Dec. 19, 1933. A. P. RAWNSLEY 1,940,229

BUTTON FEEDING ATTACHMENT

Filed June 30, 1927 7 Sheets-Sheet 1

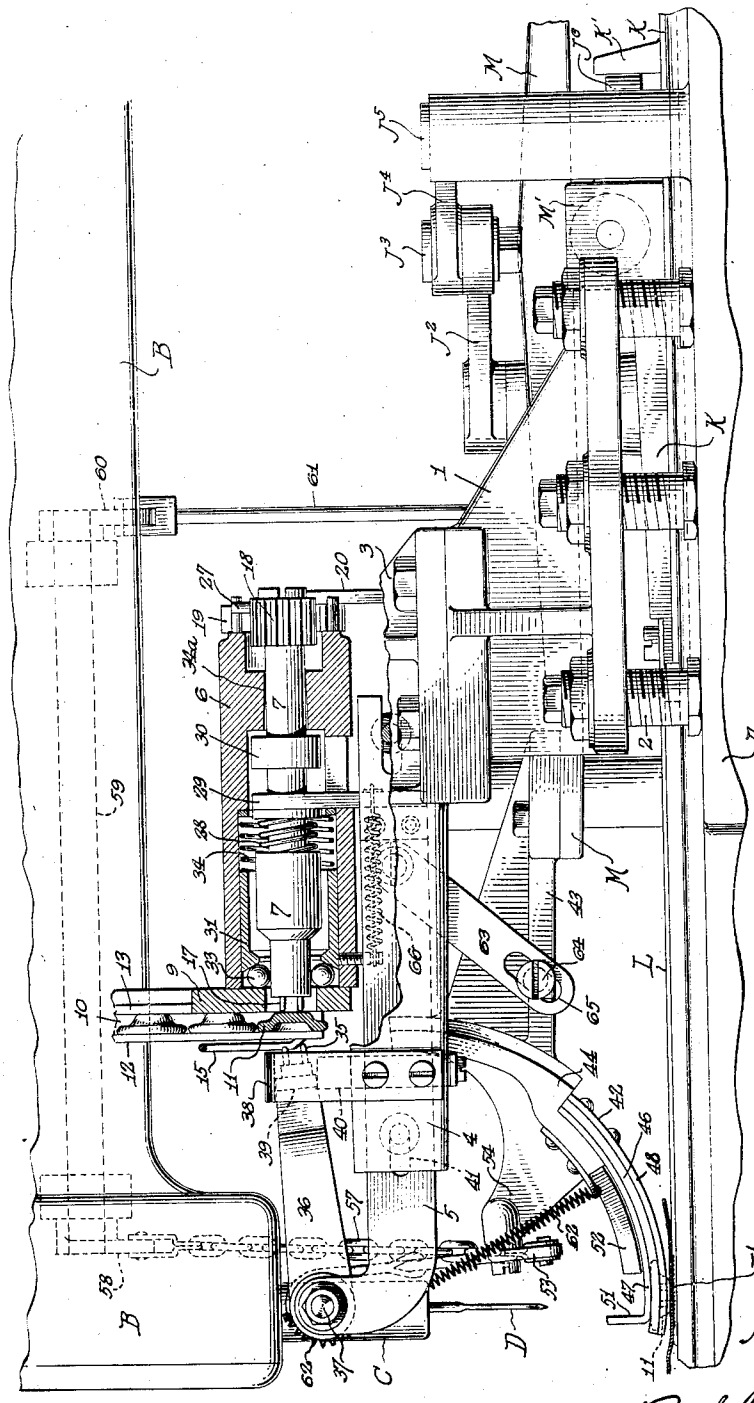


Fig. 1.

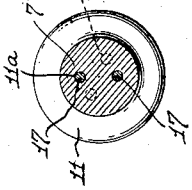


Fig. 2.

Inventor
Adin P. Rawnsley,
By Burton & Burton
Attorneys

Dec. 19, 1933. A. P. RAWNSLEY 1,940,229

BUTTON FEEDING ATTACHMENT

Filed June 30, 1927 7 Sheets-Sheet 2

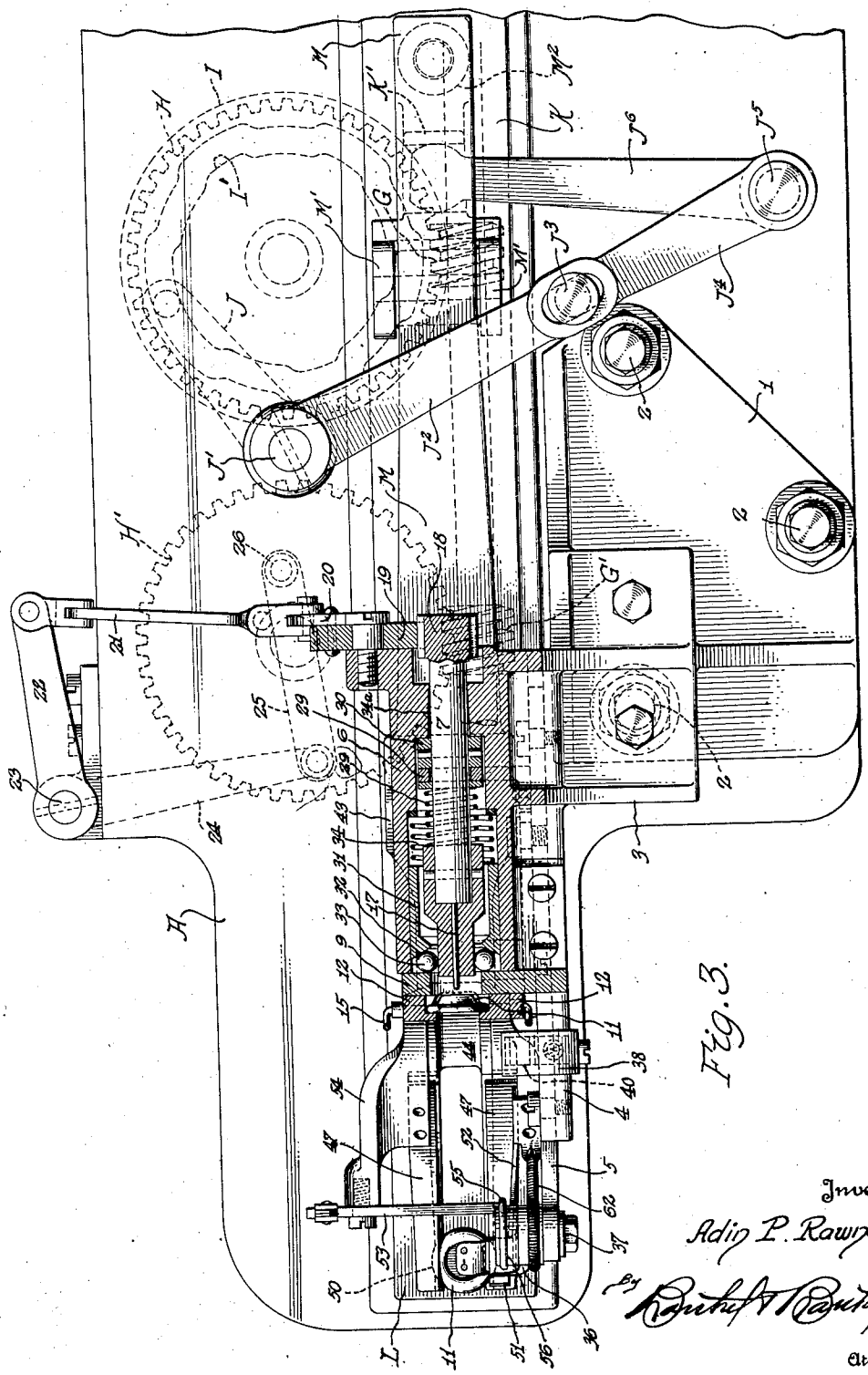


Fig. 3.

Inventor
Adin P. Rawnsley,
by Rachel & Rachel
Attorneys

Dec. 19, 1933. A. P. RAWNSLEY 1,940,229

BUTTON FEEDING ATTACHMENT

Filed June 30, 1927 7 Sheets-Sheet 3

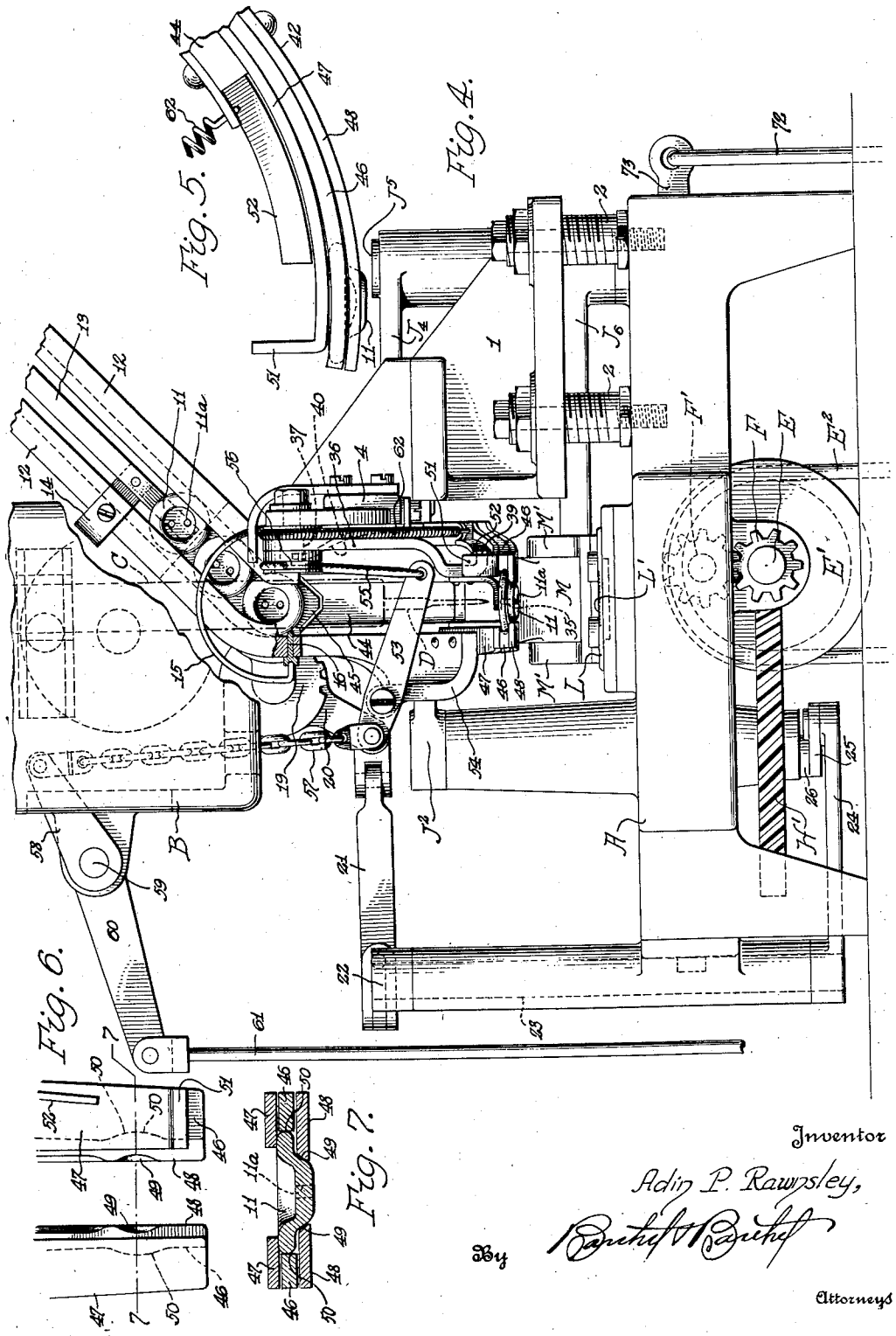


Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Inventor

Adin P. Rawnsley,

By Bartlett & Bartlett

Attorneys

Dec. 19, 1933. A. P. RAWNSLEY 1,940,229

BUTTON FEEDING ATTACHMENT

Filed June 30, 1927 7 Sheets-Sheet 4

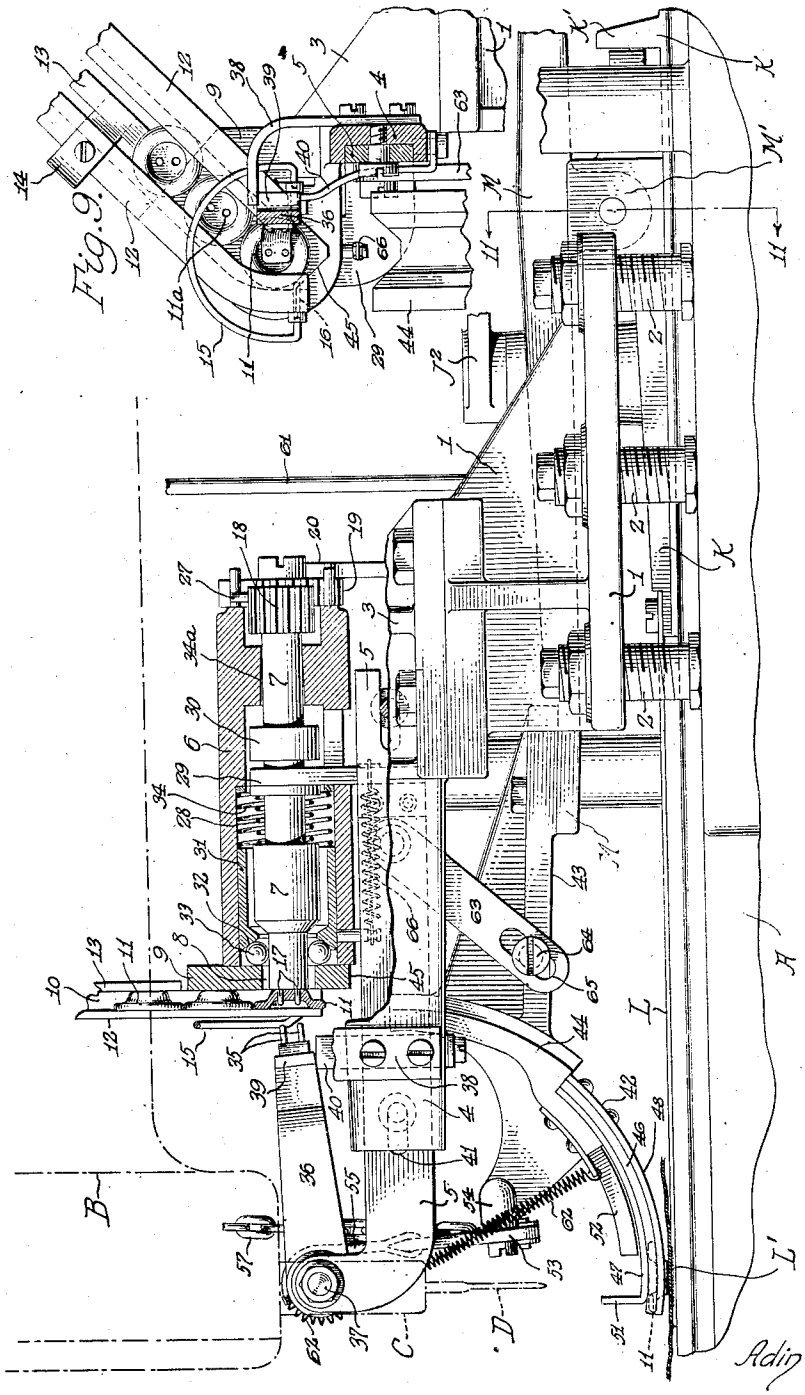


Fig. 8.

Fig. 9.

Inventor

Adin P. Rawnsley,

By Bartlett & Bartlett

Attorneys

Dec. 19, 1933. A. P. RAWNSLEY 1,940,229

BUTTON FEEDING ATTACHMENT

Filed June 30, 1927 7 Sheets-Sheet 5

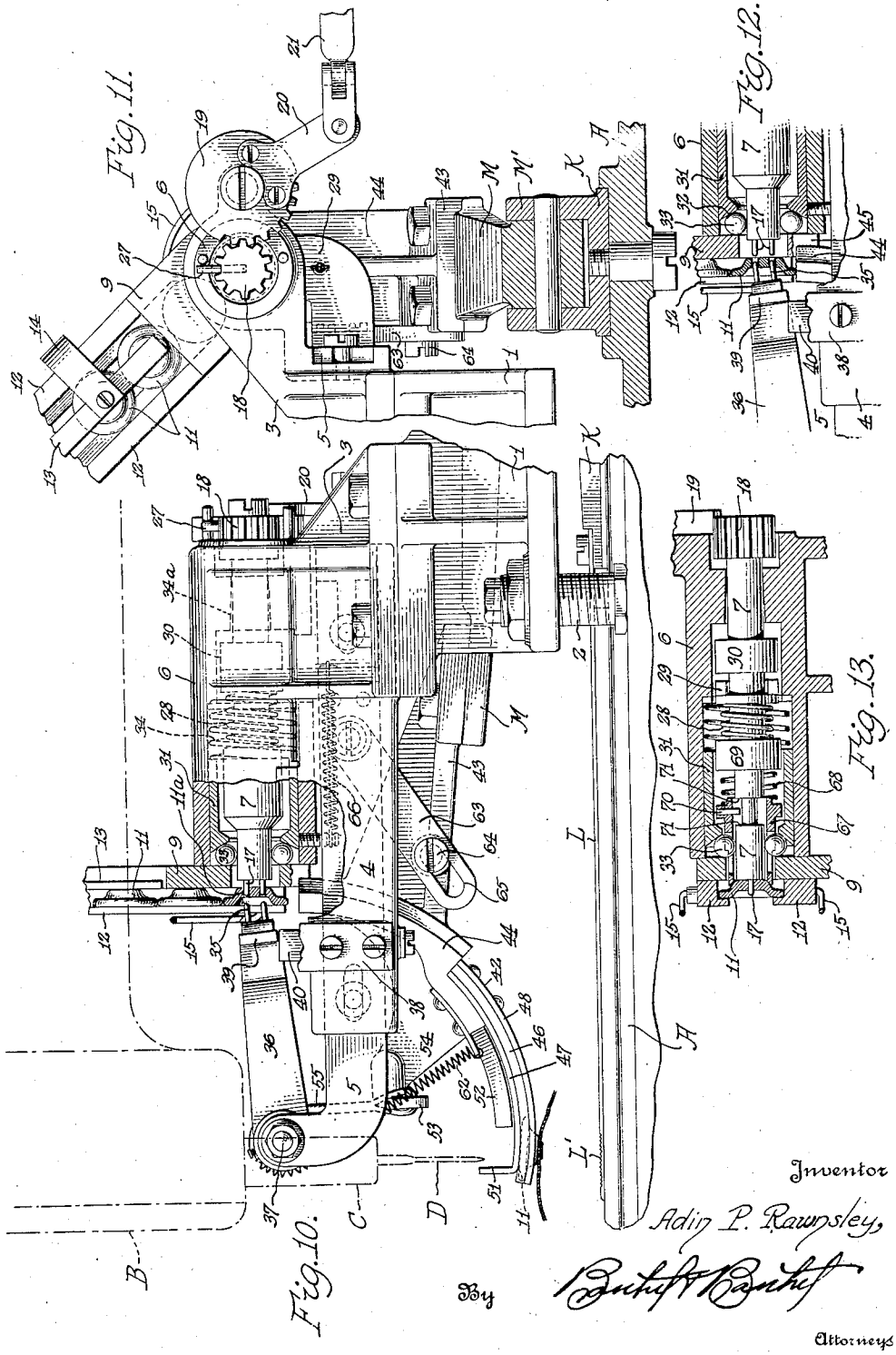


Fig. 10.

Inventor
Adin P. Rawnsley,
By Burton & Burton
Attorneys

Dec. 19, 1933. A. P. RAWNSLEY 1,940,229

BUTTON FEEDING ATTACHMENT

Filed June 30, 1927 7 Sheets-Sheet 6

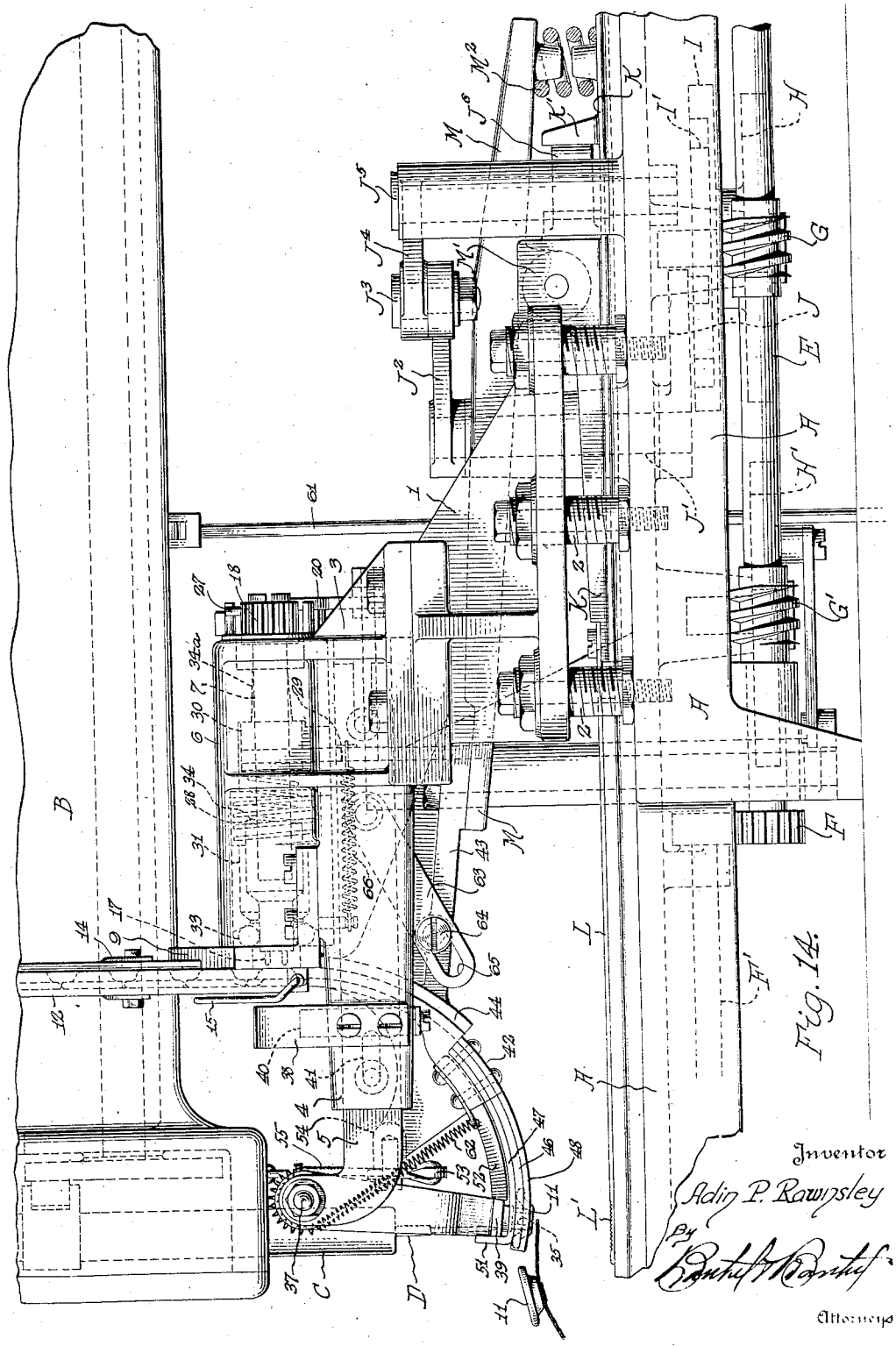


Fig. 14.

Inventor
Adin P. Rawnsley
By Bartlett & Bartlett
Attorneys

Dec. 19, 1933. A. P. RAWNSLEY 1,940,229

BUTTON FEEDING ATTACHMENT

Filed June 30, 1927 7 Sheets-Sheet 7

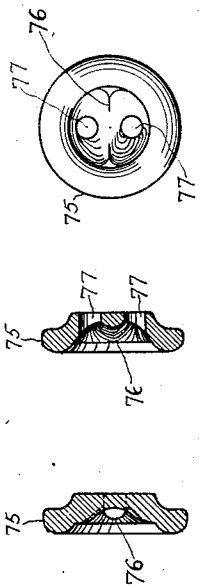


Fig.15.

Fig.16.

Fig17.

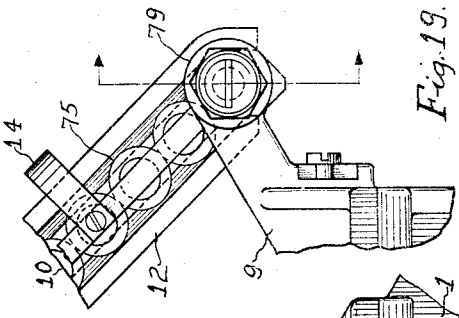


Fig.19.

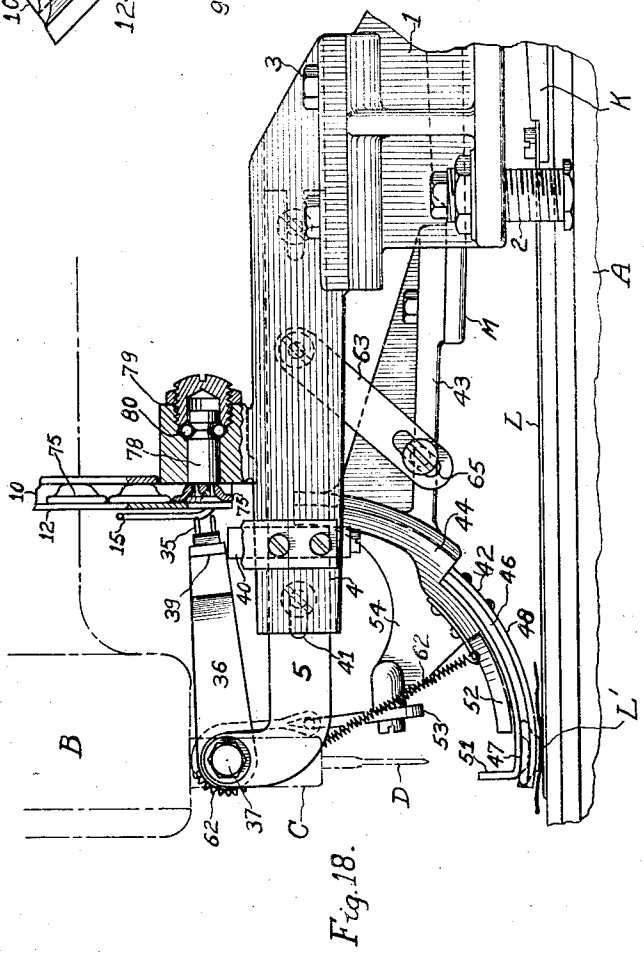


Fig.18.

Inventor

Adam P. Rawnsley

By

Attorney

Patented Dec. 19, 1933 1,940,229

UNITED STATES PATENT OFFICE

1,940,229

BUTTON FEEDING ATTACHMENT

Adin P. Rawnsley, Detroit, Mich.

Application June 30, 1927. Serial No. 202,630

29 Claims. (Cl. 112—113)

This invention relates to button attaching machines, and more particularly to the method of and means for automatically feeding, positioning and holding buttons in connection with such machines.

An object of the invention is to provide a novel method of feeding, positioning and holding buttons and an attachment which may be conveniently applied to button attaching machines as commonly constructed, which attachment is arranged to be driven by the machine in timed relation to the operation thereof. A further object is to feed buttons, one at a time, and bring them automatically into proper relation to the attaching mechanism of the machine to be secured in place upon a garment or the like, and to securely hold each button during the attaching operation in proper relation to the work and to the machine needle or other attaching device. It is also an object to insure against breakage of the machine attaching means and also breakage of buttons and to greatly facilitate and speed up the operation. A further object is to provide an attachment for the purpose, which is simple in construction and may be conveniently applied to button attaching machines as commonly constructed, without material change in such machines and to be driven in timed relation thereto, from the usual operating parts thereof.

Another object is to provide an attachment for the purpose which will not interfere with the operator's view of the work and that will require no different manual movements of the work by the operator than has been the case in the past.

Another object is to provide an automatic ejection for the finished or attached button thus reducing manual work of the operator and increasing the speed of the attaching operation.

With the above and other ends in view, the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which

Figure 1 is a side elevation, with parts broken away and in section, of an attachment illustrative of the invention and showing the same as applied to a button sewing machine and in operative position thereon, the parts being in the position which they assume at the start of the sewing operation;

Fig. 2 is an enlarged cross-sectional detail of a button with locating pins engaged within the holes in the button to illustrate the operation of rotating the button to bring its holes into proper position to receive the sewing needle of the sewing machine;

Fig. 3 is a plan view of the sewing machine bed or table and operating parts of the machine, with the attachment embodying the present invention in operative position thereon and with parts thereof in horizontal section;

Fig. 4 is a front elevation of the button sewing machine and feeding attachment in place thereon with the parts in the position which they assume at the end of the operation, as in Fig. 14;

Fig. 5 is a detail of the lower end portion of a presser foot and button clamp forming a part thereof, showing the same in side elevation;

Fig. 6 is a plan view of the lower end portion of the presser foot button clamp shown in Fig. 5;

Fig. 7 is a transverse section, substantially upon the line 7—7 of Fig. 6 and showing a button in place;

Fig. 8 is a view similar to that of Fig. 1 and showing the parts in the position which they assume at the end of the sewing operation;

Fig. 9 is a transverse sectional detail showing the lower end portion of a button clamp and adjacent parts in elevation, and with other parts of the mechanism in the position shown in Fig. 8;

Fig. 10 is a view similar to Fig. 8 showing the attachment in side elevation with parts broken away and in section, and showing the operative parts in the positions which they assume when the pressure foot is in the midposition of its upward movement;

Fig. 11 is an end elevation of Fig. 10 with the rocker arm which carries the presser foot and a portion of the table in transverse section, substantially upon the line II—II of Fig. 8;

Fig. 12 is a sectional detail of locator mechanism and illustrating a button feed-arm at the start of its feeding movement and after the locator has been retracted from the button;

Fig. 13 is a longitudinal sectional view of button locator mechanism of slightly modified form;

Fig. 14 is a side elevation of the button sewing machine and attachment embodying this invention in position thereon with the parts in the position which they assume at the end of the operation and the discharge of the sewed-on button from the machine;

Fig. 15 is a face elevation of a modified form of button;

Figs. 16 and 17 are vertical and horizontal sections of Fig. 15;

Fig. 18 is a view of the machine and attachment similar to that of Fig. 1 and showing the attachment slightly modified to adapt the same for use

in attaching buttons of the form shown in Figs. 15, 16 and 17; and

Fig. 19 is a detail view of part of Fig. 18, showing a portion of the button chute and parts adjacent the lower end thereof in rear elevation.

For the purpose of illustrating the application of the present invention, a button sewing machine of an old and well known type is, in a general way, illustrated in the accompanying drawings to assist in explaining the application and operation of the attachment embodying the present invention, but it will be understood that this attachment may be applied to other forms of button attaching machines, such changes being made in the manner of attaching and driving the attachment as may be necessary to accommodate the same to the particular machine used.

The button sewing machine illustrated, includes a base or table A, and a machine head B housing the usual drive mechanism for operating the vertically reciprocable needle bar C which carries the needle D. Beneath the table A is the usual longitudinally extending drive shaft E which is driven in any suitable manner, as by a pulley E' on the shaft engaged by a belt E^2 as shown in Fig. 4, and from which shaft motion is transmitted by a pinion F (see Figs. 4 and 14) to drive the usual looper shaft F' indicated in dotted lines. Also secured on this shaft E are two worms G and G' to mesh with worm wheels H and H' (see Fig. 3) mounted beneath the table to rotate upon vertically extending axes and mounted above the wheel H for rotation therewith, is a cam wheel I, having a cam groove I' engaged by a roller or pin on the end of a lever arm J which is secured to the lower end of a shaft J' extending vertically upward through the table and to the upper end of which shaft is secured an arm J^2 having a slotted end to receive a pin J^3 for loosely connecting said arm to the short arm J^4 of a bell crank which is pivoted upon an upwardly extending stud J^5 on the table A, with the long arm J^6 of the bell crank engaged at its free end, between suitable abutments K' on a slide K reciprocable in suitable ways provided therefor in the upper face of the table. Attached to the forward end of this slide, is a vibrating plate L having a roughened upper surface L' at its forward end to engage beneath the fabric to which the button is to be sewed and move the work back and forth with the reciprocation of the slide and relative to the needle, such reciprocating motion being imparted to the slide through the medium of the levers J^6, J^4, J^2, J and cam wheel I.

Pivotally mounted between suitable upwardly extending bearing ears M' on the slide K, is a rocker bar M with its long arm extending forwardly above the slide, and its short arm extending rearwardly from its pivotal support, and a coiled spring M^2 (see Fig. 14) is interposed between this short arm and the slide and exerts a yielding upward pressure on the rear end of the rocker to rock the same on its pivot.

The attachment embodying the present invention, comprises a suitably shaped supporting frame 1 the base of which is secured to the table A by means of three lag screws or adjusting bolts 2 arranged in triangular relation to each other and affording a three-point support for the supporting frame or base so that by adjusting these screws, the frame may be adjusted to bring the button feeding mechanism carried thereby into exact relation vertically to the needle D and to the slide K and rocker bar M for operating such mechanism.

Secured upon the frame or base 1 by means of screws is a bracket 3 which may be adjusted laterally by loosening said screws to adjust said bracket relative to the needle D, and said bracket is formed with an integral guideway 4 extending forwardly from the bracket for a reciprocating bar 5, the purpose of which is hereinafter described, and with a tubular casing or barrel 6 extending longitudinally of said guideway and positioned laterally thereof. Within this barrel is a plunger 7, the forward end of which projects through the forward end of the barrel and through an opening 8 in a plate 9 which forms a closure for the forward end of the barrel and a support for the lower end of a button chute 10 for feeding buttons 11 downwardly from a suitable hopper, (not shown), into position opposite the forward end of said plunger 7. This button chute comprises parallel opposed and spaced apart channel bars 12 to receive buttons between them with the edges of the buttons loosely engaged in the channels and with the faces of the buttons forwardly and exposed through the space between the channels, the buttons being superposed edgewise in the chute. A bar 13 is positioned in the space between the channels and held in a parallel position near the backs of the buttons by one or more supporting clips 14 (see Fig. 9) to retain the buttons as they pass down the chute and prevent wedging at their edges. The row of buttons passing down the chute is stopped to prevent them from passing out through the lower end of the chute, by a spring loop 15 having inturned ends pressing inwardly against stop pins 16 passing through holes in the lower ends of the channel bars 12 to yieldingly engage beneath the lowermost button and yieldingly hold the same against dropping out. Stop pins 16 are enlarged at their outer ends to arrest their inward movement so as to locate their points of contact against the edges of the buttons accurately, thus locating the button uniformly and concentrically before the locator 7.

When the lowermost button is stopped by the stops 16, it is opposite the end of the plunger 7 but the holes or eyes 11*a* in the button may not be in such position that when the positioning or transfer mechanism hereinafter described operates to place the button, these holes will be in the exact position to be entered by the needle D or other means for securing the button to the work. Therefore to insure the proper positioning of these eyes, the plunger 7 is provided with finder pins 17 projecting from its forward end to enter these eyes or holes and to insure their entrance, said plunger is given a rotative motion imparted thereto through a gear 18 secured upon its rear end and which gear is engaged by a gear segment 19 operated by means of an arm 20 on the segment, which arm is connected by means of a link connection 21 to a lever arm 22 on the upper end of a vertical shaft 23 mounted in a suitable bearing upon the table A and to the lower end of which shaft a second arm 24 is secured. A turning motion is imparted to this vertical shaft through the arm 24 by means of a link 25 connected at one end to the free end of the arm and at its opposite end, pivotally connected at 26 to the worm wheel H' eccentrically of the axis of rotation of this wheel. As this worm wheel H' is rotated by means of the worm G' on the main drive shaft E, motion will therefore be imparted to the plunger 7 in timed relation to the operation of the sewing machine to rotate the plunger through a half rotation and

back to original position, a stop pin 27 being provided on the pinion 18 to engage stops on the end of the barrel and accurately limit such rotative movement.

The plunger 7 has a limited longitudinal movement within the barrel 6 and is normally urged forward to yieldingly hold the pins 17 in engagement with the button, by a coiled spring 28 interposed between a shoulder on the plunger and the end of an arm 29 on the slide bar 5 which arm projects through an opening in the barrel with its inner end embracing and loosely engaging the plunger which is provided with an abutment 30 in the form of a collar secured upon the plunger to be engaged by the arm when the slide bar 5 is moved rearwardly. The plunger is thus moved forwardly with the bar 5 and its pins 17 are either pressed against the back of the button or entered into the eyes thereof by the action of the spring 28. Should the button eyes not be in proper position to receive the pins, they will be yieldingly pressed against the back of the button and upon rotative movement of the plunger, will enter the eyes. After entrance of the pins into the button eyes, further rotation in the same or a reverse direction will rotate the button, and at the end of this rotative movement, the stop pin 27 engages its stop, thus accurately locating or positioning the button with its eyes in the exact desired position.

The forward end of the plunger 7 is accurately centered in the barrel to rotate freely therein, by a sliding sleeve 31 in the forward end of the barrel, which sleeve is formed at its forward end with an annular inclined seat 32 for a series of balls 33 which are engaged between this seat and the inner side of the plate 9, and the sleeve is urged toward the plate by a coiled spring 34 engaging the rear end of the sleeve, so that the balls 33 are forced inwardly against the plunger and yieldingly hold the same centered in the barrel. The rear end portion of the plunger 7 engages a bearing 34*a* adjacent the rear end of the barrel and the bore of this bearing is tapered slightly, being larger at its forward than at its rear end, thus permitting of a limited lateral movement of the forward end of the plunger, such lateral movement being permitted by the yielding engagement of the sleeve 31 with the centering balls 33, and therefore, should the button not be accurately aligned with the end of the plunger or should the holes in the button be slightly eccentric to the axis of the button, the plunger may yield laterally and permit the pins 17 to enter the button eyes. After these pins have so entered the button eyes and rotation of the button has been started by rotation of the plunger, the floating action of the sleeve 31 will permit the rotation of the button into position with its eyes properly located, even though the eyes are eccentrically located in relation to the periphery of the button as this floating action will permit the locator to follow such eccentricity, preventing undue friction of button periphery against the sides of the chute.

The plunger 7 thus serves the purpose of a finder to locate the button holes 11*a* and a locator to position the buttons so that their eyes will be in proper position to be readily entered by pins 35 on a laterally extending end portion of a swinging transfer arm 36 which is pivotally attached by means of a stud bolt 37 to the forward upturned end of the slide bar 5 to swing downwardly above the horizontal axis of this bolt past the bar when released at the proper time, as hereinafter described. On the guideway 4 for this bar 5 is a stop arm 38 which extends upwardly and laterally to be engaged by a lateral projection 39 on the end of the transfer arm 36 and limit the upward swinging movement of said arm so that the pins 35 carried thereby will be in exact alignment with the button center 11*a* when the transfer arm is at the upper end of its movement and is locked in that position by a flat spring 40 secured at its lower end to the guide-way with its free end portion curved laterally into the path of swinging movement of the projection 39 so that when the transfer arm reaches the upper end of its movement, the spring 40 will snap beneath the projection on the arm and hold the arm against the stop 38. When the bar 5 is moved rearwardly in its guideway a limited distance which is determined by a pin in the way engaging a longitudinal slot 41 in the bar, the transfer arm 36 which is carried by the bar is also moved endwise rearwardly, sliding upon the upper end of the spring 40 and the pins 35 are thus entered in the button eyes, the finder pins 17 being simultaneously withdrawn from these eyes due to the fact that the arm 29 which actuates the plunger 7 longitudinally, is also secured to the bar 5 and moves therewith to move the plunger rearwardly. Immediately upon the full entrance of the pins 35 into the button eyes, the projection 39 on the transfer arm 36 slips off the upper end of the spring 40, and the arm is then free to swing downwardly and carry the button with it.

The button 11 is held in engagement with the pins 35 and retained thereon during its downward movement to position directly beneath the needle D, by a presser foot which is indicated as a whole by the numeral 42, said presser foot comprising a supporting bracket 43 which is rigidly secured to the forward end of the rocker bar M and has a portion 44 which is curved concentrically with the axis of swinging movement of the transfer arm 36 and is formed with a V-notch at its upper end to receive a V-projection 45 on the lower end of the plate 9 so that when the presser foot is raised to the extreme upper end of its movement by upward rocking movement of the rocker M, the presser foot will be accurately aligned with the lower end of the chute 10 to receive and retain the button during the downward swinging movement of the transfer arm 36, which, by the engagement of its pins 35 with the button eyes, will force the button along the curved surface 44 of the presser-foot to its lower end and with its eyes in proper position to receive the needle when the presser-foot is lowered into contact with the work, such lowering or downward swinging of the foot serving to withdraw the pins 35 from the button eyes, leaving the button in proper sewing position within the lower or forward end of the presser foot hereafter referred to as the button clamp. To insure the firm holding of the button in attaching position at the forward end of the foot after the release of the button from the pins 35, the forward end portion of this presser foot is constructed as shown in detail in Figs. 5, 6 and 7 wherein the outer sides of the channels are formed by spring plates 46 which are secured at their rear ends between the top strips 47 and bottom strips 48 to yield outwardly toward their forward ends and by their tendency to spring inward, engage the edges of the button and yieldingly clamp the same, and to accurately position the button, the inner edges of the lower strips 48

are notched slightly as at 49 to receive the central rounded protuberance of the back of the button, and the inner edges of the spring member 46 are also notched as at 50 to receive the edges of the button between them and yieldingly hold the same at this particular point of its travel. To insure the stopping of the transfer arm 35 at the proper point in its travel along the button clamp and leave the button engaged in the notches 49 and 50 thereof, the end 51 of one of the strips 47 is turned upwardly to form a stop for limiting the forward swinging movement of the transfer arm, and to lock this arm in position against this stop until it is released by the lowering of the presser-foot, a flat spring 52 is secured at its rear end to the presser foot with its forward end projecting into the path of movement of the arm to snap behind said arm when the same comes into engagement with the stop.

As the presser-foot 42 is carried upon the forward end of the rocker-bar M, the upward rocking motion of this bar raises the foot to bring the upper end of its curved portion 44 up against the guiding end portion 45 of the plate 9 and into alignment with the button chute 10, and the downward rocking of the bar brings the presser-foot down upon the work to clamp it between the foot and the roughtned portion L' of the vibrating plate L so that the work or strip to which the button is to be attached, will be moved back and forth by the reciprocation of the vibrating plate to bring first one eye and then the other, of the button into alignment with the needle during the sewing operation, this reciprocating motion being simultaneously imparted to the presser-foot which holds the button and which is carried by slide K also, both vibrating plate L and rocker-bar M to which the presser-foot is attached, being attached to and movable with the slide K which is reciprocated in the manner previously described, in timed relation to the sewing operation.

The presser-foot 42 is normally held pressed downwardly to clamp the work, by the spring M^2 and is raised to release the work and to receive the next button, by means of a lever 53 pivoted intermediate its ends upon a bracket 54 on the slide of the presser-foot, the long arm of said lever 53 being connected by means of a cable 55 to the hub of the transfer arm 36, which hub turns with said arm upon the pivot stud 37 of said arm and forms a pulley 56 over which the cable extends and to which one end of the cable is secured. To the opposite or short end of the lever 53 is attached one end of a pull chain 57, with its opposite end attached to the free end of an arm 58 secured to a rock-shaft 59 mounted in suitable bearings on the sewing machine head B. This rock shaft 59 is also provided with an arm 60 to the free end of which is pivotally connected a rod 61 extending downward to a suitable foot pedal (not shown) or other operating means.

When the sewing operation has been completed and it is desired to raise the presser-foot to release the work and receive another button from the chute 10, the operator will operate the foot pedal (not shown) to exert a pull upon the chain 59 and turn the lever 53 upon its pivotal support, which turning movement of said lever will first exert a pull upon the cable 55, which pull would tend to swing the transfer arm 36 downwardly, but as this arm has previously been swung upwardly to the limit of its upward movement by a coiled spring 62 which is attached at one end to the presser-foot and at its upper end is passed over and secured to the hub of the transfer arm or pulley 56 and has been locked in this uppermost position by the locking spring 40, the arm will not be turned by such pull on the cable and the cable, therefore, at this time serves as the fulcrum so that a further pull on the chain will raise the presser-foot by rocking the rocker-bar M against the action of the spring M^2.

As the presser-foot approaches the upper end of its movement, the slide bar 5 which carries the transfer arm 36 is moved rearwardly to retract the finder pins 17 from the button and to enter the pins 35 in the button eyes, and this rearward movement of the slide bar is effected by means of a link 63 pivotally attached at its upper end to the bar and connected at its lower end to the presser-foot bracket 43 by means of a pin or bolt 64 on the bracket passing through an elongated slot 65 in the link, the length of the slot being such that the pin will engage the ends of the slot prior to the end of the upward movement of the foot and thus cause the slide bar to move rearwardly in its way against the action of a coiled spring 66 which is anchored at one end to the barrel 6 and at its opposite end to the arm 29 on the slide bar. A further purpose of slot 65 in link 63 is to provide a loose connection between presser-foot and slide bar so as to provide for work of varying thicknesses and permit vibratory movement of presser-foot during the sewing operation without transmitting such movement to the slide bar.

It may be found, in certain cases, where the button eyes are not in position to be immediately engaged by the finder pins 17 upon the forward movement of the finder plunger 7 and these pins thus engage the back of the button, that the pressure of these pins on the button or burrs thereon around the button eyes may cause the button to turn, with the plunger when the plunger starts its rotative movement. In such a case these pins would not enter the button eyes and the button would not be properly positioned thereby. To provide for such contingency, the finder may be modified in its construction as shown in Fig. 13, where spring pressure is applied to the button independently of the pressure of the finder pins thereagainst, upon forward movement of the plunger, and this independent frictional resistance to the turning of the button is secured by providing a sleeve 67 surrounding the plunger with its forward end formed to frictionally engage the back of the button, which sleeve is urged forward when the plunger is projected, by means of a coiled spring 68 interposed between the rear end of the sleeve and a suitable collar on an enlargement 69 of the plunger, a limited lost motion or play between said sleeve and plunger being provided by means of a pin 70 on the sleeve arranged to engage shoulders 71 formed on the plunger. The sleeve 67 is cut away or slotted longitudinally to permit the balls to engage the plunger so that these balls will function in centering the plunger.

In this construction, when the plunger is moved forwardly by the arm 29, the sleeve will first engage the button and upon further forward movement of the plunger, will put a yielding pressure on the button to frictionally hold it against turning with the plunger, said plunger being free to turn independently of the sleeve, and thus the button will be held against being turned by the frictional engagement of the pins 17 therewith until the pins find and enter the eyes, after

which the button will be turned with the plunger.

With the parts in the position shown in Fig. 14, the work of sewing a button in place has been completed and the machine has been automatically stopped by the usual means provided in connection with this class of machines and not shown in the drawings. The starting of the sewing operation of the machine is effected through a pull rod 72 and lever 73 indicated in Fig. 4, which lever controls the usual clutch (not shown) for transmitting power from the drive pulley E' to drive the drive shaft E from which shaft motion is taken to operate the sewing mechanism including the needle D, the slide K and the feed plate L, and to rotate the finder plunger all as hereinbefore described. As indicated in this Fig. 14, the operator has raised the presser-foot, through the operation of the pull rod 61, to the limit of its upward movement, having thereby retracted the finder plunger 7 to release the lower button in the button chute and to enter the pins of the transfer arm 36 into the button eyes, which arm has, immediately after the engagement of said pins 35 with the button, been released by the rearward movement of the bar 5 which has carried the arm rearwardly to engage its pins with the button eyes and to move it out of engagement with the locking spring 40, whereupon it has been immediately swung downward by the pull of the cable 55, into locked position at the forward end of the presser-foot, carrying another button into the button clamp beneath the needle D and thereby ejecting the previously sewed on button automatically. The work is now re-positioned to the proper place for the sewing of this next button, and the operator then releases the presser-foot which is immediately swung downwardly by the action of the spring M^2 to firmly clamp the work between said foot and the feed-plate L. The lowering of the presser-foot releases the transfer arm 36 from engagement with the spring 52 and it is immediately swung upwardly by the action of the spring 62 to its uppermost position, where it is again caught and held by the spring 40, the parts being in the position shown in Fig. 8 with the finder pins 17 either entered into the eyes of the next button or against the back of the button, the finder plunger 7 having been projected forwardly by its spring 28 immediately upon the lowering of the presser-foot by the release of the rod 61 which also releases the bar 5, permitting the spring 66 to act and move said bar and arm 36 carried thereby, forwardly. The parts are now in position to begin the operation of sewing the positioned button in place upon the work.

The button being properly positioned and held relative to the needle and the work being firmly clamped in place between the foot and feed plate, the operator will operate the main clutch (not shown) by means of the rod 72 and start the sewing operation, the slide K being moved back and forth by the rotation of the cam wheel I, in timed relation to the reciprocation of the needle and carrying the presser-foot with it so that the button will be alternately moved to bring first one of its eyes into alignment with the needle and then the other to sew through both of the button eyes. During this sewing operation the large worm wheel H' is rotated by the main shaft E and through the connection of the crank pin 26 on this wheel with the segment 19, a half turn in first one direction and then in the other, is imparted to the finder plunger 7, so that the finder pins 17 will find and enter the button eyes and hold, at the end of the sewing operation, the lower button in the button chute in proper position until engaged by the transfer arm 36 and transferred to the button clamp of the presser-foot when said foot is again raised as previously described.

When the sewing operation is completed, the machine is again stopped automatically, thus ending the cycle of operation.

Where the buttons to be attached are provided with four eyes instead of two as shown, a sideways motion is applied to presser-foot, in addition to that above described, by a similar cam wheel device (not shown) which is a regular part of the sewing machine and may be connected when required but does not affect the operation of this invention, and it will be understood that the present invention is applicable to button attaching machines other than sewing machines and that it is the method of and mechanism for feeding, positioning holding and ejecting buttons, as set forth in the appended claims which is the gist of the present invention irrespective of the type of machine to which it is applied.

Further, where the buttons 75 have the form shown in Figs. 15, 16 and 17 with a transverse ridge 76 between the eyes 77 and the face of the button concaved to provide surfaces inclined toward the eyes and no flat surface which may be engaged by the pins 35, the finder mechanism for rotating the button to properly position its eyes relative to the pins 35 on the transfer arm 36 may be dispensed with, the rounded ends of the pins 35 coming into contact with the inclined surfaces of the face of the button, serving to rotate the button until said pins enter its eyes. However to insure ready rotation of the button under the pressure of the pins 35 thereagainst and thus prevent breakage, a rotary abutment member 78 is mounted within a bore in a head 79 on the bracket 9 to rotate freely therein with the end of said member 78 positioned so that the button to be engaged by the pins 35 will be forced by the pressure of the pins against said end of said abutment member, and as said member is mounted within a ball thrust bearing 80 in the bore of the head 79, the button will be turned with comparative ease by the engagement of the pins 35 with its inclined surfaces to permit the entry of these pins into the eyes thereof.

Obviously this attachment may be employed to attach other forms of buttons, the construction and arrangement being varied to suit the particular form of button, the main ideas embodied in the present invention and which fall within the broad scope of the appended claims, remaining the same.

Having thus fully described my invention, what I claim is:—

1. In a machine for attaching buttons, the combination of means for attaching a button to the work through the eyes of the button, means projectable into and retractable from the button eyes for rotating and positioning the button, and separate means to engage the button eyes and feed the button to the attaching means.

2. In a machine for attaching buttons, the combination of means for attaching a button to the work through the eyes of the button, a swinging arm having means engageable with the eyes of a button for feeding the button to the attaching means, means engageable with the button eyes for rotating and positioning the button, and means operating in timed relation to the movement of said arm for retracting said last named

button engaging means from engagement with said button.

3. In a machine for sewing buttons in place upon material including a needle and means for operating the needle, of a chute for feeding buttons, a rotary finder positioned to engage the lowermost button in the chute and enter the eyes of the button, means for reciprocating and rotating the finder in timed relation to the means for operating the needle, and transfer means operated independently of the operation of the finder and operating means for the transfer means to engage the positioned button and transfer the same from the chute to the needle with its eyes in position to be entered by the needle.

4. In a button attaching machine, the combination of a button chute positioned with its lower end in a horizontal plane above the horizontal plane of the work to which buttons are to be attached, a transfer member pivoted to swing upwardly between the lower end of said chute and work to engage the lowermost button in the chute and carry said button into position beneath the attaching means, and means curved to conform to the path of movement of said transfer member to receive and guide the button during its movement with said transfer member and hold the button while being attached.

5. In a machine for attaching buttons to material including means for attaching a button through the eyes thereof, the combination of a button chute, releasable means for stopping the lowermost button in the chute to stop the gravity column of buttons, means adjacent the chute for engaging and rotating the button, separate means for engaging the eyes of said button and positively feeding the same against the action of said releasable means, to the button attaching means, and means for operating said button rotating means to withdraw the same from engagement with the button in timed relation to said feeding means.

6. In a machine for attaching buttons to material including means for attaching a button through the eyes thereof, the combination of a button chute with its discharge end in a plane above the plane of the work, releasable means for stopping the lowermost button in the chute to stop the gravity column of buttons, a transfer arm to swing upwardly toward the lower end of said chute and engage and release said button and feed the same to the button attaching means, and a member curved to conform to the path of swinging movement of said arm and adapted to receive and hold said button and to press the button against the material to which it is to be attached.

7. In a button attaching machine for attaching buttons to material through eyes of the buttons, and including button attaching means, the combination of a button chute, a rotatable button-eye finder having pins to engage in the eyes and longitudinally reciprocable at right angles to the vertical plane of the lowermost button in the chute, means for operating said finder, a swingable transfer member having pins to engage the button eyes, and arranged to positively feed the button from the chute to the button attaching means, and means curved to conform to the path of movement of said swingable member to guide the button during such transfer and to hold said button in place upon said transfer member during the swinging movement thereof.

8. In a button attaching machine for attaching buttons to material through eyes of the buttons and including button attaching means, the combination of button holding means, a button transfer member having means to engage the eyes of the button, means for moving said member to engage the same with the button eyes, said member being arranged to swing about a fixed pivot and transfer the button while engaged therewith from said holding means to beneath the button attaching means, and a presser member formed with a curved guideway to receive and hold the button during such transfer, said presser member being movable relative to said transfer member to release the button therefrom at the end of swinging movement thereof.

9. In a button attaching machine for attaching buttons to material through eyes of the buttons and including button attaching means, the combination of a presser member forming a curved guideway for buttons, means for raising and lowering said presser member, button holding means to feed buttons into the guide of said presser member, a button transfer member pivoted to swing with its free end adjacent the curved guide of the presser and to engage the eyes of a button held by the button holding means and positively move said button along the guide of said presser into position adjacent the attaching means, and means to operate said presser member relative to said transfer member to disengage said transfer member from said button and to clamp and release the work.

10. In a button attaching machine for attaching buttons to material through eyes of the buttons and including button attaching means, the combination of an elevated button chute, a presser member movable below the chute toward and from the same and formed with a guideway to receive a button from said chute and guide the same downwardly, a transfer member movable along the guideway of said presser to engage the lowermost button in the chute and positively move the same downwardly along the guideway of said presser into position beneath the button attaching means, and means for moving said presser relative to said transfer member to release the button from said transfer member.

11. In a button attaching machine for attaching buttons to material through eyes in the buttons and including button attaching means, the combination of means for holding buttons and arranged to present one button at a time, a finder to engage the eyes of the presented button and place the button with its eyes in a predetermined position, a presser member movable toward and from the button holding means, transfer means for positively moving the button positioned by the finder from said finder to position adjacent said button attaching means, and means for moving said finder and transfer means to disengage the finder from the button and engage the transfer means therewith.

12. In a button attaching machine for attaching buttons to material through eyes of the buttons and including button attaching means, the combination of a means for receiving and holding a button in a substantially vertical edgewise position, means for turning said button while so held to position the button with its eyes in a pre-determined position, transfer means to engage and hold the positioned button and positively move the button downwardly through an arc of a circle to a position beneath the button attaching means with the button in a horizontal plane, presser means to receive the button from the transfer means and press the same

into firm contact with the material to which it is to be attached.

13. In a button attaching machine for attaching buttons to material through eyes of the buttons and including button attaching means, the combination of means for receiving and holding a button in a substantially vertical edgewise position, means for positioning said button while so held, with its eyes in a predetermined position and including an oscillatory and reciprocatory plunger having end pins to engage in the button eyes, and means for oscillating said plunger, button transfer means for moving the positioned button from said holding means to position beneath said button attaching means and including a member having pins to enter the eyes of the positioned button, and means for reciprocating said plunger to disengage the pins thereof from the button eyes and for simultaneously moving said member of the transfer means to engage the pins on said member with the button eyes.

14. Means for feeding buttons to the button attaching means of a button attaching machine including a button-eye finder comprising a plunger having pins at one end thereof to engage button eyes, a barrel inclosing said plunger, said plunger being mounted in said barrel to permit lateral movement of one end of said plunger, means for yieldingly holding the laterally movable end of said plunger centered in said barrel, means for yieldingly moving said plunger longitudinally in one direction, and means for moving said plunger longitudinally against the action of said yielding means, and means for imparting a rotary or oscillatory motion to said plunger.

15. A button-eye finder in the combination and as characterized in claim 14 and wherein said means for yieldingly holding said plunger centered comprises a sleeve longitudinally movable in the barrel and formed with an inclined seat at one end for a plurality of balls, balls engaging said seat, and a spring to yieldingly hold said sleeve moved with said seat in contact with said balls.

16. Means for feeding buttons to the button attaching means of a button attaching machine including a button-eye finder comprising a barrel, a plunger reciprocable and rotatable in said barrel, said plunger being provided with end pins to engage in the button eyes, a spring within the barrel to yieldingly move the plunger longitudinally from the barrel, means for moving the plunger longitudinally in opposition to said spring, means for oscillating said plunger and means for limiting the turning movement of the plunger.

17. Means for feeding and positioning buttons relative to the button attaching means of a button attaching machine, including a button chute, a slide bar, a transfer device pivotally attached to said bar to swing in the arc of a circle thereon and moved toward and from the chute by said bar to engage the lowermost button in said chute, a presser foot curved to conform to the arc of movement of said transfer device and provided with a stop to limit the swinging movement of said device, means for receiving and holding a button, carried by said presser foot, and means for raising and lowering said presser foot.

18. The combination as set forth in claim 17 and characterized in that said transfer device includes a swinging arm provided with pins at its free end to engage the button eyes, and said curved presser foot forms a guide to hold the button in place upon said pins.

19. The combination as set forth in claim 17 and including an operative connection between said slide bar and said presser foot, whereby movement of the foot moves the bar.

20. The combination as set forth in claim 17 and including an operative connection between said slide bar and said presser foot for moving said bar longitudinally in one direction, and a spring operative to move said bar in the opposite direction.

21. Means for the purpose specified and the combination set forth in claim 17 and including a locking device to hold said transfer device at the upward end of its swinging movement, said locking device being unlocked by the movement of said transfer device toward said chute.

22. Means for feeding and positioning buttons relative to the button attaching means of a button attaching machine, including a button chute to hold buttons in superposed edgewise relation a transfer arm pivotally supported at one end to swing in the arc of a circle and provided with means at its opposite end to engage and hold the lowermost button in said chute and transfer the same to position beneath the button attaching means, a spring to normally turn the transfer arm on its pivotal support toward its upward position, a presser foot, means for raising said presser foot having operative connection with said transfer arm to turn the same on its support, and means on the presser foot to engage and hold the button in the position to which it is transferred by said transfer arm and operative to release said transfer arm from said button upon downward movement of said presser foot.

23. Means for feeding and positioning buttons relative to the button attaching means of a button attaching machine, including a button chute positioned at a distance above the horizontal plane of the work and attaching means, a transfer arm pivoted to swing in a vertical plane from the lower end of said chute downwardly to said work beneath the attaching means, and an upwardly and downwardly movable presser foot forming a guide for the button during the transfer movement of the arm, said transfer arm having means to engage the eyes of the lowermost button in the chute to transfer said button from said chute to said presser foot and along the guide thereof to beneath said button attaching means, and means for moving said presser foot in timed relation to the swinging of said arm.

24. Means for the purpose and the combination set forth in claim 23 and including stops to limit the swinging movement of said transfer arm in both directions, and means on the presser foot to receive and hold the button.

25. Means for feeding and positioning buttons relative to the button attaching means of a button attaching machine, including a button transfer member supported to swing in the arc of a circle in a vertical plane and feed a button into position below the button attaching means, an upwardly and downwardly movable member, a presser foot to work beneath said button attaching means and carried by said member, a curved guide on said foot to engage and hold a button delivered thereto by said transfer member, a horizontal reciprocable bar on which said transfer member is mounted, and means for reciprocating said bar, swinging said transfer member and moving said upwardly and downwardly movable member in timed relation to each other.

26. Means for the purpose specified and as set forth in claim 25 and characterized in that said means for operating the presser foot and transfer member is connected to said foot to first raise the same and is thereafter operative to swing said transfer member downwardly, said foot and transfer member being relatively movable and operatively connected to cause said relative movement when the foot is raised and for the purpose of releasing said transfer member when said foot has reached the end of its upward movement.

27. Means for the purpose specified and in the combination set forth in claim 25, and including a stop to limit the upward swinging movement of the transfer member, locking means for holding said transfer member in its up position, a stop on said presser foot to limit the downward swinging movement of said transfer member, and means for causing a relative movement between said foot and transfer member other than the swinging movement of said member and the up and down movement of said foot, to release said transfer member from engagement with said locking means.

28. The combination with a button attaching machine having a vertically reciprocable attaching member, driving mechanism for operating said member including a main shaft, a work vibrating plate operated by said driving mechanism in timed relation to the operation of said attaching member, and a rocker bar; of an attachment including a supporting bracket detachably attached to the machine, a button chute supported upon said bracket, a button-eye finder carried by said bracket to engage and rotate the lowermost button in said chute, means for oscillating said finder with a rotative movement and connected to said driving mechanism to operate said finder in timed relation to the operation of said button attaching member, a presser foot carried by said rocker bar, button transfer means carried upon said bracket for transferring buttons from said chute to said presser foot and into position beneath said vertically reciprocable button attaching member, means to hold said button in said attaching position, and means operative independently of said driving mechanism for raising and lowering said presser foot and for operating said button transfer means.

29. In a button attaching machine, the combination with button attaching means, of a presser member for clamping and holding the material to which the button is to be attached and provided with a guideway for a button, means in said guideway to yieldingly engage and hold a button when moved along said way to attaching position, a transfer member to engage a button and move the same along said guideway into engagement with said holding means and positively eject the attached button therefrom against the resistance of said holding means, and means for operating the presser member and transfer member to raise the presser member and release the material, prior to the ejection of the attached button by the positioning of an unattached button by the transfer member.

ADIN P. RAWNSLEY.