Gordon & Gilbert.

Eyeleting Machine.

No. 46660 Patented Mar. 7, 1865.

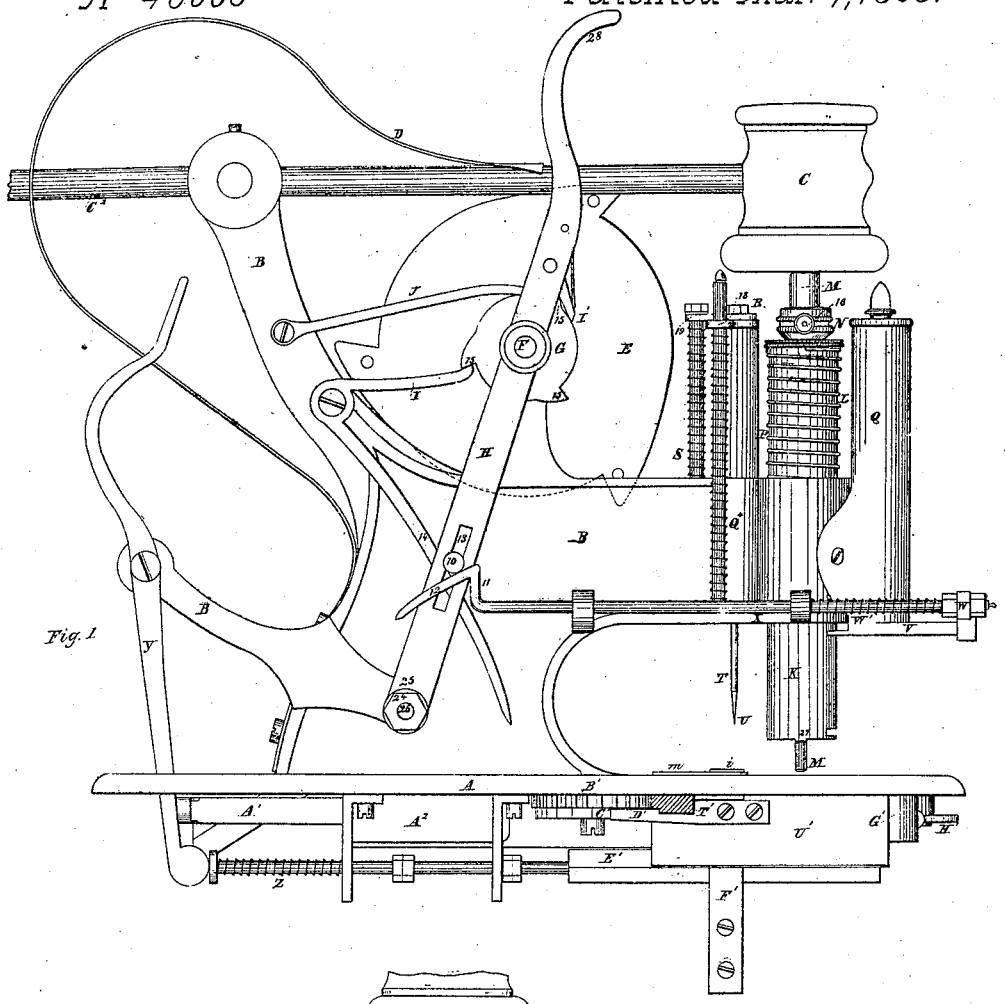

Fig. 1.

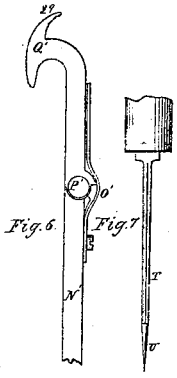

Fig. 6. Fig. 7

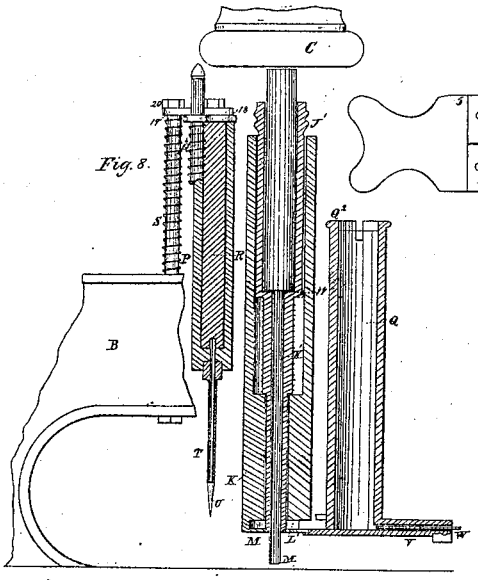

Fig. 8.

Fig. 9

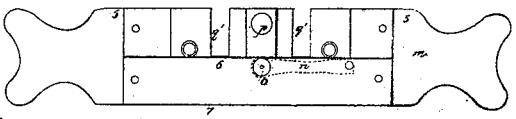

Fig. 10.

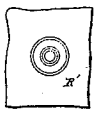

Fig. 11.

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Fig. 2.

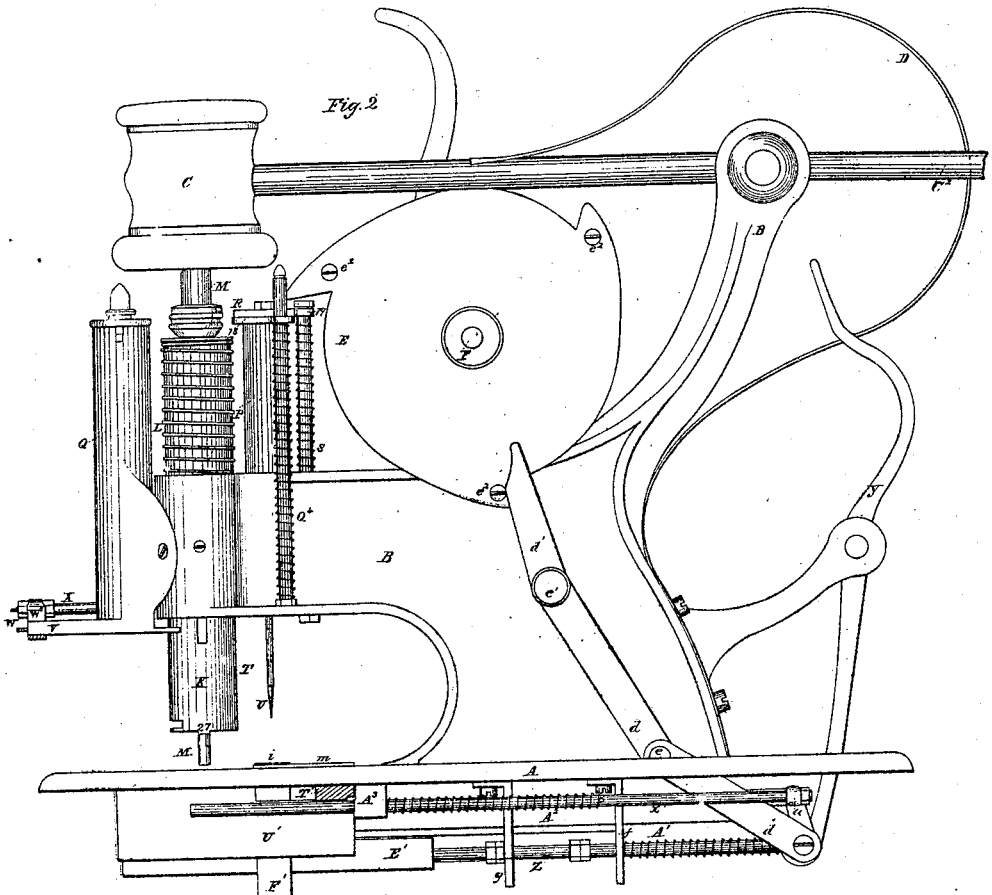

Fig. 5.

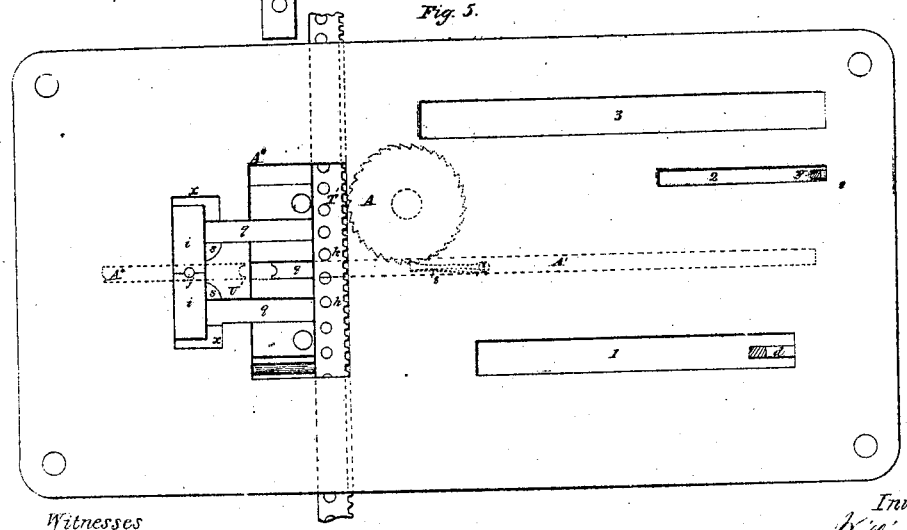

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Fig. 3.

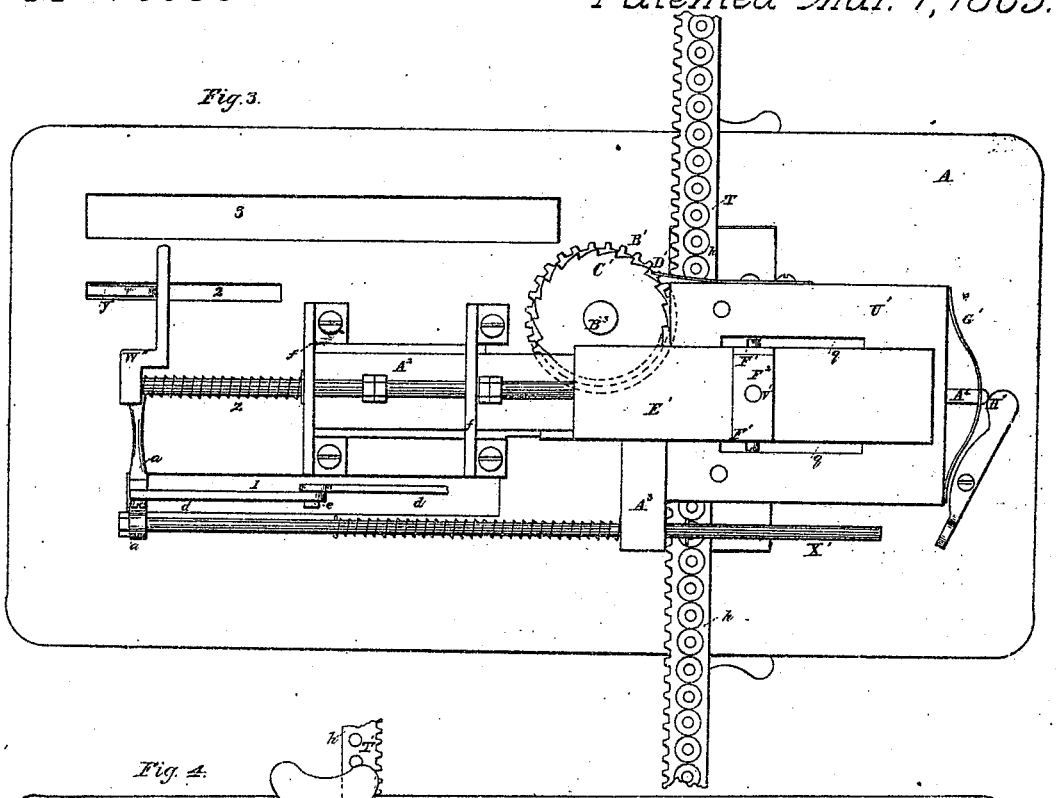
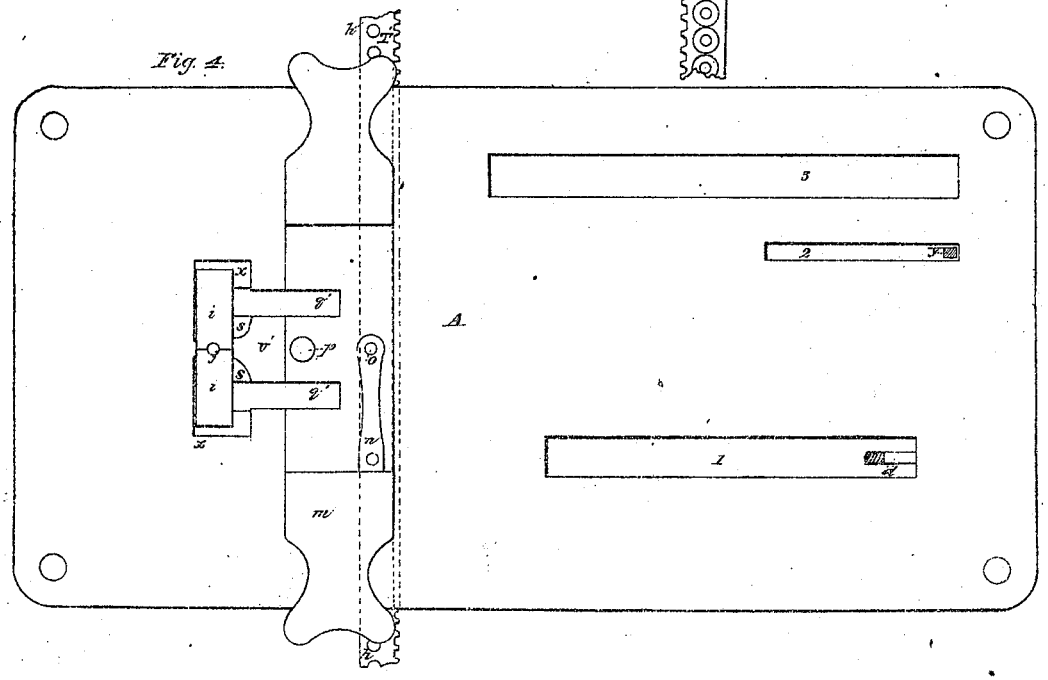


Fig. 4.



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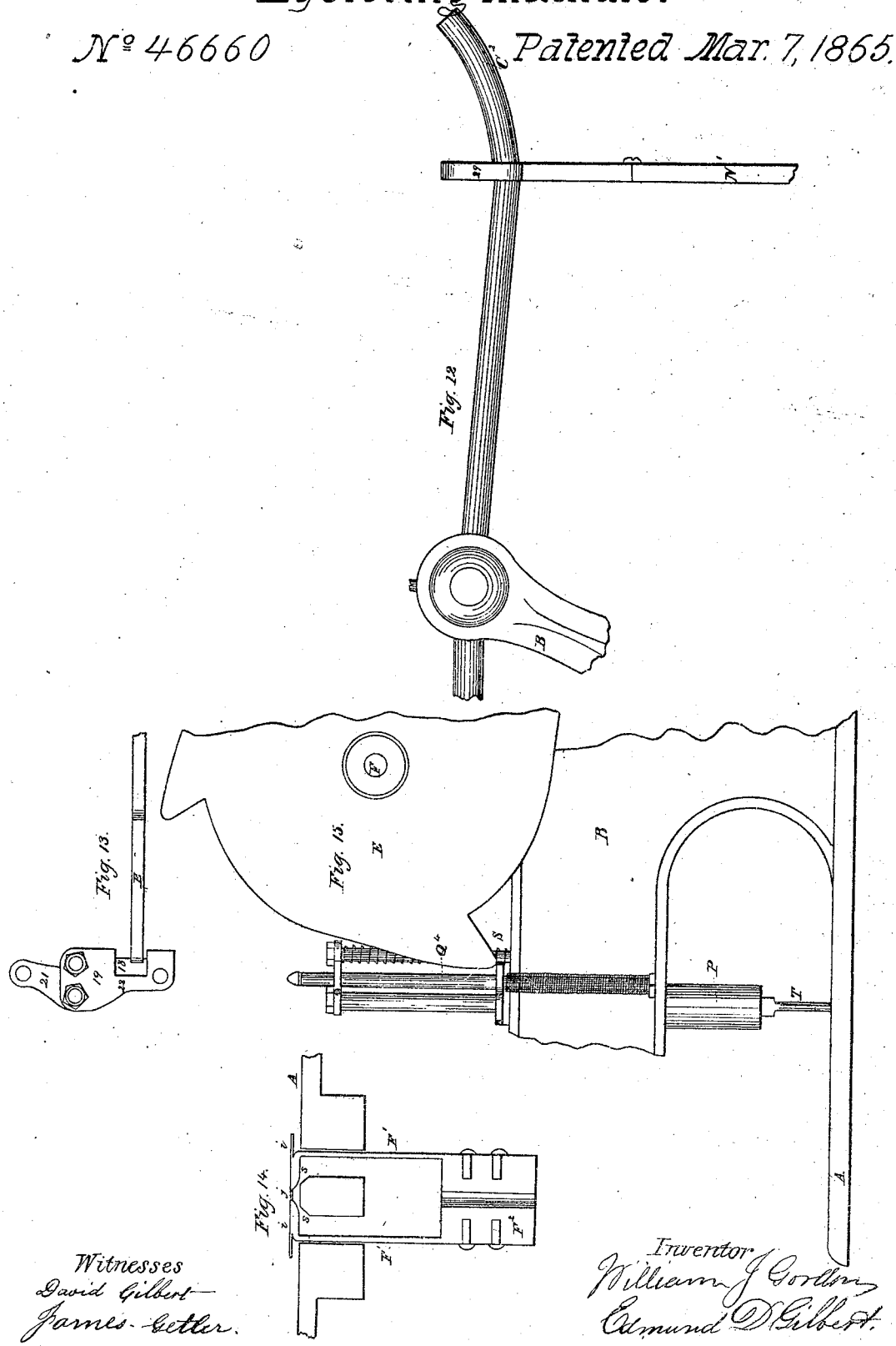

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UNITED STATES PATENT OFFICE.

WILLIAM J. GORDON AND EDMUND D. GILBERT, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR RIVETING BUTTONS ON CLOTH.

Specification forming part of Letters Patent No. **46,660**, dated March 7, 1865.

To all whom it may concern:

Be it known that we, WILLIAM J. GORDON and EDMUND D. GILBERT, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful improvements in machines for riveting buttons upon cloth and other materials and perforating and inserting rivets in the same; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of a machine which contains our improvements as seen from the left-hand side. Fig. 2 is an elevation of the same, as seen from the right-hand side. Fig. 3 is a plan of the same as seen from below. Fig. 4 is a plan of the table of the machine without the parts which are supported upon it, showing the plate *m* in position. Fig. 5 is a like view, the plate *m* being removed. Fig. 6 is a view of a portion of the hooked connecting-rod which works the hammer C. Fig. 7 is a detailed view of the needle and its case. Fig. 8 is a sectional elevation of the hopper and some of the adjacent parts. Fig. 9 is a plan view of the bottom of the plate *m*. Figs. 10 and 11 are detailed views of a button after it has been attached to a piece of cloth and one of the rivets. Figs. 12, 13, 14, and 15 are detailed views of different parts of the machine.

Similar letters of reference indicate like parts.

Our invention consists in the construction and arrangement of certain mechanical devices for riveting buttons to cloth or other material, whereby the cloth is pierced to receive the body of the rivet, and the various movements and operations necessary to feed the rivet and the button and insert the rivet in the cloth and through the center of the button and clinch them together are performed automatically.

The bed-plate A of our machine, which supports the various parts thereof, is to be fixed to a bracket or in a frame, so as not to obstruct the movement of those parts. A supporting-standard, B, rising from the plate A, sustains the various devices which are located above it in the several positions seen in Figs. 1 and 2. The arm of the clinching-hammer C is fixed by a collar and set-screw upon a short shaft, which rotates in bearings in the highest part of the standard B, a shorter arm, C^2, on the same shaft extends in an opposite direction, its end being bent up slighty, as seen in the detailed view given thereof in Fig. 12. A spring, D, bolted to the back of the standard, presses continually downward upon the arm of the hammer. A shaft, F, which has its bearings on the standard in front of the hammer-shaft, carries a cam-plate, E, on one of its ends, whose cams, three in number in this instance, are set at equal distance apart on its periphery. A pin, e^2, is set on the outer surface of each of the three cams, which strikes against the short arm d' of a jointed lever, *d*, which is jointed loosely to the projecting arm of a cross-bar, *a*, which connects the sliding rods X′ and A′. The rod X′ slides in a bearing made for it in the projection A^3 below the bed, and it should have a longitudinal movement sufficient to bring it against the shorter end of a lever, H′, whose longer end strikes against a sliding bar, A^4, which slides in ways made for it in the upper part of the solid block U′ on a line which coincides with that in which the sliding-bar A′ moves, and which passes directly under the needle. The bar A^4 is brought out and held against the lever H′ after each inward movement by means of an elliptical spring, G′, which is secured at its center to the head of the bar by a set-screw, and at one of its ends to the face of the block U′, so that its tension shall be in an outward direction. The inner end of the bar A^4 is flattened and carved out, as seen in Fig. 4, to the shape of half a circle of a size to fit the body of the rivet to be used. The inner end of the sliding bar A′ is formed in a similar manner, and both these bars are intended to slide toward each other at the same time, meeting each other directly beneath the needle, at which time they will grasp the body of the rivet between their curved ends, as hereinafter explained.

A rectangular opening, A^0, is made in the bed-plate A, which receives and is covered by a plate, *m*, shown bottom side up in Fig. 9. The object of this opening is to get access to the channel to set the rivet in case it gets upset and to get at the working parts in that

portion of the machine, and to see that the rack, when a rack is used, starts right, the part of said plate which fits within said opening being deeper or of greater thickness than the outer ends, which are made thin, so as to lay upon the surface of the bed-plate, as seen in Fig. 4. The solid or thick part of the plate *m* is planed off, so as to be only about one-half its original thickness between the shaded line 6 and its side 7, Fig. 9. Two transverse slots, *q'*, cut across the thickest portion of the plate, extend to the line 6, and a needle hole, *p*, is drilled through the plate midway between the slots *q'*. A flat spring, *n*, Fig. 4, is secured upon the top of the plate *m*, having at its end a blunt pin, O, which projects downward through a hole drilled through the plate. This pin O must coincide with the holes *h h* of the rivet-feeding rack T', which traverses the machine below the plate *m*. The rack T' is made of the form shown in Figs. 3, 4, and 5, which show it in plan view from above and beneath, and also in Figs. 1 and 2, which show it in section. It passes beneath the bed-plate in its movement and slides upon the block U', which is planed off to make room for it. Its teeth engage with the teeth of a pinion, B', fixed on a shaft, B^3, Fig. 3, which hangs down from the bed-plate. The lower side of the pinion has a ratchet-wheel, C', cut upon it. The position of the pinion on the machine is such that its teeth will engage with the rack which traverses in front of it, while its ratchet C' will be engaged by a spring-pawl, 8, Fig. 5, fixed upon the upper side of the sliding bar A', whose path is beneath and at right angles with the rack. This pawl is shown in dotted outline in Fig. 5.

The rack is in practice laid upon a separate table, attached or brought up to the machine at the level of the rack, so as to confine the rivets in their receptacles *h*, while the rack moves across the machine.

The rivets are supplied to the rack after each traverse through the machine by removing the rack from the machine, laying it over upon its face, and inserting a rivet in each hole *h*, which holes are countersunk, as shown in the drawings, to receive the heads of the rivets, so that they shall lie flush with the lower face of the rack. A light plate or strip of any suitable material is next laid and held upon the rack, so as to cover the heads of the rivets, and the rack is then turned over upon the table, from which it is to be fed into the machine. The ends of the rack may be dovetailed, so as to fit with the ends of other racks, in order that as one is nearly fed through the machine another may be joined to its end, and thus a continual supply of rivets be provided. An endless belt or chain can be substituted for the racks, which substitution can easily be made by any well-skilled mechanic without further description. When the cross-head *a* is pushed inward, the pawl 8 of the bar A' engages with the ratchet-wheel C', thereby turning the pinion B', which causes the rack to advance across the machine a distance equal to the distance between its holes *h*, the ratchet, pinion, and rack being made and adjusted so as to produce that result.

A spring-detent, D', secured to the adjacent side of the block U', holds the ratchet against any backward motion. When the rack has advanced so that one of its holes *h* is brought over the channel *q*, which is cut in the block U', and extended through A^2 to make a path for the sliding bar A', the rivet contained in that hole. *h* is free to fall into the channel, and it is assisted in so doing by the pressure of the pin *o*, which at the same instant presses upon the point of the rivet through the upper side of the hole in the rack, the object being to prevent the rivet from sticking fast and remaining in the rack at the time it should fall into the channel *q*. The head, being the heaviest part of the rivet, will be found resting on the bottom of the channel and its shank will project upward, so as to lie directly in the path of the curved bar A', which is so adjusted as to come in contact with and embrace one side of the rivet just above its head as the rivet then lies. The continuation of the advance of the bar A' will push the rivet along the channel until it comes directly beneath the needle U, at which time the other side of the shank of the rivet will be met and embraced by the curved end of the sliding bar A^4.

The button-hopper Q is located in front of the punch M, being secured to that part of the standard which furnishes a socket for the needle and the punch. The hopper is open at top, and it has a slot (not shown) down its front to enable the operator to note the order in which the buttons lie. The hopper opens at bottom into a horizontal channel, V, in which a slide, W, is moved backward and forward by a pin projecting upward from the end of a bent arm, W^2, attached to a sliding rod, X. A spiral spring, W', is secured on this rod between a collar on its end and one of the bosses which carry it, and the rod is thereby held so that the slide W will be drawn forward in its channel, where it will remain in front of and on a level with the lowest button in the hopper until it is drawn inward by means of the rod X, as hereinafter described.

The bottom of the channel is slotted longitudinally to allow the holding-pin of the bent arm W^2 to travel with the slide. This slot is continued across the bottom of the hopper and along an extension of the channel behind the hopper, and along the bottom to a point beyond the center of a receiving-chamber, L', which is formed in the bottom of the punch-stock K, and which in one position of the stock forms a continuation of the channel V.

The position of the slide W in the channel V is adjustable by means of two jam-nuts, which secure its arm in rod X, so as to enable the same slide to operate different-sized buttons. The hopper Q is made to receive different-sized buttons by sliding a hopper case

of smaller diameter within the outer case of the hopper Q, thereby enabling us to use various-sized buttons with the same hopper arrangement.

The rod X is drawn backward by the movement of the lever H, Fig. 1, through the agency of the sliding dog 10, which slides up and down in slot, 13, cut in the arm of that lever below its fulcrum. When the lower limb of the lever H is moved backward, its dog 10 comes against the shoulder 11 of the rod X, thereby drawing the rod X and its slide W backward, the adjustments being so made as that the inner end of the slide shall carry the lowest button in the hopper into the extension of the channel V behind the hopper, and beyond it into a chamber, L, formed in the bottom of the punch-stock, the contour of which is to be such as that the perforated button, which is to receive the rivet, and is made concave on its face side, immediately around the perforation, the corresponding lower side being convex, and the rim or edge of the button being flat, as shown in Figs. 10 and 11, will lie in position to receive the body of the rivet from below. So soon as the button is placed in the chamber L′, the tube or casing J^4, which incloses the punch M, is forced down by means of the curved end 28 of the lever H, which bears down upon handle 16, projecting from the collar N of the casing J′, until it rests lightly upon button, its face being convex in form, so as to fit with the concavity of the button around its rivet-hole, so as to center the button and insure its being and remaining in position to receive the rivet. The casing J′ moves within the punch-stock K. When the button is in position in the chamber L′, and the lower end, M′, of the casing J′ has been brought down upon it, a continuation of the pressure upon the handle 16 will cause the punch stock K to descend until it meets the rivet-carriage *i i* below, or, rather, the cloth upon it, which at that time should be in position beneath the chamber L′, with a rivet projecting through it, as will be hereinafter explained. The button in that case will pass over or receive the body of the rivet within the rivet-hole, when the descent of the hammer C upon the punch M will clinch the rivet in the concavity of the button by a single blow. The cloth, being next moved toward the front, draws the button out of the open side of the chamber L′, when the punch-stock may be released, the spiral spring L about it serving to raise it again, so as the chamber L′ will coincide with the channel V. The tube J′ will also be raised by means of the spiral spring K′ about it so soon as its handle 16 is released. The punch is also carried upward, being supported within the tube J′ by means of its shouder, as seen in Fig. 8, so that it shall not descend below a certain limit to be fixed by the maker. The punch is shown in Fig. 8 as projecting below the chamber L′, being forced down by the weight of the hammer. When the hammer does not rest upon it, it, as well as the tube J′, will be raised by the spring K′ above the chamber L′, so as to clear it for the entrance of a button from the hopper. The tube J′ and punch-stock are to be guided by key-seats, or by any equivalent devices, so as to prevent them from rotating.

The needle U, for perforating the cloth, is located behind the punch, and is secured in a needle stock or holder, R, which slides vertically within a tube, P, which latter slides vertically in a socket made for it in the standard. The lower part of the tube P has a smaller tube, T, secured in its end, which tube T incloses the needle, and is slotted throughout its whole length, as seen in Fig. 7. When the needle and the tube T are in their normal position, the lower end of the tube rests upon a shoulder formed on the shank of the needle, its shank being of smaller diameter above the shoulder than it is at the shoulder, so as that the slitted tube, which is to be made of steel or other material which has suitable strength and elasticity, will close around the shank of the needle above the shoulder. The diameter of the tube T externally, when it is in that condition, its slit being closed, will be or is to be the same as the diameter of the needle at its shoulder. A cross-head, 19, rigidly attached at the top of the needle bar R, extends to and embraces a standard, S, fixed in the standard B. The cross-head 19 can slide upon the standard, a nut, 20, preventing it from becoming disconnected, and a spiral spring about the standard pressing up against the cross-head 19, in order to maintain the needle in the position shown in the drawings, ready to be forced down through the cloth by the rotation of the cam-plate. The cross-head 19 is of the shape shown in Fig. 13, its branch 21 embracing and sliding upon a guiding-standard, Q^4, and a recess, 22, being cut in its front to receive a boss on the cross head 18 of the tube P, which boss in the normal position of the tube and needle-bar rises flush with the cross-head 19. The boss may be dispensed with, and the cam be allowed to fall from one cross-head upon the other. The cross-head 18 is rigidly attached to the tube P, and its arms embrace and slide upon guiding-standards Q^4, fixed on either side of the tube. Spiral springs about these standards, bearing up against the cross head 18, tend to keep the tube P in its normal position close up against the cross-head 19. In this example of our invention we have relied upon the force of the spiral springs to give limits to the descent of the needle and of the tube T; but it will be better to limit their movements by stops, which may be located in any suitable position, either within the bearing on which they move or upon the outside, so as to be struck by the heads 18 and 19, which any competent mechanic can easily arrange without further explanation. The needle and the tube are driven downward by means of the cam-plate E, whose cams strike successively upon their cross-heads, first striking upon the cross-head 19 and driving the needle-bar downward, which carries the tube

P with it. This descent continues until the needle has pierced the cloth lying upon the rivet-carriage *i i*, when the further rotation of the cam-plate carries the toe of the cam past the head 19 upon the boss of the head 18, whereby the slitted tube T is forced downward over the shoulder of the needle U and through the perforations just made by the needle in the cloth and the hole *j* in the rivet-carriage *i i* until it reaches the rivet held in the channel 9 between the rounded ends of the sliding-bars A′ A⁴, which it seizes between its elastic sides. So soon as the shank of the rivet has been seized by the tube T the bars A′ A⁴ are released and allowed to spring back ready for another advance. The edge of the boss next to the cam plate is inclined or rounded off, so as to aid the cam to pass over it readily as it continues its rotary movement. So soon as it has passed the boss the springs on the standards Q⁴ will elevate the tube T, which returns through the rivet-carriage *i i* and through the cloth until the head of the rivet strikes against the edge of the hole *j*, and is thereby detached from the mouth of the tube T, which continues its ascent until it again closes around the needle-shank above its shoulder. The needle in its descent goes through the hole *j* in the rivet carriage *i i*, the plates *i* of which are gradually forced apart by the entrance of the needle, which is of tapering form from its shoulder to its point, until its shoulder has passed a little way below the hole, thereby also making a passage for the tube T, which at that instant will be forced by the cam down over the shoulder of the needle, its expanding sides separating the jaws of the rivet-carriage *i i* still farther apart. So soon as the cam slips off the head 19 onto the boss the needle is free to be drawn up by the spiral spring on the standard S. When the tube T rises, after the cam has passed off its head 18, and brings the rivet up between the jaws *i i*, these jaws spring shut, and hold the body of the rivet projecting through the hole *j* and through the cloth. So soon as the tube is withdrawn therefrom these jaws are moved from beneath the needle to a position beneath the punch-stock, bringing with them the cloth, which has the body of the rivet projecting through it, and which is ready now for the descent of the button and the operation of the punch.

The jaws of the rivet-carriage are flat pieces of metal, a hole, *j*, being made in them (half in each jaw) at the line of their meeting and directly in the path of the needle when the jaws are in a state of rest. Each is connected at its outer edge to vertical pieces of steel or steel springs F′ F′, which pass down through slots *q q* in the block U, which slots reach from a line running across the path of the needle to a line running across the path of the punch. The springs F′ are secured beneath the block E′ to a solid piece of metal, F², which is perforated to receive a guiding-pin, U′, reaching down from the block E′, so that the rivet-carriage may have vertical play.

The springs as they pass down to their block F² are let into mortises cut in the edges or sides of the sliding block E′, so that the rivet-carriage will be carried along with it in its movement. This block slides in ways made for it in the bottom of the block U′, which in this example are dovetailed, (not shown in the figures,) but which can be made in any proper manner. The block E′ is moved to and fro by means of a sliding rod, Z, which slides in bearings *f f* on the lower side of the bed-plate, its movements being adjusted as to their extent by collars screwed upon a thread cut on the rod, which come in contact with the bearings *f f*. These adjustments are required to bring the carriage in its movements beneath the center of the needle and button.

A spiral spring, confined on the outer end of the rod by means of a collar, W″, and one of the bearings *f f*, returns the block E′ to its position in Fig. 3 so soon as it is released from the force which drove it forward. The collar W″ takes the shape of an elbow, (see Fig. 3,) which extends across the slot 2 in the bed-plate, in order to be in the way of the lever Y, which is pivoted to the standard B above and reaches down through the slot 2. When the handle of this lever is moved outward, the rod Z and block E′ will be driven toward the front of the machine, carrying the rivet-carriage and cloth and rivet to the desired position beneath the punch. The top of the bed-plate at this point is made with a flat or concave bed of a size to fit the head of the rivet, and on each side of this flat or concave bed this part of the bed-plate is rounded off or inclined, as seen at *s* in Figs. 4 and 5 and in Fig. 14, so as to permit the projections 27 in the bottom of the punch-stock to drive the rivet-carriage downward, and thereby open its jaws wide enough to release the rivet and allow it to slip from between the jaws.

The jaws *i i*, on their under sides, are made of the shape seen in Fig. 14, rounded or inclined, so as that a gentle blow or pressure will force them to slide over the curved sides *s*, and the jaws to be thereby forced apart, as above stated.

To the opposite end of the shaft F from that on which the cam is secured, is keyed a ratchet, G, whose teeth, three in number in this example of our invention, answer to the number of the cams on the cam-plate, and are situated in or about the radial planes extending from the center of the shaft to the several cams. A lever, H, is hung loosely upon the same shaft outside of the ratchet. This lever extends above the line of the shaft, so as to be formed into a handle above, or so as to meet a connecting-rod or other device for operating it, and below the shaft it reaches nearly down to the bed-plate, having a short arm, 26, which extends laterally outward across the slot 3 in the bed plate in order to receive a connecting-rod from below to cause it to vibrate, as hereinafter explained, and also inward toward the standard B, so as to strike

the arm 14. The connecting-rod (not shown) is secured thereon by a nut, 24. A friction-roller, 25, is set on the arm 26 inside of the lever, which, when the lever has got to the end of its vibration to the left, (looking at Fig. 1,) strikes the upper end of the lever Y, thereby driving the rod Z and rivet-carriage block E′ forward, as before explained.

The lever H has a pin, 10, sliding in a slot, 13, in a position thereon that will in the beginning of its vibration to the left strike against the vertical side 11 of the sliding-rod X, carrying it along with it, and thereby feeding the button. When the lever H has vibrated to such a distance to the left that the pin 10 has reached the top of the straight side 11, the pin will slide over the top of the side 11 and be free to move up and along the slot 13 and release the rod X, which will immediately be drawn to its original position by its spiral spring W′. On the return movement of the lever H, its pin 10 rides upon the inclined face 12 of the rod X and upward within its slot 13, to permit it to take the position again in front of the vertical slide 11 of the rod, ready to feed another button.

An elbow-lever, I, is pivoted to the standard B in such a position as that its stouter arm will reach and act upon the teeth 15 of the ratchet G. Its longer arm, 14, extending downward, as seen in Fig. 1, lies in the path of the friction-roller or pin (not seen) formed by the extension of the arm 26, which, on the backward or return movement of the lever H, strikes the arm 14, and thereby causing the short arm or pawl of lever I to draw the ratchet and its shaft F around in the direction of its previous movement. The cam-plate, being keyed to the shaft F, is also thereby moved to an equal distance. This forward rotation of the cam is necessary, because, as we use the same shaft for working the cam and the lever, and the lever moves through only one-fourth, more or less, of a complete circle in its movement from right to left, the cam, which is driven by means of the spring-pawl I′ of the lever acting against the ratchet-teeth 15, only makes one-fourth of a complete revolution. This is sufficient to enable it to perform its work on the needle and its tube T, but not sufficient to bring it in position to act on them when the pawl I′ next acts on its shaft. The office of the pawl I therefore is to rotate the shaft with its ratchet and cam until they have completed their revolution, when the ratchet will be in position to receive the pawl I′ on the next vibration of the lever H, and the cam will be in position to strike the cross-heads 19 and 18, as before explained. The detent J, fixed to the standard B, rests continually upon the periphery of the ratchet-wheel G′, its office being to catch under one of the teeth of the ratchet when the lever has completed its movement to the left and is ready to return, so as to hold the ratchet and the cam-shaft and prevent their backward rotation. At every partial rotation of the cam-plate one of its dogs, e^2, strikes against the end d' of the lever d, which has its fulcrum at e' on the standard B. This lever works through the slot 1 of the bed-plate, and drives the rod X and the bar A′ simultaneously, as before stated.

The outer end, C^2, of the hammer-arm curves upward, as seen in Fig. 12, in order to permit the hook Q′ of a reciprocating bar, N′, to draw upon the arm in a direction which shall be constantly vertical.

The hook (shown in part in Fig. 6) is connected to a bar, N′, and the latter is connected below to a treadle, (not shown,) and is to be held upright in guides, so as to move in a vertical path in such a position as that its outer inclined face, 29, shall, when the bar is ascending, come against the side of the end C^2 of the hammer-arm. The bar and hook are hinged at P′, and the spring O′ holds the hinge closed, allowing it to yield when the inclined face strikes against the arm C^2, so as to catch it again under the hook ready for another movement. This reciprocating hook after each descent is carried upward immediately by a counter-balance arrangement (not shown) of ordinary construction, so that its jointed hook shall again spring over the hammer-arm.

The operation is as follows: The movement of the lower part of the lever H from its extreme position on the right (which is not shown the drawings) causes the pawl I′ to engage the ratchet-wheel G, and thereby rotate the cam, and by means of one of its pins, e^2, striking the lever d' d, moving the sliding bar A′ and feed a rivet (when a rack or belt is used to feed the rivets) into the channel 9 in the path of the ends q of the sliding bars A′ and A^4. The further vibration of the lever H causes the rod X to draw the slide W inward and feed a button into the chamber L′, about at which time one of the cams of cam-plate E has depressed the cross-head 19 and 18, and thereby brought the needle down through the cloth, which must previously be laid in position over the rivet-carriage. The continuation of the pressure of the cam upon the cross-head 18 forces the slitted tube down into the channel 9, over the rivet, which has been by that time brought forward by the sliding bar A′ and has been seized upon its opposite side by the sliding bar A^4. When the cam has passed the cross-heads of the needle-bar and the tube, they rise successively to their original positions. The lever H, having released the button-feeding slide continues its movement until it strikes the lever Y, which moves the rivet-carriage, and this carriage, holding now the rivet brought up by the needle-tube between its jaws, is carried forward beneath the punch-stock, when the continued rotation of the lever H brings its upper end, 28, down upon the arm 16 of the punch-stock, and thereby carries the stock down upon the rivet-carriage, opening its jaws by the pressure of its projections 27, so as to release the rivet, and causing the button to pass over the rivet when the ham-

mer descends upon the punch, and thereby clinches the rivet in the concavity of the button. The cloth is then withdrawn with the button riveted to it. The lever I, on the return of the lever H, causes the cam-plate and ratchet to complete one-third of a revolution, the detent J having meanwhile prevented any backward motion of the shaft F. When the driving-lever I′ and its spring bear lightly upon the smooth periphery of the ratchet-wheel, there is little or no tendency in the cam-shaft to be rotated backward, and in that case the detent J can be left off the machine.

The hopper-case Q receives cases like Q, which rest within it, being inserted from above. When it is necessary to feed buttons of smaller sizes than those that fit the capacity of the outer case, we place a spring, D, upon the hammer-arm, so as to give energy and force to its blow, and thus avoid the necessity of using a heavier and unwieldy hammer.

The machine can be operated by hand through the handle of the lever H, the hammer being operated by the foot of the workman through a treadle fast to the connecting-rod N′; or it may be driven by power in any ordinary manner by connecting-rods and gearing in the way machines are usually driven.

We claim as new and desire to secure by Letters Patent—

1. In machines for attaching buttons to cloth or other material, feeding the rivet and the button, perforating the material, placing the rivet therein, advancing the cloth and rivet to the button, and uniting them by riveting by mechanical devices constructed, arranged, and operating as a whole substantially as described.

2. The needle and its tubular casing, T, constructed and operating substantially as described.

3. The jointed hook Q′, with its inclined face 29, for operating the hammer in its connection with the button-riveting machine, substantially as described.

4. The combination of the punch-stock K, casing J′, punch M, and spring K′, constructed, arranged, and operating substantially as described.

5. The button-chamber L′ in the bottom of the punch-stock, substantially as described.

6. The button-chamber L′, in combination with the centering-tube J′, constructed with a centering end, M′, substantially as above described.

7. Releasing the rivet from its carriage by the impact thereon of the punch stock, substantially as described.

8. The rivet-carriage, constructed substantially as above described.

9. The hopper, in combination with the channel V, chamber L′, and the feeding-slide W, substantially as described.

10. Operating the punch-stock by means of the upper arm of the lever H, substantially as described.

11. Operating the botton-feeding slide W by means of its sliding rod X, or its equivalent, and the sliding pin 10, substantially as described.

12. The combination of the ratchet G, bent lever I 14, and lever H substantially as described.

13. Operating the pawl I on the return movement of the lever H in the manner and by means substantially as described.

14. The cross-heads 18 and 19, constructed as described, in combination with the standards S S and 2^4 and cam E, for the purpose described.

15. Operating the cam by means of the pawl I′ on the lever H, and the ratchet G on the cam-shaft, substantially as described.

16. Operating the rivet-carriage by means of the lever H and the lever Y, substantially as described.

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