the link a^4, in the way a^5, of the arm a^6, determines the extent of the said change and thus when the end of the link a^4, is over the pivot of the arm a^6, there is no vertical motion of the link a^4. The adjustment of the link a^4, intermediate of its length (see Fig. 1) is for the purpose of determining the working position of the end of the link a^3, in the way a^{22}, of the lever a^{21}. To the free end of the lever a^8, is attached the lower end of a link b', to the upper end of which is attached a lever b^2, which is suitably pivoted at b^3, and which at its forward end is adapted to engage the tension b^4, and automatically release the same from the thread.

Before specifying further the stitching, tacking and feeding mechanism, I will describe so far as is thought necessary for an understanding of the same, my stop motion device.

To the rear end of the upper shaft of the machine is attached a wheel c^1. Next to the said wheel c^1, is loosely mounted on the said shaft, a driving pulley c^2, which is adapted to engage the wheel c^1, and through it operate the machine. A lever c^3, having extensions c^4, c^5, and c^6, is suitably pivoted on a bearing which is attached to the rear end of the arm B of the machine. A bracket c^7, is also attached to said arm. To the outer end of the said bracket, by means of springs c^8, is attached one end of a strap c^9, which strap encircles the wheel c^1, and is at its other end attached to the lever c^3. The periphery of the wheel c^1, is suitably formed for frictional engagement with the strap c^9. A standard c^{10}, is attached to the arm B. A stud is adjustably connected to the said standard, and, at its lower end, is connected by means of a spring c^{12}, to the strap c^9. This yielding connection between the stud c^{11}, and the strap c^9, serves as a means for holding the strap in position around the wheel c^1, and at the same time permits it to move under the action of the stop motion. To a standard c^{13}, is adjustably connected a threaded bolt c^{14}, which is fastened to one end of a spring c^{15}, the other end of the said spring being connected to the extension c^6, of the lever c^3. An incline c^{16}, is formed on the upper end of the extension c^4, of the lever c^3, which incline is adapted to engage a bearing c^{17}, on the pulley wheel c^2. This pulley wheel c^2, is so mounted on the end of the upper shaft of the machine that it turns loosely on the same and may also be moved longitudinally of the same so as to be pushed in or out of engagement with the wheel c^1.

When the lever c^3, is in the position shown in Fig. 3, the wheel c^2, is pressed into engagement with the wheel c^1, by means of the incline c^{16}, formed on the extension c^4, of the said lever. The spring c^{15}, normally acts on the lever c^3, so as to turn it and through it the extension c^4, in the direction shown by the arrow on Fig. 3. A catch c^{18}, having a notch c^{19}, formed therein is attached to the lower end of the lever c^3, and a suitably pivoted latch c^{20}, adapted to engage the said notch serves as means for holding the stop lever in its operative position against the action of the spring c^{15}. This stop mechanism, so far as herein described, forms no part of my present invention and is the same as that shown by me and claimed in my Patent No. 653,938, issued July 17, 1900.

In my present invention the work moving mechanism is adapted at the proper time to trip the said stop mechanism into action. When it is so tripped the lever c^3, and through it the extension c^4, of the same is moved in the direction shown by the arrow. This movement by reason of the incline c^{16}, disengages the wheel c^2, from the wheel c' and brings the strip c^9, into engagement with the wheel c', thereby arresting the movement of the machine.

A feed wheel 1, is attached to the rear end of a shaft 2, which shaft is mounted to turn in suitable bearings. The feed wheel 1, is provided with a double segment 3, which has teeth formed on it coincident with the teeth on the feed wheel and which teeth are adapted to close gaps 4, and 4*, in the teeth of the feed wheel, the segment being adjustable for this purpose.

On a suitable bearing of the frame is pivoted at its upper end a lever d', which is oscillated from a cam (not shown) attached to the rear end of the lower shaft E, said shaft being oscillated in a usual manner. In the face of the lever d^1, is formed a curved way d^2, in which one end of a link d^3, is adjustably connected, the other end of the link being connected with a pawl lever d^4, which is pivoted on the rear end of the shaft 2. A pawl 5, is attached to the pawl lever d^4, and adapted to engage the ratchet wheel 1. The way d^2, formed in the lever d^1, is so constructed that the pawl 5, always starts forward at a given point whatever the extent of the stroke may be. Means for driving the feed wheel 1, are the same as shown in the Patent No. 658,578, issued September 25, 1900.

To the forward end of the shaft 2, is attached a gear wheel 6, which meshes with a gear wheel 7, attached to a shaft 8, mounted to turn in suitable bearings. To the forward end of the shaft 8, is attached a bevel gear 9, which meshes with a bevel gear 10, attached to vertical shaft 11, mounted to turn in suitable bearings.

To the top of the gear 10, is attached a disk

12, which has a way 13, formed in it. A slide 14, having a feather or rib 15, formed on its upper side, and a like feather or rib 16, formed on its under side, and at right angles to the one on the upper side, is mounted on top of the disk 12, the rib 16, being adapted to slide in the way 13, formed in the said disk 12.

A cam carrying disk 17, is mounted on top of the slide disk 14, a way being formed in its under side in which the rib 15, of the disk 14, is adapted to slide, as shown in Fig. 13. On the top of the cam carrying disk 17, is adjustably mounted a cam 18, which is adapted to operate between jaws on the under side of a work-clamp 36, said work-clamp being shown in Fig. 12, partly broken away to expose the driving cam and disk. The cam 18, is so constructed that it gives the work-clamp, when operating between bearings or jaws attached to it, as in my said patent, a uniform reciprocating movement longitudinally of the buttonhole, the extent of which is increased or decreased by adjusting the cam from or toward the center of the disk on which it is mounted.

To the rear end of a shaft 21, which is mounted in suitable bearings, is attached the cam 22, which is turned by a mutilated ratchet wheel 23, in the teeth of which are gaps 24, and 25. A pawl 26, mounted on the upper end of a pawl lever 26*, operates the mutilated ratchet wheel, suitable means (not shown) being provided for actuating the said pawl lever. To the forward end of the shaft 21, is attached an auxiliary cam 27, which engages by means of an anti-friction roller shown in dotted outline in Fig. 12, one end of a bell crank lever 28, which is pivoted on a suitable bearing at 29. The other end of the bell crank lever 28, is enlarged, as at 30, and has a hole 31, through it which adapts it to encircle the cam carrying disk 17; as shown in Figs. 9 and 12.

In a slot 32, formed in the gear 6, is adjustably attached in a usual way a tappet 33, the tappet projecting from the side of the gear next to the cam 22. A fixed tappet 34, projects from the same side of the said gear and a tappet 35, projects from the end of the cam 22, next to the gear 6, as shown in Figs. 4 and 5.

As in my former Patent #658,778, the lever 36, transmits, through the action of the cam 22, the necessary movements to the needle-bar for tacking the ends of the buttonholes and moving the working position of the needle-bar from one side of the hole to the other.

In getting the machine ready for operation, the means which actuate the pawl 5, are adjusted so that the said pawl turns the feed wheel 1, at each stroke and, through it and the intermediate mechanism, the cam 18 the desired extent. The segment 3, is adjusted so that the gaps 4, and 4*, are of a greater extent than the stroke of the pawl 5, preferably one tooth greater than the stroke of the said pawl. The gaps 24, and 25, in the teeth of the ratchet wheel 23, are of a greater extent, also preferably one tooth greater, than the stroke of the pawl 26, which operates the said ratchet wheel. The tappets 33, 34 and 35, are so located that they all turn in one path or circle, the tappet 35, being, of course, between tappets 33, and 34.

The cam 27, is so constructed that the cam 18, is moved bodily an extent which it is desired to have the tacking spread longitudinally of the buttonhole, that is, an extent that is equal to the distance between *a* and *b* in Fig. 10.

The disk 14, being free to move in two directions, which directions are at right angles to each other, it is seen, of course, that the cam-carrying disk 17, can be given a universal movement. The cam-carrying disk 17, only has to be moved a short distance, that it, the extent of the tack at the end of the hole, and longitudinally of the said hole.

With my present improvement applied to my former machine above referred to, the operation of the said machine is as follows:— During the tacking at the ends of the buttonhole, the pawl 5, operates in one of the gaps in the teeth of the feed wheel 1, as shown in Fig. 14, the position of the pawl, in the said figure, being that which it is in just previous to its forward movement, so, of course, the feed wheel 1, remains at rest until it is turned so that the first tooth beyond the gap comes under the pawl 5. The stop motion of the machine is so timed that the machine is stopped when the pawl 26, is in engagement with the teeth of the ratchet 23, as shown in Fig. 6, which is between the gaps in the teeth of the said wheel and in the middle of the barring at the first end of the buttonhole. Now, when the machine is started, about one-half of the barring stitches at the first end of the hole are first made, and during which the tappet 35, comes into engagement with tappet 33, and turns the gear wheel 6, and through it, the feed wheel 1, until the pawl 5, engages the teeth beyond the gap 4. The tappets and gaps are so placed that the finishing of the last stroke of the pawl 26, in engagement with the teeth of the ratchet wheel 23, before reaching the gap 24, brings the tappet 35, into engagement with the tappet 33, and thereby turns the first tooth of the feed wheel 1, beyond the gap 4, of the said wheel, under the actuating pawl 5. The next stroke of the pawl 26, is in the gap 24, between the teeth of the wheel 23, and, therefore, the wheel comes to a rest and remains so until the pawl 5, has turned the wheel 1, so as to bring the gap 4*, of the said wheel under the pawl 5. The last stroke

of the said pawl, before moving in the gap 4*, brings the tappet 34, into engagement with the tappet 35, and thereby brings the teeth of the ratchet wheel 23, again under the actuating pawl 26. While feeding the wheel 23, from gap 24 to gap 25, the tacking at the second end of the buttonhole is completed. The last stroke of the pawl 26, before moving in the gap 25, brings the tappet 35, again into engagement with the tappet 33, and thereby turns the first tooth across the gap 4*, of the wheel 1, into engagement with the pawl 5. During the engagement of the pawl 5, with the teeth of the wheel 1, from gap 4*, to the gap 4, the second side of the buttonhole is stitched. The last stroke of the pawl 5, before moving in the gap 4, again brings the tappet 34, into engagement with the tappet 35, and thereby, as before, turns the teeth of the wheel 23, into engagement with the pawl 26, which engagement continues until the bar at the first end of the hole is completed, when the stop motion is tripped into action and the machine is stopped. Under these conditions it will be seen that the bar at the end of the hole is not affected at all by the movement of the feed wheel 1, as the movement of the said wheel is always stopped before the barring commences. It will also be seen that the barring at the ends of the holes does not in any way affect the movement of the work during the stitching of the sides of the holes, for the reason that the barring is always stopped before the stitching of the side commences. It will also be seen that the barring stitches, as far as the working of the mechanism up to this point has been explained, would be piled on top of each other, as the movement of the work-carrier during the time that the said barring stitches are made has not been explained. Of course, a bar made in this manner will always be the same no matter how many stitches there are made in the sides of the buttonhole, or how long the hole is made. A bar made in this manner, with the stitches piled on top of each other, is objectionable, as noted in connection with the statements of objects at the beginning of this specification. Therefore I have provided means for disposing said stitches at the end of the buttonhole so they will not all be piled on top of each other, these means I will now describe.

To spread the bar longitudinally of the hole, I provide the mechanism which is operated through the movements of the auxiliary cam 27, the operation of which I will now explain.

The cam 27, is so constructed and timed relatively to the cam 22, that the anti-friction roller, mounted on the end of the bell crank lever 28, is engaged by the cam groove of the said cam 27, from a^1, to a^2, simultaneously with the movement of the cam 22, in barring the first end of the buttonhole. This engagement moves the bell crank lever 28, through it the cam 18, and the work-carrier, so that a layer of barring stitches is made from *e*, to *d*, and a second layer on top of the first layer from *d* to *e*, as shown in Fig. 10. Thus, it will be seen, that the barring at the first end of the buttonhole is finished just where it was started, and that this brings the work in the proper place under the needle for the beginning of the binding stitches on the first side of the hole, which is at *e*. After the first side of the buttonhole is completed and simultaneously with the movement of the cam 22, during the barring of the second end of the hole, the cam groove of the cam 27, engages the bell-crank lever from a^2 to a^1, and thereby moves the work-clamp, so that a layer of barring stitches is first made from *b*, to *a*, then a second layer from *a*, to *b*, which brings the work in a position for the commencement of the binding stitches on the second side of the hole.

It is seen from the foregoing that the extent of the lateral movement of the needle for the barring stitches, and the change of the working position of said needle from one to the other side of a button-hole is under the control of a ratchet operated mechanism, and that from the movement of a part of this mechanism the auxiliary cam 27 is revolved, and by the means between the same and the work-carrier the latter is shifted for the purpose of disposing the barring stitches as described. And it is also seen that the mechanism for moving the work to dispose the binding stitches along the sides of the button-hole is under the control of a second ratchet operated mechanism, which includes a revolving cam by means of which the work-carrier is moved for disposing the stitches along the side of the button-hole. And it is of course obvious that as the feed wheel 1 is idle during the making of the barring stitches at the ends of the holes, the cam 18 does not revolve, and that thus the use of this cam is kept intact for its special purpose of moving or feeding the work to dispose the binding stitches along the sides of the button-hole. And it is thought that it has also been made clear that as the ratchet wheel 23 is idle during the operation of the ratchet wheel 1, the cams 22 and 27 are idle during the stitching of the sides of the button-hole, and that thus the use of these cams are kept intact for their special purpose, of controlling the extent of the lateral movement of the needle, shifting laterally the working position of said needle, and displacing the work-carrier for the purpose of disposing barring stitches at the ends of the button-hole.

The term barring stitches used in this application is to be understood to mean the placing of stitches at the ends of a hole in such a manner as to finish said ends, and it will be understood to be immaterial whether

said end stitches are composed of long stitches or short stitches or otherwise, so long as they reinforce the ends of the button-hole. The term work moving mechanism is to be understood to only take within its scope the means for producing a relative movement between the stitch forming mechanism and the work to dispose the stitches along the side of a button-hole. The term auxiliary work moving device is to be understood to only take within its scope the means which moves the work separately from the work moving mechanism to dispose the stitches at the ends of the hole. And it is to be understood that this device includes the mechanism that acts to move the work for said end stitches, during the time the mechanism that gives the work the usual feeding movement for the length of the hole is idle. The cam 27, can be constructed so as to finish its movements a little ahead of the cam 22, say two or three stitches, which will cause two or three barring stitches to be made on top of each other, the needle going down in the same holes, at the same time tying the ends of the thread at the finishing of each bar.

It will be noted that the movements of the work-holder are consecutively progressive; but, it is to be understood that the claims are not to be limited thereto, except when specified.

I do not wish to be limited to the specific means herein shown for separating the movement of the barring mechanism from the movement of the mechanism which stitches the sides of the holes, as it is evident other means might be used without departing from the spirit of my invention.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. A button-hole machine comprising a stitch forming mechanism adapted to make the end and side stitches of a button-hole, a feeding mechanism for moving the work to dispose the side stitches, means for suspending the action of said feeding mechanism, a device actuated separately from said feeding mechanism for controlling said stitch forming mechanism for the end stitches, and means adapting said device to cause the feeding mechanism to again act after said suspension.

2. A button-hole machine comprising means for making the end and side stitches of a button-hole, a feeding mechanism for moving the work to dispose the said side stitches, means for suspending the action of said feeding mechanism during the making of the end stitches, a barring mechanism, and means adapting said barring mechanism to cause said feeding mechanism to again act after said suspension.

3. A button-hole sewing machine comprising a needle and means for operating it; a work carrier; means for producing a relatively progressive movement between the work-carrier and the needle longitudinally of the button-hole during the formation of the side rows of stitches; and independent means for producing a relatively progressive movement between the needle and the work-carrier longitudinally of the button-hole during the barring.

4. A button-hole machine comprising a stitch forming mechanism having a vertically reciprocating and laterally vibrating needle for making the end and side stitches of a button-hole, a feeding mechanism for moving the work to dispose the stitches, means for suspending the action of said feeding mechanism, a barring mechanism, and means adapting said barring mechanism to cause said feeding mechanism to again act after said suspension.

5. A button-hole sewing machine comprising a work-carrier; means including a cam for giving the work-carrier a progressive movement longitudinally of the button-hole; and means including a second cam, for giving the work-carrier a second and separate progressive movement longitudinally of the button-hole.

6. A button-hole sewing machine comprising a work-carrier; means including a ratchet mechanism for giving the work-carrier a progressive movement longitudinally of the button-hole; and means including a second ratchet mechanism for giving the work-carrier a second and separate progressive movement longitudinally of the button-hole.

7. A button-hole sewing machine comprising a feed-wheel; a work-carrier; means intermediate the work-carrier and the feed-wheel, whereby the former is progressively moved longitudinally of the button-hole during the stitching of the sides of the same; a cam means intermediate the said cam and the work-carrier, whereby when the cam is operated the work-carrier is additionally progressively moved longitudinally of the button-hole during the stitching of the ends of the same; and means for operating the said cam.

8. A button-hole sewing machine comprising a device for progressively moving the work longitudinally of the button-hole during the stitching of the sides of the same; a second device for progressively moving the work longitudinally of the button-hole during the stitching of the ends of the same; means for operating the first device only during the stitching of the sides of the button-hole; and means for operating the second device only during the stitching of the ends of the button-hole.

9. A button-hole sewing machine comprising a ratchet-wheel; means for periodically rotating the same; a second ratchet-

wheel separately mounted from the first ratchet-wheel; means for periodically rotating the second ratchet-wheel; mechanism, operated through the movements of the first ratchet-wheel, adapted to move the work longitudinally of the button-hole during the stitching of the sides of the same; and mechanism, operated through the movements of the second ratchet-wheel, adapted to move the work during the stitching of the ends of the button-hole.

10. A feeding mechanism for button-hole sewing machines, comprising a work-carrier; a cam for operating the same, said cam being mounted to rotate and free to move in any direction at substantially right angles to the axis of its rotation, and means for actuating the said cam.

11. A feeding mechanism for button-hole sewing machines comprising a work-carrier; a cam for operating the said work-carrier, mounted to rotate in a horizontal plane and free to move in any direction in the said plane; and means for operating the said cam.

12. A feeding mechanism for button-hole sewing machines comprising a disk mounted to rotate in a horizontal plane; a second disk adapted to slide on the said first disk; a third disk adapted to slide on the said second disk; a work-carrier; a cam adapted to reciprocate the said work carrier, said cam being mounted on the said third disk; means for rotating all of the disks and means for reciprocating the third disk.

13. A feeding mechanism for button-hole sewing machines comprising a work-carrier; a cam 18, for reciprocating the said work-carrier; the disk 17, for rotating the said cam; means whereby the said disk is rotated and free to move laterally; the cam 27; the bell-crank lever 28, one end of which engages the said disk and the other end of which engages said cam 27; and means for operating said cam 27.

14. A button-hole machine comprising a vertically reciprocating and laterally moving needle for making the end and side stitches of a button-hole, a feeding mechanism for moving the work to dispose the said stitches longitudinally of the hole, means for suspending the action of said feeding mechanism, a device actuated separately from said feeding mechanism for changing the working position of the needle from one to the other side of a button-hole, and means adapting said device to cause said feeding mechanism to again act after said suspension.

15. A sewing machine comprising a vertically reciprocating and laterally vibrating needle, a feeding mechanism for moving the work to properly place the stitches longitudinally of the hole, means for suspending the action of said feeding mechanism, a device for changing the amplitude of vibration of the needle, means adapting said device to change the working position of said needle, and means adapting said device to cause the aforesaid feeding mechanism to again go into action after the said change in the working position of the needle.

16. A button-hole machine comprising a stitch forming mechanism, a feeding mechanism for moving the work comprising a ratchet wheel in the teeth of which there is a gap that causes the action of said feeding mechanism to be suspended, means for controlling the stitch forming mechanism comprising a second wheel in the teeth of which there is a gap that causes the action of said wheel to be suspended, and means adapting said ratchet wheels to alternately turn each other into action.

17. A button-hole machine comprising a mechanism for making the end and side stitches of a button-hole, feeding mechanism for moving the work to dispose the side stitches longitudinally of the button-hole comprising a toothed wheel, an auxiliary feeding mechanism for moving the work to dispose the end stitches comprising a second toothed wheel, and means for operating said second toothed wheel at a higher rate of speed than said first toothed wheel.

18. A button-hole machine comprising a feeding mechanism having a ratchet-wheel and means for operating it, means for suspending the action of said ratchet wheel, a stitch forming mechanism comprising a vertically reciprocating and laterally vibrating needle, a device for changing the amplitude of vibration of said needle comprising a barring ratchet wheel that is mounted separately from said feeding ratchet wheel, means for actuating said barring ratchet wheel at a higher rate of speed than said feeding ratchet wheel, and means adapting said barring ratchet wheel to turn the feeding ratchet wheel into action.

19. A button-hole stitching machine comprising a vertically reciprocating and laterally moving needle, a barring mechanism for controlling the amplitude of the lateral movement of said needle, a work-carrier, a cam for reciprocating said work-carrier, means for revolving said cam means for suspending the action of said cam, a device for moving said work-carrier after said suspension, and means adapting a part of said barring mechanism to operate said device.

20. In a buttonhole stitching machine, the combination with a stitch forming mechanism, a work-carrier, a cam coöperating with said carrier, a barring mechanism, means for rotating said cam connected with one of said mechanisms, and means for bodily moving said cam connected with another of said mechanisms.

21. A feeding mechanism for sewing machines comprising a work-carrier confined to operate in a single right line, an actuating de-

vice coöperating with the carrier and mounted so that it may have universal movements in a given plane, and means for actuating said device in said plane.

22. In a buttonhole stitching machine the combination with a stitch forming mechanism and a feed mechanism, the latter including a work-carrier and a rotating cam for moving the carrier to space the binding stitches, of barring mechanism including means for bodily moving said cam to actuate the carrier.

23. In a buttonhole stitching machine, the combination with a stitch forming mechanism and a feeding mechanism, the latter including a work-carrier and an axially movable cam for actuating the carrier to space the binding stitches, of barring mechanism including means for bodily moving said cam to actuate the carrier.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM N. PARKES.

Witnesses:
EUGENIE P. HENDRICKSON,
GEO. W. EISENBRAUN.