

H. J. SKIPP.

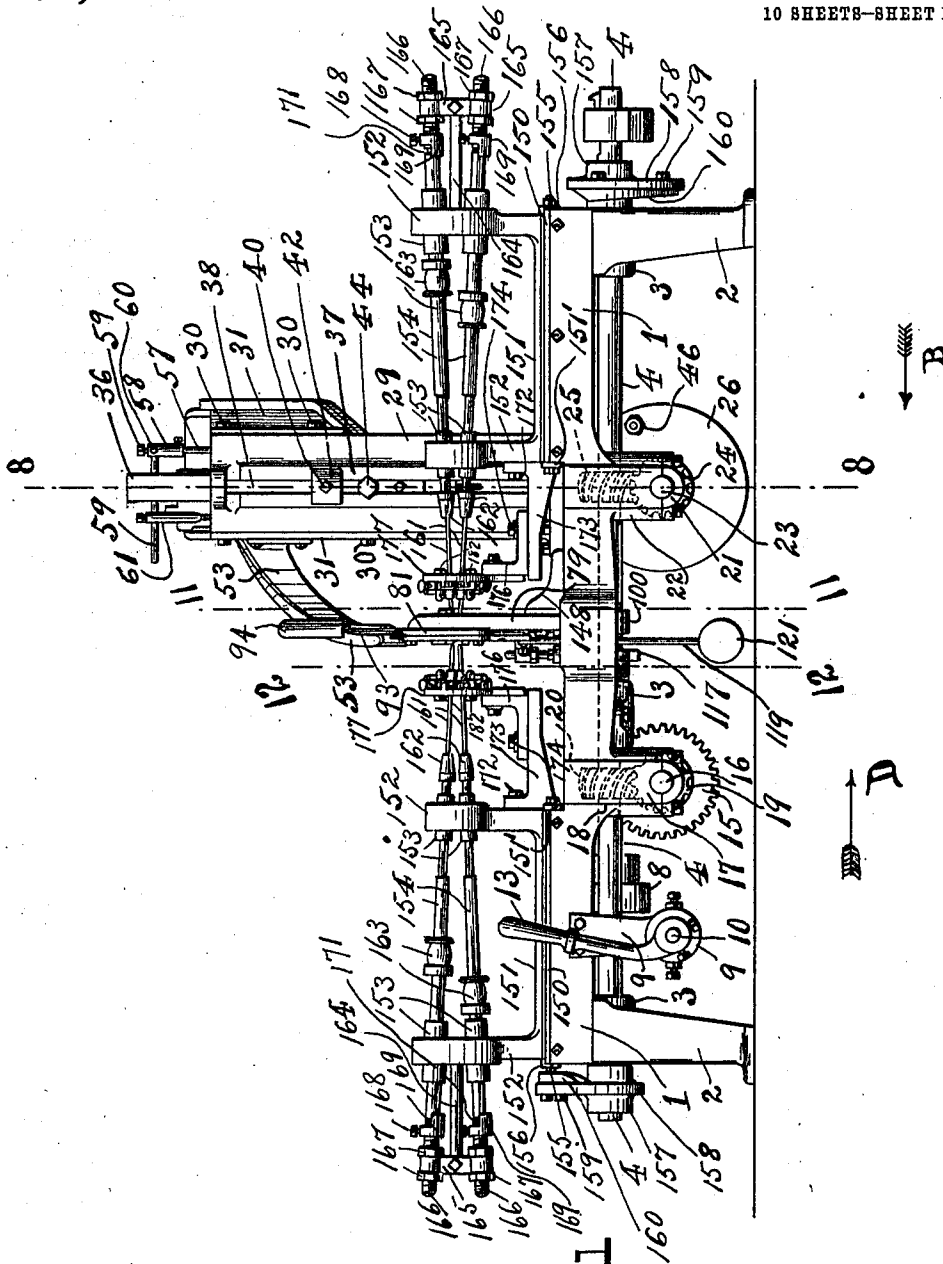
APPARATUS FOR DRILLING AND COUNTERBORING THREAD HOLES AND CUTTING THREAD
NICHES IN BUTTON BLANKS.

APPLICATION FILED AUG. 21, 1908.

Patented Nov. 1, 1910.

10 SHEETS-SHEET 1.

974,532.



WITNESSES:

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FIG. 1

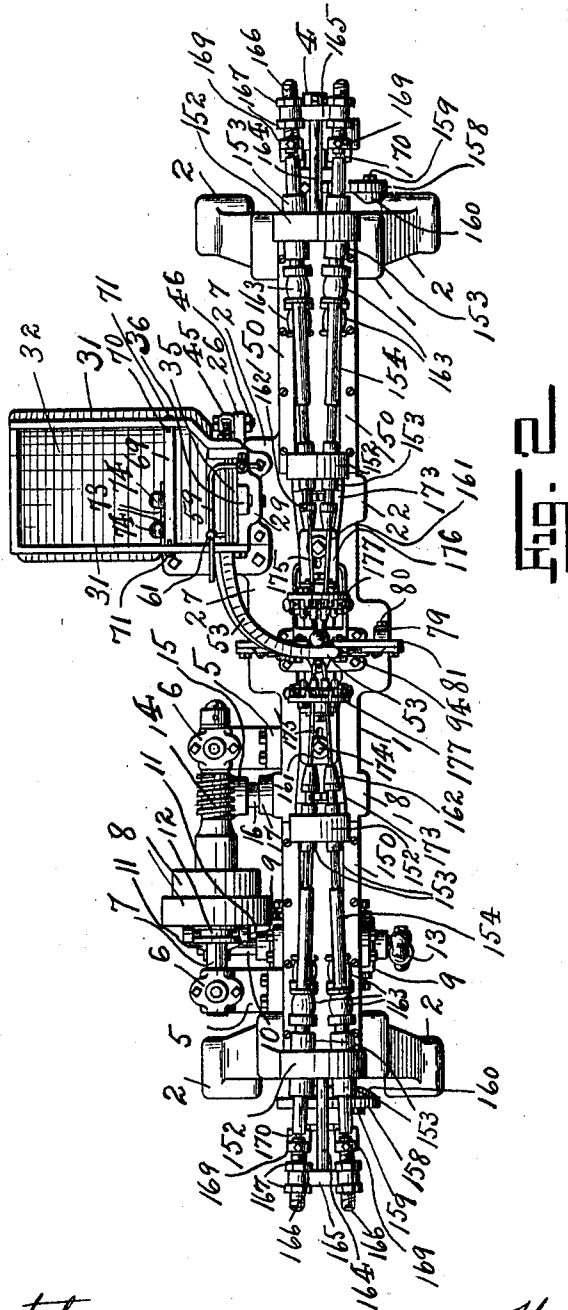
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 10 SHEETS—SHEET 2.



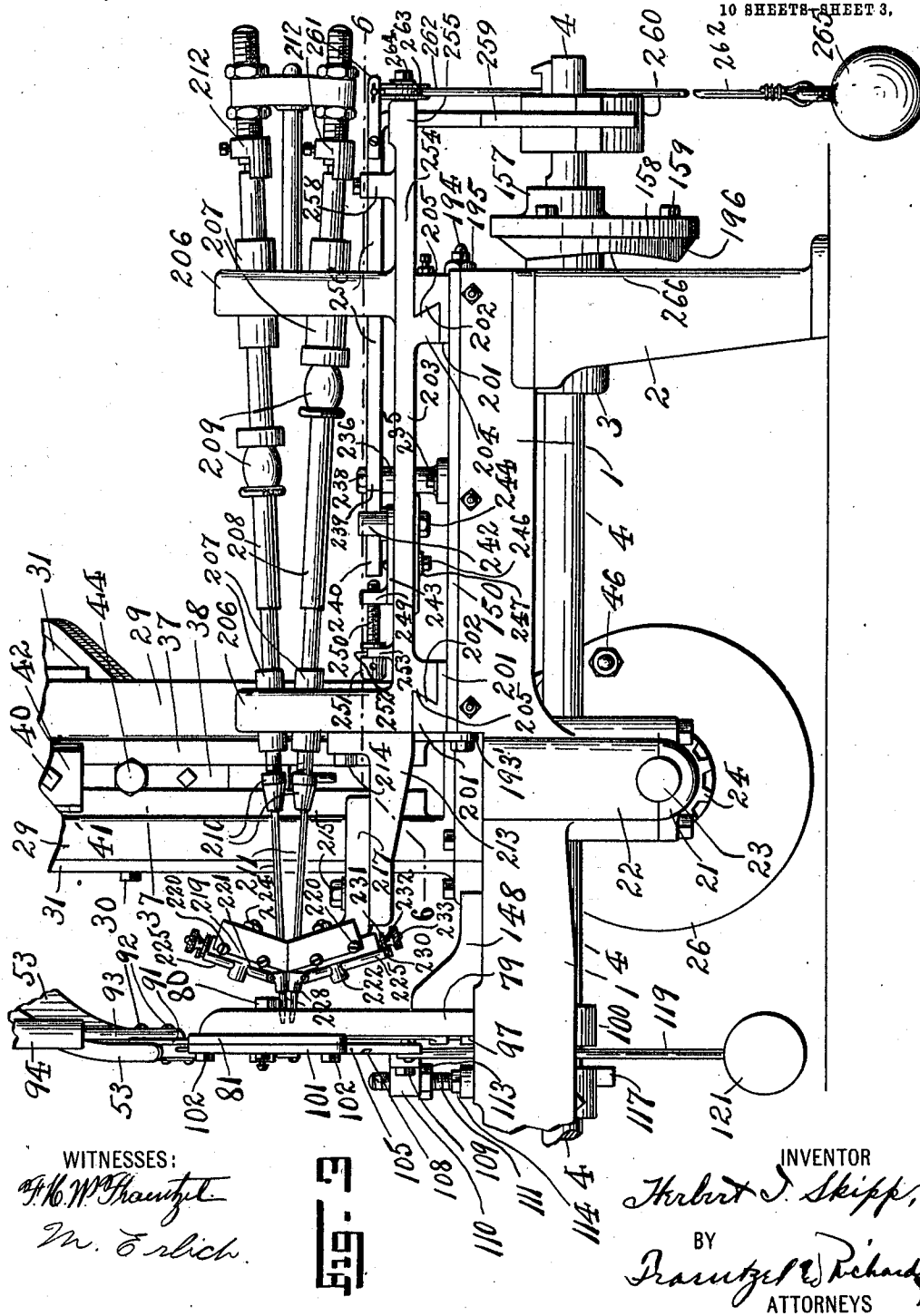
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10 SHEETS-SHEET 3.



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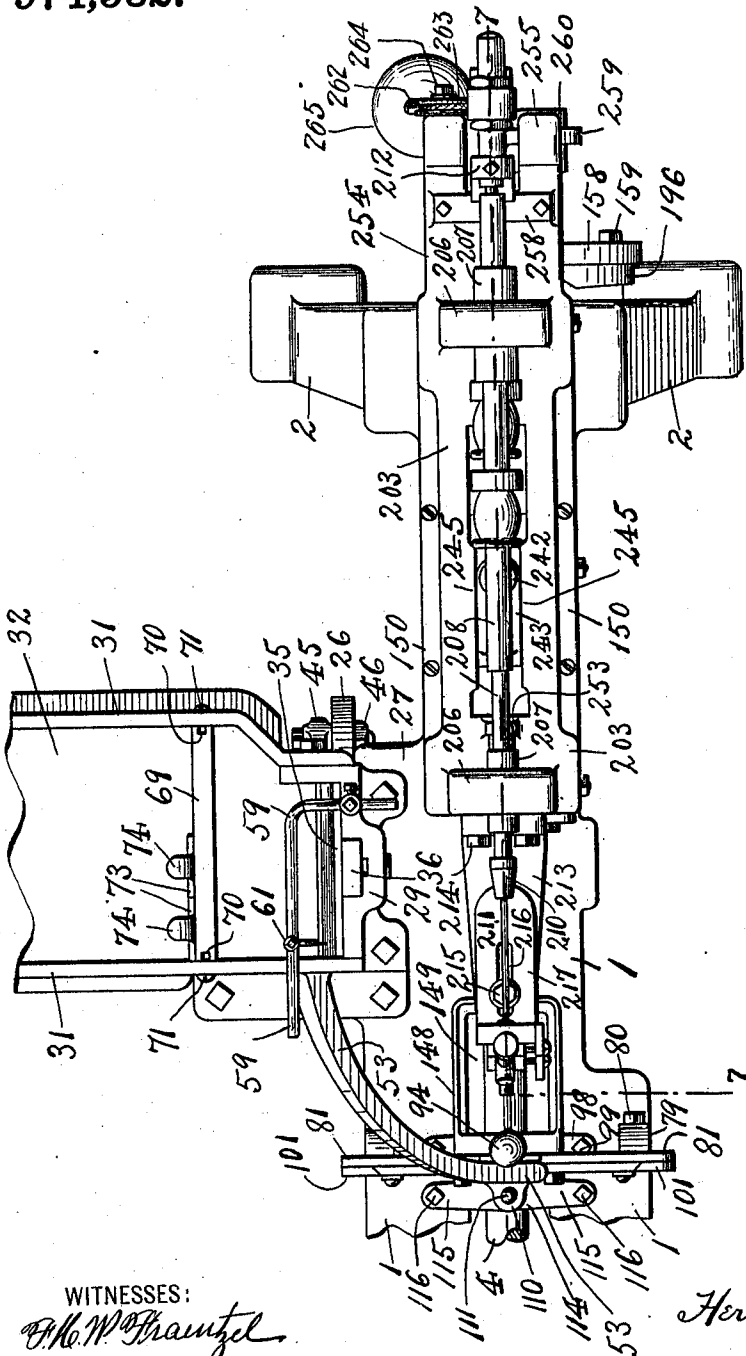


Fig. 4

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APPARATUS FOR DRILLING AND COUNTERBORING THREAD HOLES AND CUTTING THREAD
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10 SHEETS—SHEET 5.

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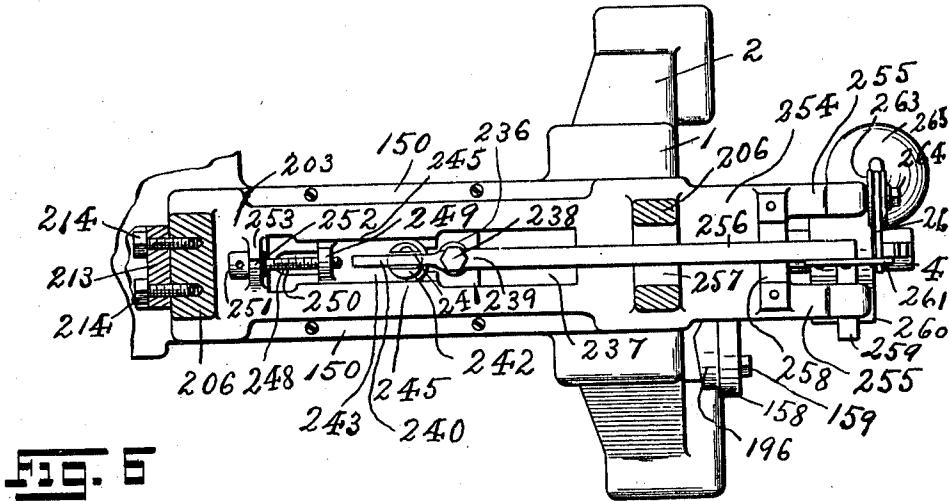


Fig. 5

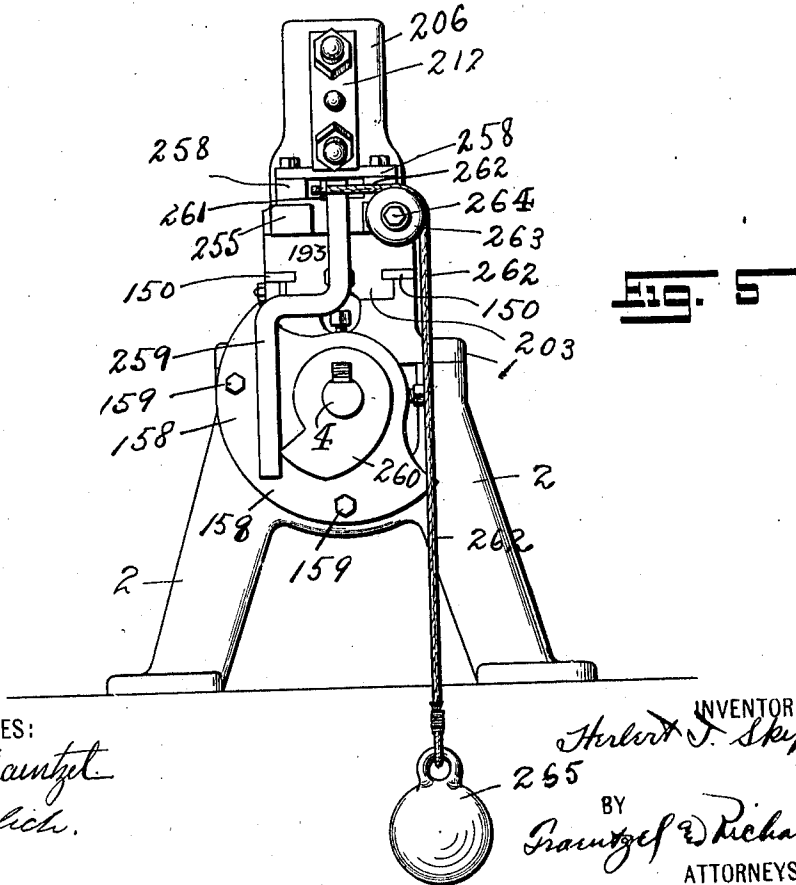


Fig. 6

WITNESSES:

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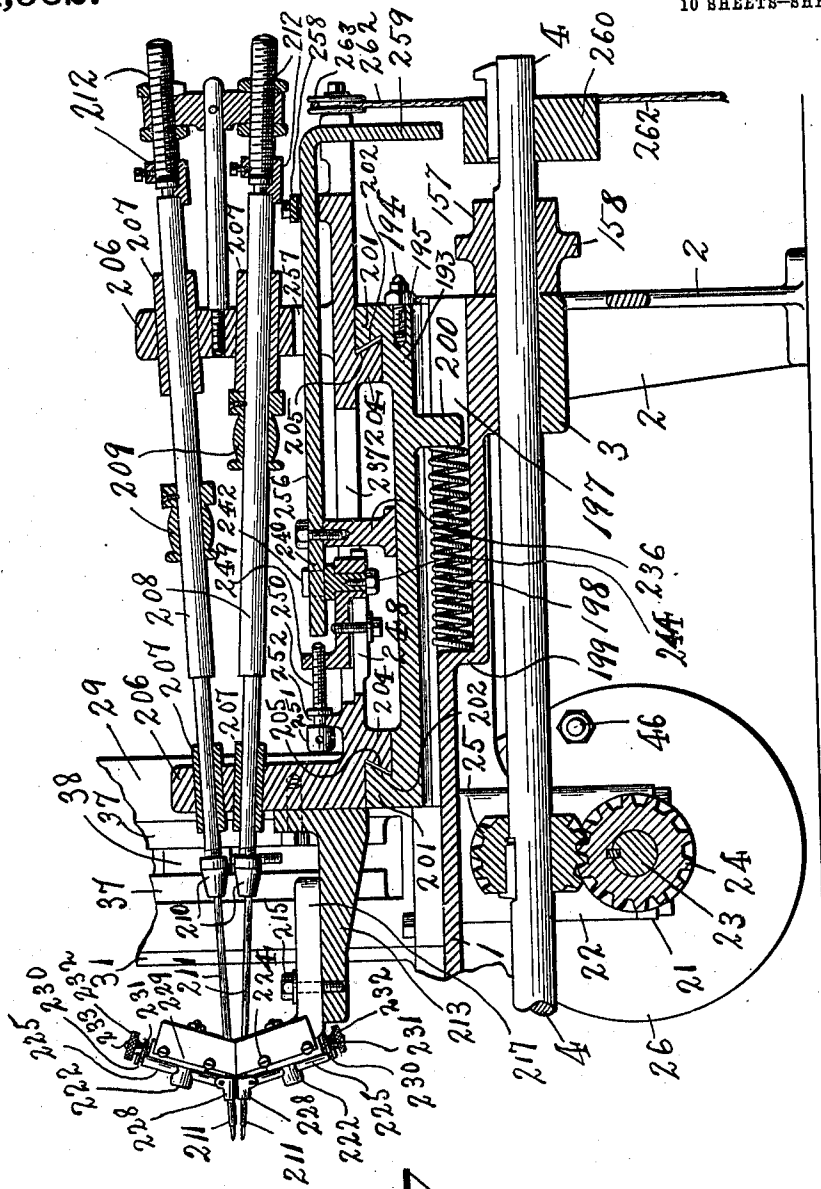
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 APPLICATION FILED AUG. 21, 1908.

974,532.

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 10 SHEETS—SHEET 6.



WITNESSES:
F. H. W. Thayer
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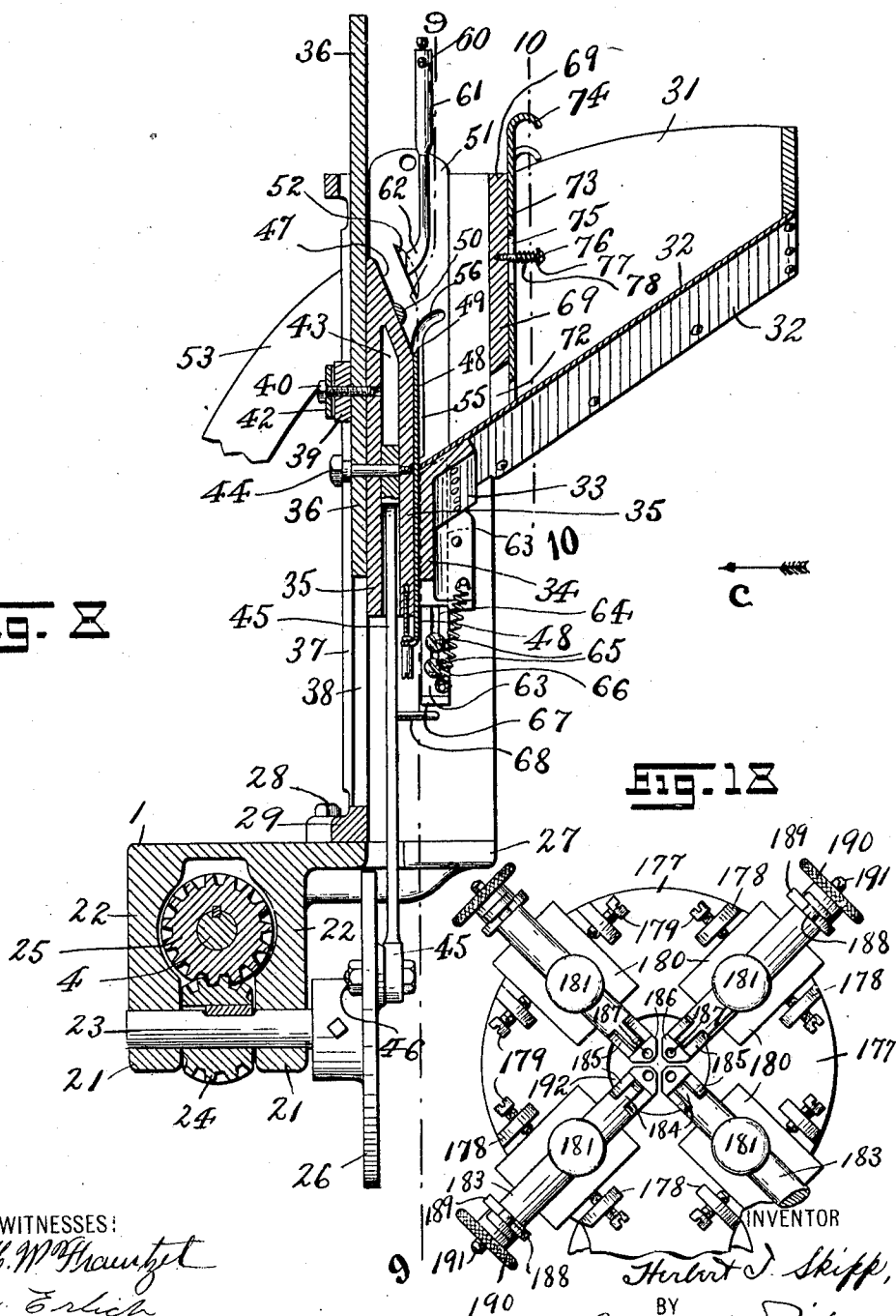
515-7

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APPARATUS FOR DRILLING AND COUNTERBORING THREAD HOLES AND CUTTING THREAD
NICHES IN BUTTON BLANKS.

Patented Nov. 1, 1910.

10 SHEETS--SHEET 7:



WITNESSES:

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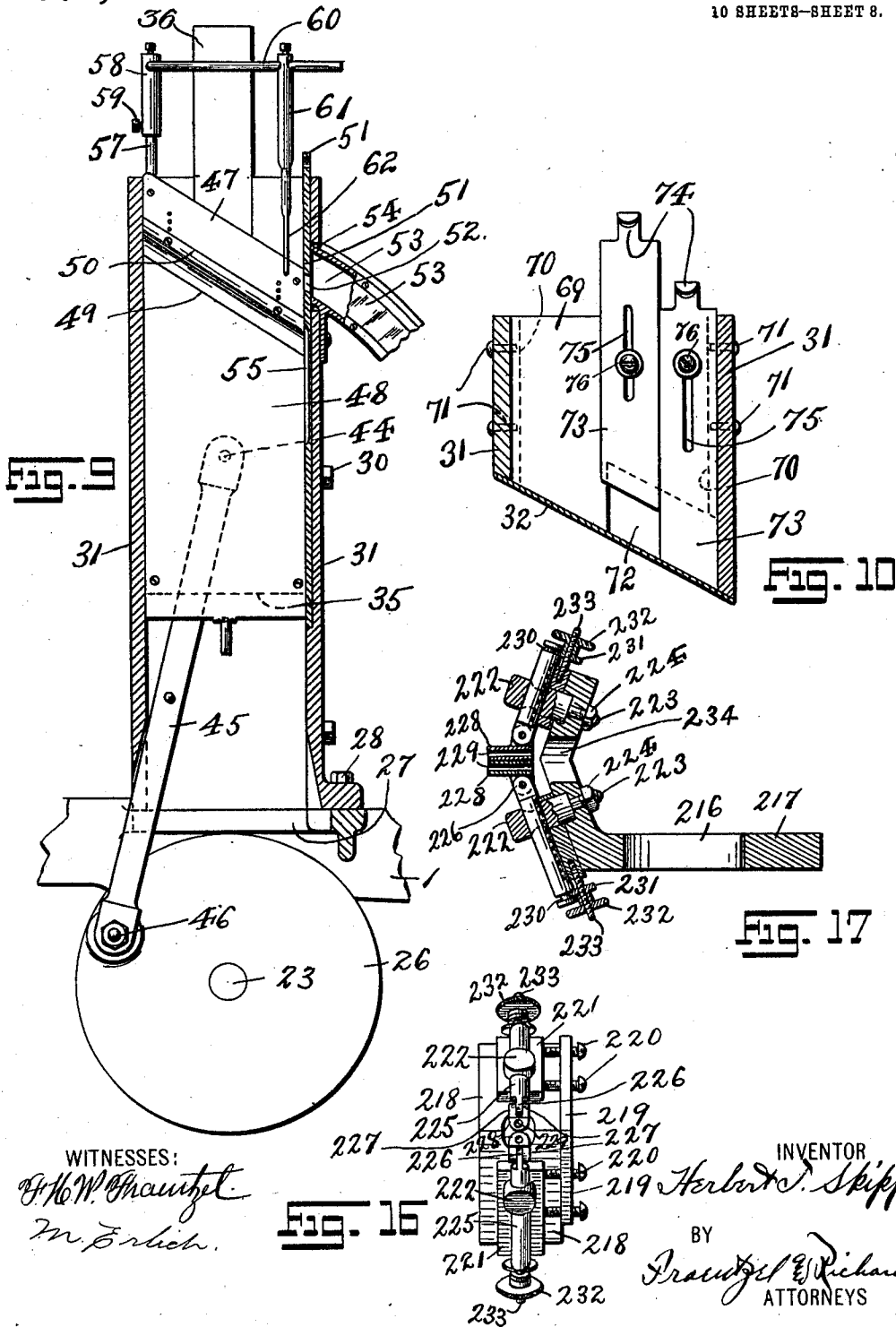
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10 SHEETS—SHEET 8.

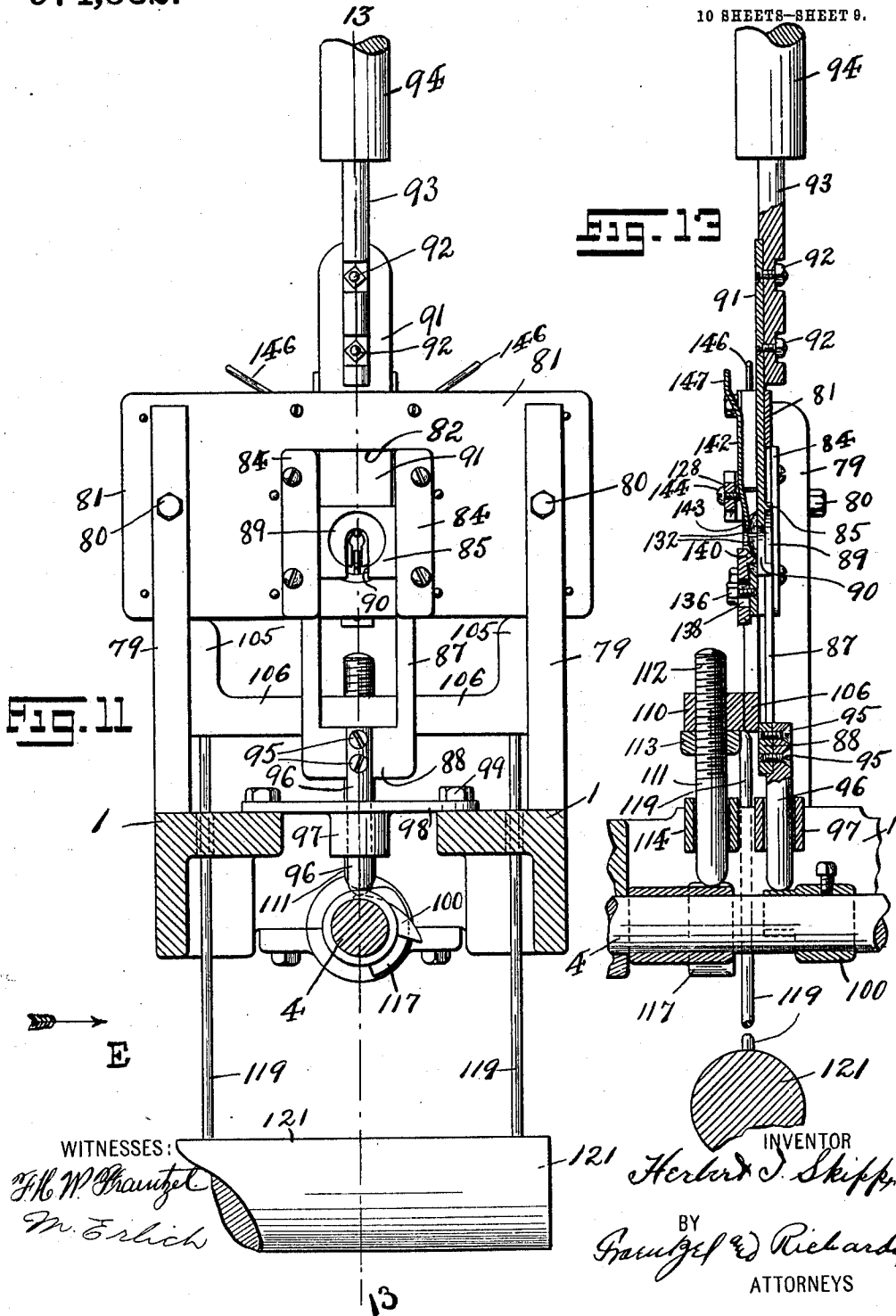


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974,532.

Patented Nov. 1, 1910.

10 SHEETS—SHEET 8.



WITNESSES:
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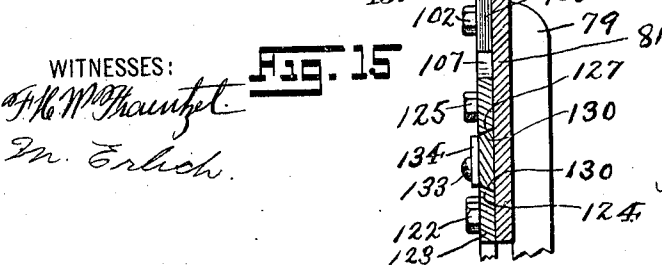
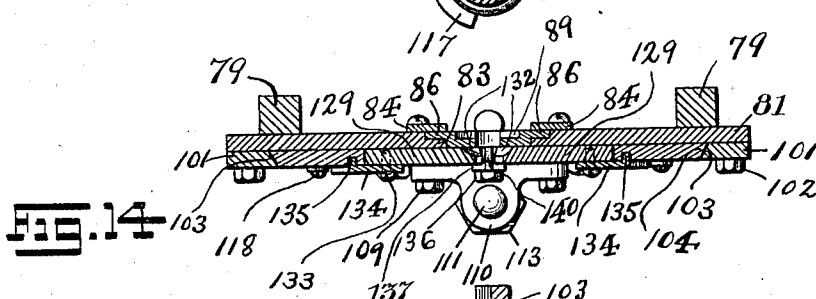
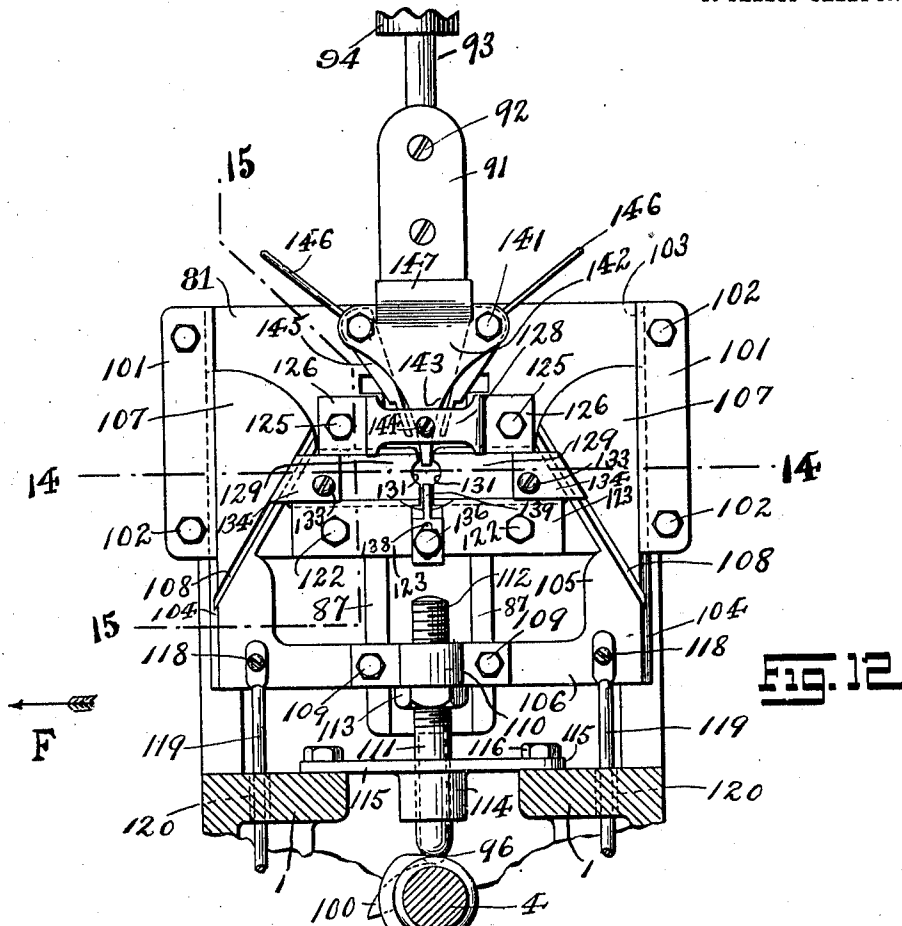
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 APPLICATION FILED AUG. 21, 1908.

974,532.

Patented Nov. 1, 1910.

10 SHEETS—SHEET 10.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DRILLING AND COUNTERBORING THREAD-HOLES AND CUTTING
THREAD-NICHES IN BUTTON-BLANKS.

974,532.

Specification of Letters Patent.

Patented Nov. 1, 1910.

Application filed August 21, 1908. Serial No. 449,732.

To all whom it may concern:

Be it known that I, HERBERT J. SKIPP, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Drilling and Counterboring Thread-Holes and Cutting Thread-Niches in Button-Blanks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention has reference, generally, to improvements in that class of apparatus used in the manufacture of buttons, and the like; and, the invention relates, more particularly, to a novel arrangement and construction of apparatus or machinery adapted to automatically drill and counter-bore the thread holes in button-blanks, and, also, to cut the counter-sunk thread-receiving niches or grooves in the face of said button-blanks between the said thread-holes and thereby provide a finished button ready for use in connection with wearing apparel and with other uses in which buttons are employed.

The invention, therefore, has for its primary object to provide a novel button-boring and niching or grooving machine or apparatus of the general character hereinafter set forth, and a novel means for feeding the button-blanks from a hopper automatically and one at a time to where the blank is held in a proper position to be drilled or niched, as the case may be.

A further object of the present invention is to provide an automatically timed and operated holding or clamping chuck which receives the button-blanks and holds the same in position to be drilled or niched; and, furthermore, means connected therewith for quickly and easily adjusting the same to the various sized button blanks to be drilled or niched.

Another object of the present invention is to provide interchangeable boring and niching or grooving mechanisms, which, when operatively connected with the machine, are

automatically timed and operated in carrying out their functions.

A still further object of this invention is to provide, in connection with the above-mentioned boring and niching or grooving mechanism a novel and simple construction of drill-guide and adjustment of the same; and, a still further object of this invention is to provide a means for automatically operating the niching or grooving mechanism, so as to cause the same to cut a convex niche or groove in the button blank, said niche or groove connecting each pair of thread-holes.

Other objects of the present invention not at this time more particularly mentioned will be clearly understood from the following detailed description of the said invention.

With the objects of the present invention in view, the said invention consists, primarily, in the novel mechanism for drilling and niching or grooving button-blanks, and the like; and, the invention consists, furthermore, in the various novel arrangements and combinations of devices and parts, as well as in the details of the construction of the same, all of which will be hereinafter more fully described and then finally embodied in the clauses of the claim, which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation of the machine or apparatus embodying the principles of the present invention, the same illustrating the machine or apparatus set up or equipped for boring and counter-boring the thread-holes in the button-blanks. Fig. 2 is a top or plan view of the same. Fig. 3 is a detail side elevation of one end of the machine or apparatus embodying the principles of the present invention, the same being drawn upon an enlarged scale and illustrating the machine or apparatus set up or equipped for cutting the convex niches or grooves connecting each pair of thread-holes in said button-blanks. Fig. 4 is a detail plan or top view of the same. Fig. 5 is a detail end view of the same; and Fig. 6 is a detail horizontal section of the same, taken on line 6—6 in said Fig. 3. Fig. 7 is a detail vertical longitudinal section of the same taken on

line 7—7 in said Fig. 4, and looking in the direction of the arrow A. Fig. 8 is a vertical longitudinal section of the hopper and button-blank feeding mechanism, the same being taken on line 8—8 in said Fig. 1, and looking in the direction of the arrow B. Fig. 9 is a vertical cross-section of the same taken on line 9—9 in said Fig. 8 and looking in the direction of the arrow C. Fig. 10 is a detail vertical cross-section taken on line 10—10 in said Fig. 8 and looking in the direction of the arrow C. Fig. 11 is a detail cross-section, taken on line 11—11 in said Fig. 1 looking in the direction of the arrow B and illustrating more particularly the button-blank holding or clamping chuck; and Fig. 12 is a similar view taken on line 12—12 in said Fig. 1, and looking in the direction of the arrow D. Fig. 13 is a vertical longitudinal section of the same, taken on line 13—13 in Fig. 11 and looking in the direction of the arrow E. Fig. 14 is a horizontal section of the same taken on line 14—14 in Fig. 12 and looking in a downward direction. Fig. 15 is a small detail vertical section taken on line 15—15 in Fig. 12. Fig. 16 is a front end-view of the novel drill-guide and adjustment used in connection with the niche cutting drills and mechanism; and Fig. 17 is a vertical longitudinal section of the same. Fig. 18 is a front end view of the novel drill-guide and adjustment used in connection with the thread-hole drills and mechanism.

Similar characters of reference are employed in all of the said above described views, to indicate corresponding parts.

Referring now to the said drawings, the reference-character 1 indicates a suitable base or foundation-member, mounted upon legs 2. This said base-member 1 is provided with suitable bearings 3, in which is mounted a longitudinally extending shaft 4. Secured upon the side of said base-member 1, and separated at a suitable distance from each other, are a pair of brackets 5 provided at their free ends with bearings 6. Mounted in these bearings 6 is a shaft 7. Arranged upon said shaft 7 is a loose pulley 8. Mounted in a pair of bearings 9, secured to said base-member 1, is a shaft 10 which extends laterally beneath said base-member 1; and secured upon one end of said shaft 10 and adapted to receive an oscillatory movement from said shaft, is an arm and yoke-like member 11 of a friction-clutch mechanism 12 which is slidably arranged upon said shaft 7 and is adapted to revolve therewith in the usual manner. This said friction-clutch mechanism 12 is adapted to engage with said loose-pulley 8 which is operatively connected by means of a belt to a main source of power, when it is desired to start the machine or apparatus. Secured to the opposite end portion of said shaft 10

is a lever or handle 13 for actuating the shaft 10 and the clutch-mechanism connected therewith. Rigidly secured upon said shaft 7 is a worm 14, the same being adapted to mesh with a worm-gear 15 secured to a shaft 16. This said shaft 16 is mounted in bearings 17 which form a part of downwardly extending arms 18 preferably formed integrally with said base-member 1, one upon each side of said base-member 1, so that said shaft 16 extends laterally beneath said base-member 1 and at right angles to said longitudinally extending shaft 4. Rigidly secured upon said shaft 16 is a helical gear 19 which meshes with a similar helical gear 20 secured upon said longitudinally extending shaft 4, thus completing the construction of the mechanism for driving said shaft 4. Mounted in bearings 21 which form a part of downwardly extending arms 22 preferably formed integrally with said base-member 1, one upon each side of the same, is a laterally extending shaft 23. Rigidly secured upon this shaft 23 is a helical gear 24 which meshes with a similar helical gear 25 rigidly secured upon said longitudinally extending shaft 4. Secured upon the free end of said shaft 23 is a disk or wheel 26. Connected with said base-member 1 is an outwardly extending shelf or portion 27 upon the upper surface of which is secured, by means of bolts 28, or other suitable means, a support 29. Secured to the sides of said support 29 by means of bolts 30, or the like, are the side-castings 31 of the hopper-body. The bottom edges of said side-castings 31 are constructed so as to slant downwardly and inwardly, and are also formed so as to cant the sheet-metal bottom 32, which is secured thereto in any suitable manner, from the right hand side downwardly toward the left hand side, in order that the button-blanks placed in the hopper will gravitate to the lower left hand corner of said hopper.

The bottom 32 of the hopper is further supported by a supporting-casting 33 which is secured to the side-castings 31, this said supporting-casting 33 being provided with a downwardly extending portion 34; and, furthermore said supporting casting 33 is situated so as to provide an open space between the same and the back of said support 29. Slidably arranged in the space thus formed and between the said support 29 and said downwardly extending portion 34 of said supporting casting 33, is an elevator-member 35 which extends transversely across the inner side of said hopper. Secured to the said elevator-member 35 is a bar 36, the same being slidably arranged between a pair of guides 37 integrally formed upon said hopper support 29, all arranged so as to provide a space 38. In like manner, there is provided a guide-block 39 which is secured in turn to the said sliding-bar 36 and said ele-

vator-member 35 by means of the bolt 40 or other suitable device. This said guide-block is also provided with overlapping lugs 41 upon its outer sides adapted to engage with the outer surface of said guide-bars 37, and a suitably shaped spring-washer 42 is arranged between the head of said bolt 40 and said guide-block 39. The said elevator-member 35 comprises a box-like casting providing the inner space 43 open at the bottom. Pivotaly secured within this space 43, and operatively connected with said elevator-member 35 by means of the bolt 44, is a connecting-rod 45, the lower end of which is pivotally connected by means of the bolt 46 with the said disk-wheel 26 at a point near its outer circumference, thus providing a means for raising and lowering the said elevator-member 35. This said elevator-member 35 is provided at its upper end with a chamfered surface 47 extending laterally across the same, and at the same time this chamfered surface is canted or sloped downwardly from the left hand side to the right hand-side when looking at the same from the base of the hopper, as illustrated more particularly in Fig. 9 of the drawings. Secured upon one side of said elevator-member 35 is a plate 48 the upper edge of which is made to conform with the cant or slope of the top of said elevator-member 35, said upper edge being provided with a chamfered portion 49 which projects slightly above the edge of the elevator-member 35 and provides a holding or carrying lip upon which the button-blanks rest when picked up by the said elevator member. An adjustably arranged member or element 50 which forms a rest for the button blanks is disposed upon the chamfered surface 47 of said elevator-member 35, against which the said button-blanks lean and are guided when picked up by said elevator member. This said rib 50 may be adjusted so as to provide for the varying diameters of button blanks. Secured in one of the side castings 31 is a plate 51, the same being countersunk in the said side-casting 31, and the said plate 51 being provided with a suitably disposed hole or opening 52, through which the button-blank which is carried up from the bottom of the hopper by the said elevator-member 35, escapes into a chute 53 and is thus delivered to the holding or clamping chuck in a proper position for boring or niching. The upper end of said chute 53 is secured by means of screws, or other suitable fastening devices, to the outer surface of said side-casting 31, and is made to register with a hole or opening 54 in said side-casting 31, and against the plate 51 so as to also register with the hole or opening 52 therein.

It is essential to the proper working of the machine, that the button-blanks are delivered to the chuck with their concave faces

turned toward the right hand end of the machine and their convex backs turned toward the left hand end of the machine. The elevator-member 35 picks up the button-blanks during the lowering of said elevator-member and the button-blanks rest upon the chamfered surface 47 with their convex surfaces or backs turned outwardly, the blank being held upon said chamfered surface 47 by means of the chamfered portion 49 which forms a holding-lip; and, the button-blank, during the upward movement of the elevator-member 35, as it is brought directly in alinement with the hole or opening 52 sliding off of said elevator-member 35 and into the chute 53 from which it is delivered into its proper position to the chuck. If by any chance a button-blank is caught and carried upon the chamfered surface 47 of the elevator-member 35 with its convex-surface or back turned inwardly, the edge of said button-blank will then be caught by a groove 55 which is provided at its upper end with a curved portion 56. As the elevator-member 35 continues to rise the edge of said button blank will ride in said groove 55 and as it reaches the curved portion 56 will be turned away and forced off of the elevator member 35 before it reaches the hole or opening 52 so as to drop back into the hopper. In this manner the button-blanks are assured to be delivered into their proper position to the chuck.

In order that only one button-blank at a time shall be delivered from the elevator-member 35 into the chute 53 and thence to the chuck, regardless of the number that may be carried up by said elevator-member 35, there is provided a retaining means which holds back all button-blanks upon said elevator-member 35 except the one adjacent to the plate 51 and its hole or opening 53. This retaining means comprises a post 57 having a sleeve 58 slidably arranged thereon so as to be capable of vertical adjustment, a set-screw 59 or the like means being provided for securing the same. Slidably secured to the upper portion of this sleeve 58, in a perforation or hole adapted to receive the same, is an arm 60 which is disposed at right angles to said sleeve 58. This arm 60 is also bent or turned at right angles and extends parallel to the face of the elevator-member 35. Slidably secured upon said arm 60 is a downwardly extending arm or member 61 the lower or free end-portion of which is provided with a finger or retaining-blade 62 turned inwardly toward the said elevator member 35. As the latter rises with its load or string of button-blanks resting upon the chamfered surface 47 and approaches the hole or opening 52, this finger or retaining-blade 62 passes between the first and second button-blanks in the string and thus permits the first but-

ton-blank to escape into the chute 53, but retains all the others until the elevator-member 35 again descends into the hopper.

In order to stir up the button-blanks in the bottom of the hopper and prevent the same from jamming together, there is provided a means comprising a bar 63 which is provided with a slot 64, through which are passed suitable screws 65 upon which said bar 63 rides. The upper end of this bar 63 penetrates through a proper opening in the bottom of the hopper so as to extend into the interior thereof, the bar 63 being held in a raised position within the hopper by means of a coiled spring 66, one end of which is secured to the supporting-casting 33 and the other end thereof being attached to said bar 63. The lower end of said bar 63 is provided with an outwardly extending lug or projection 67. Secured in a proper position upon the connecting rod 45 is an outwardly projecting pin 68. When the elevator-member 35 is descending into the hopper this connecting rod 45 rides over and downwardly toward the lug or projection 67 of said bar 63 and comes in contact therewith thus carrying the said bar 63 downwardly until the oscillating movement of the connecting rod causes the pin 68 to slip away from contact with the lug or projection 67 of the bar 63, and the distended coils of the spring 66 causes the bar to be sharply returned to its normal initial position and thus to move its upper end rapidly up into the interior of the hopper thereby stirring up the button-blanks lodged in the bottom of the hopper at a time when the elevator-member 35 reaches its lowest point and also aiding the same to pick up the said button-blanks as it rises again.

In order not to permit too many button-blanks to be deposited in the bottom of the hopper and thereby interfere with the proper working of the elevator member, the said hopper is provided with a partition or member 69 which is provided at each outer vertical edge with a groove 70 into which penetrate suitable retaining screws 71 which retain the partition or member 69 in place. The partition or member 69 is also provided with an opening 72 through which the button-blanks pass to the bottom of the hopper, their passage being regulated by a pair of slidable gates 73 which can be arranged so as to produce a larger or smaller opening 72 at will, and as will be evident the said slidable gates 73 are provided with finger-pieces 74 for operating the same, and with a slot 75 through which passes the screws 76 upon which the gates ride. A washer 77 and a spring 78 which is arranged between said washer 77 and each gate 73 produces sufficient friction by holding the gates 73 against the partition or member 69 so that the said gates can be re-

tained in any one of their adjusted positions.

The chute 53 conducts the button-blanks from the hopper to a holding or clamping chuck, which comprises a pair of posts 79 rigidly secured to the base-member 1. Secured in front of said posts 79, by means of bolts 80, or other fastening devices is a plate 81. This plate 81 is provided with a cut-away or open portion 82, the vertical edge portions of which are formed with projections 83, and secured upon the outer surface of said plate 81 and overlapping the vertical edges of the cut-away or open portion 82, are a pair of plates 84, the outer edges of said plates 84 and the projections 83 forming vertical guides in which is slidably arranged a retaining-plate 85. The said retaining-plate 85 is provided with lips or projections 86 to correspond with the guides formed in the plate 81 as above described. The said projections 86 extend downwardly in the form of arms 87 which terminate at their bottom ends in a cross-piece 88. The said retaining-plate 85 is further provided with a circular concavity 89 and an inverted V-shaped cut-away portion 90 radiating downwardly from the center thereof. The retaining-plate 85 is further provided with an upwardly extending member 91 which projects above the upper edge of the said plate 81. Secured to the free-end of said upwardly extending member 91, by means of bolts and nuts 92 or the like, is a rod 93 upon the free end of which is secured a weight 94. Secured to the cross-piece 88, by means of screws 95 or the like, is a rod 96. This rod 96 passes through a yoke-piece 97, the same being provided with oppositely extending arms 98, which are secured to the base-member 1, by means of bolts or the like 99, said yoke-piece 97 forming a guide for the rod 96. The free end of said rod 96 engages with a cam 100 which is secured upon said longitudinally extending shaft 4, and by means of which the said retaining-plate 85 is operated. Secured upon the opposite face of said plate 81 and parallel with the vertical edges thereof are a pair of plates 101, the same being secured in place by means of bolts 102 or the like. The inner vertical edges of said plates 101 are chamfered, as at 103, and slidably arranged between said chamfered portions 103 of said plates 101, by means of its correspondingly chamfered edges 104, is a chuck operating plate 105, the same comprising a cross-bar 106 and a pair of upwardly extending members 107. The said upwardly extending members 107 are each provided with grooves 108 which extend diagonally across the face of each of said members 107, the said grooves 108 slanting inwardly and upwardly from the outer edge of said members 107 to the inner

edges of the same; and, furthermore, the upper portion of the inner edges of said members 107 are made to parallel the said grooves 108, substantially as shown. Secured to the said cross-bar 106 by means of bolts 109, or other fastening means is a nut-piece 110, a rod 111 provided upon its upper end with a screw-thread 112 being screwed into the said nut-piece 110 and a nut 113 being arranged upon said rod 111 in order to lock the same in any desired adjusted position. The said rod 111 passes through a yoke-piece 114 which forms a guide, said yoke-piece 114 being provided with oppositely extending arms 115 which are secured to the base-member 1 by means of bolts 116, or other suitable fastening devices. The free end of said rod 111 engages with a cam 117 which is secured upon said longitudinally extending shaft 4, and by means of which the said chuck-operating plate 105 is operated. The said rod 111 is made adjustable in its relation with said chuck-operating plate 105 so that the chuck may be used with various sizes and diameters of button-blanks. Secured to said cross-bar 106 by means of screws 118, or other suitable fastening means, are a pair of downwardly extending rods 119 which pass through suitable openings 120 in said base-member 1. Secured to the free end of each of said rods 119 is a weight 121.

Secured upon the plate 81 parallel with its bottom edge and by means of bolts 122 or the like, is a chuck-plate 123, the upper edge of the same being provided with a chamfered portion 124. Secured upon the said plate 81, by means of bolts 125, or other suitable fastening means, and parallel to said chuck-plate 123 is a guide-plate 126, the end-portions of which are provided at their lower edges with chamfered portions 127, and said end-portions 126 being connected by means of a bridge-piece 128. Slidably arranged between the chamfered portions 124 of said chuck-plate 123 and the chamfered portions 127 of the end-portions 126 of said guide-plate, are a pair of clamping-jaws 129 provided with chamfered edges 130 adapted to engage with the above referred to chamfered portions 124 and 127. The inner ends of said clamping jaws 129 are provided with semi-circular cut-away portions 131 adapted to permit the passage of drills when a button-blank is held thereby. The said clamping jaws 129 are further provided upon the inner surface of their free ends with concave or chamfered portions 132 adapted to engage with and hold the button-blanks by forcing the same against the retaining-plate 85. Secured upon the outer ends of said clamping-jaws 129, by means of screws 133 or the like are link-plates 134. The free-ends of said link-plates 134 are provided with projections 135

adapted to conform to the slant of, and penetrate into the grooves 108.

Adjustably secured by means of a screw or bolt 136 upon the face of the chuck-plate 123 is a guide-member 137 provided with a slot 138 through which the shank of the screw or bolt 136 passes. The upper end of said guide-piece is provided with a guide-blade 139 provided at its upper end with a chamfered head 140 which is adapted to engage with the back of the button blank when the same is clamped by the clamping jaws 129.

Secured to the plate 81 by means of bolts or the like 141 is a guide-plate 142 provided with a downwardly extending member 143 which passes behind the bridge-piece 128 and forms a spring-blade adapted to be adjusted by a screw or the like 144 arranged in said bridge-piece 128. The free-end of said downwardly extending-member 143 is adapted to engage with the upper edge and back of the button-blank when the same is held by the clamping jaws 129. Pivotaly secured upon the bolts or the like 141, between the said plate 81 and said guide-plate 142 are a pair of swinging guide-members 145 which are each provided with operating finger-pieces 146. An upwardly projecting portion 147 is integrally connected with guide-plate 142 and is adapted to enter the outlet of the chute 53. The button-blanks as they leave said chute 53 pass between the parts 91 and 142, and between the swinging guide members 145, to the proper position in the chuck member whereupon they are gripped by the clamping jaws 129, the said guide-members being adjustable to permit the passage of different sizes or diameters of button-blanks.

When a button-blank leaves the chute 53, the action of the cam 117, which is properly timed with the automatic action of the whole machine, engages the rod 111 and raises the chuck-operating-plate 105. The grooves 108 of said plate engage the projection 135 of the link-plates 134 and as the plate 105 rises, the button blank follows the slant of the grooves 108 which tends to spread apart the free ends of said clamping jaws 129 for the reception of the button-blank so that the button-blanks will follow between said jaws. The cam 117 by this time having reached its highest point, the rod 111 is permitted to drop carrying the plate 105 with it, this action being aided and assured by the weight 121. In so doing the action of the clamping jaw is reversed, as will be clearly evident and the ends of said clamping jaws are firmly and securely brought in engagement with said button-blank, thereby forcing the same against the retaining-plate 85 and securely holding the same while the operation of boring or niching is carried out by the machine. After the

boring or niching has been accomplished, the cam 100 comes into operation and raises by means of the rod 96 the retaining-plate 85 away from contact with the button-blank and thereby allows the latter to fall forward and out of the clamping-chuck when it may be caught by any desirable receptacle, the weight 94 serving to return the retaining plate 85 to its normal operative position when the cam 100 has passed.

A guard-piece or rail 148 is secured upon the clamping-chuck and base-member 1 and serves to insure the buttons falling through the opening 149 in the base-member 1 so that they may be caught in a receptacle beneath the machine.

Referring now more particularly to Figs. 1 and 2 of the drawings, there is represented thereby the machine set up for drilling or boring the thread-holes in the button-blanks. The drilling apparatus is alike in construction at each side or end of the machine, the drills on one side or end being used for boring or drilling the holes and the drills on the other side or end being used for counter-boring or drilling to remove the sharp edge of the hole at the back of the button-blank. The construction and operation of this drilling or boring apparatus is as follows:—

Formed upon the upper surface of the base-member 1 are guide-bars 150 and slidably arranged between these guide-bars 150 are the drill-carriages 151. Extending upwardly from each end of said drill-carriages are drill-supports 152, provided with bearings 153 in which are rotatably mounted the drill-shafts 154. As shown in the drawings there are four drill shafts 154 to each drill-carriage 151, so that four-thread holes may be drilled or bored in the button-blanks, but if only two thread-holes are desired the said carriages 151 may be provided with only two drill-shafts 154 each. Each of said drill-carriages 151 are provided with stud-screws 155, which are adjustable and may be locked in their adjusted relation with said drill-carriages 151 by means of a lock-nut 156. Mounted upon the said longitudinally extending shaft 4 and at each end thereof adjacent to the outer ends of said drill-carriages 151 are cam-carriers comprising a hub-portion 157 and a wing or body-portion 158. Secured in a proper position upon the said wing or body portion 158, by means of bolts or the like 159, is a drill-carriage operating cam 160. These cams 160 engage at proper times in their revolution with the said longitudinal shaft 4 with the said stud-screws 155 and in so doing force the said drill-carriages 151 forward so that the drills 161, which are secured to the drill-shafts 154 by drill-chucks 162 of any desirable construction, are caused to penetrate the button-blanks held in the clamping-chuck and thus bore and counter-bore the thread-holes there-

in. The drill-carriages 151 and the drills 161 are withdrawn to their normal position after the cams 160 have acted upon them, by means of a return-spring identical in construction with that presently to be described in connection with the button-niching apparatus. Secured upon the inner end of each of said drill-carriages 151 is a stop-member 151' adapted to limit the return or backward movement of said drill-carriages. Each of the drill-shafts 154 are provided with pulleys 163 secured thereon for the purpose of revolving or driving the same, this being accomplished by belts connected with a main source of power transmission such as overhead shafting or the like. In order to retain the said drill-shafts 154 in their proper relation with the said drill-carriages 151, there is provided the following means comprising a supporting rod 164 secured upon the outer of said drill-supports 152 and extending outwardly therefrom. Secured upon the free-end of said supporting-rod 164 is a spider 165 provided with suitable openings through which pass screw-threaded studs 166, and arranged upon said screw-threaded studs are a pair of locking-nuts 167 one on each side of said spider 165 for the purpose of locking said studs 166 in their adjusted relation. Secured upon the inner end of said studs 166 by means of a set screw or the like 168 are thrust-bearings 169 adapted to receive and retain the ends of said drill-shafts 154. Said thrust-bearings 169 being provided with a rib 170 adapted to engage with a corresponding channel or groove 171 in the end of said drill shafts 154 thus holding the same against longitudinal displacement while permitting a free revolution thereof.

Secured upon the inner drill-supports 152 by means of bolts or the like 172 is a bracket 173, and secured adjustably upon said bracket 173 by means of a bolt or the like 174 which passes through a slot 175 in the supporting bracket 176 thereof, is a drill-guide, comprising, a disk 177 provided with a plurality of pairs of lugs 178 provided with set-screws 179. Blocks 180 are arranged between each pair of lugs 178 and held in their adjusted relation by means of said set-screws 179 which engage with the sides thereof. Studs 181 pass through said blocks 180 and said disk 177 and are secured by means of nuts 182 at the back of said disk 177. The free ends of said studs 181 are provided with suitable perforations through which pass the bearing-carriers 183. These said bearing-carriers 183 are provided at their lower or inner ends with a tongue or lug 184 to which are pivotally secured a pair of similar tongues or lugs 185 formed upon a bearing-piece 186, the latter being provided with suitable perforations 187 to permit the passage of the drills 161, thus

providing a knuckle joint which will accommodate the said bearing-pieces 186 to the angle of the drills 161. The upper or outer end of said bearing-carriers 183 are each provided with an encircling channel or groove 188 which is engaged by the flange 189 of an adjusting screw-nut 190 which is arranged upon a screw-threaded stud 191 secured in the said blocks 180, thus affording a means for adjusting the bearing-pieces 186. The disk 177 is provided with a suitable hole or opening 192 to permit the passage of the drills therethrough.

When it is desired to provide button-blanks with thread-holes, connected by means of thread-niches, instead of the plain drilled and counter-bored thread-holes, the drill-carriage provided with the counter-boring drills is removed from its operative relation with said base-member and in its place is substituted a drill-carriage and mechanism for cutting niches extending from hole to hole in said button-blanks. The counter-boring drill-carriage and said niche-producing drill-carriage, it will thus be understood, are interchangeable and either one or the other may be operatively connected with the base-member of the machine according to the finish of the thread-holes desired to be obtained.

Referring now more particularly to Figs. 3, 4, 5, 6 and 7 of the drawings there is illustrated thereby the machine equipped with the button-niching apparatus. This apparatus comprises a carriage 193 slidably arranged between the guide-bars 150 formed upon the upper surface of said base-member 1. Secured upon the inner end of said carriage 193 is a stop-member 193' adapted to limit the return or backward movement of said carriage 193. Secured upon the outer end of said carriage 193 is a stud-screw 194, which is adjustable and may be locked in its adjusted relation with said carriage 193 by means of the lock nut 195. A cam 196 of proper conformation is secured upon the wing or body-portion 158 of the cam-carrier by means of the bolts or the like 159, the cam 160 having been removed when the drilling or boring apparatus above described is replaced by the niching apparatus. This cam 196 at a proper time in the revolution of the said shaft 4 forces the carriage 193 forward to engage the drill-mechanism to be subsequently described, with the button-blank held by the clamping-chuck. The means for returning said carriage 193 to its normal position comprises a cylindrical chamber 197 open at the top formed in the said base-member 1, a return-spring 198 arranged in said chamber 197 one end of said spring 198 engaging with the end-wall 199 of said chamber 197 and the other with a downwardly projecting lug or projection 200 formed integrally with the bottom of said

carriage 193, the said spring 198 being compressed when the carriage 193 is forced forward by the cam 196 and reacting when the action of the cam is released thereby causing a return of the carriage to its normal position. The said carriage 193 is provided at each end with upwardly extending portions 201, the inner sides of which are undercut to form an inwardly extending chamfered surface 202 and mounted so as to be capable of a lateral sliding movement on this said carriage 193 is a drill-carriage 203 provided with downwardly extending portions 204 provided with chamfered surfaces 205 adapted to engage and conform with the chamfered surfaces 202 above described, thus forming guides for the lateral movement of said drill carriage 203. Extending upwardly from each end of said drill-carriage 203 are the drill-supports 206 provided with bearings 207 in which are arranged a pair of drill-shafts 208 provided with driving pulleys 209, drill chucks 210, drills 211, and thrust-bearing apparatus 212, all similar in construction to that described above in connection with the drilling or boring apparatus. A bracket 213 is secured by means of bolts or the like 214 to the inner drill-support 206. Secured adjustably to said bracket 213 by means of a bolt or the like 215 which passes through a slot 216 in a supporting bracket 217 is a drill-guide comprising an upwardly extending arm 218, provided with a flange 219 at one side thereof, set-screws 220 arranged in said flange, blocks 221 arranged upon the face of said arm 218 and held in their adjusted relation by means of said set-screws 220. Stud 222 pass through said blocks 221 and said arm 218, said studs 222 being provided with a screw-threaded shank 223 which penetrates to the inner side of said arm 218 and a nut 224 secured upon said shank 223 for locking the blocks 221 and studs 222 to said arm 218. The free-ends of said studs 222 are provided with suitable perforations through which pass the bearing carriers 225. These said bearing-carriers 225 are provided at their inner ends with a tongue or lug 226 to which are pivotally secured a pair of similar tongues or lugs 227 formed upon a bearing-piece 228, the latter being provided with suitable perforations 229 to permit the passage of the drills 211, thus providing a knuckle-joint which will accommodate the said bearing-pieces 228 to the angle of the drill 211. The outer ends of said bearing-carriers 225 are each provided with an encircling channel or groove 230 which is engaged by the flange 231 of an adjusting screw-nut 232 which is arranged upon a screw-threaded stud 233 secured in the said blocks 221, thus affording a means for adjusting the bearing-pieces 228. The upwardly extending arm 218 is provided with a

suitable hole or opening 234 to permit the passage of the said drills 211 therethrough.

The means for causing the drills 211 to be carried across the face of the button-blank from thread-hole to thread-hole as the drills are pushed forward to a cutting position by the action of the cam 196 as above described, comprises the following mechanism: Secured upon the carriage 193 by means of bolts or the like 235, is a fulcrum-post 236 which extends upwardly through a suitable opening 237 in the drill-carriage 203 and to which is pivotally secured by means of a bolt or the like 238, a lever-member 239. The said lever-member 239 is provided with a forwardly extending member 240, which engages with a slot 241 in a swivel-stud 242, the latter being secured to an adjustable swivel-stud carriage 243, so as to be capable of a swivel or pivotal movement, by means of a bolt or the like 244. The said swivel-stud-carriage 243 is slidably arranged between a pair of guide-bars 245 integrally formed in the upper part of said drill-carriage 203, and said swivel-stud-carriage 243 is locked in any adjusted position by means of the bolt 246 and washer 247, the former passing through a slot 248 and screwing into the said swivel-stud carriage 243, while the washer 247 engages the under edges of said slot 248 in a binding action. To provide a means of adjusting said swivel-stud-carriage 243, the same is provided at one end with an upwardly extending lug 249, into which screws the shank 250 of an adjusting screw. The head 251 of said adjusting screw is provided with an encircling groove or channel 252 which is engaged by an upwardly extending lug 253 forming an integral part of the drill-carriage 203, and affording a means for holding the said adjusting screw against longitudinal movement so that it may properly act up the swivel-stud carriage 243 to adjust the same in a manner clearly to be understood from an inspection of the drawings. By adjusting the said swivel-stud carriage 243 so as to move the swivel-stud 242 toward or away from the fulcrum-post 236 the action of the said lever-member 239 is decreased or increased, in order to give a less or greater lateral sweep to the drill-carriage 203, so that the action of the drills 211 may be accommodated to the varying distance between the thread-holes of different sized buttons, when cutting the niches therein. The said drill-carriage 203 is provided with a backwardly extending member 254, the same being further provided with a pair of backwardly extending arms 255. The said lever-member 239 is provided with a backwardly extending arm 256 which passes through a suitable opening 257 in the outer of said drill-supports 206, this said opening being made sufficiently large to permit of the

free action and sweep of said arm 256 when the lever member 239 is in operation. The said backwardly extending member 254 is provided with a guide-member 258 which supports and guides the arm 256 when said lever-member is in operation. Extending downwardly from the free end of said arm 256, and preferably in the manner illustrated in Fig. 5 of the accompanying drawings, is the tail-piece 259 of said lever-member 239. Secured upon the said longitudinally extending shaft 4 is a cam 260, which at proper times in the revolution of said shaft 4 and the operation of the whole machine, engages with the tail-piece 259 of said lever-member 239 and operates the same to slide the drill-carriage 203 laterally in order to force the drills to move across the face of the button-blank in order to cut the niches between the thread-holes in the same. The means for returning said drill-carriage laterally to its normal position, comprises a lug or holding piece 261, secured to said tail-piece 259. Secured to said lug or holding piece 261 is the end of a flexible cord, belt or the like 262 passing over a pulley-wheel 263 pivotally secured to the end of one of said backwardly extending arms 255 by means of a bolt or the like 264, and secured to the free end of said flexible cord, belt or the like 262 is a counterbalance weight 265, the weight of which, when the cam 260 ceases to act upon the said tail-piece 259 of said lever-member 239 pulls said lever-member 239 in the opposite direction and the same is caused to return the drill-carriage 203 laterally to its normal position. It is desirable to cut the niches in the face of said button blanks between the thread-holes of the same, so that the bottom surfaces of said niches are convex, that is to say, that ends of the said niches or channel are deeper near the thread-holes than at a point midway between them. To accomplish this result the cam 196 is made with a concave surface as indicated at 266 in said Fig. 3. This permits the carriage 193 to draw back slightly as the drills 211 move from one thread hole toward the center of the button-blank and then to move forward again as the drills 211 pass the center of said button blank and approach the opposite thread-hole.

It will be clearly understood that the operation and action of the above described parts and mechanism of the complete machine are all properly timed and automatic, and these operations of the parts and devices of the complete machine will be clearly understood from an inspection of the drawings, and need not, therefore be more fully described.

It will be readily understood from the foregoing description, that the present invention provides a novel and effective machine for drilling the thread-holes in button-

blanks and also for cutting the thread niches or channels between said thread-holes in the same.

I claim:—

5 1. In an apparatus for cutting thread-niches between the thread-holes of buttons, the combination with a base-member, of a longitudinally extending shaft connected therewith, means for driving said shaft, a
10 button-clamping and holding chuck connected with said base-member, means for feeding buttons one at a time to said clamping and holding chuck, a longitudinally moving carriage slidably arranged upon said
15 base-member, a drill-carriage slidably arranged upon said longitudinally moving carriage, so as to be capable of a lateral movement thereon, a plurality of niching drills rotatably connected with said drill-carriage,
20 means adapted to slide said longitudinally moving carriage forward toward said clamping and holding chuck to bring said niching drills into a cutting position with relation to a button held therein, and means for causing
25 a lateral movement of said drill-carriage on said longitudinally moving carriage to cut the thread-niches between the thread-holes of said buttons, means for returning said drill-carriage to its normal initial position, and means for returning said longitudinally moving carriage to its normal initial position, substantially as and for the purposes set forth.

35 2. In an apparatus for cutting thread-niches between the thread-holes of buttons, the combination with a base-member, of a longitudinally extending shaft connected therewith, means for driving said shaft, a button-clamping and holding chuck connected with said base-member, means for feeding buttons one at a time to said clamping and holding chuck, a longitudinally moving carriage slidably arranged upon said
40 base-member, laterally extending guide-members upon the upper surface of said longitudinally moving carriage, a drill-carriage slidably connected with said guide-members, a plurality of revoluble shafts provided with drill-chucks mounted on said drill-carriage, niching-drills secured in said drill-chucks, means connected with said longitudinally extending shaft adapted to slide said longitudinally moving carriage forward toward said clamping and holding chuck to bring said niching-drills into a cutting position with relation to a button held therein, and means for causing a lateral movement of said drill-carriage on said longitudinally moving carriage to cut the said thread-niches, means for returning said drill-carriage to its normal initial position, and means for returning said longitudinally moving carriage to its normal initial position, substantially as and for the purposes
65 set forth.

3. In an apparatus for cutting thread-niches between the thread-holes of buttons, the combination with a base-member, of a longitudinally extending shaft connected therewith, means for driving said shaft, a
70 button-clamping and holding chuck connected with said base-member, means for feeding buttons one at a time to said clamping and holding chuck, a longitudinally moving carriage slidably arranged upon said base-member, laterally extending guide-members upon the upper surface of said longitudinally moving carriage, a drill-carriage slidably connected with said guide-members, a plurality of revoluble shafts provided with drill-chucks mounted on said drill-carriage, niching-drills secured in said drill-chucks, means connected with said longitudinally extending shaft adapted to slide said longitudinally moving carriage forward toward
85 said clamping and holding chuck to bring said niching-drills into a cutting position with relation to a button held therein, comprising a cam upon said longitudinally extending shaft adapted to engage the outer
90 end of said longitudinally moving carriage, and means for causing a lateral movement of said drill-carriage on said longitudinally moving carriage to cut said thread-niches, means for returning said drill-carriage to its
95 normal initial position, and means for returning said longitudinally moving carriage to its normal initial position, the same comprising a spiral spring-member connected with said base-member and adapted to operatively engage with a lug connected with said longitudinally moving carriage, substantially as and for the purposes set forth.

4. In an apparatus for cutting thread-niches between the thread-holes of buttons, the combination with a base-member, of a longitudinally extending shaft connected therewith, means for driving said shaft, a
105 button-clamping and holding chuck connected with said base-member, means for feeding buttons one at a time to said clamping and holding chuck, a longitudinally moving carriage slidably arranged upon said base-member, laterally extending guide-members upon the upper surface of said longitudinally moving carriage, a drill-carriage slidably connected with said guide-members, a plurality of revoluble shafts provided with drill-chucks mounted on said drill-carriage, niching-drills secured in said drill-chucks, means connected with said longitudinally extending shaft adapted to slide said longitudinally moving carriage forward toward
115 said clamping and holding chuck to bring said niching-drills into a cutting position with relation to a button held therein, comprising a cam upon said longitudinally extending shaft adapted to engage the outer
120 end of said longitudinally moving carriage, and means for causing a lateral movement
130

of said drill-carriage on said longitudinally moving carriage to cut said thread-niches, comprising a fulcrum-post secured upon said longitudinally moving carriage, a lever pivotally secured thereto, a swivel-post adjustably connected with said drill-carriage adapted to be engaged by said lever, means connected with said longitudinally extending shaft for operating said lever, means for returning said drill-carriage to its normal initial position, and means for returning said longitudinally moving carriage to its normal initial position, the same comprising a spiral spring-member connected with said base-member and adapted to operatively engage with a lug connected with said longitudinally moving carriage, substantially as and for the purposes set forth.

5. In an apparatus for cutting thread-niches between the thread-holes of buttons, the combination with a base-member, of a longitudinally extending shaft connected therewith, means for driving said shaft, a button-clamping and holding chuck connected with said base-member, means for feeding buttons one at a time to said clamping and holding chuck, a longitudinally moving carriage slidably arranged upon said base-member, laterally extending guide-members upon the upper surface of said longitudinally moving carriage, a drill-carriage slidably connected with said guide-members, a plurality of revoluble shafts provided with drill-chucks mounted on said drill-carriage, niching-drills secured in said drill-chucks, means connected with said longitudinally extending shaft adapted to slide said longitudinally moving carriage forward toward said clamping and holding chuck to bring said niching-drills into a cutting position with relation to a button held therein, comprising a cam upon said longitudinally extending shaft adapted to engage the outer end of said longitudinally moving carriage, and means for causing a lateral movement of said drill-carriage on said longitudinally moving carriage to cut said thread-niches, comprising a fulcrum-post secured upon said longitudinally moving carriage, a lever pivotally secured thereto, a swivel-post adjustably connected with said drill-carriage adapted to be engaged by said lever, a downwardly extending tail-piece upon one end of said lever, a cam secured upon said longitudinally extending shaft adapted to engage said tail-piece to operate said lever, means for returning said drill-carriage to its normal initial position, comprising a spiral spring-member connected with said base-member and adapted to operatively engage with a lug connected with said longitudinally moving carriage, substantially as and for the purposes set forth.

5. In an apparatus for cutting thread-niches between the thread-holes of buttons, the combination with a base-member, of a longitudinally extending shaft connected therewith, means for driving said shaft, a button-clamping and holding chuck connected with said base-member, means for feeding buttons one at a time to said clamping and holding chuck, a longitudinally moving carriage slidably arranged upon said base-member, laterally extending guide-members upon the upper surface of said longitudinally moving carriage, a drill-carriage slidably connected with said guide-members, a plurality of revoluble shafts provided with drill-chucks mounted on said drill-carriage, niching-drills secured in said drill-chucks, means connected with said longitudinally extending shaft adapted to slide said longitudinally moving carriage forward toward said clamping and holding chuck to bring said niching-drills into a cutting position with relation to a button held therein, comprising a cam upon said longitudinally extending shaft adapted to engage the outer end of said longitudinally moving carriage, and means for causing a lateral movement of said drill-carriage on said longitudinally moving carriage to cut said thread-niches, comprising a fulcrum-post secured upon said longitudinally moving carriage, a lever pivotally secured thereto, a swivel-post adjustably connected with said drill-carriage adapted to be engaged by said lever, a downwardly extending tail-piece upon one end of said lever, a cam secured upon said longitudinally extending shaft adapted to engage said tail-piece to operate said lever, means for returning said drill-carriage to its normal initial position, comprising a spiral spring-member connected with said base-member and adapted to operatively engage with a lug connected with said longitudinally moving carriage, substantially as and for the purposes set forth.

gage with a lug connected with said longitudinally moving carriage, substantially as and for the purposes set forth.

6. In an apparatus for cutting thread-niches between the thread-holes of buttons, the combination with a base-member, of a longitudinally extending shaft connected therewith, means for driving said shaft, a button-clamping and holding chuck connected with said base-member, means for feeding buttons one at a time to said clamping and holding chuck, a longitudinally moving carriage slidably arranged upon said base-member, laterally extending guide-members upon the upper surface of said longitudinally moving carriage, a drill-carriage slidably connected with said guide-members, a plurality of revoluble shafts provided with drill-chucks mounted on said drill-carriage, niching-drills secured in said drill-chucks, means connected with said longitudinally extending shaft adapted to slide said longitudinally moving carriage forward toward said clamping and holding chuck to bring said niching-drills into a cutting position with relation to a button held therein, comprising a cam upon said longitudinally extending shaft adapted to engage the outer end of said longitudinally moving carriage, and means for causing a lateral movement of said drill-carriage on said longitudinally moving carriage to cut said thread-niches, comprising a fulcrum-post secured upon said longitudinally moving carriage, a lever pivotally secured thereto, a swivel-post adjustably connected with said drill-carriage adapted to be engaged by said lever, a downwardly extending tail-piece upon one end of said lever, a cam secured upon said longitudinally extending shaft adapted to engage said tail-piece to operate said lever, means for returning said drill-carriage to its normal initial position, comprising a spiral spring-member connected with said base-member and adapted to operatively engage with a lug connected with said longitudinally moving carriage, substantially as and for the purposes set forth.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 12th day of August, 1908.

HERBERT J. SKIPP.

Witnesses:

GEORGE D. RICHARDS,
F. H. W. FRAENTZEL.