

C. M. HORTON.
THREAD CUTTING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED JAN. 12, 1904.

5 SHEETS—SHEET 1.

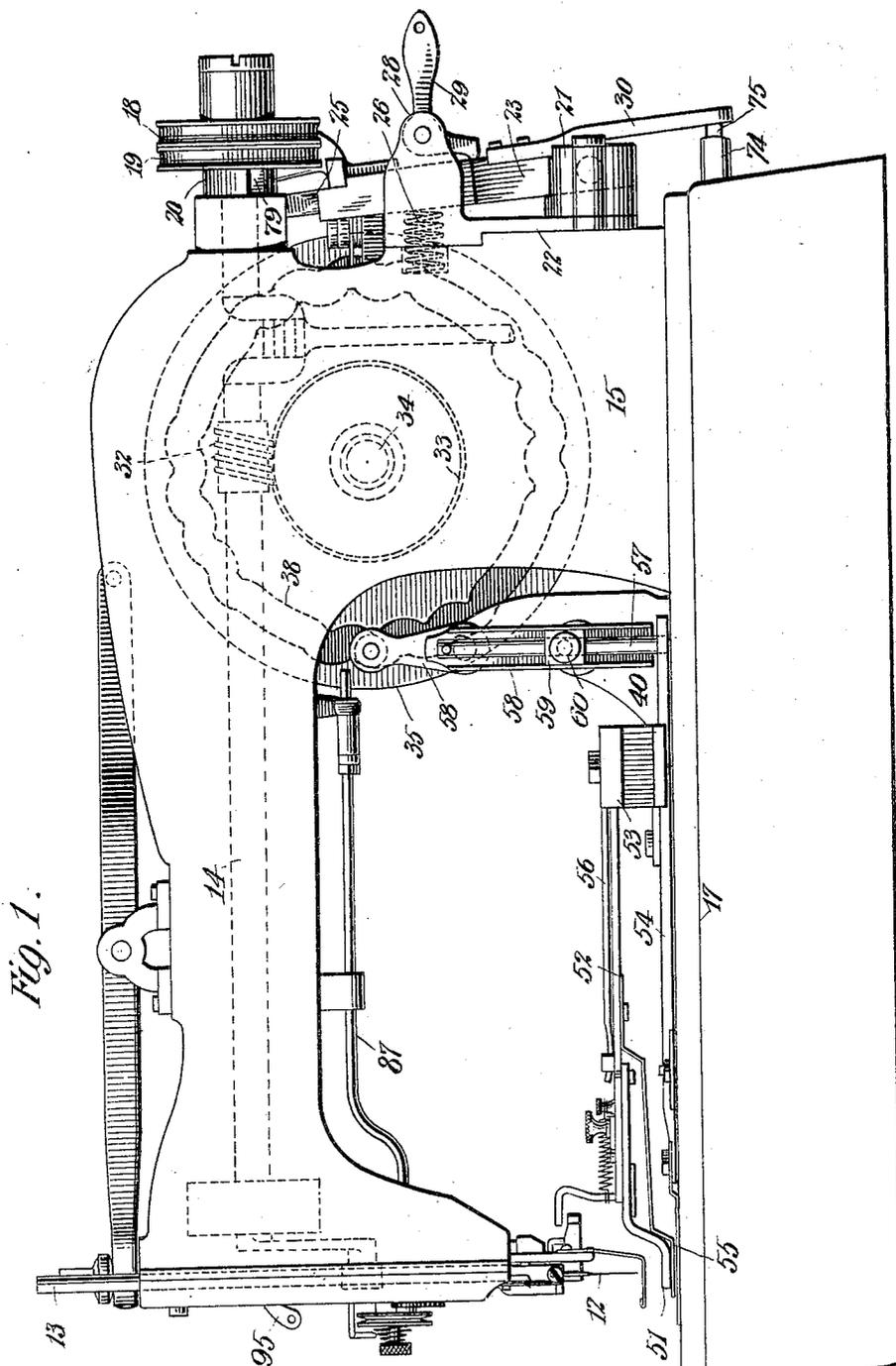


Fig. 1.

Witnesses:
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C. M. Sweeney.

Inventor:
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By His Attorney
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5 SHEETS—SHEET 2.

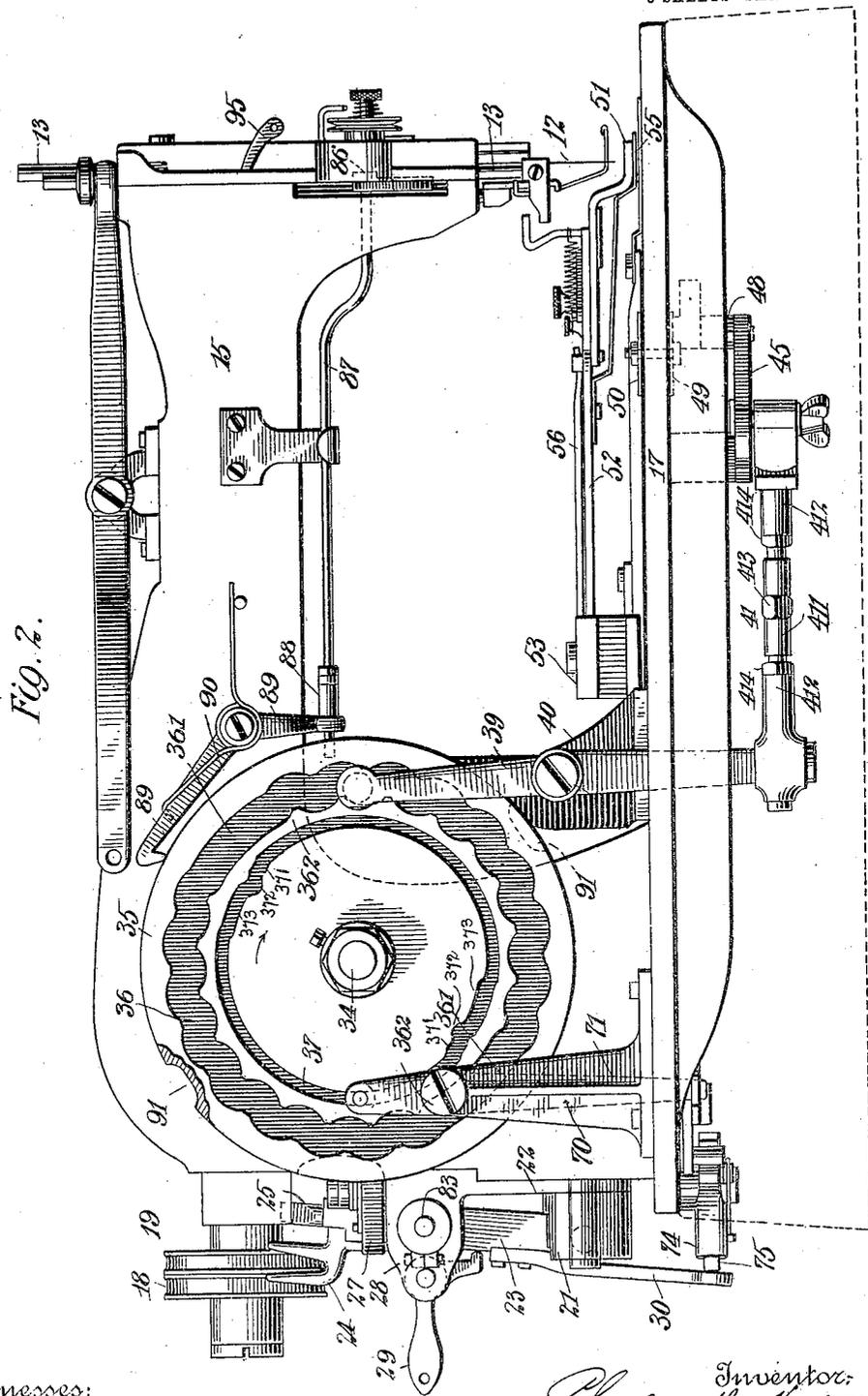


Fig. 2.

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 [Signature]

No. 807,676.

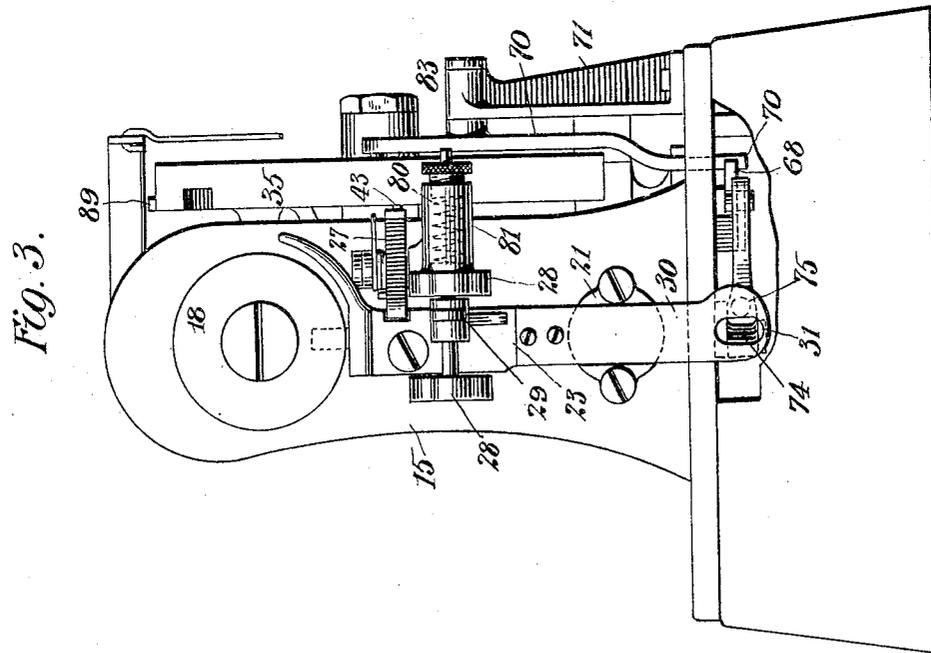
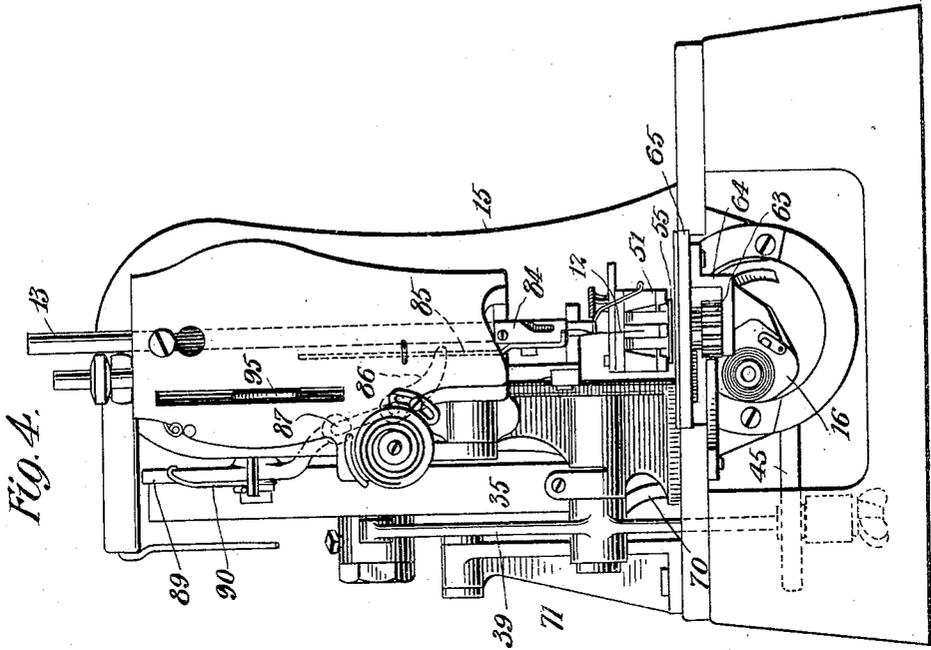
PATENTED DEC. 19, 1905.

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5 SHEETS—SHEET 3.



Witnesses:
Frank S. Ober
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5 SHEETS—SHEET 4.

Fig. 5.

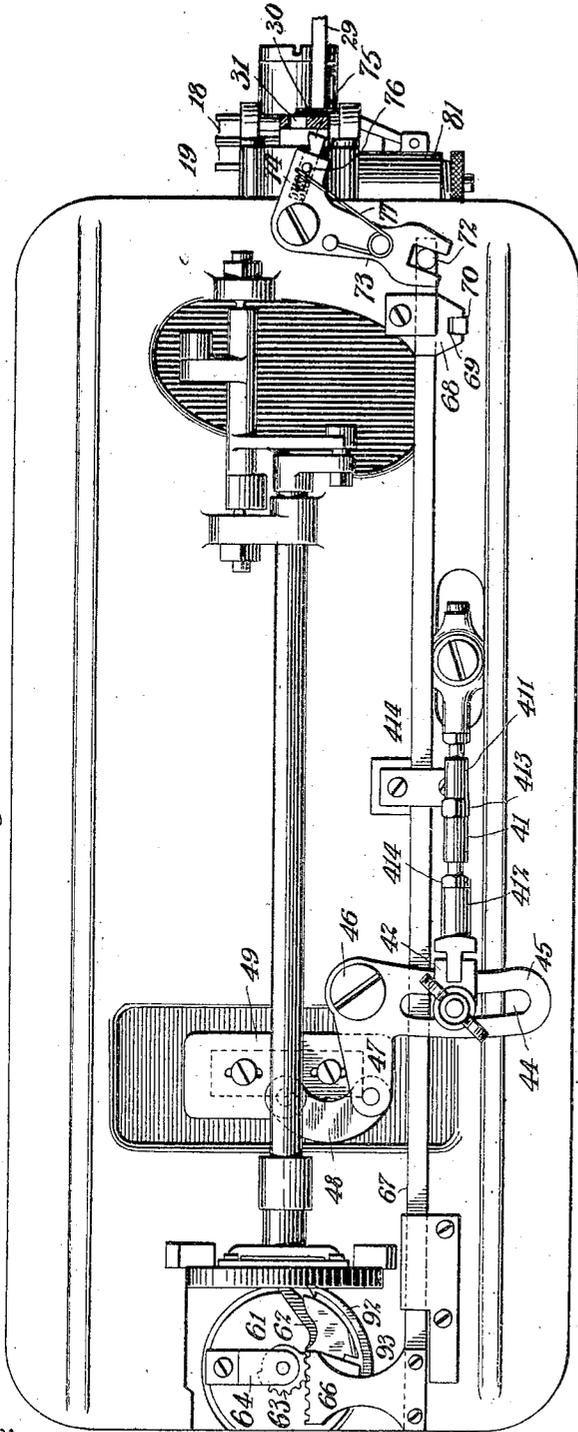


Fig. 7.

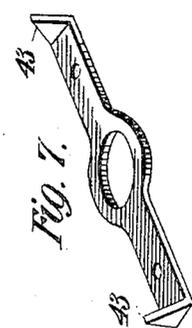


Fig. 6.

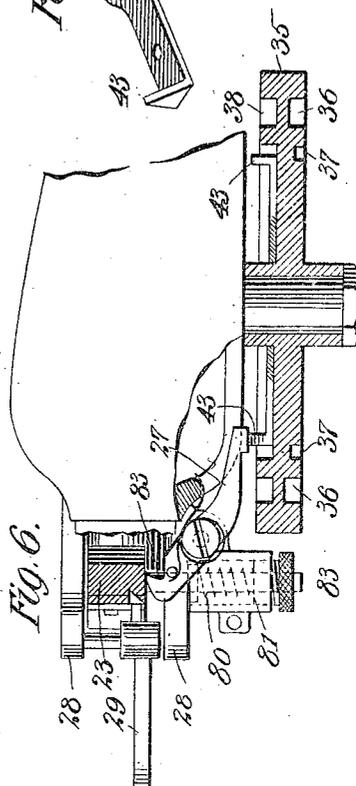
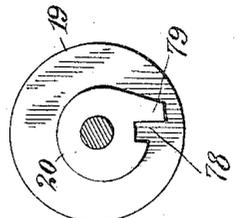


Fig. 8.



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5 SHEETS—SHEET 5.

Fig. 11.

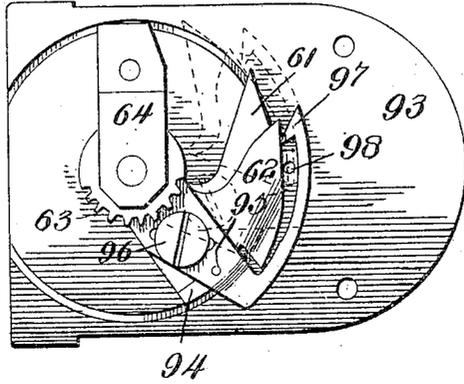


Fig. 10.

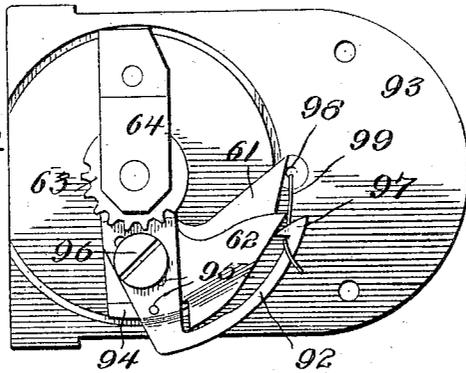
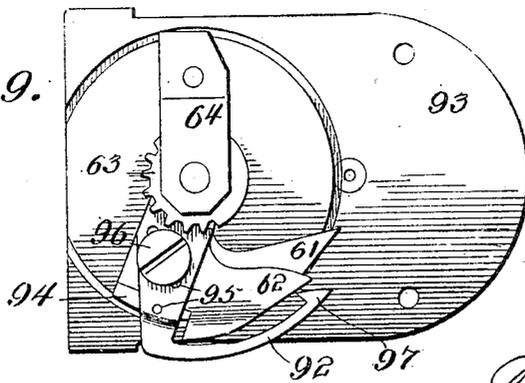


Fig. 9.



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UNITED STATES PATENT OFFICE.

CHARLES M. HORTON, OF PORTSMOUTH, NEW HAMPSHIRE, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

THREAD-CUTTING MECHANISM FOR SEWING-MACHINES.

No. 807,676.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed January 12, 1904. Serial No. 188,693.

To all whom it may concern:

Be it known that I, CHARLES M. HORTON, a citizen of the United States, residing at Portsmouth, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Thread-Cutting Mechanisms for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of sewing-machines for forming groups of a predetermined number of stitches, which in most instances are disposed in different directions or across each other, as in sewing on buttons by crossing stitches, barring, tacking, &c., and which machines are preferably provided with means for severing the threads at the end of each stitching operation; and the invention has for its object to simplify the mechanism and to improve the efficiency of the class of machines referred to.

In the accompanying drawings, Figures 1 and 2 are opposite side views of a sewing-machine embodying the present invention. Fig. 3 is a rear end view, and Fig. 4 a front end view, of the same. Fig. 5 is a bottom view, and Fig. 6 a partial plan view, partly in horizontal section, of the same. Fig. 7 is a detail perspective view of the double-stop-motion tripping-cam device. Fig. 8 is a detail view of the stop-motion cam. Figs. 9, 10, and 11 are detail views of the thread-cutting and thread-nipping devices with the parts in different positions in the several views.

The machine to which the present invention is herein shown as being applied is a well-known form of Singer lock-stitch sewing-machine, comprising a needle 12, carried by a vertically-reciprocating needle-bar 13, operated from a driving-shaft 14, journaled in the upper part of the arm 15, and an oscillating shuttle 16, located below the work-plate 17 and operatively connected in a usual manner with the said driving-shaft, which latter is in the present instance provided with a loose pulley 18 and a fast pulley 19; said fast pulley having an integral or rigidly-attached stop-motion cam 20. Pivotaly mounted at its lower end in a projection 21 on a bracket 22 is a start and stop motion lever 23, provided with a belt-shifter 24 and with a plunger 25, pressed upward by a suit-

able spring, the said start and stop motion lever being acted on by a coil-spring 26, having a tendency to force the upper end of said start and stop motion lever outward, but which tendency is restrained by a detent-lever 27, which serves to retain said start and stop motion lever in its inoperative position, as shown in Figs. 1 and 2. Mounted in ears 28 of the bracket 22 is a bell-crank lever 29, the lower arm of which impinges against the said start and stop motion lever, so that by depressing the upper or outer arm of said bell-crank lever the start and stop motion lever may be forced inward to start the machine when desired. The start and stop motion lever is provided with a depending arm 30, having a slot or hole 31, the purpose of which will presently appear.

The driving-shaft 14 is provided with a worm 32, meshing with a worm-wheel 33, fixed to a shaft 34, to which is also secured a cam-wheel 35, having in its outer face cam tracks or grooves 36 and 37 and in its inner face a cam track or groove 38. The cam-track 36 is entered by a roller-stud at the upper end of a lever 39, fulcrumed in a bracket 40 and extending down through the work-plate 17. The lower end of the lever 39 is connected by a pitman 41 to a block 42, adjustable in a slot 44 of an arm 45 of a bell-crank lever fulcrumed on a stud 46 and the shorter arm 47 of which is connected by a link 48 with a sliding plate 49 beneath the work-plate of the machine. To the plate 49 is attached a plate 50, located above the work-plate of the machine. The yokes forming the ends of the pitman 41 preferably have an adjustable connection consisting of a rod 411, oppositely threaded at its opposite ends and entering threaded sleeves 412, with which said yokes are provided, so that by turning said rod by a wrench applied to its central rectangular portion 413 the working length of said pitman may be varied for convenience of adjustment when the set-nuts 414 on said rod are loosened.

The work-holder comprises upper and lower members between which the work is yieldingly held and which are movable in any desired horizontal direction beneath the needle 12. In the present instance the upper member or presser-foot of the work-clamp is constructed as a button-holder 51,

carried by an arm 52, attached to a block 53, which is in turn secured to a plate or bar 54, resting on and attached to the plate 50 and which plate or bar 54 carries the movable throat-plate 55. This movable throat-plate 55 is not essential, as for many purposes the presser-foot of the work-holder might rest upon the work lying directly on a stationary throat-plate. The presser-foot of the work-holder is forced yieldingly downward by a plate-spring 56.

The lower plate or bar 54 of the work-holder is provided at its rear end with a rigidly-attached pin or post 57, received in a recess or slot of a hollow or slotted lower arm of a lever 58, fulcrumed or pivoted on the bracket 40 and the upper arm of which is provided with a pin or roller-stud entering the cam-groove 38 of the cam-wheel 35. Vertically adjustable on the pin or post 57 between the flanges of the lower hollow or slotted arm of the lever 58 is a contact-block 59, held in any desired position of adjustment by a set-screw 60. By varying the vertical position of the adjustable contact-block 59 the extent of movement imparted to the work-holder lengthwise of the machine by the lever 58 will be varied, and by changing the position of the adjustable block 42 in the slotted arm of the bell-crank lever 45 47 the extent of movement of the work-holder crosswise of the machine will likewise be varied, as will be understood.

The present machine is preferably provided with a thread-cutting mechanism essentially the same in principle as that shown and described by United States Patent No. 702,832, granted June 17, 1902, although of a somewhat improved construction. In the present instance the thread-cutters or knives 61 62 are connected with a sector-gear 63, journaled in a bracket 64, attached to the shuttle-race cover-slide 65. Meshing with the said sector-gear is a rack 66, carried by a sliding bar 67, suitably supported beneath the work-plate of the machine and having near its rear end a block 68, having a notch 69 entered by the lower end of a lever 70, pivotally mounted on a bracket 71 and provided at its upper end with a pin or roller-stud entering the cam-groove 37 in the outer face of the cam-wheel 35. The sliding bar 67 carries at its rear end a pin or roller-stud 72, engaged by the forked arm 73 of a bell-crank lever, the other arm 74 of which is provided with a pin or block 75, having a stud 76 engaged by a spring 77, which has a tendency to press the said pin or block 75 outward toward the depending arm 30 on the start and stop motion lever 23.

The two levers 70 and 73 74 serve, through the connections above described, to impart what may be termed a "two-stage movement" to the thread-cutters from the cam-groove 37 and the stop-motion device in a manner

somewhat similar to that described in United States Patent No. 702,832, above referred to, although the first-stage movement of the thread-cutters, imparted thereto from the said cam-groove, is in the present instance a two-step movement. Thus when a group of stitches is nearly completed the portion 371 of the cam-groove 37 will act on the pin or roller-stud at the upper end of the lever 70, and thus cause a partial forward movement to be imparted to the thread-cutters or knives 61 62 from the positions shown in Fig. 9 to the positions shown in Fig. 10 to cause the finger of the cutter 61 to engage the shuttle-thread, and at the next succeeding stitch the said knives or cutters will be further advanced by the portion 372 of the said cam-groove from the positions shown in Fig. 10 to the positions shown in Fig. 11, thus causing the finger of the cutter 62 to enter a loop of needle-thread. After these two steps of the first-stage movement have been effected the second or cutting stage movement of the knives or cutters, and which is a quick or sudden movement, will be imparted thereto from the stop-motion lever, as in the machine of the patent referred to, as will presently appear. The first step of the first-stage movement of the sliding bar 67, operated by the lever 70, moves the bell-crank lever 73 74 far enough to bring the spring-pressed pin or block 75 nearly into register with the hole or slot in the arm 30 on the stop-motion lever 23; but before the second step of the first-stage movement of the sliding bar 67 occurs the said stop-motion lever will be tripped, as will presently be described, and the arm 30 will then engage the spring-pressed pin or block 75 and force it inward on the arm 74, so that when the second step of the first-stage movement of the lever 70 and of the sliding bar 67, operated therefrom, is effected the lever 73 74 will be moved to bring the said block or pin 75 into register with the hole 31 of the arm 30 and into which hole it will be forced by its spring, thereby coupling the cutting mechanism with the stop-motion device.

From the foregoing it will be apparent that when the pin 75, carried by the arm 74 of the bell-crank lever 73 74, is coupled with the arm 30, attached to the start and stop motion lever 23, the stop-motion device will be positively connected with the thread-cutting device, so that the operation of the latter will be certain and positive and accurately controllable, thus obviating an objection existing in the machine of the said Patent No. 702,832. Also the two-step first-stage movement of the thread-cutters 61 62 occurring at two successive stitches enables the forwardly-projecting fingers carried by said cutters, and one of which fingers is arranged forward of the other, to be separately engaged with the thread which each cutter is

to sever, instead of engaging both threads by a single finger, as in the machine of the patent referred to, and which machine did not always work satisfactorily in the thread-severing operation in that the needle-thread was sometimes cut in two places, thus leaving the end so short that the needle was liable to become unthreaded at the commencement of the next stitching operation.

The cam-wheel 35 is provided on its inner face with a cam projection or projections 43 to trip the detent-lever 27 when the machine is to be stopped. When the said detent-lever is tripped, so as to be disengaged from the start and stop motion lever, the spring 26 forces the upper end of said start-and-stop-motion lever outward, and thus brings the spring-pressed plunger 25 beneath the cam 20 on the fast pulley 19. Adjacent to said cam is a notch 78, beyond which is a tappet 79. When the plunger enters the notch 78 and is engaged by the tappet 79, a limited movement transversely of the machine will be imparted to the start-and-stop-motion lever against the pressure of a buffer-spring 80 in a sleeve 81 on the bracket 22 and acting on a pin or rod 83, forced against said lever by said spring. This transverse or lateral movement of the start and stop motion lever causes the arm 30 thereon to impart the final or thread-severing movement above referred to to the thread-cutters through the bell-crank lever 73 74 and other connections above described. In this final or thread-severing movement the parts are moved quickly forward from the positions shown in full lines to the positions denoted by dotted lines in Fig. 11 and are then quickly returned to the full-line position of said Fig. 11 by the stress of the spring 80 acting on the stop-motion lever 23.

Rigid with the sector-gear 63 is an arm 94, to which the thread cutters or knives 61 and 62 are attached, and also secured to said arm 94 is a thread-nipper or thread-controller 92, consisting of a curved spring-plate which is bent upward, so that it has a yielding contact with the under side of the throat-plate 93, and which thread nipper and controller is provided with a shank 95, by means of which it is attached to the arm 94 by the same set-screw 96 which secures the knives or cutters 61 62 to the said arm. The said thread nipper and controller is provided at its forward or free end with a hook 97, arranged to pass beneath the needle-hole 98 in the throat-plate. When the machine is stopped, after the threads have been severed by the knives 61 62 the parts occupy the positions shown in Fig. 11, with the hook 97 beyond the needle-hole 98. When the machine is started for the next succeeding stitching operation, the cam portion 372, which is opposite the pin or roller stud at the upper end of the lever 70 when the machine is stopped, will im-

part a sufficient movement to said lever to cause a partial rotation of the sector-gear 63, so as to move the knives or cutters 61 62 and the thread nipper and controller 92 backward from the positions shown in Fig. 11 to the positions shown in Fig. 10. This movement of the parts referred to occurs during the formation of the first stitch of the new group of stitches to be formed, but after the needle has descended for said first stitch and carried its thread beneath the throat-plate and has again risen above the work, so that the hook 97 is moved so as to intersect or cross the vertical path of the needle as it passes by said needle-hole and is thus caused to catch the end of the needle-thread 99 and draw it backward away from the path of the needle and to nip it against the under side of the throat-plate 93 (see Fig. 10) with sufficient pressure to prevent the said end of needle-thread from being drawn upward when the shuttle enters and expands the needle-loop for the first stitch of the new group of stitches to be formed. The parts remain in the positions shown in Fig. 10 until the portion 373 of the cam-groove 37 will have passed by the pin or roller stud at the upper end of the lever 70 and which will be the time occurring for the formation of the two or three succeeding stitches, and when this has been done the thread cutters and knives and the thread nipper and controller will be moved backward from the positions shown in Fig. 10 to the positions shown in Fig. 9, in readiness for the next succeeding thread-cutting operation.

The needle-bar 13 is preferably provided with a thread-nipping device, which is in principle similar to that of United States Patent No. 702,832, granted June 17, 1902, the present construction consisting of a tension-plate 84, normally springing at its lower or free end away from said needle-bar and engaged by the lower arm of a lever 85, carried by said needle-bar and arranged to be engaged above its pivot or fulcrum by an arm 86 at the forward end of a sliding rod 87, having near its rear end a collar 88, engaged by the lower arm of a bell-crank lever 89, the upper arm of which is yieldingly forced against the periphery of the cam-wheel 35 by a spring 90, coiled about the pivot of said lever. The stress of the said spring 90 is exerted through the lever 89, collar 88, rod 87, and arm 86 on the thread-nipping lever 85 when not restrained by the full peripheral portion of the cam-wheel 35, and the said cam-wheel has one or more notches 91 in its periphery so arranged that when the machine is about to be stopped the bell-crank lever 89 will be free to be so moved by the spring 90 as to force the sliding rod 87 forward, and thus cause the thread-nipping plate 84 to grip the needle-thread.

The cam-wheel 35 of the present machine

is of such construction as to be suitable to impart the proper movements to the work-holder for a machine for attaching flat buttons to garments either by plain or by crossing overlying stitches. For forming crossing stitches the cam-grooves 36 and 38 of the cam-wheel herein shown are made with a proper number of acting parts to make a desired number of stitches to sew on a button and then stop the machine during each half-revolution of the cam-wheel, and the stop-motion tripping cams or projections are likewise duplicated, as are also the acting parts of the cutter-operating cam-groove 37 and the thread-nipper cams or depressions. As the work-clamp or work-holder has diagonal movements imparted to it in making crossing stitches in sewing on flat buttons, the cams for moving the work-holder both lengthwise and crosswise of the machine are timed to act simultaneously, so that the resulting horizontal movements of the work-holder will be diagonal; but if it be desired to use the machine for making a single set of button-attaching stitches, as in sewing on a flat button, having only two holes or having a bar across which the stitches are to be laid, the movements of the work-holder lengthwise of the machine may be suspended by moving the contact-block 59 to the upper end of the lower arm of the lever 58, where it will be secured in a position coincident with the fulcrum of said lever, thus rendering the movements of the latter idle, and the lever 39 will then, through the connections hereinbefore described, simply reciprocate the forward end of the work-holder back and forth transversely of the machine to make a single set of button-attaching stitches or to make a plain bar of overlying stitches.

While the machine herein illustrated is shown as being equipped with a button-holding work-clamp or presser-foot and with a cam-wheel constructed for moving the work so as to make a proper number of stitches suitably disposed for sewing on buttons with either crossing or plain stitches, or, as just stated, for making a plain bar, the improved machine may also be adapted for making different forms of bars or tacks, with either plain or crossing stitches, or for performing other work requiring groups of a predetermined number of stitches, simply by the use of interchangeable cam-wheels having different forms of cam-grooves or cam-tracks, as will be understood.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine and adjacent to the point of descent of the needle, of a sector-gear by which the said thread-cutting device is carried, a rack meshing with said sector-gear, a stop-motion device, and means

for positively connecting said rack with said stop-motion device to actuate the said thread-cutting device.

2. In a two-thread sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine, and comprising two cutting parts or knives, of a sector-gear by which the said thread-cutting device is carried, a rack meshing with said sector-gear, a stop-motion device, and means for positively connecting said rack with said stop-motion device to actuate said thread-cutting device.

3. In a two-thread sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine, and comprising two cutting parts or knives, of a sector-gear by which the said thread-cutting device is carried, a rack meshing with said sector-gear, a sliding bar by which said rack is carried, a stop-motion device, and means for positively connecting said sliding bar with said stop-motion device.

4. In a two-thread sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine, and comprising two cutting parts or knives, of a sector-gear by which the said thread-cutting device is carried, a rack meshing with said sector-gear, a sliding bar by which said rack is carried, a stop-motion device, and means for positively connecting said sliding bar with said stop-motion device, said means comprising a cam, a lever 70 operated by said cam and operatively connected to said sliding bar, a stop-motion lever having a depending arm and an intermediate lever having a spring-pressed pin and by which intermediate lever and pin said arm may be coupled with said sliding bar.

5. In a two-thread sewing-machine, the combination with a two-stage movement thread-cutting device located beneath the work-plate of the machine, and comprising two cutting parts or knives, of a sector-gear by which the said thread-cutting device is carried, a rack meshing with said sector-gear, a stop-motion device, and means for operating said rack to actuate said thread-cutting device, said means comprising a cam and connections to said rack whereby a two-step thread-engaging movement will be imparted to the said thread-cutting device, and a stop-motion device and positive connections between said stop-motion device and said rack, whereby a final or thread-severing movement will be imparted to the said thread-cutting device.

6. In a sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine and adjacent to the point of descent of the needle, of a thread-nipping device one element of which is movable with said thread-cutting device and adapted to engage and nip the needle-

thread, the movable element of said thread-nipping device comprising a curved spring-plate bearing against the under side of said work-plate and provided with a hook for drawing the severed end of needle-thread away from the path of the needle and into thread-nipping position when the thread-cutting device is retracted, and means for operating said thread-cutting and thread-nipping devices.

7. In a sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine and adjacent to the point of descent of the needle, of a thread-nipping device comprising a spring-plate bearing against the under side of said work-plate, and operating means whereby the said thread-nipping plate is caused to engage said needle-thread and nip the same beneath the work-plate during the formation of the first stitch made subsequent to the thread-severing operation.

8. In a sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine and adjacent to the point of descent of the needle, of a thread-nipping device comprising a spring-plate bearing against the under side of the said work-plate, and operating means whereby the said thread-nipping plate is caused to engage said needle-thread and nip the same beneath the work-plate during the formation of the first stitch made subsequent to the thread-severing operation, a portion of the said thread-nipping plate being arranged to intersect the vertical path of the needle in its movements and said plate being operated so as to hold said thread for two or three stitches and then release it.

9. In a sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine, and compris-

ing two knives or cutters one of which is arranged forward of the other, and each having a thread-engaging finger, the finger of the rear knife or cutter extending beyond the outer edge of the finger of the forward knife or cutter, of a two-stage operating mechanism for the said cutters comprising means for imparting a two-step movement during the first stage, so as first to bring a finger of one of the cutters into engagement with one thread to be severed at one stitch, and subsequently to bring a finger of the other cutter into engagement with the other thread to be severed at the next stitch, and means for imparting the second stage or thread-severing movement to the said cutters.

10. In a sewing-machine, the combination with a thread-cutting device located beneath the work-plate of the machine, and comprising two knives or cutters one of which is arranged forward of the other, and each having a thread-engaging finger, the finger of the rear knife or cutter extending beyond the outer edge of the finger of the forward knife or cutter, of a two-stage operating mechanism for the said cutters comprising a cam and connections for imparting a two-step movement during the first stage, so as first to bring a finger of one of the cutters into engagement with one thread to be severed at one stitch, and subsequently to bring a finger of the other cutter into engagement with the other thread to be severed at the next stitch, and a stop-motion device and connections for imparting the second stage or thread-severing movement to the said cutters.

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

CHARLES M. HORTON.

Witnesses:

HENRY J. MILLER,
HENRY A. KORNEMANN.