No. 672,022. Patented Apr. 16, 1901.

W. T. THOMSON & W. E. GOODYEAR.

MACHINE FOR SEWING BUTTONS ONTO GARMENTS, &c.

(No Model.) (Application filed Aug. 16, 1898.)

7 Sheets—Sheet 1.

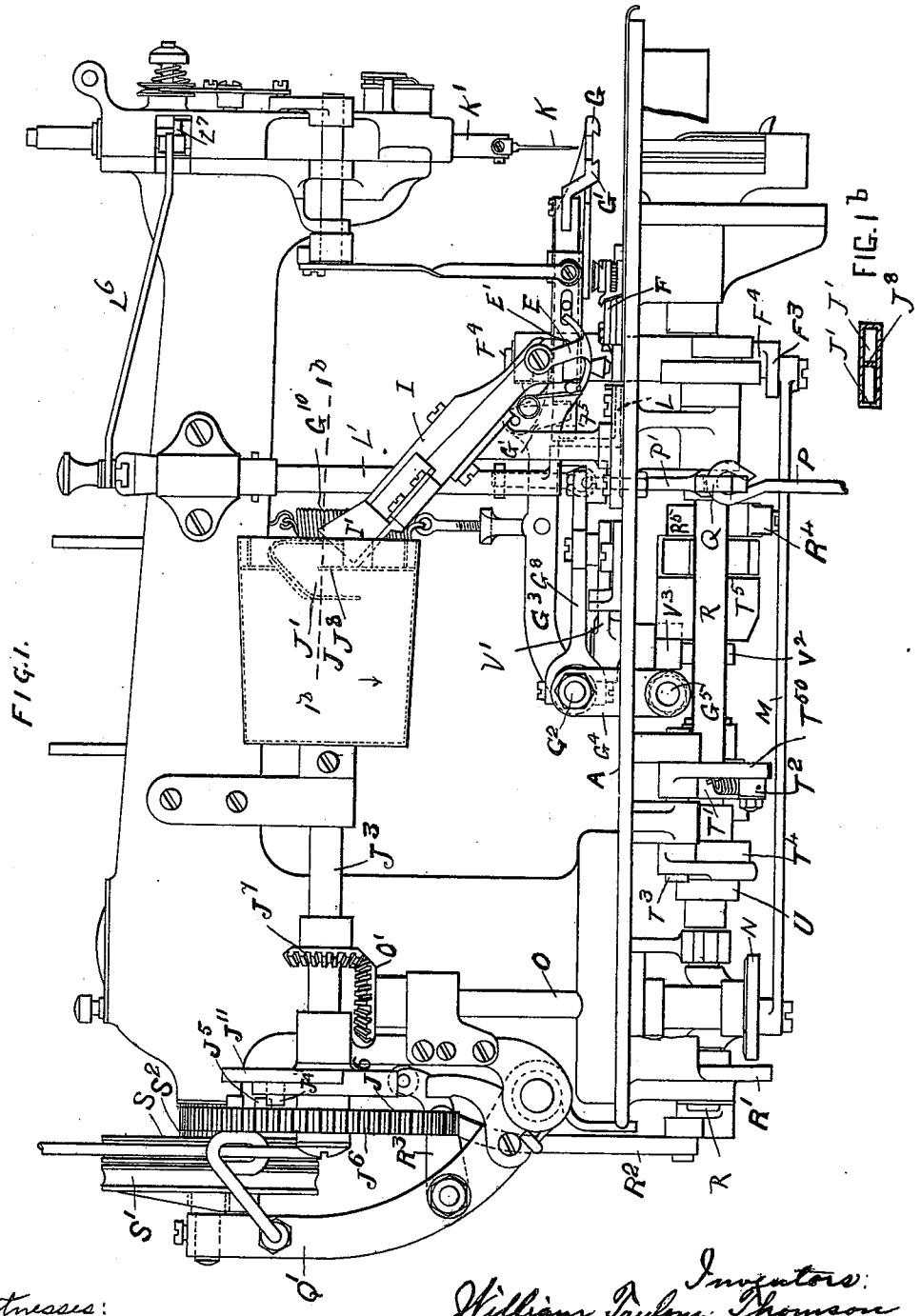


FIG. 1.

FIG. 1b

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FIG. 1a.

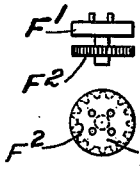


FIG. 2a.

FIG. 7a.

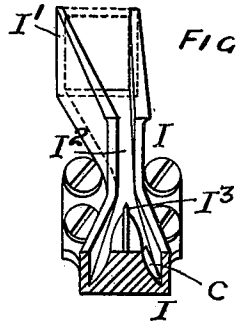
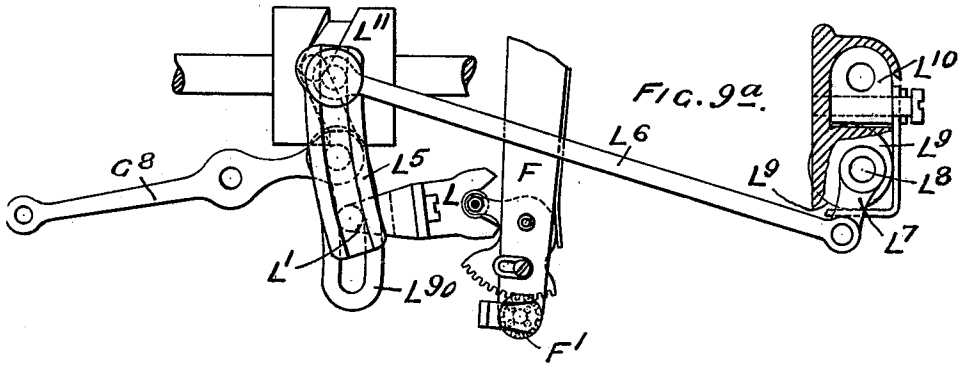


FIG. 9a.



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7 Sheets—Sheet 3.

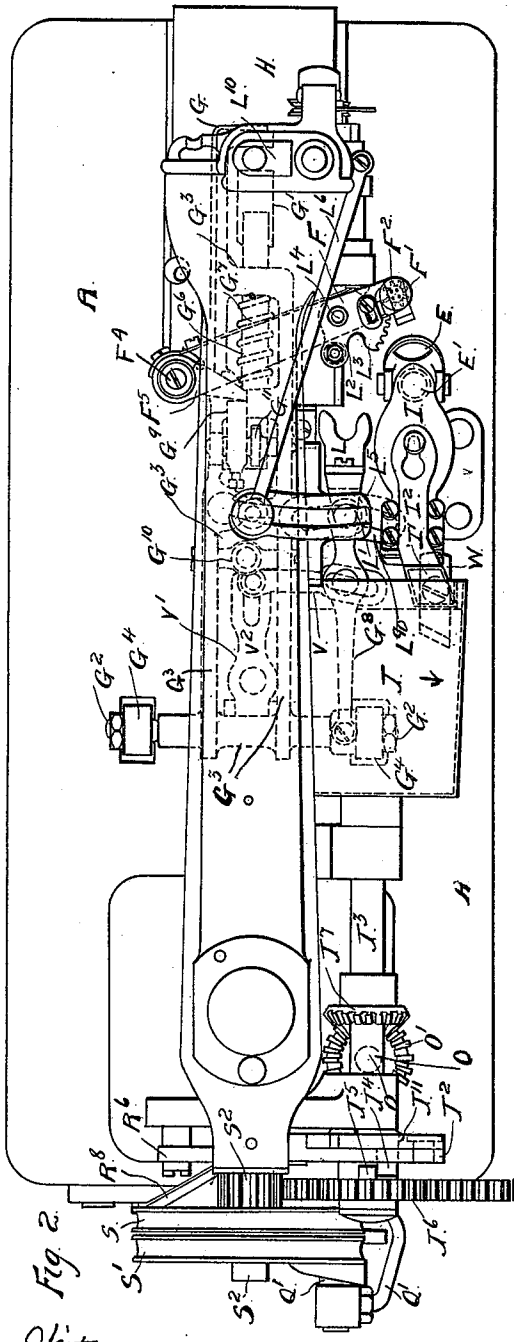


Fig. 2.

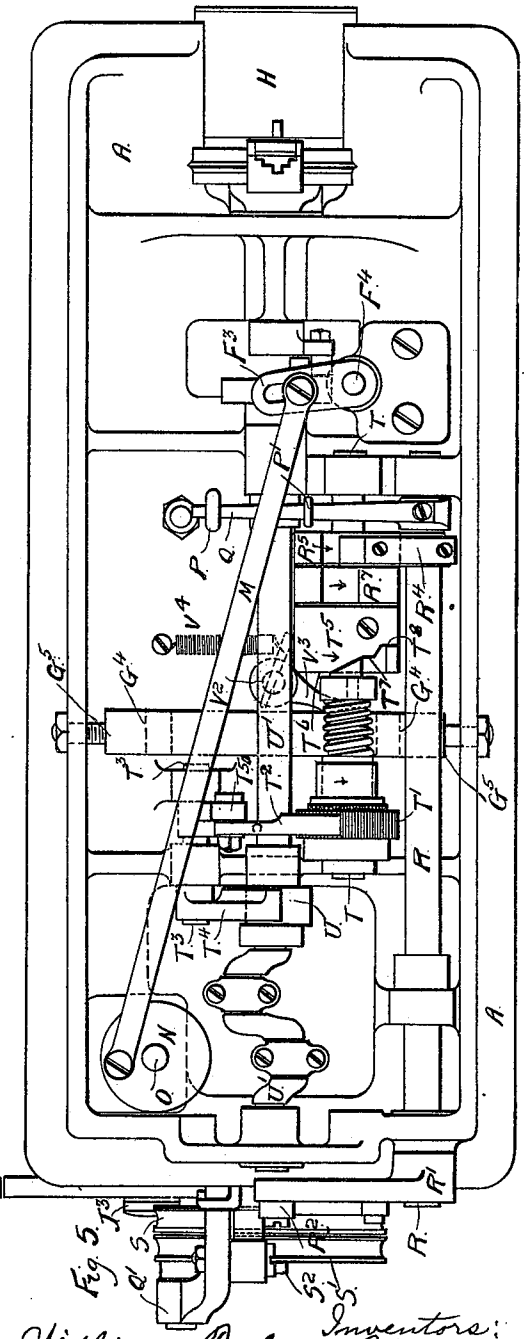


Fig. 5.

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Fig. 4.

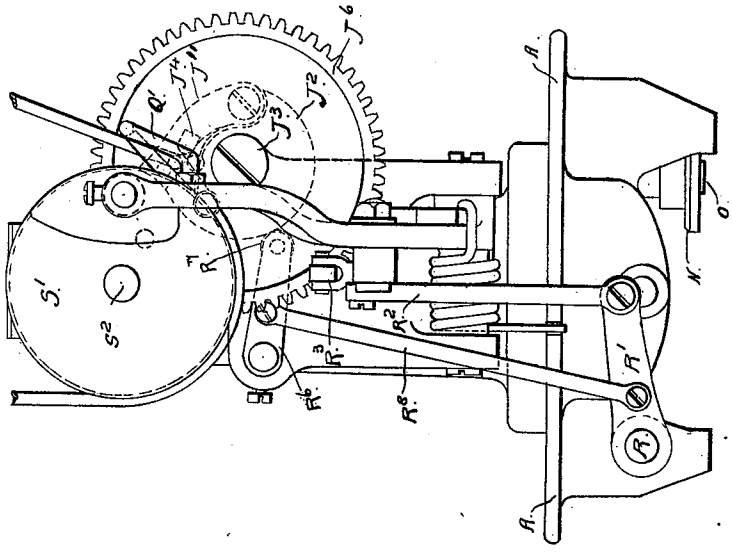
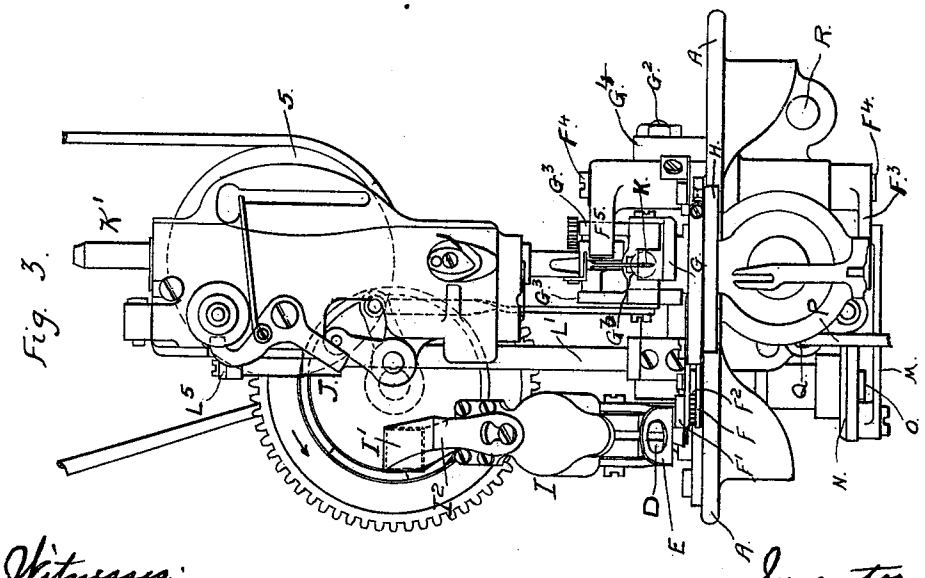


Fig. 3.



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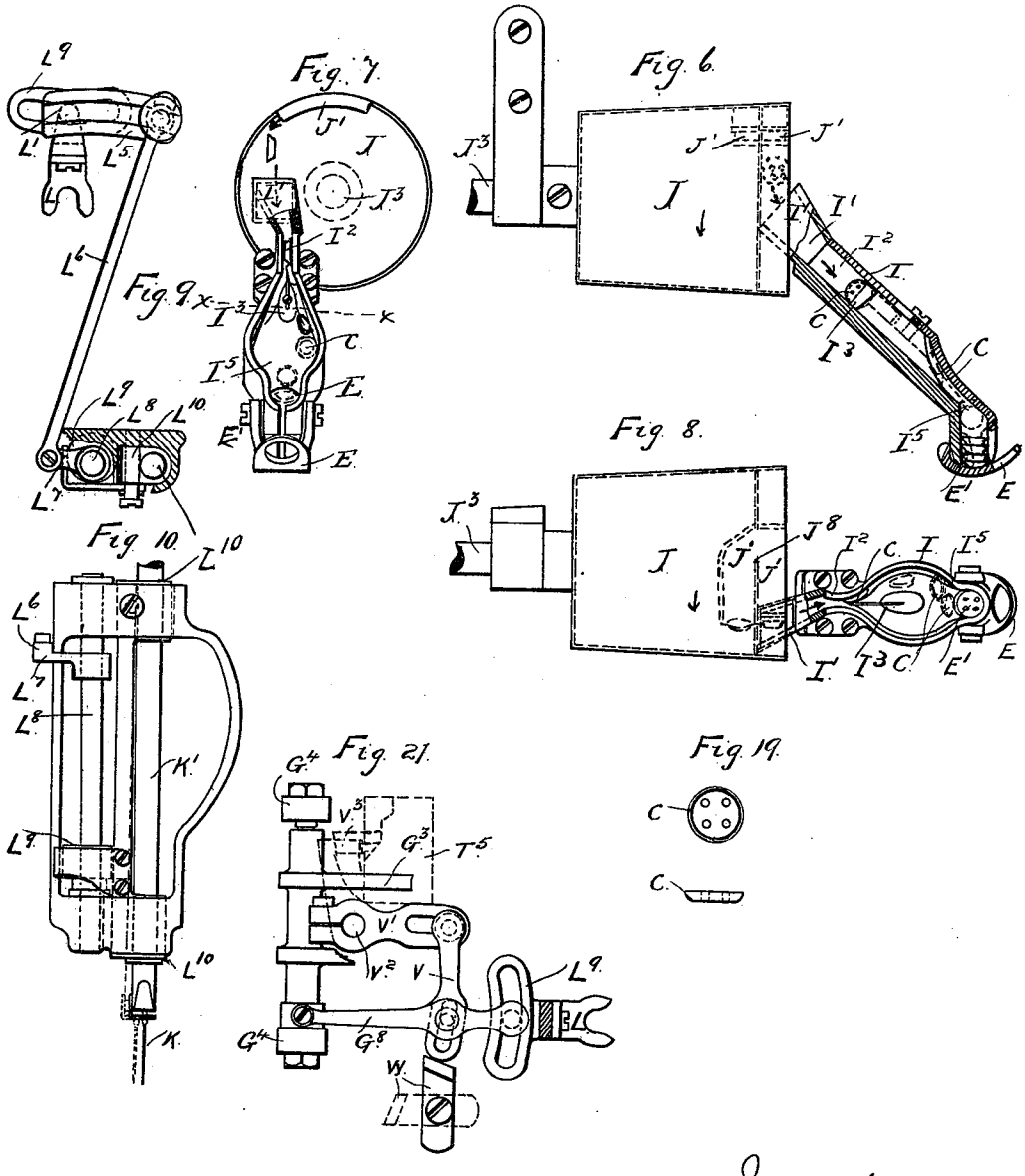
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MACHINE FOR SEWING BUTTONS ONTO GARMENTS, &c.

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7 Sheets—Sheet 6.

FIG. 8a.

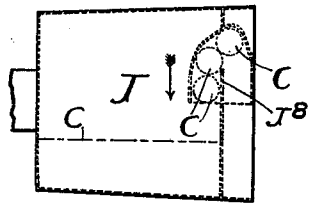
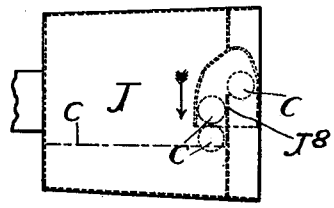


FIG. 8b



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MACHINE FOR SEWING BUTTONS ONTO GARMENTS, &c.

(No Model.) (Application filed Aug. 16, 1898.) 7 Sheets—Sheet 7.

Fig. 15.

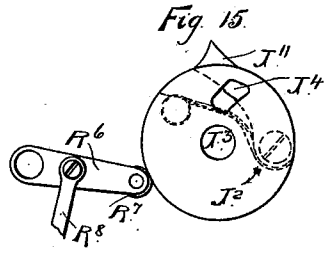


Fig. 16.

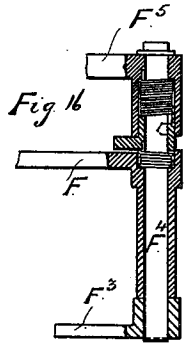


Fig. 11.

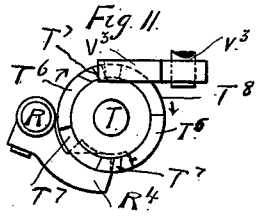


Fig. 12.

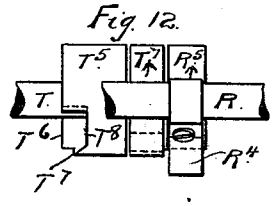


Fig. 13.

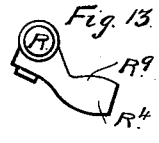


Fig. 14.

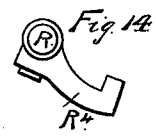


Fig. 18.

Fig. 17.

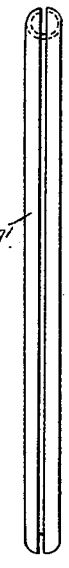


Fig. 20.

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UNITED STATES PATENT OFFICE.

WILLIAM TAYLOUR THOMSON AND WILLIAM EDWARD GOODYEAR, OF GLASGOW, SCOTLAND.

MACHINE FOR SEWING BUTTONS ONTO GARMENTS, &c.

SPECIFICATION forming part of Letters Patent No. 672,022, dated April 16, 1901.

Application filed August 16, 1898. Serial No. 688,720. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM TAYLOUR THOMSON and WILLIAM EDWARD GOODYEAR, citizens of the United Kingdom of Great Britain and Ireland, and residents of 124 Queen street, in the city of Glasgow, Scotland, have invented new and useful Improvements in Machines for Sewing Buttons onto Garments or Fabrics, (which have been patented in Great Britain by Letters Patent dated the 7th day of July, 1898, No. 14,937,) of which the following is a specification.

This invention relates to sewing-machines for sewing buttons onto garments or fabrics; and it has for its object to provide a machine of that class in which the buttons shall be automatically delivered, picked up singly, and clamped in such a position over the fabric that in the sewing operation the sewing-needle, which has a cross-stitching movement, may freely enter the thread-holes in the button.

The improved sewing-machine is so designed that upon completion of the operation of sewing on the button the stitching mechanism is automatically thrown out of action and motion is imparted to the devices for delivering, picking up, and clamping the button in position for the next sewing operation.

The invention further comprises improvements in various parts of details of mechanism applicable to this class of machine and hereinafter described.

The invention is illustrated by the accompanying drawings.

Figure 1 is a side elevation, Fig. 2 a plan, Figs. 3 and 4 front end and back end elevations, respectively, and Fig. 5 an inverted plan, of the improved sewing-machine. Fig. 1^b is a section of passage J′ on line 1^b 1^b of Fig. 1. Figs. 8^a and 8^b are side views of the casing. Fig. 6 is a side elevation, partly in section, of the button-delivering device; and Figs. 7 and 8 front elevation and plan, respectively, of the same with the cover of the button-race removed. Fig. 9 is a plan, and Fig. 10 an elevation, of the mechanism for imparting the cross-stitch to the needle. Figs. 11 and 12 are end and side elevations, respectively, of the cam, which effects the reversal of the motion of the needle and of the cam, which by the action on it of a pawl stops the sewing operation. Figs. 13 and 14 are detail views of two forms of the pawl for engaging the locking-cam and used in the machine according as the button has four or only two thread-holes. Fig. 15 is an end elevation of the devices for effecting the engagement and disengagement of the button feeding and delivering devices. Fig. 16 is a vertical section of the parts comprising the button-delivering arm and clamp-freeing device. Fig. 17 is a front elevation, and Fig. 18 a vertical section, of a modified form of button-race intended for use with flat-sided buttons. Fig. 19 shows, on a larger scale, a button having a convex back; and Fig. 20, a flat disk-shaped button. Fig. 21 shows the parts of the mechanism for effecting the longitudinal stitching in the position in which these parts are secured when buttons having only two holes are to be sewed. Fig. 7^a is a vertical transverse section of Fig. 7 on the line x x, showing the formation of the bottom of casing I. Figs. 1^a and 2^a are respectively elevation and plan of the button-carrying disk removed from its carrying-arm. Fig. 9^a is a plan somewhat similar to Fig. 9, but showing the parts in a slightly-different position and in conjunction with other dependent parts.

The improved sewing-machine may be of the Wheeler & Wilson or other type in which a cross-stitching movement is imparted to the needle or to the fabric under it, the improvements being in the main added thereto.

The buttons are supplied through a hopper placed over the bed-plate A. For the delivery of buttons C, having convex backs, as at Fig. 19, such as are commonly sewed onto garments, a delivery-hopper I, supplemental to a cylindrical casing, hereinafter referred to, of special construction is employed to insure delivery of the buttons C with the proper side uppermost. This hopper I is composed of an inclined hollow casing (shown particularly at Figs. 6, 7, and 8,) into the upper end I′ of which the buttons C are preferably fed singly by means of a tapered or cylindrical casing J, in which the buttons are carried. The tapered or cylindrical casing has at its larger or outer end a short passage J′ on the inner curved surface of the casing, construct-

ed, as shown, from various sides at Figs. 1, 2, 3, 6, and 8, so that it will only permit one button at a time to pass into the hopper I, the others which may have entered the inner end of the passage J′ being thrown back by the continued rotation of the cylinder J, because of the peculiar formation of the passage J′, which is divided by a web J^8 and turns back upon itself, so that the inlet-mouth and the delivery-mouth both open in the same direction. As shown by the dotted lines, Fig. 8^a, some of the buttons have been carried by the rotation of the casing J into the passage J′, and one of them—*i. e.*, the second lowest button—rests partly upon the upper end of the division-web J^8, partly against the side of the passage J′ and partly against the lowest button, in such wise that it has no tendency to force the lowest button into the delivery end, but when, owing to the rotation of the casing J, the passage J′ arrives in the position shown at Fig. 8^b the direction in which the weight of the buttons acts is reversed, and these, because of their centers being on either side of the web J^8, pass down that portion of the passage J′ over which their centers lie. The lowest button thus passes to the delivery end of the passage J′ at the moment the other buttons are caused to fall backward into the casing J, as none of the latter have their centers beyond the end of the web J^8. The end I′ of the hopper I is funnel-shaped or formed with a contracted neck or narrow passage I^2, adapted to admit only one button on edge as delivered from the passage J′ of the cylindrical casing J. At the lower end of this contracted neck part I^2 the casing widens and is formed with a central fin I^3, expanding and flattening as it descends and which divides the casing I at its mid-part into two separate channels, the object of the fin I^3, which has a forwardly-inclined edge sloping outward and downward from the center of the casing, being to direct the entering button C to either side but with the concave back of the button toward the fin, as shown at Figs. 6, 7, 7^a, and 8. By resting against the fin I^3, in its descent the button entering on edge is gradually laid over on its back and passes out of the widened part of the casing through a flattened tubular part I^5, common to both channels, to the delivery end E′ with the convex back downward or next to the fabric to which it is to be sewed.

Fig. 8^a shows the casing with its inlet and delivery ends on the center line of said casing and about to pass that line (in the direction of the arrow) and discharge its buttons, which are for a portion of the rotation of the casing in a state of rest. Fig. 8^b is a similar view showing the delivery end slightly over the center and on the point of discharging one button from the delivery end and the others back into the casing J. Reference to the position of the buttons in the passage J′, Fig. 8^a, will show that the discharge of all the buttons, excepting that one which entered first, cannot be other than back again in the opposite direction in which they entered the said passage. This result is obtained by the peculiar construction of the passage J′, which is merely a "scoop" compelling a certain number of buttons to enter it as the scoop passes through the mass of buttons in the casing J, the mass of buttons remaining always on the bottom of said casing J. As the centers of the buttons in the position of the casing J (shown in Fig 8^a) are on either side of the web J^8, the buttons on the arrival of the casing J at the discharge-point cannot do otherwise than travel along the passage over which their centers lie. The position of discharge is shown by Figs. 6, 7, and 8, and two positions immediately preceding this by Figs. 8^a and 8^b, the latter showing the beginning of the discharge.

Through the gateway E′ at the lower end of the hopper I the button is delivered to the button-carrier F, which is formed by a horizontally-swinging lever whose end carries a rotating or oscillating disk F′, having two or more upwardly-projecting prongs. These prongs are adapted to enter the holes formed in the button C, and in order to insure that the prongs may enter the holes in the button, so as to properly position it when engaged by the button-clamp, the disk F′ is rotated or oscillated while it remains under the delivery orifice or gateway E′ of the hopper, but is brought to rest with the buttonholes in the proper position as the carrier F is swung around toward the button-clamp under the needle K in the needle-bar K′. Rotation or oscillation of the pronged disk F′ is effected by means of suitable gearing from any convenient rotating shaft or other moving part of the sewing-machine mechanism, such as the fork L on the shaft L′, engaging an arm L^2 on a toothed quadrant L^3, centered at L^4, which in turn engages a pinion F^2, on the center of which the pronged disk F′ is secured, the shaft L′ being oscillated by means of a quadrant L^5 at its upper end actuated by a cam in the machine-arm. This cam may be of any ordinary form employed to effect the cross-stitching movement in button-sewing, overseaming, and similar machines and acts through the quadrant L^5 and a connecting-rod L^6 on a crank-arm L^7 on a vertical shaft L^8, upon which an eccentric L^9 is keyed, which imparts motion to the lower of the bearings L^{10} of the needle-bar K′.

The swinging button-carrier F, which is operated through a suitable lever, such as F^3, keyed upon the vertical spindle F^4, to which the carrier F is attached, and a connecting-rod M from a crank or eccentric N on a shaft O, brought into operation only when the sewing mechanism is stopped, delivers the button into the jaws G G′ of the button-clamp, the frame G^3 of which is carried on centers G^2 by crank-arms G^4, extending from a rocking shaft G^5, so as to be capable of rising slightly

above the fabric and of being pressed down onto the latter. The clamp-jaws G G′ are capable of adjustment to bring buttons of varying sizes centrally under the needle. One jaw, G, of the clamp is fixed to its carrying-frame G^3, and the other, G′, is secured to a sliding rod G^6 in the swinging frame, which rod is pressed forward by a spring G^7, so that the button is held between the jaws G G′ in grooves formed therein.

The frame G^3 has a movement longitudinally of the bed-plate A synchronously with the stitching, which latter takes place transversely to the direction of motion of the frame G^3, the motion being communicated to the frame through a connecting-rod G^8, which engages it at its center G^2, while the other end of the rod G^8 engages a slotted quadrant L^{90} on the vertical shaft L′, receiving its motion from the cam before mentioned situated in the arm of the machine, which effects the cross-stitching motion of the needle-bar K′, so that the combination of these two motions produces a stitch diagonal to the path of the needle, to the path of the button-clamp, and to the bed-plate of the machine. The other stitch which is to cross the first stitch at right angles is obtained by the same combination of motions, the rod G^8 being first traversed to the other end of the slotted quadrant L^{90} in the same manner as the reversal of the links in valve-gear. This reversal of the rod G^8 is effected by a link V, connected to the rod G^8 and to a lever V′ on a vertical shaft V^2, on the lower end of which a kicker or pawl V^3 is secured, which engages a face-cam T^5 on a shaft T, and this kicker V^3, according to the depth of the notch which it engages on the cam T^5, brings the rod G^8 to either end of the slotted quadrant or to the mid-position, the latter position being attained only at the end of the sewing operation immediately before the new button is carried from the hopper to the clamp.

When the sewing operation is taking place through any one pair of diagonally-situated holes, the kicker V^3 is riding upon either of the high portions T^6 of the cam T^5, said cam T^5 being rotated in the direction shown by the arrows, Figs. 5, 11, and 12, by means hereinafter described. On the completion of the sewing of any one pair of holes the cam T^5 has brought the end of the high part T^6 into such a position that the kicker V^3 drops to the step T^8, which is of the lowest depth, and the rod G^8 is by means of the lever V′ and link V carried to the opposite end of the slotted link L^9, which end is at that instant in the exact position occupied by the other end immediately previous. The transference of the end of the rod G^8 to the opposite end of the slotted link L^9 is instantaneous, so that the button-clamp frame G^3, which during the transference has moved half the distance between the holes, has returned to its original position before the needle just withdrawn from one of the holes of the button again descends, the descent being accordingly through a hole not in this instance diagonally opposite to that last entered, but through a hole in the path of its own movement. The needle now because of the combined motion of the clamp-frame G^3 and needle-bar sews through the other pair of diagonally-situated holes, beginning with this hole, which if the initial stitch of the previous sewing was made through one of the holes at that side farthest from the operator will be at the side nearest the operator, so that a diagonal line is now being sewed from instead of, as formerly, toward the operator. At the end of the sewing of these holes a stop-lever R^4 drops into a notch in its cam R^5, as hereinafter described, and by means of its inclined edge R^9 turns said cam quickly, so as to raise the kicker V^3 onto the step T^7 of medium depth, and thus instantaneously bring the rod G^8 to the mid-position.

As the swinging button-carrier F delivers the button C into the jaws G G′ a catch-lever F^5, Figs. 1, 2, 3, and 16, secured by a spring to the vertical spindle F^4 and operated by its movement, slips clear of a pivoted tumbler G^9 and lets free the clamp-frame G^3, which is drawn upward by a spring G^{10}, the tumbler having a lower arm G^{11}, which acts to hold back the rod G^6 and at the same time as the clamp-frame is released allows the sliding rod G^6 to spring forward and clamp the button, the clamp thereafter lifting the button off the prongs on the carrier F, which is then free to be carried by the continued action of the crank-disk N, rod M, and lever F^3 back into its position under the gateway E′ of the hopper I, containing the buttons C, where by pressing aside the sliding gate E it receives a fresh button. The garment or fabric being placed in position on the needle-plate H, the button-clamp is depressed by means of a treadle and connecting-links P P′ and lever Q, the link P′ being connected to the clamp-frame G^3, and the clamp is there held during the stitching operation. The depression of the treadle and lever Q, which is situated on a shaft R, also effects the starting of the sewing mechanism by withdrawing a brake or catch lever Q′, Figs. 1, 2, 4, and 5, which also acts as a belt-shifter, from a notch in the driving-pulley S′, which is fast on the main shaft S^2. The withdrawing of the catch-lever Q is effected by means of mechanism, such as a lever R′ on the back end of the shaft R, a connecting-rod R^2, attached to said lever R′, and a guide-lever R^3, attached to the rod R^2, this withdrawing action also serving to transfer the belt X from the loose or button-feeding pulley S to the fast or driving pulley S′. The same action of the treadle further serves to withdraw a stop-lever R^4 from engagement with a notch in a drum R^5 (of which there may be an interchangeable series) on a slowly rotated shaft T, Figs. 1, 5, 11, and 12, operated through a ratchet-wheel T′ on said shaft, which is actuated by a pawl T^2 on the crank-arm T^6 of a rocking shaft T^3, in turn actu-

ated by means of a fork T^4 from an eccentric U on the shuttle-driving shaft U′, and while the said stop-lever R^4 rests on the periphery of the rotating drum R^5 the belt-shifter and other parts are maintained in such a position that the main shaft S^2 of the sewing-machine continues in operation and the button-clamp presses down upon the fabric. The motion of the needle is transverse to the direction of the axis of the main driving-shaft of the machine and to the button-clamp. When by the rotation of the drum R^5 the notch or a separate notch in it is reached, the stop-lever R^4 drops therein, and by the consequent turning movement of the shaft R, carrying the stop-lever R^4, (due to the action of the incline portion R^9, Figs. 11 and 13, of the stop-lever R^4 on the notch of the drum R^5,) and the consequent movement of the connecting-levers R′, R^3, and R^2, the brake or stop lever R^4 comes into position to stop the sewing operation, and the belt is transferred to the button-feeding pulley S. The button-clamp, because of the catch-lever F^5, by the turning of the spindle F^4 being now freed from the tumbler G^9, is simultaneously drawn upward by the action of the spring G^{10}. The position or number of notches in the drum R^5 or drums and the speed at which the drum-shaft T is fed thus determine the length of time during which the sewing may proceed or the number of stitches to be put through the button.

Upon the stopping of the sewing operation the engagement of the button-feeding devices takes place by the action of a lever R^6, carrying a roller R^7 at its free end and connected by a rod R^8 to the lever R′, which lever R^6 by passing clear of a spring-arm J^{11}, pivoted on a disk J^2, keyed on the shaft J^3, carrying the tapered cylinder J, allows the arm J′ to spring outward to the position shown at Figs. 1, 2, 4, and 15, said arm J′ having upon it a pin J^4 or clutch, which is thus permitted to engage a stud J^5 on a pinion J^6, loose on the shaft J^3, which pinion is permanently in gear with a pinion S^2 on the loose driving-pulley S. The shaft J^3 has keyed upon it a bevel-wheel J^7, which gears with a bevel-wheel O′ on the upper end of the vertical shaft O, on which the disk N is keyed, so that when the rotation of the shaft J^3 is effected by the engagement of the devices above described a button is fed into the lower end of the hopper I to take the place of the button being delivered to the clamping-jaws G G′ through the intervention of the shaft O, the disk N, the link M, and lever F^3 under the bed-plate A, which latter lever operates the swinging button-carrier F and also effects the releasing of the clamp-frame G^3 in the manner already described, whereby the button last delivered from the hopper and held by the pronged disk on the button-carrier is transferred to the clamping-jaws and raised clear of the pronged disk F′.

When a button has been fed into the hopper, it rests upon the pivoted gate E, whence it is collected and delivered to the jaws in the following manner: When the button-carrier F, by the operation of the spindle F^4 through the mechanism connected therewith, is brought under the delivery end of the hopper I, it first pushes aside the pivoted gate E. While in this position the pivoted disk is oscillated about its center by the mechanism already described in order to cause the prongs to come opposite the holes in the button, the button being thereafter brought between the clamping-jaws G G′, the spring-gate again closing immediately after the carrier F has been withdrawn from beneath the hopper. The clamping-jaws immediately catch and remove the button from the pronged disk, the first step being performed by the forward motion of the jaw G′, due to the action of the spring G^7 on the rod G^6, and the latter by the upward motion of the frame G^3 under the action of the spring G^{10} on the release of the tumbler G^9 from the catch-lever F^5.

The machine may be adjusted so as to sew onto the fabric either four-holed buttons or buttons having only two holes. When adjusted to sew buttons having four holes, the stop-lever R^4 (illustrated at Fig. 13) is used, this stop-lever engaging the drum R^5; but when the buttons to be sewed onto the fabric have two holes only the stop-lever is of the form shown at Fig. 14 and it is slid along the shaft R, so as to be opposite to and engage with a notched drum R^7 adjoining the drum R^5. In this latter case it is also necessary to throw the kicker V^3 out of engagement with the cam T^5 and bring the lever G^8 to the mid-position, so that the clamp-frame G^3 will receive no motion, this being effected by the aid of a stop-piece W, pivoted on the bed-plate, as shown at Fig. 21.

Instead of making the previously-described adjustment in order to adapt the machine for sewing on buttons having two holes only the connecting-rod L^6 may be moved along the quadrant L^5 until the center of said rod coincides with the center of the vertical shaft L′. By this adjustment the bearings of the needle-bar receive no motion and the frame G^3 having the movement previously described imparted to it the two thread-holes of the button are brought alternately under the needle as it rises and falls.

Having now described the invention, what we claim, and desire to secure by Letters Patent, is—

1. In a machine for sewing buttons onto fabrics, a device for automatically discharging a single button at a time, said device consisting of a periodically-rotated receptacle for holding the buttons, an outlet-passage at one end of said receptacle, said passage being of approximately U shape and extending partly around the circumference of the receptacle and with its open end in the direction of rotation, the inner end of said passage acting as a scoop to lift the button and the outer end to deliver said buttons, and a central dividing-web extending inward from the open

end of the U-shaped passage, substantially as described.

2. In a machine for sewing buttons onto fabrics, the combination with a periodically-rotated button-holder having a U-shaped passage, a hopper to which said U-shaped passage delivers the buttons one at a time, a hinged gate at the lower end of said hopper, a pivoted button-carrying lever adapted to press aside said gate, a pronged disk on said lever, means for oscillating said disk to bring the prongs into engagement with the holes in the button, a button-clamp under the sewing-needle to which the buttons are carried one at a time and positioned in said clamp by the pivoted lever, substantially as described.

3. The combination with hopper I having a gateway E at its lower end, a button-carrying lever F below the gateway, a disk on lever F having prongs adapted to enter holes in buttons, pinion F^2 also carried by said lever and connected to said disk, a quadrant L having teeth engaging the pinion for oscillating the pronged disk, lever F^3 for moving lever F, and means for moving lever F^3, as set forth.

4. In a machine for sewing buttons onto fabrics, the combination with a sewing-needle arranged to descend alternately at two different points transversely of the machine bed-plate under the action of an eccentric on a vertical shaft oscillated by a lever thereon and a rod connected to said lever and to a rocking arm, said eccentric acting on a strap secured upon the pivoted frame forming the needle-bar bearings, of a periodically-rotated button-holder, a feed-hopper for receiving the buttons from the holder and for delivering them right side up on a hinged gate at the lower end of said hopper, a pivoted button-carrying lever, a button-clamp with grooved clamping-jaws adapted to receive the button from the pivoted lever and to retain it during the sewing operation, mechanism, such as the lever G^8 secured to the rocking shaft G^2, and to the slotted quadrant L^9 of the rocking shaft L′ for moving said clamp longitudinally of the bed-plate and synchronously with the transversely-moving needle, substantially as described.

5. In a machine for sewing buttons onto fabrics the combination with a needle and co-operating sewing mechanism the main shaft and a fast pulley thereon for operating the sewing mechanism of a loose pulley on said shaft provided with means which operate devices for feeding and transferring the buttons to the button-clamp, a belt and a belt-shifter actuated from a treadle.

In witness whereof we have hereunto set our hands in presence of two witnesses.

WILLIAM TAYLOUR THOMSON.
WILLIAM EDWARD GOODYEAR.

Witnesses:
WALLACE FAIRWEATHER,
JNO. ARMSTRONG, Junr.