

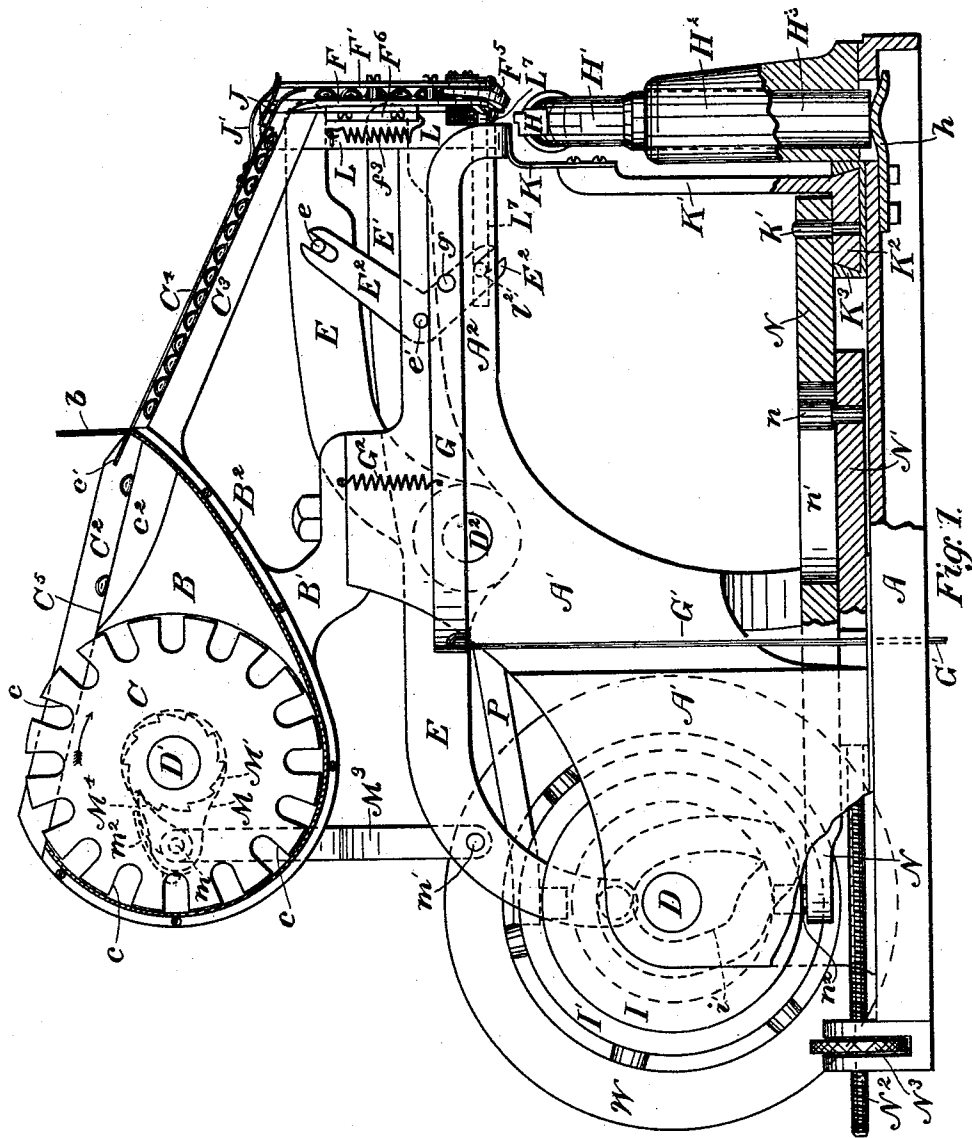
(No Model.)

5 Sheets—Sheet 1.

E. P. MERWIN & J. D. STIRCKLER.
BUTTON SETTING MACHINE.

No. 487,678.

Patented Dec. 6, 1892.



Witnesses
Albert E. Leach
O. H. Gilman

Inventors
Edward P. Merwin
John D. Stirckler
by W. B. H. Davis
Atty.

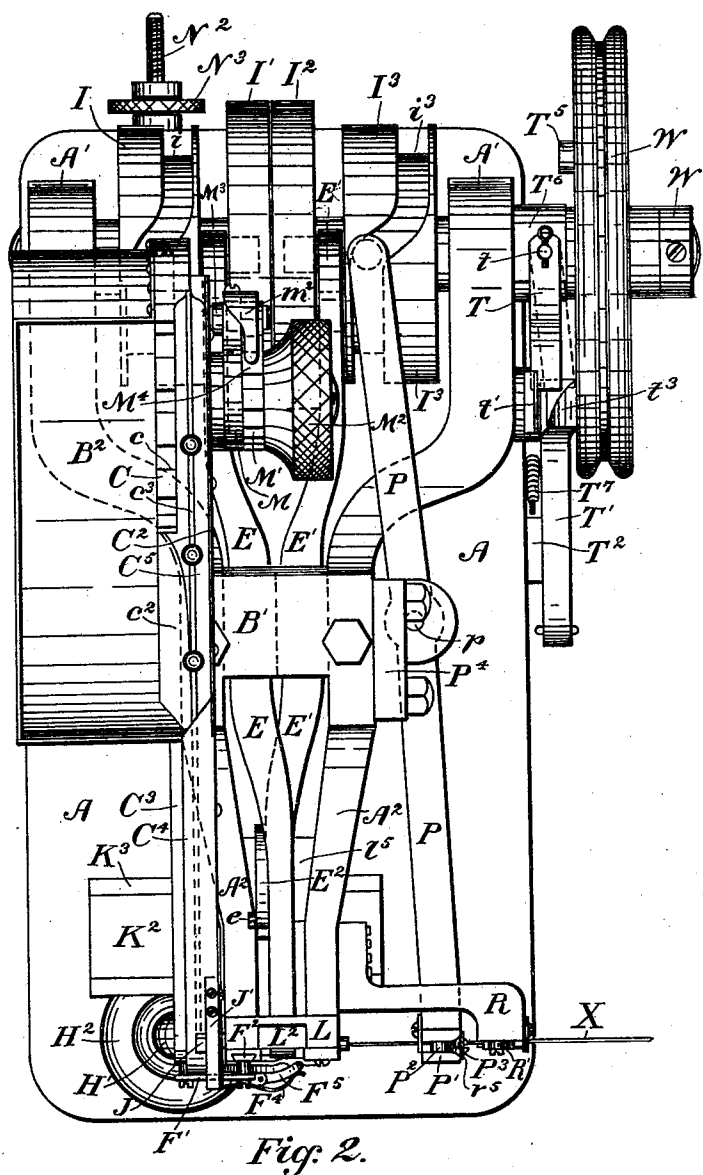
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5 Sheets—Sheet 2.

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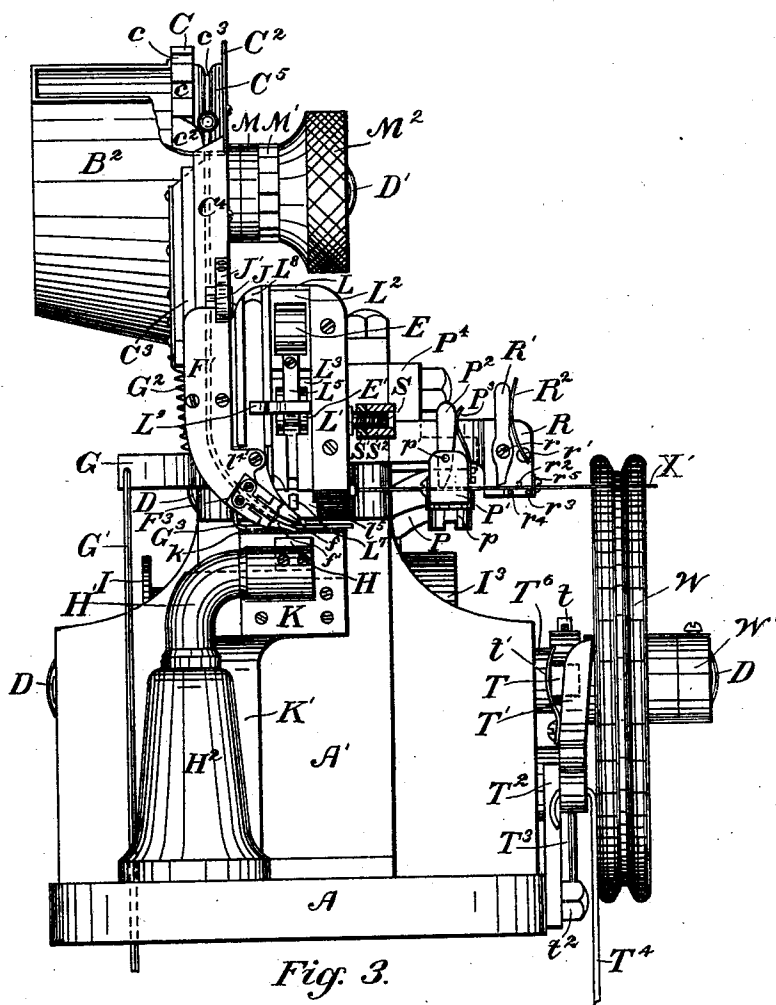
Inventors

Edward P. Allen
John Dr. Strickler
by H. B. H. Dwyer
Att

5 Sheets—Sheet 3.

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Witnesses

Albert E. Leach.

E K Gilman

Inventors

Inventors
Edward P. Merwin
J. R. D. Stucklen
by J. B. H. Bross
Atty.

J. Ren D. Strickland

by J. B. H. D. D. D.

Atty:

5 Sheets—Sheet 4.

No. 487,678.

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Albert E. Leach
E. W. Culman



Edward P. Merwin
John D. Stickler
by J. B. N. Dows
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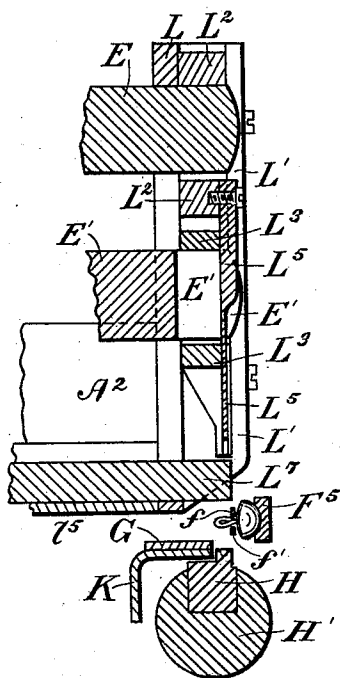


Fig. 7.

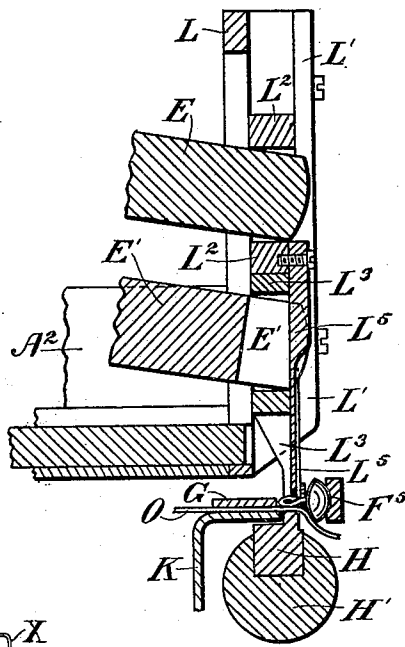


Fig. 8.



Fig. 11.

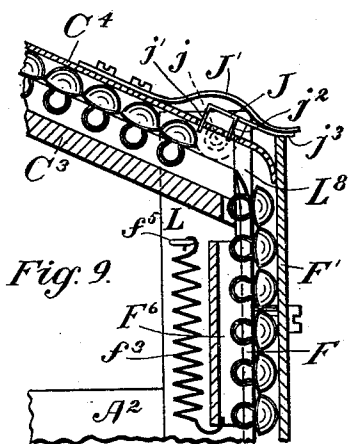


Fig. 9.

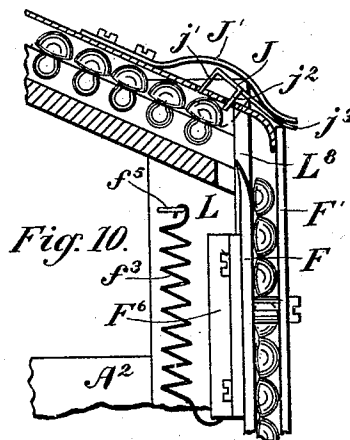


Fig. 10.

Witnesses
Albert E. Deach-
O. W. Gilman

Inventors
Edw. P. Merwin
John D. Strickler
by Wm. B. H. Dowsse
Atty.

UNITED STATES PATENT OFFICE.

EDWARD P. MERWIN AND JOHN D. STIRCKLER, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO THE IMPERIAL MANUFACTURING COMPANY, OF PORTLAND, MAINE.

BUTTON-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 487,678, dated December 6, 1892.

Application filed September 20, 1890. Serial No. 365,616. (No model.)

To all whom it may concern:

Be it known that we, EDWARD P. MERWIN and JOHN D. STIRCKLER, citizens of the United States, residing at Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Button-Setting Machines, of which the following is a full specification.

Our invention consists of an improved machine for making staple-fasteners from wire, automatically feeding buttons from a receptacle to a point above a clinching-die, feeding one staple at a time as fast as made to the clinching-point and through the eye of a button, driving the staple through the leather or material to which the button is to be secured, and finally clinching the staple under said leather or material in a manner to be hereinafter described in detail.

Of the accompanying drawings, Figure 1 is a side elevation of our machine partly in section. Fig. 2 is a top plan view thereof. Fig. 3 is a front elevation. Fig. 4 is a side view, on an enlarged scale, of the clutch mechanism for throwing the main wheel in and out of gear. Fig. 5 is a perspective front view showing the head of the machine with the plunger and clinching parts in their extreme uppermost position. Fig. 6 is a front view of the head, showing the plunger and clinching parts in their extreme lowest position. Fig. 7 is a section in the plane of $x x$, Fig. 6, with plunger up—*i. e.*, with parts in the same position as in Fig. 5. Fig. 8 is a section in the same plane with plunger down—*i. e.*, with parts in the same position as in Fig. 6. Figs. 9 and 10 are sectional views on the button-raceway, showing the movable portion of the raceway in its extreme upper and lower positions, respectively; and Fig. 11 shows the staple-fastener above the button-eye.

A is the base of the machine, supporting the standard A', which is firmly secured to the base. Through the rear of the standard A' passes the shaft D, on which are mounted the four cams I I' I² I³, from which motion is imparted to all the moving parts. These cams are fixed on the shaft to turn therewith.

W is the drive wheel or pulley mounted

loosely on the shaft D, being held thereon by 50 means of the collar W'.

The operations of making a staple and fastening on a button therewith are accomplished during one revolution of the cam-shaft and cams. The wheel W, mounted loosely on the shaft, preferably revolves continuously, motion being imparted to it by means of a band. By means of a peculiar clutch mechanism, hereinafter to be described, the parts may be thrown in or out of gear in such a manner 60 that the machine may either work continuously, putting on one button after another without cessation, or that one button only be put on, the machine starting at the beginning and stopping at the end of the operation. 65

The buttons are contained in the receptacle B², supported on a bracket B', which is bolted to the standard A'. Let into the inner wall B of the receptacle B² is the button-elevator or feed-wheel C, which is fixed to turn on the shaft D', mounted in suitable bearings. The outer surface of the wheel C is preferably flush with the surface B. The feed-wheel C is provided with radial recesses *c* at frequent intervals along its periphery, into which the buttons from the receptacle run and are elevated as the wheel revolves in the direction of the arrow. 75

M' is a ratchet fixed on the shaft D', and M⁴ is a pawl engaging therewith, pivoted at *m*, Fig. 1, to the outer end of a piece M, which is loose on the shaft. To the outer end of the piece M is also pivoted the arm M³, which at its lower end is pivotally connected at *m'* to a lever E. This lever turns on the shaft or 85 pin D² as a fulcrum and has at its lower rear end a cam-roll engaging with the groove *i'* in the face of the cam I', the construction being such that as the lever E moves up and down during one revolution of the cam-shaft D the ratchet M is advanced through a distance of one or more teeth, and with it the elevator-wheel C. 90

M² is a hand-wheel fixed on the shaft D in such a manner that the elevator-wheel may 95 be turned and the buttons fed by hand when desired.

The upper surface of the inclined button-

raceway C^5 is on a level with the bottom of the uppermost recess c , so that as the recesses come up one by one the buttons contained therein fall upon the raceway C^5 . A large portion of them drop with their eyes lengthwise in the trough c^3 of the raceway, and such buttons are properly seated to travel the entire distance to the point of clinching. Those that fall upon their heads or hit the raceway in any other than the right position fall down the beveled portion c^2 back into the receptacle B^2 .

C^2 is a flanged guard on the outer side of the raceway C^5 to prevent the button from falling off otherwise than back into the receptacle.

C^3 is a continuation of the button-raceway C^5 , being similarly shaped in section, but preferably having a steeper slope, as shown. Near the lower end of this raceway C^3 is the gate J , which temporarily checks the flow of the buttons, while along the outer side and bent over the top of the raceway C^3 is the flanged guard C^4 , at such a height as to allow those buttons properly seated therein to flow freely down the same; but whenever a button not properly seated in the trough reaches the projecting end c' of the guard C^4 it will immediately be guided off into the receptacle B^2 . By reason of the constant accumulation of the buttons on the raceway C^3 from the elevator-wheel C , aided, also, by gravity, a constant stream of the buttons is kept along the said raceway C^3 . The front of the button-receptacle B^2 is preferably bent up, as at b , to form a guard.

F is a movable raceway, the particular construction and object of which will be presently set forth in detail. This forms a continuation of the stationary raceway and conducts the buttons to a point directly over the clinching-die H . This die is held in a curved horn H' by means of screws or in any manner by which it may be readily removed therefrom when desired. The straight shank H^3 of the horn H' passes down through the standard H^2 , which is secured to the base A of the machine. In order to cushion the die under the heavy pressure it sustains, the stiff spring h is provided, which is bolted to the under side of the base A of the machine in the manner shown in Fig. 1 and bears upward against the under side of the shank H^3 of the horn H' .

A^2 A^2 are forwardly-projecting arms of the standard A' , and to the front of these arms is bolted or otherwise secured the head of the machine, containing the staple-forming devices and the plunger that forces the prongs of the fastener through the leather and clinches them on the under side thereof.

L is the frame of the head, secured directly to the ends of the arms A^2 . This frame has a central groove, in which fit loosely to slide up and down therein the blocks L^2 L^3 , these blocks being held in the groove by means of the plate L' on one side and the plate L^8 on other. The blocks L^2 L^3 are given an up-and-

down movement independent of each other by means of the levers E E' , respectively, both of which levers are fulcrumed on the shaft or pin D^2 and have at their lower rear ends cam-rolls engaging with grooves in the outer faces of the cams I' I^2 , respectively, (see Fig. 2,) from which they derive their motion.

The lever E at its forward end passes through a central opening in the upper block L^2 , while the lever E' passes in like manner through a central opening in the lower block L^3 in such a manner that the blocks move up and down with the levers.

L^5 is the plunger, secured at its upper end to the block L^2 and guided to slide in the lower block L^3 . The function of the block L^3 is to cut off and form the staple and that of the block L^2 is to operate the plunger, which forces down the staple when made and presses its prongs through the material to which the button is to be secured and into the die. The lever E' is bifurcated at its forward end to allow the plunger L^5 to pass down between the forked ends thereof.

R is a bracket or block for use in the wire-feeding mechanism, secured to the side of one of the arms A^2 . The wire X' , from which the staples are to be formed, is threaded through suitable guides in the front projecting face of the bracket R , the said guides being for the purpose of straightening out any kinks in the wire. These guides, as shown, consist of a plate r^5 , through a hole in which the wire passes, and pins r^2 r^3 r^4 . (See Fig. 3.) The wire then passes under a pawl R' , between it and a support beneath the same, the said pawl being pivoted at r to the block R and pressed constantly against the wire in one direction by the spring R^2 . The lower block L^3 is divided from beneath into two legs, which pass one on each side of the bar L^7 as the block descends.

P is the wire-feed lever, fulcrumed at p to a support P^4 , secured to the standard A' . At its rear end the feed-lever is provided with a cam-roll engaging with the groove i^3 in the periphery of the cam I^3 , whereby the said lever P is given a horizontal right and left hand motion. At the forward end of the lever P is the block P' , having a recess, between the bottom of which and the pawl P^2 the wire X' is passed. This pawl P^2 is pivoted at p' to the block P' and is pressed by means of the spring P^3 against the wire. From the block P' the wire X' passes to the bushing L^6 , Fig. 5, thence under the plunger L^5 to the edge of the plate L^8 .

L^7 is a sliding bar over which the staple is bent when said bar is at its forward position. This bar slides in a block L^7 , held between the arms A^2 A^2 . Near its rear end the bar L^7 is provided with a pin l^2 , which engages with a slot in the lower end of the bell-crank lever E^2 . This lever is pivoted at e' to one of the arms A^2 , and its upper end is provided with a slot engaging with a pin e on the lever E ,

being so arranged that as the lever E rises and falls the bar L⁷ moves back and forth. The block L³ is provided with the cutter L⁴ on the side next the bushing L⁶, so that as the block L³ moves downward the wire for the staple is cut off and bent over the bar L⁷ into the necessary shape. (See X, Fig. 11.)

K is the plate on which rests the leather or other material for the buttons during the operation of fastening the same thereto. The said material is held thereon by means of the plate G³ at the forward end of the lever G, which is pivoted at g to one of the arms A², as shown in Fig. 1. To the rear of the lever G is attached the rod G', which passes downward and is preferably attached to a pedal to be operated by the foot. The spring G² tends to keep the plate G³ pressed constantly down upon the plate K, clamping the material lightly between the two plates. The plate K is attached to a standard K', at the base of which is the block K², sliding in the guides K³, Fig. 1.

N is a lever pivotally connected at its forward end at k' to the base-block K² of the standard K and provided with a slot n', into which fits a pin n, secured to the sliding bar N'. The bar N' slides forward and backward in suitable guides and at the rear is connected with the long screw N², engaging with the thumb-nut N³, which when turned between suitable stationary guides serves to move the said sliding bar N' when desired. The rear end of the lever N is provided with a cam-roll n², engaging with the groove i in the periphery of the cam I, so that as the cam I revolves the lever N, fulcrumed at n, moves the standard K' and plate K back and forth sidewise. The upper forward edge of the plate K is provided with saw-teeth indentations k, pointing to the right, so that as the plate K moves to the right in Fig. 3 the leather or other material between it and the plate G³ is fed along, the distance which it is fed depending on the position of the fulcrum n in the slot n', which is readily adjustable by means of the thumb-nut N² in the manner already described. Whenever it is desired to insert the material into or remove it from the machine, the plate G³ is lifted by pulling down the rod G', the plate G³ being pressed down again by reason of the spring G² when the pull on the rod G' is released.

The movable raceway F when at its uppermost position forms a continuation of the raceway C³, it being formed of two plates tied together with the piece F⁶, so as to leave a space between them for the button-eyes corresponding to the trough c³, and indicated by the dotted lines in Fig. 3. This forms a chute for the buttons, curving around at the bottom to a point directly over the die H and under the plunger L⁵, the lower ends of the two plates forming the raceway F being indicated by f and f' in Figs. 3 and 6.

Secured to the raceway F or forming a part

thereof is the guiding-plate F², which slides vertically in suitable guides in the plate L⁸, as clearly shown in Figs. 2, 3, 5, and 6.

F' is a top plate or guard held at such a distance from the raceway F as to keep the buttons in place therein and forming, as it were, a continuation of the guard C⁴. The movable raceway is normally held at its uppermost position (shown in Figs. 1, 3, and 5) by means of a spring f³, stretched between the ring f⁵ on the head-piece L and the bottom of the tie-piece F⁶. When at its said uppermost position, there is considerable space between the bottom f' of the raceway and the top of the die H. This space is desirable to allow plenty of room for working and on account of varying thicknesses of material on which the buttons are to be secured. When at its extreme lowest position, (shown in Fig. 6), the button-eye held between the ends f f' of the movable raceway rests directly on the material.

The gate J, which temporarily arrests the flow of the column of buttons from the stationary raceway C³ into the movable raceway F, is best shown in Figs. 9 and 10. It has a side piece pivoted at j to the side of the raceway C³ and is also provided with stops j' j², bent downward through openings in the guard C⁴ so as to engage with the button-heads. An arm j³ projects over and rests upon the guard F' on the movable raceway F.

J' is a spring secured to the guard C⁴, tending to keep the said arm j³ pressed constantly down upon said piece F'. When the machine is at rest, with the movable raceway up, the gate J is in the position shown in Figs. 1 and 9, with the column of buttons resting against the stop j'. When the raceway moves down into the position shown in Fig. 10, the gate J is tilted and the column of buttons moves down until it rests against the stop j². When the raceway F rises again, the stop j', bearing against the head of the lowest button in the raceway C³, pushes said button around the corner into the raceway F, in which a constant column of buttons is preferably kept from top to bottom, one button dropping from the raceway C³ to the raceway F at each upstroke of the latter.

The gate J, while not positively necessary, is desirable, since by its use any buckling together of buttons in the two raceways as the raceway F rises is avoided. The lowest button in the column within the movable raceway is held therein by means of the spring jaw or holder F⁵, which is hinged to a block F³ on the guard-plate F' and is pressed lightly inward by means of the spring F⁴. The holder F⁵ is hollowed out slightly on the inner side to retain a light hold on the button, which is held, as indicated in Figs. 5, 7, and 8, with its eye projecting inward.

The downward motion of the raceway F is derived from some movable part of the head. A bar L⁹ (shown in Fig. 3) may be attached

to the end of the lever E' or to some part of the plunger L^3 in such position that when the lever E' moves downward the said bar engages with the shoulder l^4 on the raceway-guard F' , and thus moves it downward at the right moment. We preferably, however, dispense with this bar and give motion to the raceway by having the bottom l' of one of the legs of the block L^3 as it bears against the eye of the button at the end of the raceway in its downward passage move the raceway along. The return of the raceway to its upper position when the lever E' rises is accomplished by the spring f^3 .

To trace the various operations of the machine as they occur with reference to each other, start with the machine at rest in the position indicated by Figs. 1, 2, 3, 5, 7, and 9, both levers E and E' being up, the staple-wire reaching across the path of the plunger L^5 , the staple-bar L^7 being forward. If the raceways are not full of buttons, or nearly so, the elevator-wheel C is turned by hand by means of the wheel M^2 until a column of buttons has accumulated. Usually the automatic feeding of the elevator-wheel leaves the raceways constantly full, however. The leather or other material being placed between the plates K and G^3 the machine is started. As the cam-shaft D revolves, the first operation is the descent of the lower block L^3 , cutting off the wire for the staple and forming the staple over the bar L^7 , the distance between the legs at the bottom of the block L^3 being a little more than the width of the said bar L^7 , they being properly grooved out along their inner sides to contain the staple when bent and to serve as guides for the plunger L^5 as it moves. The lever E' and the lower block L^3 continue to descend, carrying with them the movable raceway F and bringing the eye of the button held by the holder F^5 down upon the material directly above the die. The upper lever E next begins to descend, immediately drawing back the staple-bar L^7 out of the way of the plunger and pressing the said plunger down with the staple before it. One prong of the staple passes through the button-eye lying directly beneath and both prongs are pressed through the leather or other material into the die and properly clinched, the parts in their extreme lowest position being indicated in the detail views in Figs. 6, 8, and 10. Both blocks L^2 and L^3 then rise quickly to their uppermost position, and with them the raceway F , causing the material, with the button attached, to be lifted off of the die. At the same moment the lever N operates to move the plate K to the right a given distance, pulling the button out from the holder F^5 and feeding the material, with the button attached thereto, a given distance under the plate G^3 , and returns quickly back to its former position with a fresh portion of leather exposed for another button. Just before the end of the revolution of the cam-shaft the wire-feed

lever P moves the block P' quickly to the left a distance sufficient to feed along wire for a new staple under the plunger, and the lever then returns to its former position, (shown in Figs. 2 and 3,) the pawl R' holding the wire X' from slipping as the block P slips back over the wire to take a fresh hold thereon. All these operations are accomplished during one revolution of the cam-shaft.

It is often desirable to make staples of various lengths for varying kinds of work. We have shown in Figs. 3 and 6 a device for varying the length of the staple made by any one machine. The bushing L^6 may be varied in position by being driven farther in when desired. If a very short staple is to be made, the cutter L^4 is removed and a thinner substituted in its place, the bushing L^6 being pushed in till it reaches the same. The wire X' is in this case not fed clear in till it reaches the plate L^5 , as is the case with the largest staple, but is caused to stop before it reaches the plate. In order to accomplish this, we provide the screw S , which enters the side of the piece L and is provided with nuts $S' S^2$, which may be turned in or out on the screw. The screw S and the nuts thereon are in such a position that as the wire-feeding block P' moves to the left in Fig. 3 the pawl P^2 will strike against the outer nut S^2 and release its hold on the wire X' , which will stop at that point and not continue to the end of the stroke. By varying the position of the nut S^2 on the screw S the feeding of the wire under the plunger may be stopped at any point of the stroke of the lever P . The second nut S' acts as a check to hold the first in any position. When the nuts are screwed clear in, they will not interfere with the wire's feeding its full stroke. For the varying positions of the nuts $S' S^2$ cutters of various thicknesses must be substituted for the cutter L^4 and the bushing L^6 pushed in or out to correspond.

The clutch mechanism whereby the motion of the drive-wheel W is imparted to the cam-shaft D in such a manner that the machinery may either run continuously or put on one button only at a time will now be described.

T^6 is an enlargement of the shaft D or a separate piece fixed on said shaft, faced off on opposite sides thereof, as best shown in Fig. 4, and occupying a position adjacent to the inner face of the hub of the wheel W , between it and the outer face of the standard A' . On the faced-off portions of the enlargement T^6 is swiveled at $t t$, on opposite sides thereof, (see Fig. 4,) the piece T , the two arms of which embrace the part T^6 in the manner shown.

t' is a spring let into the pieces T and T^6 , being held therein by a screw t^3 in such a manner as to tend to press the outer end of the piece T toward the wheel W .

T' is a bell-crank lever pivoted at t^4 to the standard A' , having at its outer end the rod T^4 , which passes downward and is connected,

preferably, to a pedal in such a manner that said rod may be depressed by the foot. At its upper end the lever T' is provided with the cam-shaped pocket t^3 , (see Fig. 2,) in which the outer end of the piece T is held when the machine is at rest. The outer end of the bell-crank lever T' may be pressed upward by a simple spring against a suitable stop, or the arrangement shown in the drawings may be employed, which consists of a piece T², pivoted at t^2 to the base A of the machine and having the slot t^5 , in which a pin t^6 on the lever T' engages.

T³ is a rod rigidly fixed in the under side of the lever T' and at its lower end fastened to a spiral spring T⁷, the other end of which spring is hooked into a ring in the top of the slotted piece T². The arrangement is such that when the outer horizontal arm of the lever T' is pulled down the spring T⁷ and rod T³ act to return it.

On one spoke of the wheel W is a pin T⁵, projecting inward for such a distance that when the outer end of the piece T is in the pocket t^3 , between it and the retaining-spring t' , (see Fig. 3,) the wheel revolves on the shaft without touching said piece T. When, however, the rod T⁴ is pulled down and the bell-crank lever T' turned thereby in the direction indicated by the dotted lines, the piece T, under the influence of the spring t' , bends toward the wheel W, as indicated by the dotted lines in Fig. 2, and when next the pin T⁵ comes around it engages with the piece T and turns it and the whole cam-shaft to which it is attached as long as the rod T⁴ is held down. If it is desired to put on one button only, the rod T⁴ is depressed to release the piece T, and when the pin T⁵ has engaged therewith the bell-crank lever T' is again allowed to spring back into place by releasing the rod T⁴. When the piece T⁴ has been pushed around one revolution, (which performs all the operations of fastening on one button,) the outer edge of the piece T will engage with the cam-shaped pocket t^3 , thereby throwing it out of engagement with the pin T⁵, and catch therein behind the spring t' , so that the wheel will continue to revolve without effect on the working parts. To have the machine work continuously without cessation, the foot is simply kept down on the pedal connected with the rod T⁴ or the rod held down in any desired manner, during which time the buttons will be fastened on and the material fed along continuously. The machine will by this clutch arrangement always stop at one point—viz., at the end of the fastening operation.

The prongs of the fastener may be clinched under the material in a great variety of ways, depending altogether on the shape of the die H. It may, if desired, be so shaped as to clinch said prongs around a cord or wire in the manner shown and described in United States Letters Patent issued to Walter E.

Bennett August 9, 1887, No. 368,124, for a method of securing buttons to materials, in which case the said cord or wire is threaded through the die; or the prongs of the fastener may be simply turned inward under the material without the aid of the cord or wire; or the clinching may take place in any desired manner. Dies of any desired shape may be introduced into the horn.

It will be noticed that in our improved machine the staple is made entirely separate from the button and is fed down separate and alone, not being introduced into the button-eye till it is ready to be clinched therein. In other words, the button and the staple are fed to the clinching-point entirely separate from each other and not together, the finished staple being passed through the button-eye just prior to clinching.

We claim—

1. In a button-setting machine, a clinching-die and a vertically-sliding button-raceway provided with a spring button-holder at the bottom thereof and having a reciprocating motion alternately to and from said die, in combination with a sliding bar L¹, a movable staple cutting and bending block engaging with said bar, a staple-moving plunger, and suitable guides for both staple and plunger, leading from the staple-forming point to the die independent of the button, substantially as and for the purposes described.

2. In a button-setting machine, a stationary clinching-die, in combination with a plunger, an inclined stationary button-raceway C³ and a vertically-sliding button-raceway formed of the two plates F, tied together and having the front plate F' provided with a spring button-holder at the bottom, said movable raceway having a reciprocating motion to and from said die, substantially as described.

3. In a button-setting machine, the suitably-guided reciprocating plunger carrying block L² and the suitably-guided reciprocating cutter-bearing and staple-bending block L³, said blocks being vertically movable each independent of the other, in combination with the horizontally-movable reciprocating bar L¹, a stationary clinching-die, a vertically-movable button-raceway, and the cam-operated levers E E', actuating said blocks, bar, and raceway, substantially as described.

4. In a button-setting machine, a stationary clinching-die, in combination with a plunger, an inclined stationary button-raceway provided at the bottom with a vibratory button-separating gate, a vertically-movable button-raceway operating said gate, said movable raceway having a curved path for the buttons and being provided with a spring button-holder at the bottom directly over said die, and suitable means for imparting a reciprocating motion to said movable raceway, all constructed, arranged, and operating substantially as and for the purposes described.

5. In a button-setting machine, the combi-

nation, with a movable bushing L⁶, of a movable staple cutting and forming block L³, adapted to receive adjustable cutters of varying thickness, a screw S, provided with nuts S' S², and a lever P, having a wire-feeding pawl P², engaging with the nut S², arranged and operated substantially as and for the purposes described.

In witness whereof we have hereunto set our hands.

EDWARD P. MERWIN.
JOHN D. STIRCKLER.

Witnesses:

WM. B. H. DOWSE,
ALBERT E. LEACH.