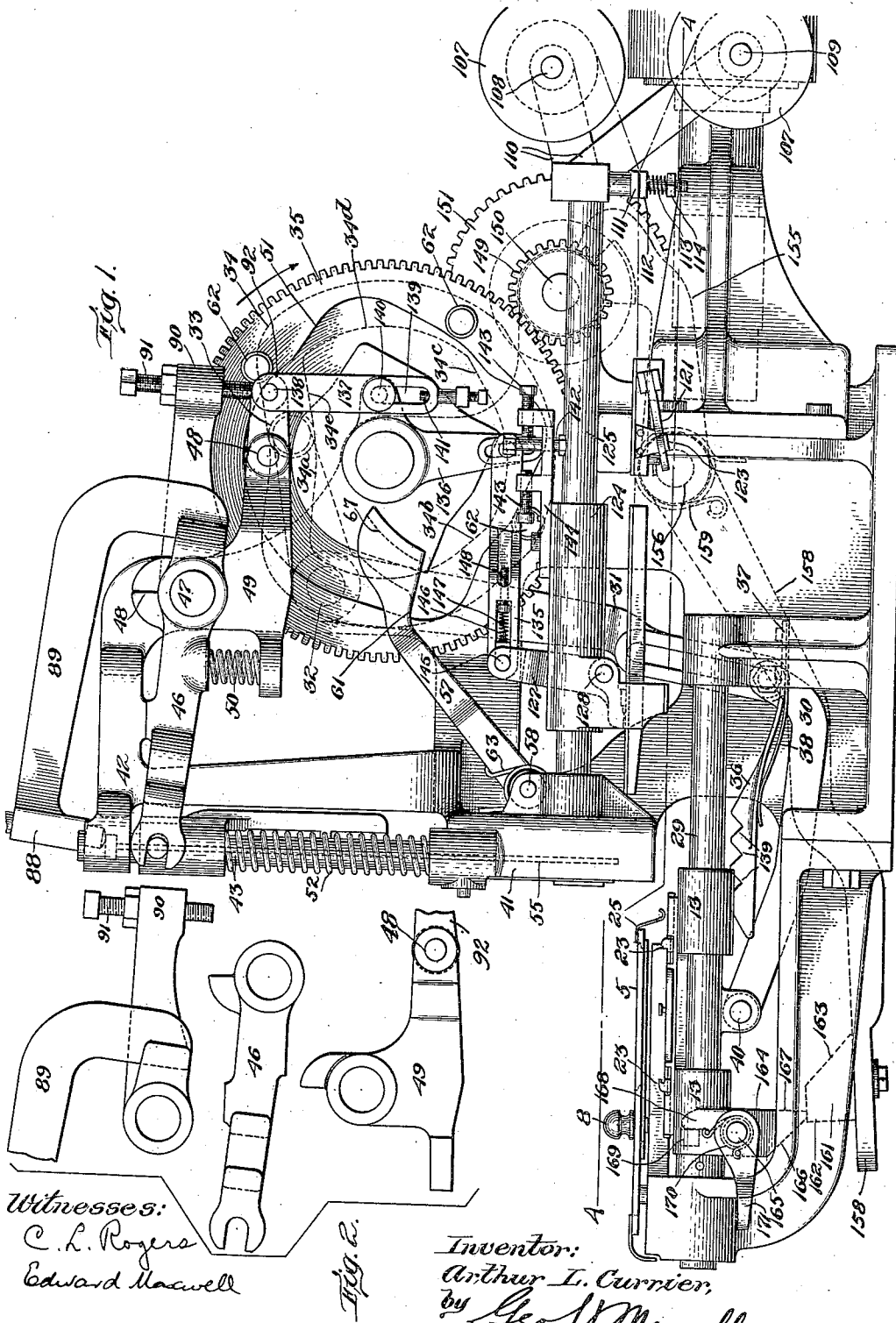


A. L. CURRIER.
 BUTTON CARDING MACHINE.
 APPLICATION FILED OCT. 20, 1911.

1,055,523.

Patented Mar. 11, 1913.

5 SHEETS—SHEET 1.

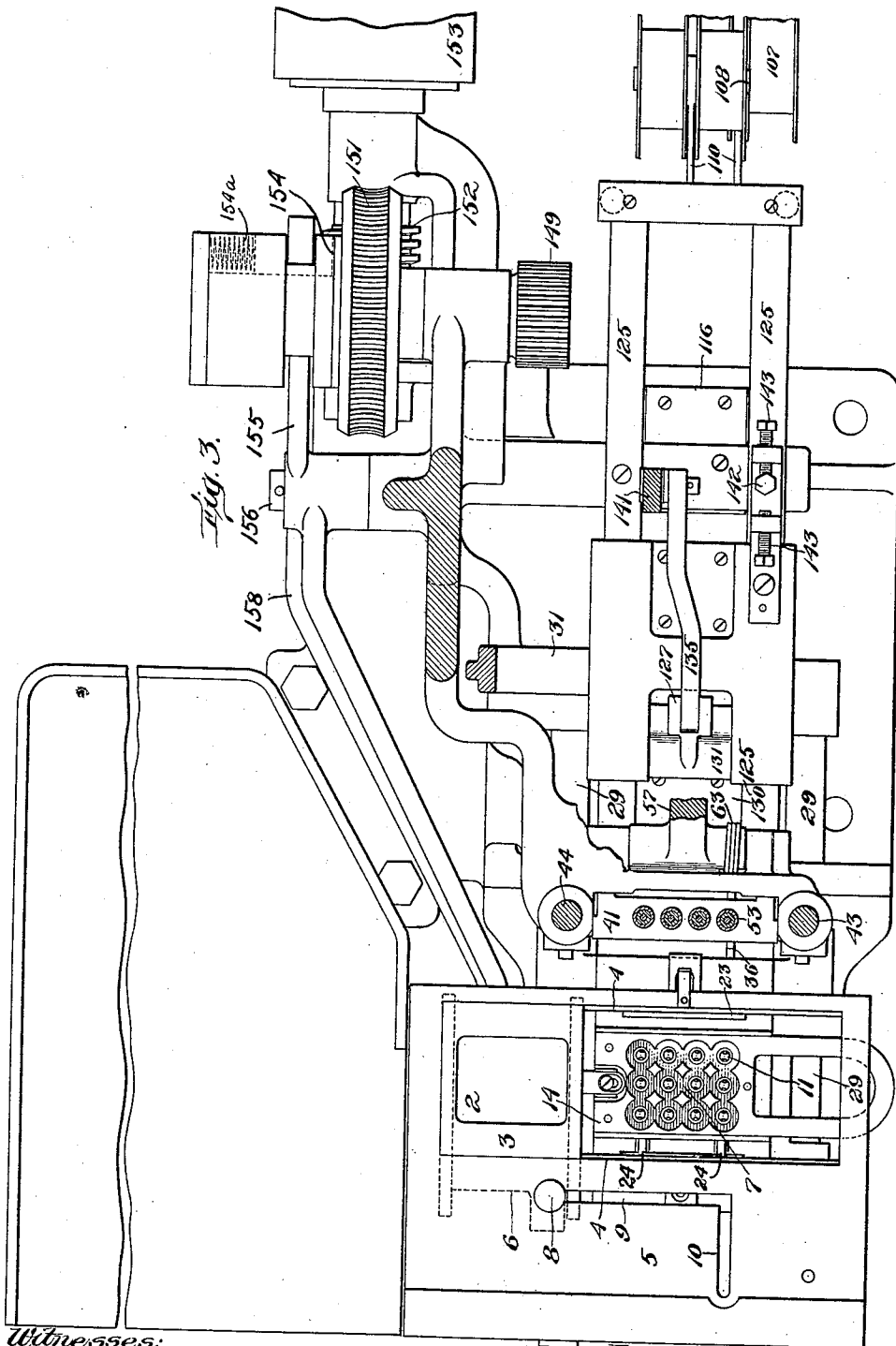


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Witnesses:
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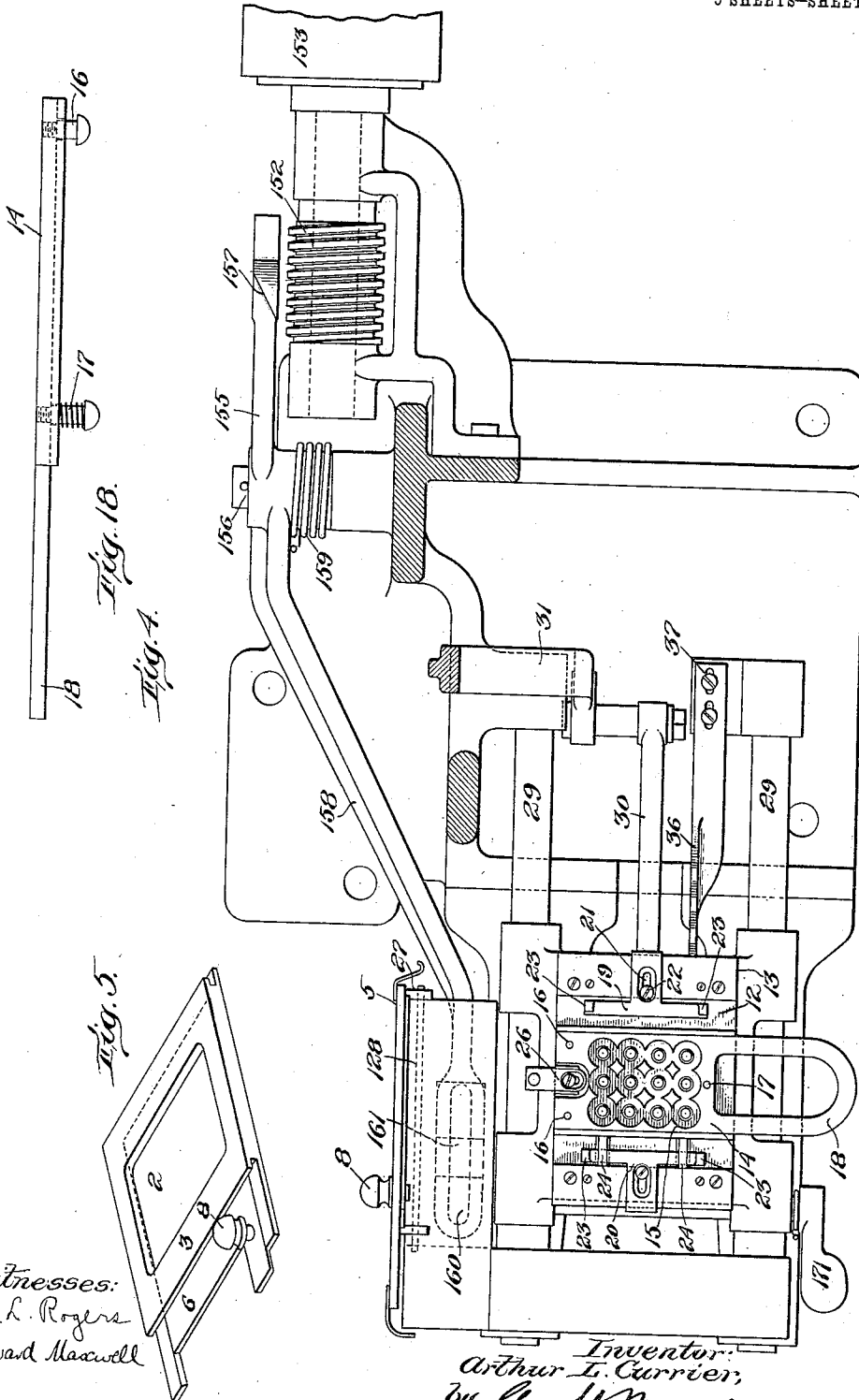
Inventor:
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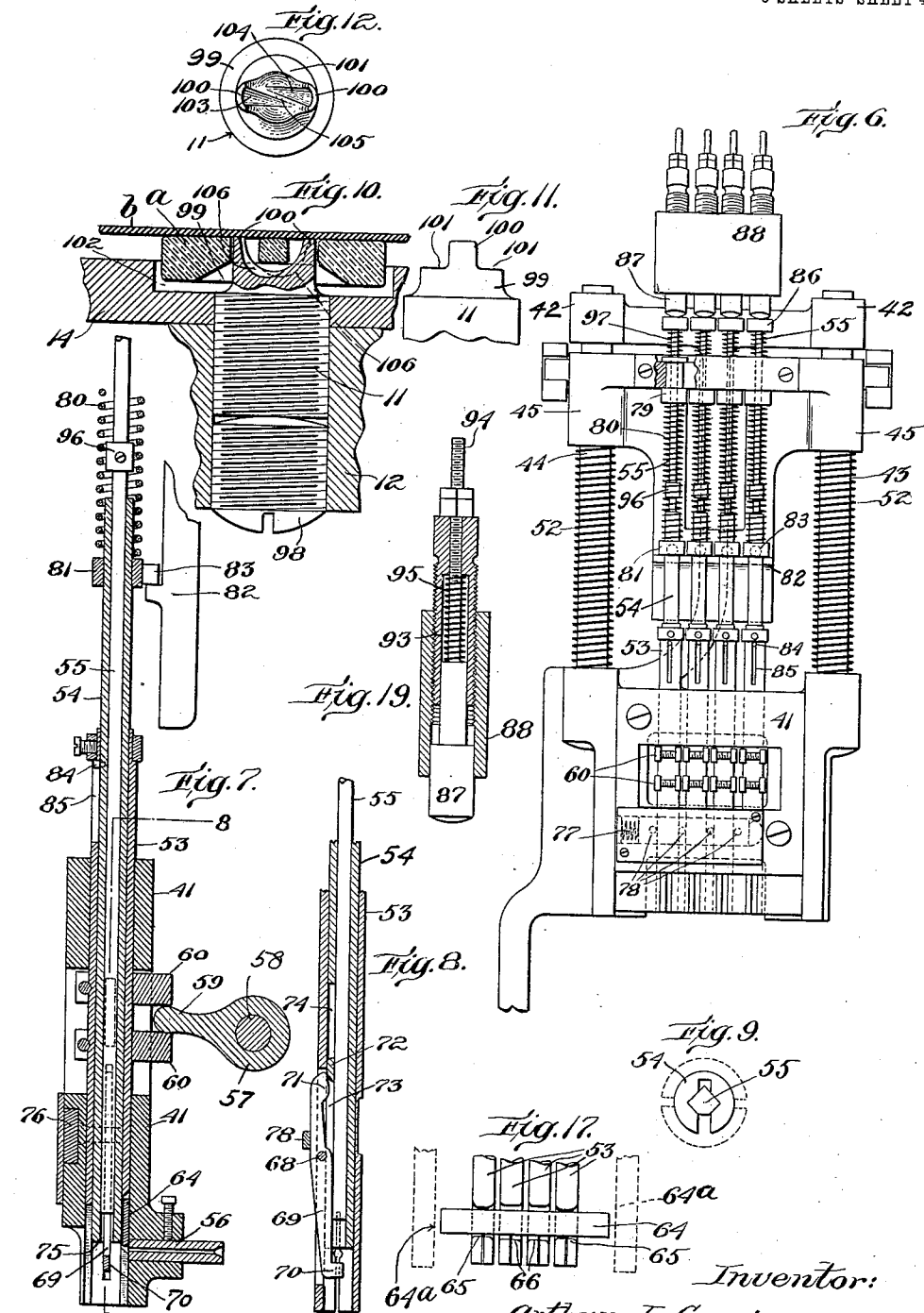
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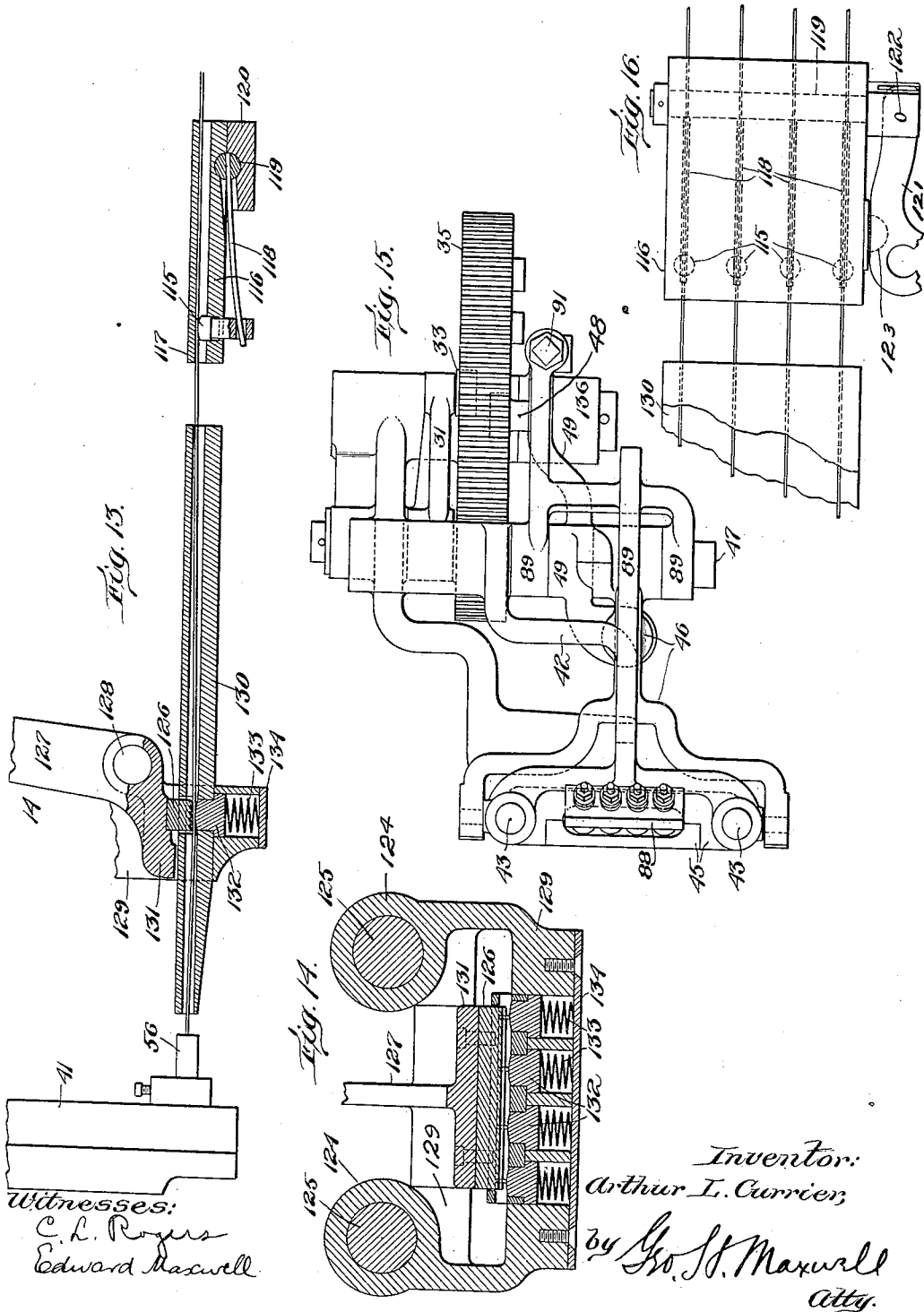
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

ARTHUR L. CURRIER, OF NEWTON HIGHLANDS, MASSACHUSETTS, ASSIGNOR TO J. W. MOORE MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

BUTTON-CARDING MACHINE.

1,055,523.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed October 20, 1911. Serial No. 655,794.

To all whom it may concern:

Be it known that I, ARTHUR L. CURRIER, a citizen of the United States, and resident of Newton Highlands, county of Middlesex, State of Massachusetts, have invented an Improvement in Button-Carding Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to machines for carding buttons and like articles, and while certain of the features thereof have other and more general fields of usefulness, the mechanism as a whole is especially designed for forming button cards of the type shown in my Patent No. 981,537, January 10, 1911.

The present machine, like its predecessors, provides means for automatically forming the wire staples which secure the buttons to the cards, and for rapidly inserting said staples and fastening the buttons to the card thereby but has many features of advantage and novelty whereby it is enabled to handle the most uneven and frail pearl buttons (for example) without danger of injury to the buttons and yet at high speed and with certainty and accuracy of stapling. In the first place, mechanism is provided
30 whereby there is no pressure on the button, either when inserting the staple or when clenching it. In the next place, means is provided for so holding the card, staple and button that the card and staple are together
35 before the card and button are engaged or at least in intimate contact with each other. In the third place, the clenching of the staple or fastener is effected independently of the button, *i. e.*, the button structure is
40 not relied upon to aid in bending the wire. This is preferably effected by giving the staple legs a forward clenching impulse in a direction from the card buttonward and outward therefrom against a relatively station-
45 ary anvil, as distinguished from giving the staple legs a clenching impulse or blow on their ends in a direction toward the button and card (as heretofore). I depend upon the staple, as its clenching is being
50 completed, to draw the button to the card, as distinguished from relying upon the button as a resistance to the stapling pressure (as heretofore).

The great advantage of all the foregoing
55 points or features is that the machine is in

no way dependent upon the button as an aid to the mechanism or to any operation, but operates with equal precision and deftness or delicacy on a thin and split button or a thick, strong button or a true regular
60 button.

Besides the above, my machine is distinguished in delivering the buttons beneath the card, in supporting the card above the button, in having a horn which holds up
65 the button in right relation to the staple, (said horn preferably constituting also a means for supporting the card free from the button), in having means to turn the ends of the staple legs independently of aid
70 from the button (and preferably so that the bending legs or ends thereby lift the button into place), in having means, like an anvil, which passes the leg-ends by each other so as not to interfere with each other, in hav-
75 ing means for driving the leg-ends of the staple through the card (gaining a good frictional grip in the card) before they engage the anvil or pass through the button, and in having a special wire feeding and
80 staple forming mechanism and card feeding and button placing mechanisms capable of properly coöperating with the aforesaid.

The invention will be better understood from the following detailed description,
85 taken in connection with the accompanying drawings, wherein a preferred embodiment is illustrated, and the features of novelty including all the above mentioned and various others will be thereafter pointed out in the
90 appended claims.

Referring to the drawings: Figure 1 is a side elevation of my improved machine. Fig. 2 is a detail view better showing certain of the operating levers shown in Fig. 1.
95 Fig. 3 is a plan view of the apparatus. Fig. 4 is a horizontal section approximately on line 4—4 of Fig. 1, showing certain of the operative parts in elevation. Fig. 5 is a detail showing the construction of the tray
100 slide for arranging the buttons. Fig. 6 is a front elevation showing the gang of operating plungers. Fig. 7 is a vertical sectional view showing the internal construction of one of said plungers. Fig. 8 is a fragmentary detail section on line 8—8 of Fig. 7.
105 Fig. 9 is an end view of a plunger. Fig. 10 is an enlarged detail showing one of the anvils in elevation and the surrounding parts in section. Fig. 11 is a fragmentary
110

view of an anvil at right angles to Fig. 10. Fig. 12 is a plan view of the anvil shown in Fig. 10. Fig. 13 is a longitudinal sectional detail showing the wire feeding mechanism. Fig. 14 is a vertical transverse section through the part 132 of Fig. 13. Fig. 15 is a partial plan view of the apparatus showing more especially the arrangement of operating levers, Fig. 16 is a detail of a wire tension device. Fig. 17 is a fragmentary detail showing the manner of mounting of the wire cut-off knife, Fig. 18 is a detail elevation of the stripper plate, and Fig. 19 is a detail sectional view of a yielding connection for operating the setting spindle.

For convenience of description and clearness of presentation, I will describe my invention in the specific embodiment of the machine in the drawings, but wish it understood at the start that, although I mention all the details of mechanism and operation, I do not intend to limit the invention thereto, as in many respects it is broadly new, as already stated, and the range of mechanical embodiments is correspondingly large.

The buttons to be carded are supplied from any suitable source shown as a tray-table 1. A shallow tray-space 2 is formed in a tray-slide 3 of a size to receive the desired number of buttons in regular arrangement, the particular form shown being adapted for three rows of four buttons each. This tray-slide 3 is mounted on suitable ways 4, 4 formed on a top plate 5, to slide transversely of the apparatus and its bottom 6 extends under said plate 5 and is separately slidable transversely of the direction of tray movement to permit opening of the bottom of the tray, when it is desired to deposit the complement of buttons therefrom. The tray-space 2 being filled with buttons in regular alinement with bottoms up, the tray is slid transversely of the apparatus so that the buttons are positioned over an anvil space 7 arranged so that the series of anvils carried thereby are in alinement with the individual buttons. To effect this cross-wise sliding of the tray a button or knob 8 is fixed to its bottom 6 and extends up through a transverse slot 9 in the large plate 5, this slot having at its inner end an extension 10 at right angles thereto. Thus, as the knob is moved along the slot 9 the tray with its load of buttons is brought directly over the anvil space 7, this occurring just as the knob reaches the end of the said slot, then, by a further movement of said knob along the length of slot 10, the bottom 6 of the tray is withdrawn, and the several buttons are deposited each on its anvil 11. As shown more particularly in Figs. 10-12, each anvil 11 is of cylindrical form with a reduced top which carries, preferably integral therewith, a horn formed with opposite prongs adapted

to enter the thread holes of the buttons and if, as the buttons are thus deposited on the anvils, certain of the buttons do not at once fit down over the horns, they may be caused to do so by slight manipulation on the part of the operative. The anvils 11 are set in a heavy plate 12 constituting part of a slide carriage 13 and their upper portions are surrounded by a stripper plate 14 having individual button sockets or pockets 15 around each anvil. The plate 14 is mounted on the slide carriage 13 with a capability of tilting movement, being loosely held in place by screw bolt connections 16 and a spring pressed connection 17. This plate extends to one side of the machine, as seen at 18, and is there cut away to enable the card to be readily removed and to afford a convenient handle for tilting the plate as required to remove the buttons from the anvils after they have been affixed to the card.

The cards to which the buttons are to be affixed are laid on the ends of the anvil-horns over the backs of the buttons as thus deposited on their anvils and to insure the proper placing of the cards with reference to the buttons, positioning brackets 19, 20 are arranged at either side of the anvil space, these being adjustable toward and from each other by means of elongated slots, 21, through which pass screws 22 into the slide carriage so that they may be clamped in proper position with reference to the anvil space and the particular cards to be used. These brackets have upstanding ears 23 at their extremities with which the cards engage, and the bracket 20, with which it is designed that the card be first engaged, has also coöperative therewith inwardly extending guiding projections 24. To further insure the proper positioning of the button card, the rear edge of the plate 5 has depending therefrom a light leaf spring 25 with a rounded lower end adapted, as the slide carriage moves forward, to drag on the card and shift it slightly if not already properly positioned and to press the card down into place. An adjustable end-positioner 26 may also be provided to determine the endwise position of the card. In order to permit convenient inspection and adjustment of the parts just described, and also in some cases to aid the removal of the carded buttons, the large plate 5 carrying the tray-slide is adapted to be swung up to uncover the same, as seen in Fig. 4, for this purpose having ears 27 pivoted on an axis 28 close to the side of the framework. The buttons thus assembled on their respective anvils, with the card to which they are to be affixed held in proper relation thereto, are now moved to the fastener forming and securing mechanisms, or, as herein shown, underneath the plunger or plungers to receive the securing staples.

My invention is not limited as to the number of staple setting plungers to be employed, but in the preferred embodiment shown, a line of such plungers corresponding in number, *i. e.* four, to the number of buttons in each line is employed and the slide carriage is moved step by step to bring the successive lines of buttons underneath the line of plungers. To effect this the slide carriage 13 is mounted to operate on parallel guide rods 29 fixed to the framework and is connected to an operating link 30 from a lever 31 fulcrumed at 32 on the machine framework and having its other end provided with a roll 33 operable in a cam groove 34 on one side of a main driving wheel 35 to be later described more fully. The cam groove 34, as shown, has alternating concentric and stepped portions, these being proportioned and arranged so that the first step portion 34^a brings the first line of buttons into register beneath the plungers, while the succeeding step portions 34^b, 34^c operate the lever 31 just enough to position the successive button rows beneath the plunger line. After the carriage is thus advanced, so that the last button row has been acted on by the setting plungers the carriage has a dwell as the roll 33 passes through the concentric portion 34^d of the cam groove and is finally returned to initial position by the inwardly directed portion 34^e. To insure further accuracy in the positioning of the successive rows of buttons exactly beneath the plunger line, especially as the driving parts become worn, a plate 36 is adjustably fixed to the framework at 37 and pressed upward by means of a stout spring 38 so that the three notches or dwells 39 in its outer end, which is turned edgewise, successively engage the shaft pin 40 on the bottom of the carriage slide which co-operates therewith as a holding detent, this detent, when seated in the successive notches exactly positioning the respective rows of buttons beneath the line of plungers.

The guide support for the plungers designated generally 41 is fixed to the main framework and is provided with an upright projection 42 carrying spaced apart guide posts 43, 44, on which is suitably guided a cross-head 45 for operating all the plungers. This crosshead is itself operated by a lever 46 pivoted at 47 and operated by a roll 48. This lever is broken or made in two parts, shown in Fig. 2, so that its operating extension 49 only moves it positively in one direction, *i. e.*, to force the crosshead 45 downward, there being a flexible connection 50 between these lever portions so that the lever arm 46 is yieldingly lifted by the lever arm 49. The arm 49 has a controlled movement imparted thereto by said roller 48 thereon operating in a cam groove 51 on the face of the wheel 35 opposite the groove 34. Coil

springs 52 around the posts 43 and 44 extend between the support 41 and the cross-head 45 to support the cross head and parts carried thereby and aid in the lifting thereof. Each operating plunger consists of three parts, *viz.*, an outer sleeve 53, an intermediate sleeve 54, and a central spindle 55, and as all the plungers are alike the following detailed description of one applies to all. The outer sleeve portion 53, which serves to cut off the wire as it is fed through the wire guiding aperture 56 in a manner later described and also coöperates with the intermediate plunger in the bending operation, is controlled primarily from a lever arm 57 fulcrumed at 58 with short extensions 59 for each spindle at one side operating between lugs 60 fixed on the sleeve 53. The operating portion of the arm 57 extends out adjacent a side of the cam wheel 35 where it is formed with a bent portion 61 adapted to be successively engaged by three spaced apart roller pins 62 on the wheel 35 to be lifted against the tension of a spring 63 coiled about its fulcrum, and thus cause the sleeve 53 to be forced down. This forcing down of the sleeve 53 of each of the plungers causes a knife plate 64, slidably guided in the support 41 and engaging insets in the respective sleeves 53, to be forced downward close across the end face of the wire guiding tubes to shear off the wires which have been fed therethrough to a predetermined extent by the automatic feeding mechanism to be described.

As seen in Fig. 17, the knife plate 64 fits the insets 65 in the two outer sleeves quite closely so as to receive operative movement therefrom, the engaging walls of these insets being convex to permit a self-adjustment of the sleeves relative to the knife plate and allow for uneven seating of the sleeves. The insets 66 in the two middle sleeves through which the knife plate passes may be considerably enlarged, as shown, since engagement by the outer sleeves is sufficient to impart operative movement to the knife plate. The knife plate 64 is unrestrained as to endwise movement so far as its operating sleeves are concerned and is loosely held for a limited endwise play between abutments 64^a formed on the guide support 41. The purpose of this arrangement is to permit the knife plate to have not only a self-adjusting movement relative to the sleeves which move it, but also a small endwise play so that fresh cutting surfaces are continually and automatically brought into action as the knife plate works back and forth between its limits of movement in action. The operating arm 57 is formed just beyond its curved-in portion 61 with a track-way 67 formed and arranged to permit the roller pins 62, after having operated the lever arm, to pass therethrough and the

direction of this track-way is such that during such period of passage the lever arm 57, and thus the outer sleeves, are held stationary during which period the intermediate sleeve coöperates therewith in a manner now to be explained to form the staple. Each outer sleeve 53 has pivoted thereto near its lower end at 68 an anvil lever 69 having a turned-in anvil portion 70 adapted to extend in at right angles and quite closely under the wire as fed in through the wire tube 56. This anvil lever extends up some little distance beyond its pivot 68 and its upper extremity is formed with a cam head 71 adapted to be engaged by a cam face 72 formed on the intermediate spindle between lengthwise slots 73, 74 therein. The wire having been fed by the automatic feeding mechanism in through the feed tube 56 to an extent so that after being cut off it extends equally at each side of the anvil 70, and the knife plate 64 having been moved for its described cut-off operation, the intermediate spindle is caused to descend by impulse from the crosshead 45, the cam face 72 on the intermediate spindle engaging the cam head 71 on the anvil lever to hold the anvil in operative position. Further movement of the intermediate sleeve brings its lower end down over the anvil 70, which end has longitudinal grooves or corners 75, into which the extremities of the wire are closely drawn by the downward movement of the sleeve 54 over the anvil 70 so that the severed piece of wire is thereby bent into a U-shaped staple around the anvil with the staple retained in the mouth of the intermediate spindle 54 and with the points extending downward in the corners 75 of the spindle aperture. Upon the completion of this bending operation the intermediate spindle 54 has moved far enough down so that the cam face 72 has passed beyond the cam head 71 into line with the slot 74 and the anvil lever is now free to swing in a direction to move the anvil outward out of operative position. As it is necessary that the anvil move out of the path of the intermediate sleeve 54 and inner spindle 55 in their further movements, means is provided to insure the swinging of the anvil lever 69 to effect this result. To this end a slide plate 76 is mounted in the guide support 41 and is urged for transverse movement by a spring 77 pressing against one end thereof. This plate carries a series of projecting pins 78, each adapted to engage one of the anvil levers 69 above its pivot and, as the anvil levers which are carried by the outer sleeves move downward therewith in the seating movement of the sleeves, it will be seen that the pivot points 68 move away from these pins so that they exert an increasing leverage on the anvil levers to insure the movement of the anvils out of the way. This

special position and relative arrangement of the spring pressed pins 78 with reference to the anvil levers 69 is of further importance when the parts are being returned to initial position after an operation in that it provides an arrangement whereby, when the cam heads 71 are engaged above the cam faces 72, *i. e.* in the slots 74, the spring pressed pins 78 engage the lever arm near its top so as to hold the same pressed in with some little force and insure the drawing up of the outer sleeve to its upper limit of movement along with the intermediate sleeve. The outer sleeve having reached its upper limit of movement as determined by engagement of the upper stop 60 with the support 41, the cam head 71 rides over the cam face 72 in the further upward movement of the intermediate sleeve 54, thus restoring the parts to the position shown in Fig. 8 with the spring pressed pins 78 back near the pivots 68 where they exert comparatively little influence on the anvil levers to resist their return to active position. The yielding pins 78 and shifting position with reference to the lever pivot, etc., constitute a simple means for insuring durability and accuracy.

As the described movement of the intermediate spindle 54 for forming the staple to U-shape around the anvil 70 is being completed, the outer sleeve 53 is released for further movement downward by the passage of a pin 62 out of the runway 67 of the lever 57 so that the intermediate and outer spindles now move on down together until both seat on the button card, (which as before explained is supported on the horns of the anvils 11, which thereby prevent any pressure of said sleeves 53, 54 coming on the buttons) the anvils 70 having in the meantime been moved out of the way as described. This downward seating movement of the intermediate and outer sleeves is effected by downward movement of the crosshead 45 acting through collars 79 upon coiled springs 80 which press upon collars 81 fixed to the intermediate sleeves 54 so that the downward seating movement of the sleeves is effected delicately by yielding pressure, thus permitting the sleeves to seat properly and with substantially equal pressure irrespective of the varying thicknesses of the buttons and without danger of injury to fragile buttons. The crosshead 45 effects the subsequent lifting of the sleeves after the staple driving operation by a ledge or lifter 82 thereon engaging a lug 83 on the intermediate sleeve 54 shown as formed with the collar 81. The intermediate and outer sleeves are held from relative turning by a pin 84 in the intermediate sleeve engaging an elongated slot 85 in the outer sleeve.

Upon the completion of the described downward movements the plunger sleeve or

spindle 54 holds the staples presented against the card in position to be forced through the card and passed through the holes or eyes of the buttons and turned over the intervening necks or cross bars of the buttons so as loosely and delicately to embrace them by being pressed downwardly past the buttons on the anvil heads. To effect this operation the central driving spindles 55 are now moved downward through the intermediate spindles 54 to force the staples therefrom through the card and against the anvil faces to turn the free ends of the spindle legs in around the bars or cross pieces between the eyes of the buttons. These driving spindles are forced downward by having their heads 86 engaged by yielding presser rods 87 Figs. 1, 6, 19 carried by a head 88 on an arm 89 pivoted on the axis 47 and having an operating extension 90 extending back of said axis with an adjustable screw bolt 91 passed therethrough to engage an inward extension 92 of the lever arm 49. Thus the driving spindles are operated from the same source, namely the cam roll 50, which moves the sleeves downward for the seating movement, but their operating connections are arranged so that their operative movement does not begin until the sleeves are seated upon the card. The presser rods 87 are adjustably mounted in the head 88 by means of sleeves 93 threaded in said head guiding reduced extensions 94 of the presser rods, there being interposed springs 95 between these parts, so that the driving spindles, though pressed forward with a substantially positive movement, have a certain amount of yield and thus they are always moved just to the end of the intermediate sleeves 54 whatever the position of these sleeves may be for different thicknesses and sizes of buttons, this limiting position being determined by stop collars 96 on the driving spindles which engage the tops of the intermediate sleeves at the proper point. The driving spindles 55 are returned from operative position to initial position by springs 97 interposed between the heads 86 thereof and the top of the crosshead 45.

I now come to a leading feature of my invention which coöperates with the mechanisms already explained to make possible the rapid, careful and accurate fastening of the buttons on the cards and yet without any danger of breaking the buttons. Also whereby the buttons, although properly secured, are so lightly held that they may be readily pulled from the card and from the holding wires without danger of tearing the card or of breaking the button, even though the latter may be frail.

Referring particularly to Figs. 10, 11 and 12, each of the anvils 11 is preferably formed of a threaded cylindrical shank set

in the carriage plate 12 and is adjusted to proper operative position in said plate for the particular buttons to be carded and locked in position by a backing set screw 98. The operative top portion of this anvil *i. e.* the anvil proper is reduced as seen at 99, and provided with an upstanding portion which is cupped and cut out to form the anvil or bending portion above which are opposite narrow upright prongs 100 constituting a horn for receiving and supporting the card free from the buttons. A flat peripheral surface 101 is preferably provided adjacent the anvil, and, as shown, integral therewith, to afford a proper seat or positioning support for the buttons. As seen in Fig. 10, an ordinary button *a* is seated on the anvil resting on the flat peripheral surface 101, as described, and setting down into a recess 102 therefor in the stripper plate 14.

By having the card on top of the buttons or, in other words, the buttons beneath the card, I utilize the force of gravity or the weight of the subjacent buttons in aiding the delicacy of engagement between the buttons and the staple-ends or wire fastener, inasmuch as, when the fastener is forced through the card, the button itself is under no tendency to press against the card nor to receive pressure from the staple and staple forming and driving mechanism, but on the contrary the button tends, by the force of gravity, to pull away, as it were, from the card. When the staple has been driven almost into holding place or position, the staple-ends are then deftly bent toward each other and caused to grasp and lift the button against the card, as will presently be described. The fact, therefore, that the buttons are placed beneath the card so that gravity tends to move them or hold them away from the card, as distinguished from tending to bring all their weight upon the card (as would be the case if they were on top of the latter), causes the dead-weight of the buttons to resist the lifting influence of the wire-ends and therefore constitutes one feature toward the delicate handling and protection of frail buttons.

The staples as formed by the coöperative action of the plunger sleeves described, and held in the corners 75 of the square hole in the end of the intermediate sleeve 54, and have their ends exactly positioned and spaced apart just the proper distance so that, as they are forced through the card *b* by the driving spindles 55, they engage within the prongs 100. To provide for the proper guidance of the staple ends after they are passed through the card and the button, so that they shall be turned over and closely folded against the button but without pressure on the button, and also to

insure that the two ends shall be guided past each other so as not to meet and be mutually blocked and thereby be in danger of buckling or bending improperly against the button, the inner sides of the prongs 100 are milled out to form guide grooves 103, 104. These grooves lead from the top of each prong down through the cupped out portion and past the center the two grooves passing the center with an intermediate rib 105 between them so that each leg end of the staple is guided past the other without any liability of the ends meeting disastrously as explained above. To insure a proper clearance space for the wire ends as they are folded around over the center of the button, the grooves 103, 104 are deepened at the bases of the prongs 100, as seen at 106, so that there is a way always provided for the movement of the wire ends to bend around the center of the button no matter what type of button may be in hand. A further important function of this special mechanism is that the upstanding prongs 100 insure proper registered position of the buttons relative to the setting plungers so that the staple ends after passing through the card are in exact alinement with the holes in the buttons so as to pass straight down through the same. But the most important function of this mechanism is that the buttons are thereby relieved of strain. This is extremely important in certain classes of pearl buttons in which the buttons are far from uniform and the centers of the buttons which contain the eyes are exceedingly fragile. These buttons are cut from fresh-water shells and are apt to be irregular in thickness, sometimes verging down to a thin edge at one side from a thick edge at the other side, and sometimes the center chips away to an exceedingly thin cross bar or bridging portion when the eyes are drilled. Yet it is essential in the machine carding of such pearl buttons that the machine shall handle all the buttons with a delicacy which is safe for the frailest of the buttons so that none of them shall be broken when presented to the machine. Accordingly this delicacy is attained in my machine largely by the following features.

The staple (or, as will later be explained, whatever kind of relatively stiff but readily yieldable filamentous device or wirelike holder is employed) is made at the back of the card and presented to the imperforate card and forced through the card, thereby getting all the gripping resistance and co-operative support of the card, but without bringing any pressure or strain whatever on the button because the card is supported, not by the button, but by the horn above the anvil whose prongs 100 enter the button eyes and present their stub ends against the front side of the card around the points or

spots through which the staple-ends are forced, whereby said prongs take all the pressure of this staple forcing movement and relieve the button entirely of said pressure. The grooves in the prongs of the horns receive the ends of the staple-legs so that, notwithstanding the fact that said legs have been shoved downward with sufficient pressure to force them through the card, they cannot engage the sides of the button-eye nor strike against the button in any way whatever, because they are housed and guided or directed along said grooves down through the centers of the button-eyes. Then the anvil comes into play and cooperates with these prongs in folding the staple-ends across the bridging cross-bar of the button which is between the eyes, and it accomplishes this folding or deflecting of said ends into the desired embracing position with relation to the button, without the possibility of any pressure coming against the button, because the pressure on the staple wire is in a direction away from the face of the button as distinguished from being toward the face of the button. Moreover the card, by reason of the foregoing arrangement of mechanism, is utilized as a cushion-support for the staple. This is in distinction from having the staples put through in the opposite direction, for instance, in which case the staple would come directly against the cross bar of the button and the legs of the staple would have to be bent against the back of the card, which would necessarily result in pulling the body of the staple hard against the button under the influence of whatever strain or deflection of the staple legs might be brought against their ends behind the card. Instead of this, I bring the body of the staple behind the card, and hold the card on the stub ends of the prongs rigidly against any tendency which might otherwise be present to pull the card hard against the button under the clenching operation and I accomplish the clenching of the staple, not by moving a plunger toward the face of the button to jam or crush the staple legs down against the button, but by providing a guide-way or grooved path for said legs in the stationary anvil and then continuing the forward movement of the staple from the back of the card so that as the legs are moved downward and forward in a direction away from the face of the button, said movement causes them to cooperate with the grooved path or paths in assuming the required embracing positions, said leg ends being preferably bent toward each other. Preferably also this movement is continued to a sufficient extent to cause the staple end or ends of the legs thereof to hug against the cross bar of the button sufficiently to pull the button up relatively tightly against the card. The

fact that the grooves are right and left or out of line with each other facilitates this result without in any way endangering the button. According to my invention, the staple has pierced the card before engaging the prongs of the supporting horn. Also, the buttons do not rest on the card nor the card on the buttons, but they are brought together by the inward pulling bending of the staple under its outward impulse or propulsive movement. This prevents any dangerous pinching of the button or any possible lack of uniformity of engagement. The pressure that clenches the staple is applied behind the card in a direction away from the face of the button. The horn (or, as herein shown, the prong extensions from the anvil) has five functions, axially maintaining the button in right relation to the staple, supporting the card, turning the ends of the staple so as to lift the button, delivering the ends of the staple to an anvil in such position as to pass by each other so as not to interfere with each other or with the button, and guiding the wire ends in a direction from the ends of the prong and thence lengthwise thereof through and about the button.

As explained, it is essential that the wire be intermittently fed in precisely the right lengths and at exactly the proper times to the several staple forming plungers and to this end I provide an automatic wire feeding mechanism operated in timed relation to the rest of the machine and in the preferred embodiment shown, having its operative impulse imparted from the wheel 35. The four wires for supplying the respective plungers are drawn from reels 107 suitably mounted on the framework, there being two of these reels side by side on an upper axis 108 and two lower ones on a lower axis 109, the supports for these reels being shown as brackets 110 projecting outward from the framework. These reels are relatively arranged laterally so that the respective wires as drawn therefrom are properly spaced apart and these wires first pass through an initial tension device composed of a fixed block 111 supported from the framework and slidably guided blocks 112 pressed up against the fixed block by springs 113 adjustable by means of nuts 114 threaded on the guide pins of said blocks. The wires are thence drawn through a further individual tension device so that a substantially uniform tension is imparted to each. This tension device consists of a series of pins 115 with friction heads, one for each wire, slidably transversely through a lower wire guiding plate 116 and pressed upward to push the wire against an upper wire guide plate 117 with the desired friction grip by spring arms 118 fixed to a rock shaft 119 journaled in a fixed block 120.

The rock shaft 119 is held in position to place the proper stress on the springs 118 by means of an arm 121 pivoted thereto at 122, this arm engaging over a fixed lug 123 when the friction pins are to be held in operative position, and the arm 121 being adapted to swing on its pivot 122 so as to be disengaged from its holding lug 123 when it is desired to turn the shaft 119 to relieve the pressure on the pins. The wire gripping and feeding devices are mounted on sleeves 124 slidable on spaced apart horizontal rods 125, the immediate wire gripping jaw 126 being carried by an arm 127 pivoted at 128 to an extension 129 depending from sleeves 124. The depending extension 129 carries a wire guide 130 extending for most of the distance between the tension devices and the receiving tubes 56. The gripper carrying arm 127 is extended beyond the gripper 126 and formed with a toe 131 which is adapted to come into engagement with the top of the wire guide 130 and limit the gripping movement so that the teeth of the gripper 126 can only bite into the wire to the desired extent. Mutilation of the wire by the gripper teeth is further avoided by the use of spring pressed backing blocks 132 oppositely arranged to serve as backings for the respective wires opposite the points where they are engaged by the gripper 126. These blocks are slidably guided in recesses formed at the base of the extension 129 and are pressed upward by springs 133 held in place by a backing plate 134. Driving movement for reciprocating the slide 124 and simultaneously swinging the arm 127 to grip the wire is imparted through a link 135 connected to one arm of a bell crank lever 136 pivoted on the shaft of wheel 35, and having its other arm connected with a link 137 pivoted at 138 to the extremity of the lever extension 92. The movement of this lever extension is greater than is usually required for effecting the desired wire feed and to regulate the amount of motion transmitted, the link 137 has an elongated slot 139 in which plays a pin 140 on the bell crank lever 136, the extent of play of the pin in the slot being regulated by a screw bolt 141 adjusted through the end of the link to extend into the slot a greater or less extent. The extent of feed is determinable with exactness by means of a stop pin 142 fixed to rod 125 and engageable at either side by stops 143 threaded through a bracket 144 fixed to the slide sleeve 124 so that the extent of movement of the slide sleeve can be quickly determined with precision by adjusting these threaded stops. To take up any excess movement of the operating link 135 after the feed slide has been positively stopped by these stops, the arm 127 has a yielding connection with the link 135 constituted by a pin 145 thereon

operating in an elongated slot 146 in link 135 against a stiff spring 147, whose tension is determined by an adjusting screw bolt 148. The extent and timing of the wire feed can thus be determined and regulated with the utmost precision for proper co-operation with the staple forming and setting plungers.

Since the machine proceeds automatically to perform its several operations, forming the staples and securing the buttons to the card for each card after being started, it is desirable that the driving mechanism be arranged for operative connection throughout a complete cycle of movements and then automatically disconnected until again started by the operative, and to effect this result a clutch and stop mechanism is provided, of which the particular form shown is an illustrative embodiment. As shown, the main driving wheel 35 has a toothed periphery which is engaged by a pinion 149 on a shaft 150 having thereon a worm wheel 151 driven by a worm 152 fast on a shaft with the initial driving pulley 153. The worm wheel 151 is loose on shaft 150 and adapted to be connected therewith by a usual sliding pin and collar connection indicated at 154, the pin being normally held in clutching connection by a spring 154^a. As a means of controlling this connection a lever 155 Figs. 1 and 4 is pivotally mounted at 156 on the framework and provided with an inclined cam face 157 adapted, when raised up into the path of the clutch pin, to withdraw the same and so disconnect the worm wheel 151 from its connection to operate the machine. The lever 155 is extended out to the front of the machine, as seen at 158, and a coil spring 159 is mounted on its axis arranged by its tension to counterbalance the excess weight in the long arm 158, so that the lever, when released, will move so as to cause the cam face 157 to move downward out of position for engaging the clutch pin. The forward end of this lever has an elongated slot 160 to which a block 161 is adjustably fixed, having at its front end a vertical face 162, and at its rear an inclined cam face 163. The slide carriage 13 carries a somewhat similar block 164 fixed on a rock shaft 165, this block having a forward inclined face 166 and a rearward vertical face 167. An upward extension 168 rigid with this block engages a stop 169 on the slide carriage and a coil spring 170 is connected to urge this extension against this block so as normally to hold the block 164 in the position shown in Fig. 1. The shaft 165 extends across the machine and at the side opposite the blocks 161, 164 is provided with a hand lever 171, this hand lever thus being at the front side of the machine for convenient operation.

In use, the operative having filled the tray-space 2 with buttons arranged in rows

and bottoms upward, moves same over the anvils and then sliding the knob 8 through the slot 10, the bottom of the tray is removed and the buttons deposited on the respective anvils which are properly spaced to receive them, and by slight manipulation the buttons are fitted on the anvils so that the prongs of the horns extend up through the button eyes in each case. The button card is positioned in its holding members over the buttons and supported on the ends of the horns ready to receive all the carding pressures, and the machine is ready for operation. The operative now lifts the hand lever 171, swinging the block 164 to the left, as seen in Fig. 1, enough so that its edge 167 clears the edge 162 of block 161, thus permitting the lever arm 158 to rise and to lower the cam face 157 out of engagement with the clutch pin. Driving connection is thus established from the worm wheel to the shaft 150 and thence to the main controlling wheel 35 so that the entire machine is started into action. The slide carriage 13 is first advanced to bring the first row of buttons underneath the setting plungers which thereupon, having their several parts actuated by the levers 57, 46 and 89, shear off the wire accurately in length and evenly, bend it into staple form and force its evenly severed ends through the button card to be projected into the guide grooves 103 and 104 of the staple guiding and bending horn-supports, whereby it is bent and closely pressed against the center webs of the buttons. The plungers are thereupon retracted and the operation repeated as the slide carriage is advanced to bring the successive button rows into alinement underneath the setting plungers. After the last row of buttons has been fastened, *i. e.*, as herein shown, and preferably stapled to the card, the roll 33 enters the portion 34^e of its controlling cam and the slide carriage is quickly returned to initial position, the latter part of this movement causing the inclined face 166 to engage the incline 163, thus forcing the lever arm 158 downward and projecting the cam face 157 again up into the path of the clutch pin, so that the driving connection is again broken. It is to be observed that in this operation the block 164 is held rigid for coöperation with the face 163, because the projection 168 engages the stop 169. On the other hand, as the slide carriage advances on its forward movement, the block 164 rides over the block 161 merely turning it against the tension of the spring 170.

From the foregoing it will be understood that my machine is capable not only of carding the buttons rapidly and automatically but without danger of breakage. This is one of the chief objects of the invention. The frail fresh-water-pearl buttons can be secured to the cards without liability of break-

ing out the center, even though any particular button may be very thin, chipped or slender at that point. This is of prime importance to the manufacturer because the breakage of a single button necessarily throws out the entire card (in power carding), requires sorting, much hand-work, etc. I provide means for forcing the wire through the card first, this being of practical importance in causing the wire to cling and hold or remain in the card when the button is subsequently pulled off. I provide means for maintaining the wire out of pressing contact with the button while its end or ends are being bent or deflected laterally at the face side of the button for holding the button on the card.

My machine contains means for bending or deflecting the wire adjacent the face of the button but without using the button as the anvil or fulcrum over which the wire is bent or against which it is crushed or forced. Means is provided for fastening the card and button together without pressure of one against the other, as distinguished from pressing them together in the process of putting the fastening device in place and securing it. Mechanism is provided for causing the wire to pierce the card before engaging the horn, anvil, or button. The button is brought against the card by means of the wire instead of being pressed against the card as a means of supporting the wire-placing mechanism. The pressure that bends the wire (*i. e.* clenches the staple in the preferred embodiment of the invention here presented) is applied behind the card in a direction away from the opposite side of the card and from the face of the button, and not in a direction toward the button and the card behind it. The card is on top of the button in the carding operation, as distinguished from having the button on top of the card, as heretofore. This is of very decided practical importance in saving the buttons from breakage or other injury. The card is supported free from the button (and by this I do not mean that they must necessarily be out of touch with each other, but that means is provided for sustaining the card so that the weight of the card and the pressure brought thereon by the wiring mechanism are not borne by or transmitted to the button). A horn is provided for entering the button-eye, said horn containing guiding means for deflecting the end of the wire. Also said horn and the adjacent mechanism are arranged to receive the end of the wire first at the outer end of the horn. Also said horn has a blunt end to constitute a support for the card to rest down flat against or upon. Means is provided for adjusting the horn up or down to vary the height of the card. Also the horn coöperates with the anvil in actually clenching the wire

around the face of the button. The anvil contains means for passing the wire ends by each other or out of alinement across the face of the button. Means is provided for supporting the center of the button at all points excepting where the wire must pass, so that a frail button is thus momentarily reinforced or strengthened just as it is being fastened by the wire. I provide this center-supporting means in position to engage the face of the button, which is always the properly turned, leveled and finished side of the button, and therefore best adapted to fit evenly, smoothly and accurately against such a center-support. Also, by holding the card as explained, I am enabled to utilize the card as a cushion support for the staple.

I believe my invention is novel in each of the features set forth in each of the preceding sentences of this paragraph, and I intend to cover the same individually as well as in various combinations, as will be apparent in the appended claims.

It is to be understood that while all of the several features of my improved machine have special coöperation with one another and together constitute a particularly effective mechanism for the purpose in view, certain of these features may be applied in other relations, and I therefore desire to cover the combinations present in the several parts of my improved machine, whether employed in the general organization shown or elsewhere.

The invention is not limited to any particular kind of a staple or fastening device as a one-prong device is practical, and in general I wish it understood that the various mechanisms are intended to be claimed broadly enough to cover any combination or relation (and for use with any kind of fastener) in and with which it is practicable to use them.

It is further to be understood that the structural embodiment of the invention as a whole and its various features as shown is merely illustrative and not restrictive, since I am well aware that many of the details of construction can be widely varied without departing from the spirit of the invention. I therefore do not desire to be limited in these particulars or in any others, except as set forth in the appended claims. Moreover, I wish it understood that I use certain terms herein in a broad or generic sense. By the word "wire fastener" I include any thread-like, slender filament, of metal or otherwise, capable of passing through and being held in and by a card-like support and outstanding therefrom so as lightly to embrace or engage and lightly retain the button or garment fastener, and having sufficient stiffness for maintaining the fastener or button in place prior to use and sufficient pliability to be readily bend-

able (somewhat like an annealed wire) in the direction of pull on the fastener for releasing the fastener from the support upon a slight pull on the fastener, *i. e.* stiff enough to retain the button by reason of its own inherent stiffness, and yet pliable enough to part with the button without disrupting the card on the one hand or injuring the button on the other, but simply bending or straightening out when the button is lightly pulled. By the word "embrace" I mean to include any form of overlapping engagement which will offer opposition to a pull on the button or garment fastener in a direction to remove the button from the card. The word "button" is used to mean a catch or garment fastener, including various forms and materials, to fasten together the different parts of dress, including glove snaps or buttons, hooks and eyes, as well as the ordinary kinds of buttons which coöperate with button-holes. The word "staple" is used to include any form of said filament or wire bent into substantially U-shape, irrespective of whether the legs are both long and of the same length or not. "Stapling" the button to the card is not meant to be restricted to the particular form into which the wire is bent, but is used to mean the placing of the wire in the card and through the button in such form, position and arrangement as to secure the wire in the card and in such engagement with the button as to retain the latter. "Clenching" the wire is meant to include the lateral deflecting of the end or ends of the filamentous securing means in such a manner as to hold the button in place, irrespective of whether the wire is bent in one direction or in another, or whether it has two ends so bent or only one, and whether the ends are overlapped or simply bent toward each other or are bent away from each other. The fastener is "yielding" in the sense of being bendable or capable of bending, *e. g.* when in the form of a staple the latter is preferably comparatively open-mouthed so that the ends shall open freely to release the button when the latter is pulled slightly. Preferably this yielding also has a slight spring so as to permit the legs to return toward each other slightly when the button has been removed, the fastener thereby maintaining a shape which makes it impossible for it to drop from the card (although it will normally be held in the card anyway by reason of the fact that it was originally forced through the card as distinguished from being inserted through holes in the card). And finally by the word "card" I mean to include any sheet-like member for supporting or carrying a button, irrespective of the form and material of said member, *i. e.* whether it is wide or narrow, long

or short, stiff or flexible, paper, metal, cloth, leather, or any other substance, etc.

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

1. A button carding machine, comprising mechanism for maintaining the card and button in proper relation to be secured together, and means for forcing the holding wire through the card prior to being engaged with the button, and means for thereafter clenching the wire into holding relation with the button.

2. A button carding machine, comprising mechanism for maintaining the card and button in proper relation to be secured together, means for forming a wire into a U-shaped staple, mechanism coöperating therewith for forcing the legs of said staple through said card in frictional holding engagement with the card and then through the eyes of the button, and means for thereafter clenching the free ends of said staple into holding engagement with the button.

3. A button carding machine, comprising mechanism for maintaining the card and button in proper relation to be secured together, mechanism for interlocking a wire with the card so as to permanently mount the wire in the card and leave an outstanding portion of the wire on the button side of the card, and coöperating means for so deflecting the free end of said outstanding portion into button holding relation to the button as to be capable of readily yielding to a slight pull on the button to permit the removal of the button without dislodging the wire from its mounting in the card.

4. A button carding machine, comprising mechanism for maintaining the card and button in proper relation to be secured together, and mechanism for removably attaching the button to the card by means of a wire holder, including means for maintaining the wire out of pressing contact with the button while the wire is being bent laterally at the face side of the button, and means for so bending the wire at the face side of the button into holding relation with the button.

5. A button carding machine, comprising mechanism for maintaining the card and button in proper relation to be secured together, and mechanism for removably attaching the button to the card by means of a wire staple, including means for maintaining the wire out of pressing contact with the button while the ends of the staple are being bent laterally at the face side of the button, and means for so bending the free ends of the staple at the face side of the button into holding relation with the button.

6. A button carding machine, comprising mechanism for maintaining the card and button in proper relation to be secured to-

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gether, and mechanism for removably attaching the button to the card by means of a wire staple, including means for maintaining the wire out of pressing contact with the button while the ends of the staple are being bent laterally at the face side of the button, and means for bending the free ends of the staple toward each other to grasp the center of the button at the face side of the button.

7. A button carding machine, comprising mechanism for maintaining a card and button in proper relation to be secured together, and mechanism for removably attaching the button to the card by means of a wire, including mechanism for bending the wire adjacent the face of the button independently of resistance from the button, whereby the clenching of the wire is accomplished without using the button as an anvil or fulcrum over which the wire is bent.

8. A button carding machine, comprising mechanism for maintaining a card and button in proper relation to be secured together, but without pressure of one against the other, as distinguished from pressing them together in the process of putting the fastening wire in place and securing it, means for putting a fastening wire in place to secure the button to the card, and means for then securing it.

9. A button carding machine, comprising mechanism for maintaining a card and button in proper relation to be secured together, including a stationary anvil for bending the wire into holding relation to the button, and means for placing the wire through the card and button and forcibly projecting a free end of the wire against the stationary anvil until the wire is bent into holding relation with the button.

10. A button carding machine, comprising mechanism for maintaining a card and button in proper relation to be secured together, including a stationary anvil for bending the wire into holding relation to the button, and means for inserting the wire through the card and then through the button and against the stationary anvil and for continuing the forward movement of the wire until the anvil has bent said wire into holding relation with the button.

11. A button carding machine, comprising mechanism for supporting the card independently of the button while maintaining them in proper relation to be secured together, and wire placing and bending mechanism for securing the button and card together, including means operating independently of pressure on the bottom for bending the wire into holding relation with the button.

12. A button carding machine, comprising mechanism for supporting a button and card in proper position to be secured together, in-

cluding means for supporting the card independently of the button, and mechanism for placing a holding wire in holding relation to the card and button, including pressure applying means for bending the wire to retain the button arranged to apply all its pressure against the card only.

13. In a machine for carding buttons, means for supporting a button bottom upward, means for supporting a card above said button, and wire placing mechanism for fastening the button and card together, including means operating above the card for inserting a wire downward through the card and button.

14. In a machine for carding buttons, means for supporting a button bottom upward, means for supporting a card above said button, and wire placing mechanism for fastening the button and card together, including means operating above the card for inserting a wire downward through the card and button, and means located below the button for bending the forward end of said wire about the button.

15. In a machine for carding buttons, means for supporting a button bottom upward, means for supporting a card above said button, and wire placing mechanism for fastening the button and card together, including means operating above the card for inserting a wire downward through the card and button, and stationary means located below the button for bending the forward end of said wire about the button.

16. In a machine for carding buttons, means for supporting a button bottom upward, means for supporting a card above said button, staple inserting means operating above the card to insert a staple downward through the card and then through the button, and means below the button for deflecting the free ends of the staple about the button.

17. In a machine for carding buttons, means for supporting a button bottom upward, means for supporting a card above said button, staple inserting means operating above the card to insert a staple downward through the card and then through the button, and means below the button for deflecting the free ends of the staple toward each other about the button.

18. In a machine for carding buttons, means for supporting a button bottom upward, means for supporting a card above said button, staple inserting means operating above the card to insert a staple downward through the card and then through the button, and means below the button for deflecting the free ends of the staple toward each other and out of alinement with each other about the center of the button.

19. A button carding machine, comprising means for supporting a card and button

in proper position to be secured together by a bent wire, and mechanism for thus securing them together by said wire, including means for applying propulsive pressure
 5 lengthwise of the wire in a direction away from the face of the card and outward from the face of the button, as distinguished from a direction toward the button and the card behind it, for placing the wire in button-
 10 holding position and relation to the card and button.

20. A button carding machine, comprising positioning means for maintaining the card and button in proper relative position to be
 15 carded, and mechanism for fastening said card and button together by a bent wire, including wire deflecting means for bending the wire into holding position about the button, and means for applying the pressure to
 20 the wire which thus bends the wire in a direction from the card toward the button and outward from the face of the button as distinguished from a direction toward the button and the card behind it.

21. A button carding machine, comprising positioning means for maintaining the card and button in proper relative position to be
 25 carded, and mechanism for fastening said card and button together by a bent wire, including wire deflecting means for bending the wire into holding position about the
 30 button, and means located behind the card for applying the pressure to the wire which thus bends the wire in a direction from the
 35 card toward the button and outward from the face of the button as distinguished from a direction toward the button and the card behind it.

22. A button carding machine, comprising
 40 positioning means for maintaining the card and button in proper relative position to be carded, and mechanism for fastening said card and button together by a bent staple, including staple deflecting means for bend-
 45 ing the staple into holding position about the button, and means located behind the card for applying the pressure to the staple which thus bends the staple in a direction
 50 ward from the face of the button as distinguished from a direction toward the button and the card behind it.

23. A button carding machine, comprising means for supporting the card above the
 55 button and relieving the button from pressure when applied to the card, and mechanism for fastening said card and button together by a staple, including means located above the card for applying solely a down-
 60 ward movement to the staple for placing the staple legs through the card and button, and stationary means located beneath the button for deflecting the leg-ends of the staple laterally into holding relation with the

button as the staple is thus moved downward.

24. In a machine for carding buttons, means for supporting a card in carding position above the buttons, means for supporting a series of buttons beneath said card in
 70 proper relation for carding, whereby the buttons tend by gravity to move away from the card, and a plurality of fastener-applying devices for applying fasteners in holding relation to the card and subjacent but-
 75 tons, for securing them together in opposition to said gravity tendency while the buttons are still supported beneath the card.

25. In a machine for carding buttons, means for supporting the card in carding
 80 position above the button, whereby the button tends by gravity to move away from the card, and means for applying a holding wire to the card and button, including means for deflecting the wire about the
 85 button to hold the button upward toward the card in opposition to said gravity tendency.

26. A button carding machine, comprising mechanism for maintaining a card and
 90 button in proper relation to be secured together, including means for supporting the button and means for supporting the card independently of the button, and fastening-inserting and securing mechanism for
 95 securing the card and button together while they are so supported.

27. In a machine for carding buttons, means for supporting the card free from
 100 the button, and automatic mechanism for detachably securing and drawing said button and card together.

28. In a machine for carding buttons, a horn adapted to enter the button eye, in
 105 carding relation to the button and card, said horn containing guiding means for deflecting the end of the fastening wire, and wire placing mechanism for inserting said fastening wire.

29. A button carding machine, comprising
 110 mechanism for maintaining a card and button in proper relation to be secured together, including a horn for supporting the card independently of the button, an anvil for bending the fastening wire, and means
 115 for causing the wire to pierce the card before engaging the horn, anvil, or button.

30. In a machine for carding buttons, a horn adapted to enter the button eye, and
 120 having a blunt end to constitute a support for the card to rest flat against, and wire placing mechanism for inserting a fastening wire through the card and button.

31. In a machine for carding buttons, a horn adapted to enter the button eye, in
 125 carding relation to the card, and wire placing and fastening mechanism, including means to deliver the end of the wire to the

outer end of the horn before engaging the rest of the horn.

32. In a machine for carding buttons a horn having two prongs adapted to enter the eyes of a button in carding relation to the card, and staple forming, placing and clenching mechanism, including means for delivering the free ends of the formed staple to the outer ends of said prongs with a movement toward the body of the prongs.

33. In a machine for carding buttons, means for supporting a card above the button to be carded, including a horn adjustable in and out to suit different buttons, and cooperating means for inserting a fastening device for removably securing the card and button together.

34. In a machine for carding buttons, means for supporting a button, a horn for supporting a card in carding relation to the button, adjusting means for adjusting the horn to vary the height of the card, and cooperating means for inserting a fastening device for removably securing the card and button together.

35. In a machine for carding buttons, a horn, an anvil, and cooperating staple forming delivering and driving mechanism, all arranged in mutual carding relation for securing a button and card together, said horn and anvil being mounted to operate on the same side of the card and containing means for deflecting the ends of the staple-legs to embrace a portion of the face of the button when the staple is impelled by said driving mechanism.

36. In a machine for carding buttons, an anvil adapted to bend the leg-ends of a staple toward each other across the face of a button and containing means for passing said ends by each other out of endwise alinement, and staple placing and driving means cooperating with said anvil to deliver and clench the staple in carding relation to a card and button.

37. In a machine for carding buttons, supporting means for engaging the face of the button about its center at substantially all points excepting where the fastening wire must pass, and wire inserting and clenching mechanism for inserting a wire through the card and button and clenching said wire in position to hold the button and card together.

38. In a machine for carding buttons, two separated supports for holding a card in proper relation to and independently of a button to permit the carding operation, and wire inserting and bending mechanism for securing the card and button together by means of a bent wire, including means for inserting the wire through the card and the button between said two separated supports to utilize the yielding of the card as an aid to the fastening operation.

39. In a machine for carding buttons, two separated supports for holding a card in proper relation to and independently of a button to permit the carding operation, and staple inserting and clenching mechanism for securing the card and button together by means of said staple, including means for inserting the staple ends through the card between and close to said respective separated supports to utilize the card as a cushion support for the staple in the fastening operation.

40. An apparatus of the kind described, comprising means for holding a button to be carded and a card in assembled relation, and means for lightly securing the button to the card by a frail, pliable staple, including means for forcing the staple legs through the card first and cooperating means for clenching the staple independently of aid and resistance from the button and substantially out of contact with the button.

41. An apparatus of the kind described, comprising means for holding a plurality of buttons to be carded and a card in assembled relation, and means for lightly securing the buttons to the card by frail, pliable staples, including means for forcing the staple legs through the card first and cooperating means for clenching the staples independently of aid and resistance from the buttons and substantially out of contact with the buttons.

42. An apparatus of the kind described, comprising means adapted to receive and hold a plurality of series of buttons to be fixed on a card, means for holding a card in assembled relation thereto, and means for fastening the buttons to the card with wire one series at a time.

43. An apparatus of the kind described, comprising means adapted to receive and hold in definite relation a plurality of series of buttons required to fill a card, means for moving said holder to and from operative position, means for holding a card in assembled relation to the buttons, and means for fastening the buttons step by step to the card with wire.

44. An apparatus of the kind described, comprising a series of anvils in position to hold a series of buttons, means for holding a card in assembled relation to the buttons on said series of anvils, and means for fastening the buttons to the card with wire while positioned on said anvils.

45. An apparatus of the kind described, comprising a plurality of series of anvils in position to hold a plurality of series of buttons in the arrangement required to fill a card, means for holding a card in assembled relation to said buttons and anvils, and means for fastening the buttons to the card with wire, one series at a time.

46. An apparatus of the kind described, 130

comprising a tray-slide adapted to receive and hold in definite relation the buttons to fill a card, a series of anvils, means for moving the tray-slide to deposit a complement of buttons on said anvils, and means for fixing the buttons to the card with wire while positioned on said anvils.

47. An apparatus of the kind described, comprising means for receiving in one position and holding in definite relation the required plurality of rows of buttons to fill a card, mechanism for removably securing the buttons to the card a row at a time, said holding means containing a delivery device operable when the holding means is in a second position to deliver said buttons to be acted upon by said securing mechanism, and means for holding a card in carding relation to the buttons to be acted upon by said securing mechanism.

48. An apparatus of the kind described, comprising a tray-slide having a slidably removable bottom and adapted to receive a complement of buttons to fill a card, and a series of anvils mounted underneath the path of said tray-slide and adapted each to receive a button as the tray-slide bottom is removed, said anvils being formed and adapted to cooperate with wire setting means for fastening the buttons to a card.

49. An apparatus of the kind described, comprising a tray-slide adapted to hold in assembled relation a complement of buttons to fill a card said tray-slide having a slidably removable bottom, a series of anvils directly underneath the path of movement of said slide, means for moving said tray-slide to position over said anvils, said means being adapted by a further movement to remove the tray-slide bottom to deposit the buttons each on one of said anvils, and means for holding a card in assembled relation to the buttons on said anvils.

50. An apparatus of the kind described, comprising a holder adapted to receive and hold in assembled relation a complement of buttons to fill a card, said holder being slidably mounted and having a slidably removable bottom, a series of anvils arranged underneath the path of movement of said holder, means for moving said holder to position over said anvils and for then removing the holder bottom to deposit the buttons on the anvils, means for holding a card in assembled relation to the buttons on said anvils, and means for securing the buttons to the card with wire.

51. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons when fixed on a card, means for holding a card in assembled relation to a complement of buttons on said anvils, and means for wire securing the buttons to the card.

52. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons when fixed on a card, means for holding a card in assembled relation to a complement of buttons on said anvils, means for wire securing the buttons to the card, and means for stripping the buttons from the anvils after being secured to the card.

53. In an apparatus of the kind described, mechanism for wire fastening a complement of buttons to a card, means for delivering the buttons to said mechanism in position to be fastened to the card, means for holding the card in proper relation to the buttons for the carding operation, and means for stripping the completed card of buttons from its previously held position upon the completion of the carding operation.

54. In an apparatus of the kind described, mechanism for wire fastening a complement of buttons to a card, means for delivering the card in position to have said buttons fastened thereto by said fastening mechanism, and means for stripping the completed card of buttons from its previously held position upon the completion of the carding operation.

55. In an apparatus of the kind described, mechanism for wire fastening a complement of buttons to a card, mechanism for delivering the buttons and card to said mechanism in position and proper relation for the carding operation, and means for stripping the completed card of buttons from its previously held position upon the completion of the carding operation.

56. In an apparatus of the kind described, mechanism for wire fastening a complement of buttons to a card, means for delivering the buttons to said mechanism in position to be fastened to the card, means for holding the card in proper relation to the buttons for the carding operation, and a stripper plate mounted for tilting movement to strip the completed card of buttons from its previously held position upon the completion of the carding operation.

57. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons when fixed on a card, means for fixing a complement of buttons on said anvils to a card with wire, and a stripper plate mounted for tilting movement to free the buttons from the anvils after the stapling operation.

58. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons when fixed on a card, a staple setting plunger, and means for moving said anvils to bring successive ones thereof beneath said plunger.

59. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons when fixed on a card, means for holding a card in assembled relation to a complement of buttons set on said anvils, a staple setting plunger, and means for intermittently moving said anvils to bring successive ones thereof beneath said staple setting plunger.

60. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons to be fixed on a card, a line of staple setting plungers extending in parallelism with the lines in which said anvils are formed, means for moving said anvils intermittently to bring successive lines thereof beneath the staple setting plungers, and means for operating said plungers in timed relation to said anvil moving means.

61. An apparatus of the kind described, comprising means for holding a complement of buttons in a series of rows corresponding to the arrangement of buttons when fixed on a card, means for holding a card in assembled relation to said buttons, a row of wire securing means for fastening the buttons to the card a row at a time, means for moving said button holding means with the buttons and said card holding means with the card by steps to said wire securing means, and means for automatically locking at each step and exactly locating said moving means with relation to said wire securing means.

62. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons to be fixed on a card, a line of staple setting plungers extending in parallelism with the lines in which said anvils are formed, mechanism for moving said anvils by steps to position successive rows of buttons on said anvils in operative relation to said plungers, and a spring pressed arm having detents therein coöperative with said anvils to exactly locate the same in their several positions.

63. An apparatus of the kind described, comprising a series of anvils corresponding in arrangement to the desired arrangement of buttons to be fixed on a button-card, horns operatively related to said anvils and having upstanding prongs to extend into the button-eyes, wire setting means to coöperate with said horns and anvils, and means for moving the anvils and horns to bring them into operative relation with said wire setting means.

64. An apparatus of the kind described, comprising a series of anvils corresponding in number and arrangement to that of a complement of buttons to be fixed on a button card, horns having upstanding prongs to

extend into the button eyes, a series of staple setting plungers, means for moving the anvils and horns to bring them into operative relation with said plungers, and a stripper plate surrounding said anvils and adapted to free the buttons from the anvils after the stapling operation.

65. An apparatus of the kind described, comprising an anvil containing means for guiding and bending the leg-ends of a staple, upstanding prongs to project upward through the button-eyes of a button held in operative position with relation to said anvil, and a plunger coöperative with said anvil and prongs to insert a staple through a card and button and to turn the staple ends into holding engagement with the button.

66. An apparatus of the kind described, comprising an anvil having a seat for a button, upstanding prongs to project through the button eyes, and a plunger coöperative with said anvil and prongs to force a staple through a card and button and to turn the staple ends in closely against the center of the button.

67. An apparatus of the kind described, comprising an anvil having a seat for a button, upstanding prongs adapted to extend through the eyes of the button, said prongs having on their inner sides guiding grooves, and a staple setting plunger mounted for coöperation with said anvil to force the ends of a staple through a card and said button on said anvil and to bend the staple ends closely against the center of the button.

68. An apparatus of the kind described, comprising an anvil having a seat for a button, upstanding prongs adapted to pass through the button eyes, said anvil having grooves formed to guide the staple ends past each other, and the inner sides of said prongs having grooves forming clearance spaces for the wire ends to traverse in passing through the button eyes and bending over the button center.

69. An apparatus of the kind described, comprising means for holding a complement of buttons and a card in assembled relation, and a plunger mounted and arranged to force the ends of a staple first through said card and then to pass said ends through the eyes of a button to fasten the button to the card.

70. An apparatus of the kind described, comprising means for holding a complement of buttons and a card in assembled relation, and a plunger constructed and arranged to deliver a staple and force its ends first through said card and then to pass said ends through the eyes of a button to fasten the button to the card.

71. An apparatus of the kind described, comprising means for holding a complement of buttons and a card in assembled relation, a separate anvil support for each

- button, and a plunger on the opposite side of the button and card constructed and arranged to engage the card with a yielding pressure and to force the ends of a staple first through the card and then to pass said ends through the eyes of a button to bend the staple against its anvil support and closely against the adjacent face side of the button.
72. An apparatus of the kind described, comprising means for holding a complement of buttons and a card in assembled relation, an anvil support for each button, and a composite plunger having a sleeve adapted to yieldingly press directly against the card and an inner spindle adapted to project the ends of a staple through the card and then through the eyes of the button to be bent by said anvil support closely against the center portion of the opposite side of the button.
73. An apparatus of the kind described, comprising a line of wire manipulating and setting plungers, means for feeding wires in definite amounts thereto, and a knife extending transversely of said plungers and connected for operation by certain of the plungers for severing the wires, said plungers having coöperative parts for manipulating the wires and securing the buttons to the card.
74. An apparatus of the kind described, comprising a line of staple forming and setting plungers, means for feeding wires in definite amounts thereto, and a knife positively operated by certain of the plungers and loosely related to the other plungers for severing the wires, said plungers having coöperative parts for forming the staples and stapling the buttons to the card.
75. In a button carding machine, means for positioning the buttons, means for positioning a card, and means for inserting fasteners to secure the buttons to the card, said card-positioning means including means to drag on the card capable of shifting the card slightly into correct position if not already properly positioned, and means for feeding the card into fastener-receiving position.
76. In a button carding machine, means for positioning the buttons, means for positioning a card, and means for inserting fasteners to secure the buttons to the card, said card-positioning means including guides to limit the position of the card, and yielding means to press the card into place with reference to said guides.
77. In a button carding machine, means for positioning the buttons, means for positioning a card, and means for inserting fasteners to secure the buttons to the card, said card-positioning means including projecting guides for normally locating the card, and a spring drag for pressing the card into place against said guides, and means for feeding the card into fastener-receiving position.
78. An apparatus of the kind described, comprising means for holding a complement of buttons in a series of lines, a line of staple forming and setting plungers, means for feeding wires in definite amounts thereto, and a knife extending transversely of said plungers and connected for operation by certain ones thereof for severing the wires, said plungers having coöperative parts for forming the staples and stapling the buttons to the card.
79. In a button carding machine, mechanism for inserting wire fasteners for securing the buttons to the cards, including a series of fastener-forming devices, and a knife-plate for cutting off a fastener for each of said devices as said devices are operated, said knife-plate being snugly held adjacent its opposite ends by certain of said devices adjacent the opposite ends of said series, the engaging walls of those devices which hold said plate being convex to permit a self-adjustment of said devices relatively to the knife-plate and to allow for uneven seating of said devices when securing the buttons to the card.
80. In a button carding machine, mechanism for inserting wire fasteners for securing the buttons to the cards, including a series of fastener-forming devices, and a knife-plate for cutting off a fastener for each of said devices as said devices are operated, said knife-plate being mounted in and operated by said devices for up and down movement but held loosely for limited endwise play to permit the knife-plate to have a limited self-adjusting movement and endwise play for bringing fresh cutting surfaces automatically into action.
81. In a button carding machine, mechanism for inserting wire fasteners for securing the buttons to the cards, including a series of fastener-forming devices, and a knife-plate for cutting off a fastener for each of said devices as said devices are operated, said knife-plate being mounted in and operated by said devices for up and down movement but held loosely for limited endwise play to permit the knife-plate to have a limited self-adjusting movement and endwise play for bringing fresh cutting surfaces automatically into action, and end abutments for limiting said endwise movement.
82. An apparatus of the kind described, comprising means for holding a line of buttons, a line of staple forming and setting plungers, means for feeding wires in definite amounts thereto, and a knife extending transversely of said plungers and connected for operation by certain ones thereof for severing the wires, said knife being mounted for self-adjustment relative to said plun-

gers and also for limited endwise play, said plungers having coöperative parts for forming the staples and stapling the buttons to the card.

5 83. An apparatus of the kind described, comprising an anvil backing constituting a support for the work, and a staple forming and setting plunger mounted for coöperation therewith, said plunger having an outer
10 sleeve carrying an anvil block movable into and out of operative position and an inner sleeve adapted for coöperation with said anvil block to bend a staple thereover and to thereafter move the anvil out of operative
15 position, said sleeves having a range of movement to carry the formed staple into engagement with said anvil backing.

84. An apparatus of the kind described, comprising a backing to support a card and
20 button, and a staple forming and setting plunger mounted for coöperation therewith, said plunger having an outer sleeve, a cutter actuated in substantial unison with said outer sleeve for severing the wire, an anvil
25 block controlled by said outer sleeve and movable into and out of operative position, an inner sleeve coöperative with said anvil block to bend a staple thereover and having provision to control the movement of
30 said block into and out of operative position, and a setting spindle movable within said inner sleeve for forcing the formed staple therefrom for stapling a button to a card.

35 85. An apparatus of the kind described, comprising a staple forming and setting plunger composed of an outer sleeve, a wire cut-off knife influenced by said sleeve an anvil block movably fixed to said sleeve, an
40 inner sleeve coöperative with said anvil block to form a staple thereover and to control the movement thereof to and from operative position, a setting spindle movable within said inner sleeve adapted to force a
45 staple therefrom, means for imparting a controlled movement to said outer sleeve to cut off the wire, and mechanism for imparting yielding movements to said inner sleeve and to said setting spindle to first position
50 the sleeves against the object to be operated on and to thereafter project the staple to operative position.

86. In a button carding machine, a staple fastener forming-mechanism, comprising an

outer guide sleeve, an inner sleeve for forming the wire over an anvil into a staple, a driver for driving the staple when formed, an anvil lever movably carried by the outer sleeve, and mechanism for operating said
55 several parts, including means for positively moving upward the inner sleeve, and means for yieldingly holding said anvil lever in frictional engagement with said inner
60 sleeve, while the latter is being moved upward, for thereby moving the outer sleeve upward at the same time.

87. In a button carding machine, a staple fastener forming-mechanism, comprising an outer guide sleeve, an inner sleeve for forming the wire over an anvil into a staple,
70 a driver for driving the staple when formed, an anvil lever pivoted to the outer sleeve and capable of engaging at one side of its pivot with said inner sleeve, yielding means for normally pressing said engaging end
75 against said inner sleeve, and operating mechanism for the aforesaid parts, including means for relatively shifting said yielding pressing means close to said pivot when the anvil end of said lever is to be brought
80 to operative position.

88. In a button carding machine, means for supporting a card in position to receive a staple, and wire staple forming-mechanism, including an outer sleeve to rest upon
85 the card, means for guiding the wire into position to be formed into a staple, a staple-forming anvil movable into staple-forming position within said outer sleeve, an inner sleeve movable lengthwise of the outer
90 sleeve for bending the wire over said anvil to form a staple, means operable by the movement of said inner sleeve for withdrawing the anvil from said staple-forming position, a staple driver within said inner
95 sleeve, and mechanism for dissimultaneously moving said outer sleeve, inner sleeve, and driver, including means for permitting the inner sleeve to slide downward onto the card after the outer sleeve has engaged the
100 card.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ARTHUR L. CURRIER.

Witnesses:

C. L. ROGERS,
R. G. HERSEY.

It is hereby certified that in Letters Patent No. 1,055,523, granted March 11, 1913, upon the application of Arthur L. Currier, of Newton Highlands, Massachusetts, for an improvement in "Button-Carding Machines," an error appears in the printed specification requiring correction as follows: Page 11, line 60, for the word "bottom" read *button*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of March, A. D., 1913.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.