United States Patent [19]

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[11] **3,722,436**

[45] **Mar. 27, 1973**

[54] **GARMENT WORKING MACHINE**

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[22] Filed: **Feb. 23, 1971**

[21] Appl. No.: **118,119**

[52] **U.S. Cl.**.....**112/121.11,** 112/121.29

[51] **Int. Cl.**.....**D05b 19/00**

[58] **Field of Search**.....112/2, 121.11, 121.29, 65

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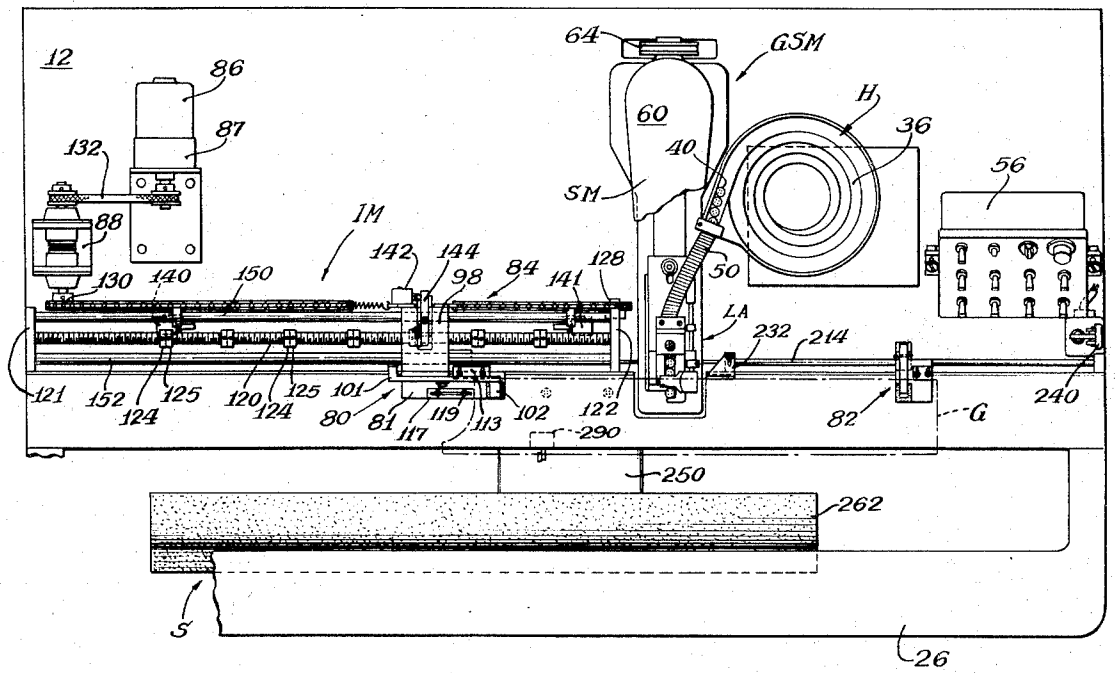
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[57] **ABSTRACT**

A machine for performing a work operation on a garment, for example, a button sewing operation, including a frame, a button sewing machine on the frame and improved means for indexing the garment past the button sewing machine in a precise predetermined relationship. The indexing machine includes first adjustable clamping means and second adjustable clamping means and carriage means for moving the clamping means predetermined increments from a first position to a second position to permit buttons to be sewn on the garment at spaced intervals between said two positions corresponding to said predetermined increments.

8 Claims, 14 Drawing Figures



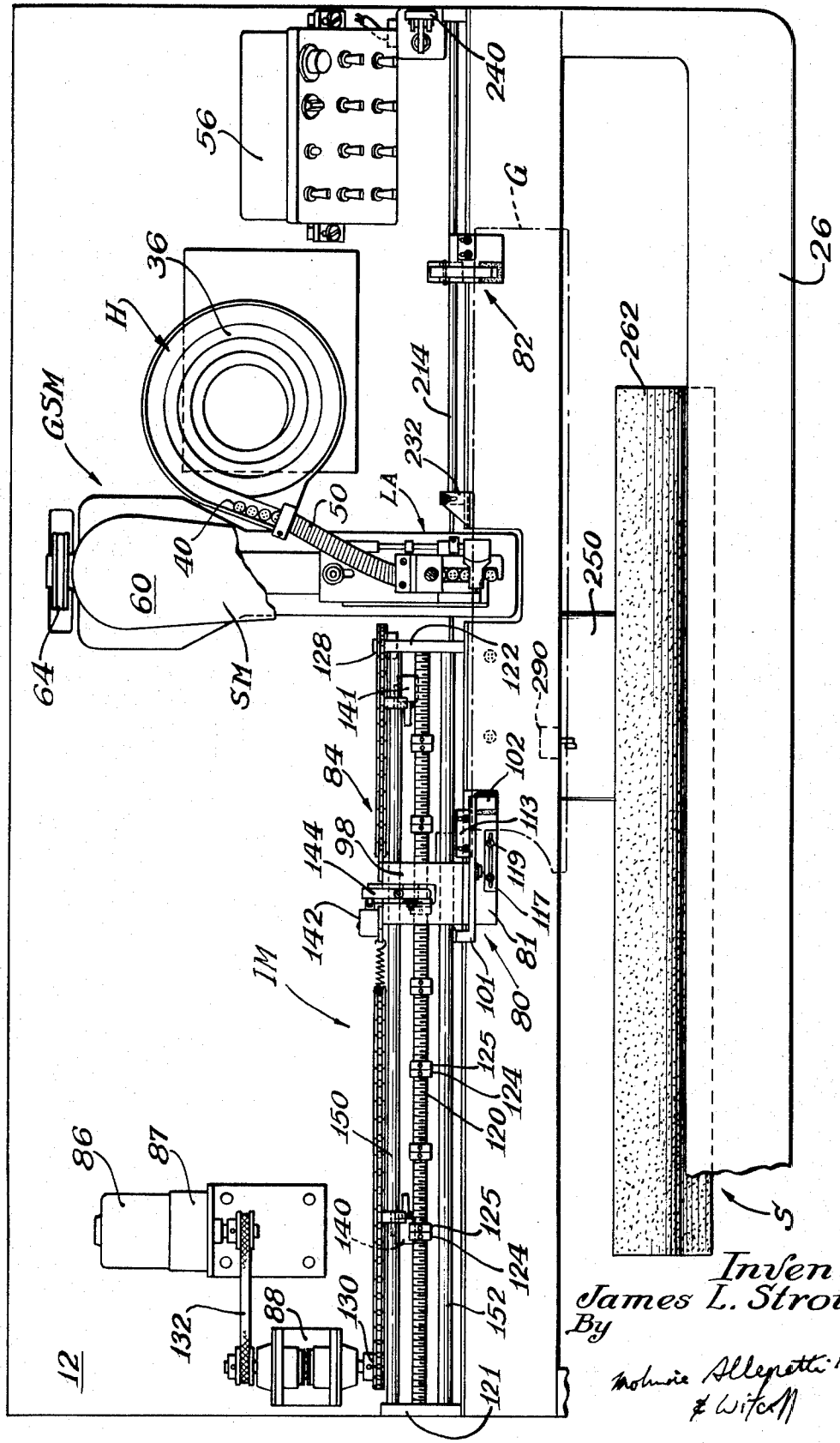


FIG. 1.

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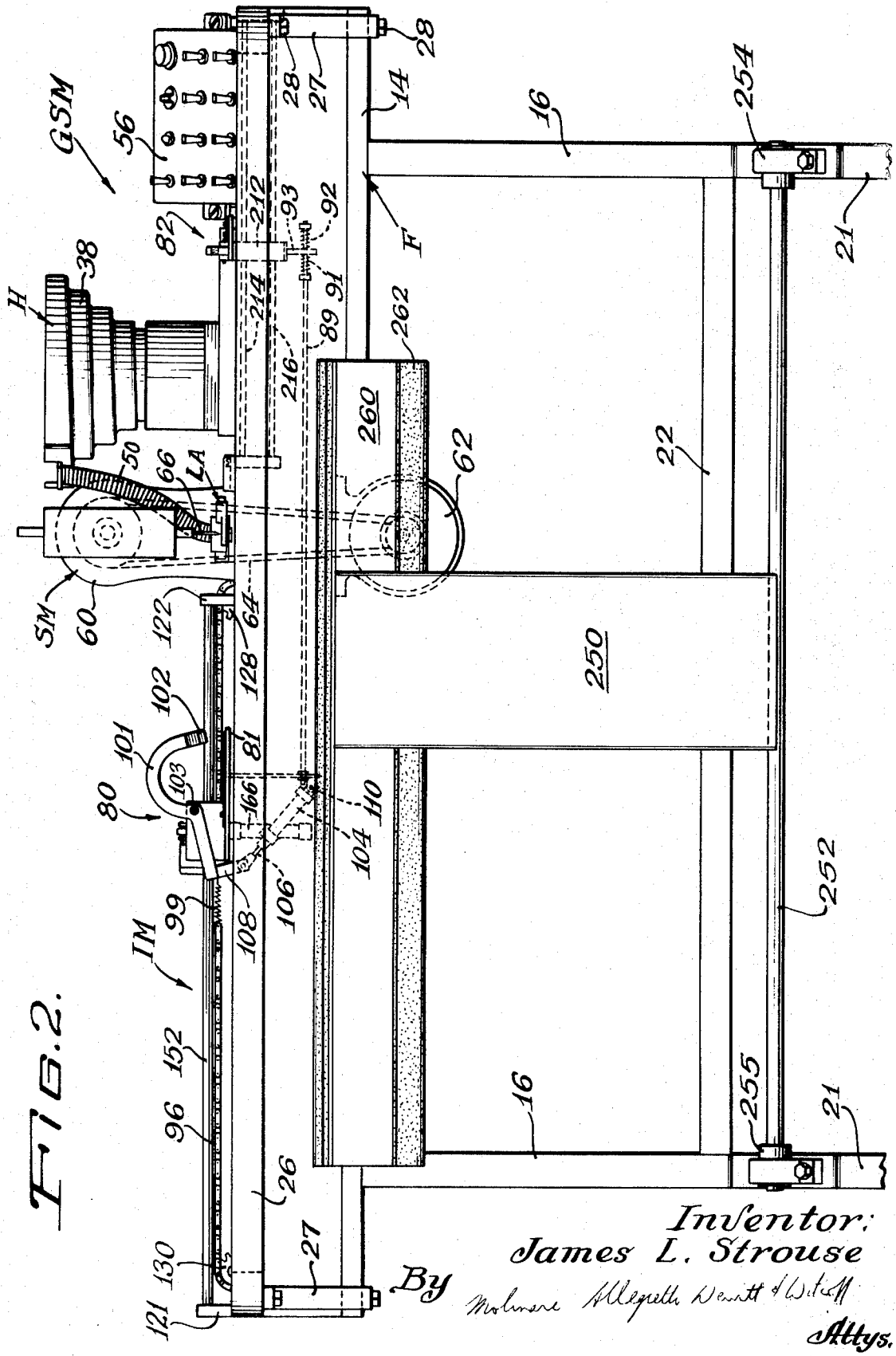
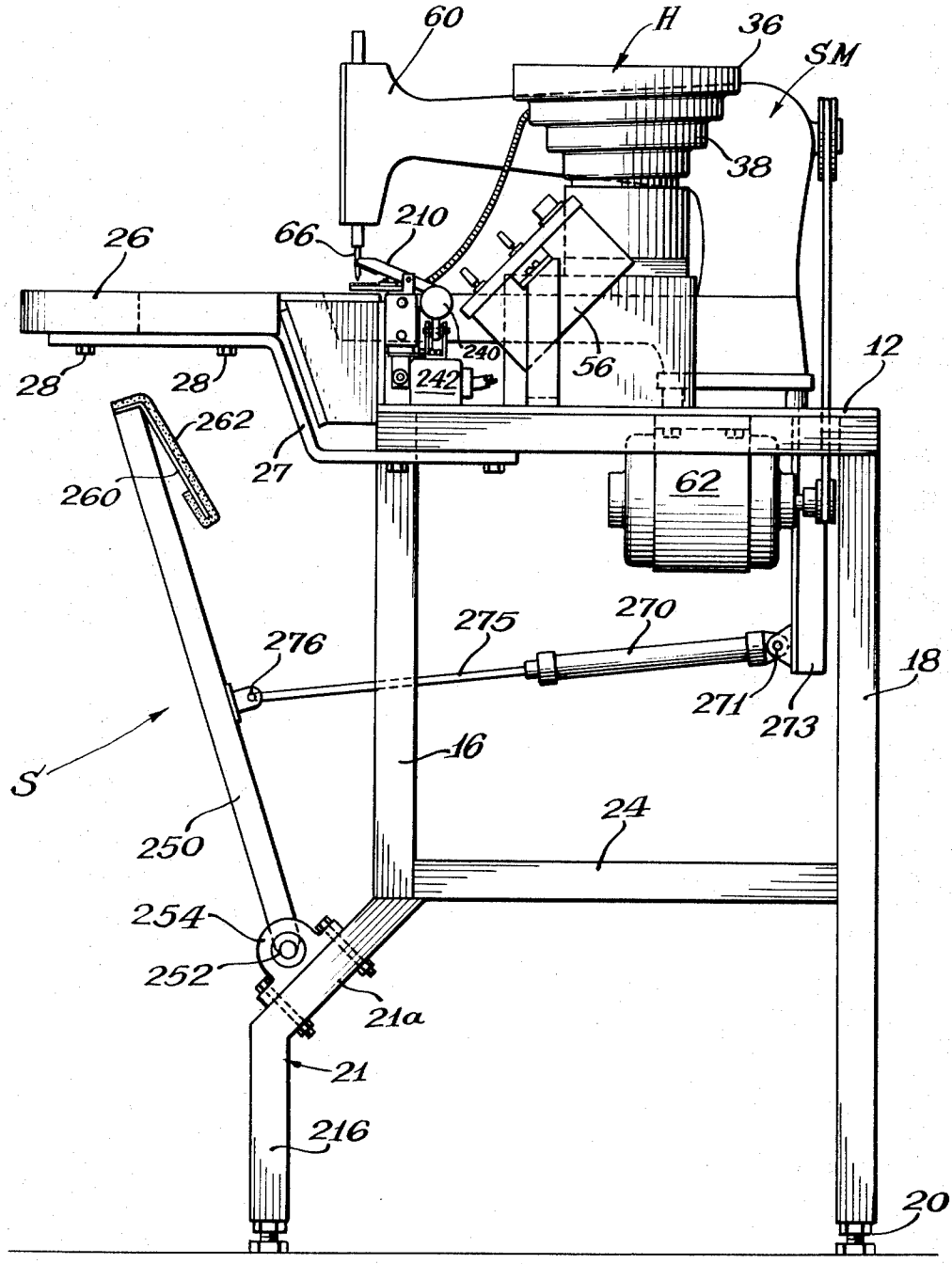


FIG. 2.

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FIG. 3.



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FIG. 5.

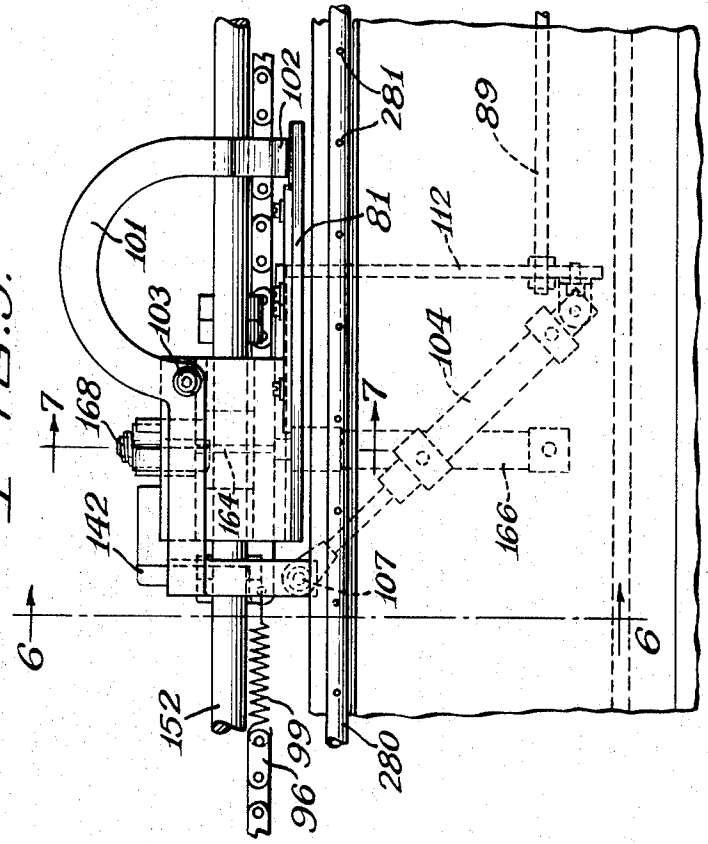


FIG. 7.

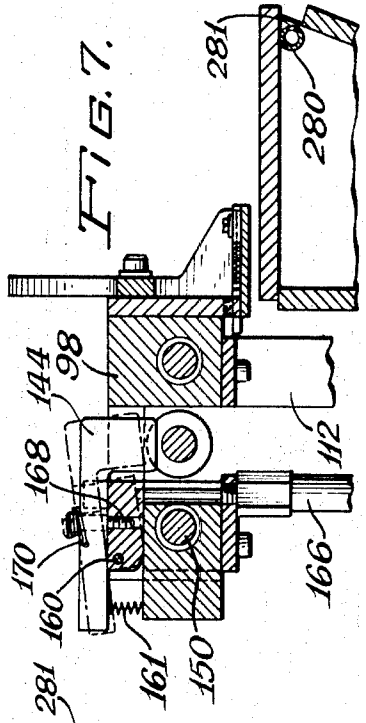


FIG. 4.

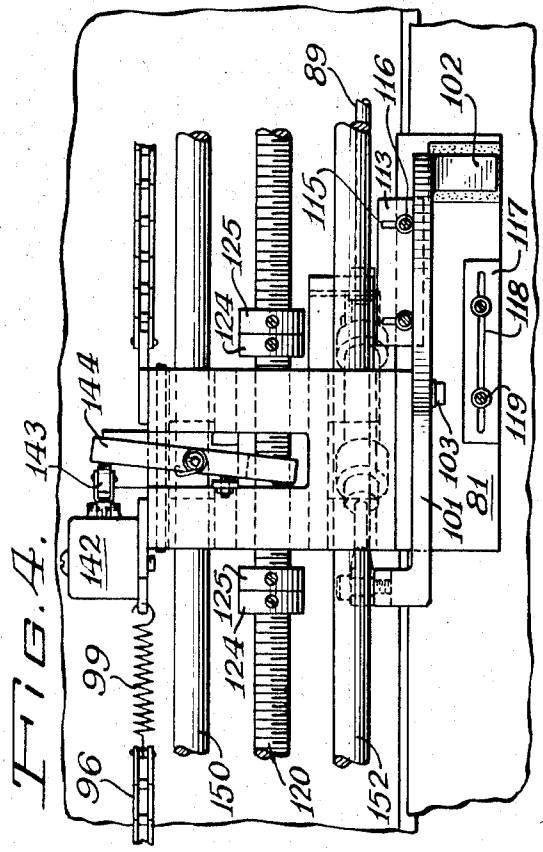
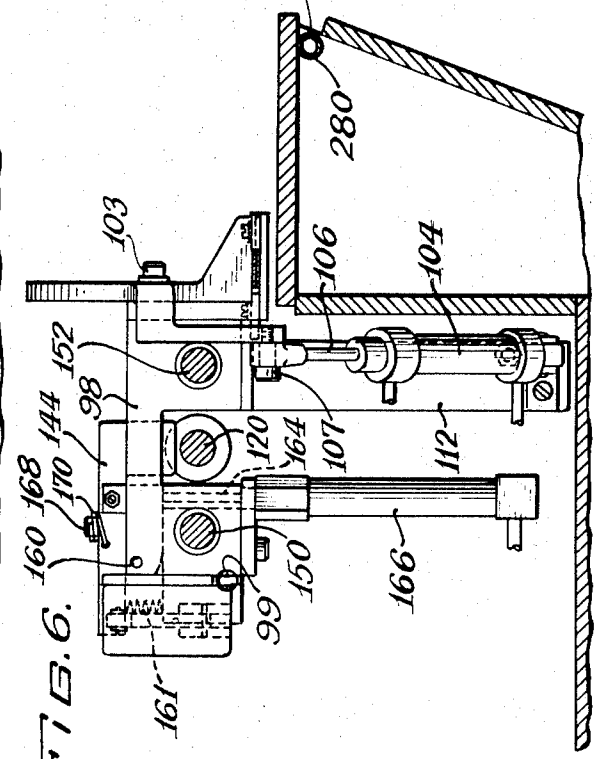


FIG. 6.



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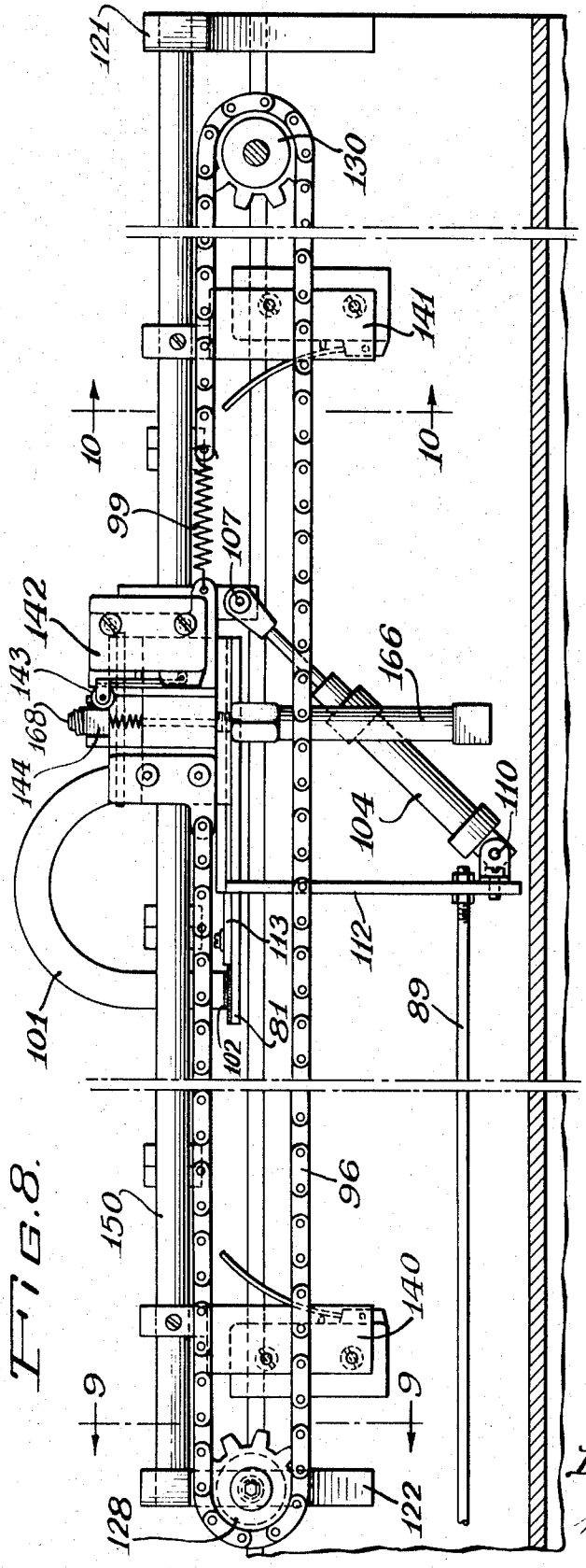


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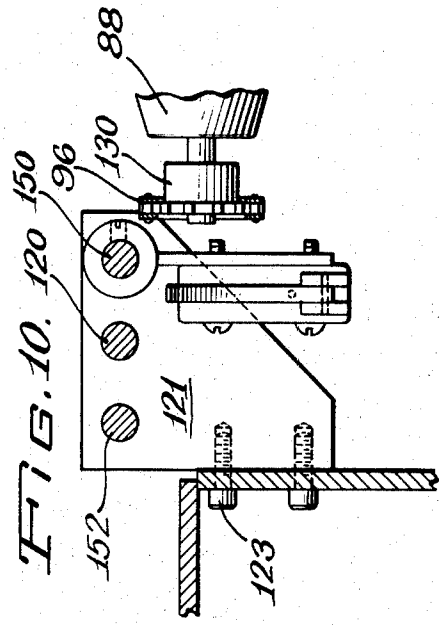


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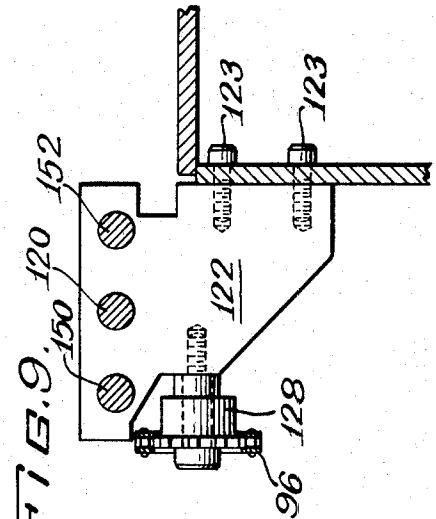


FIG. 9.

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FIG. 11.

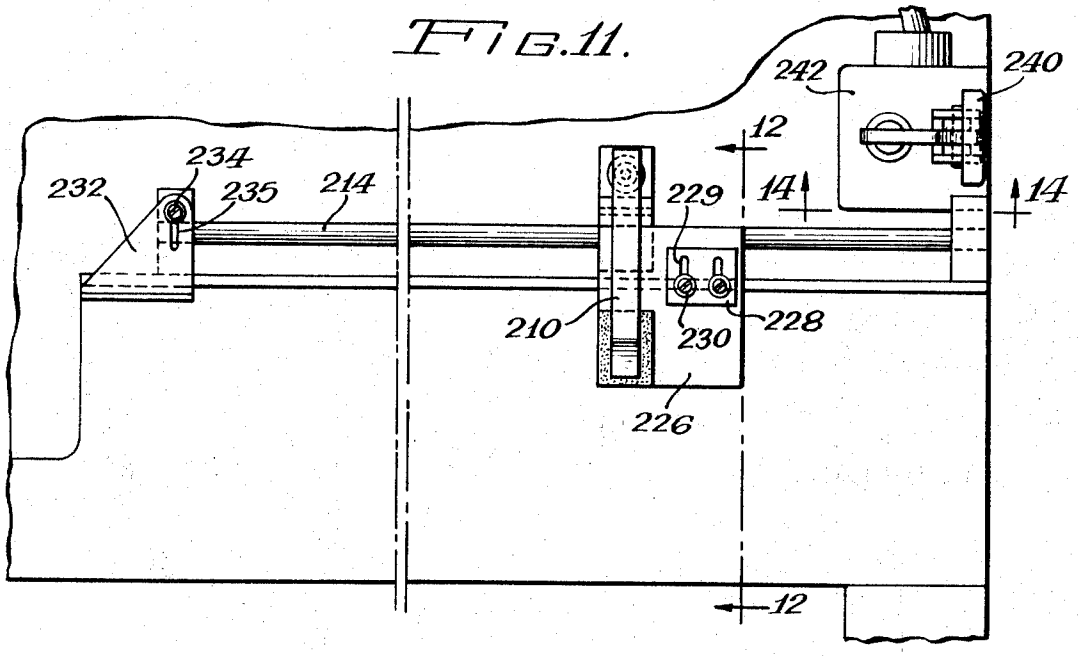


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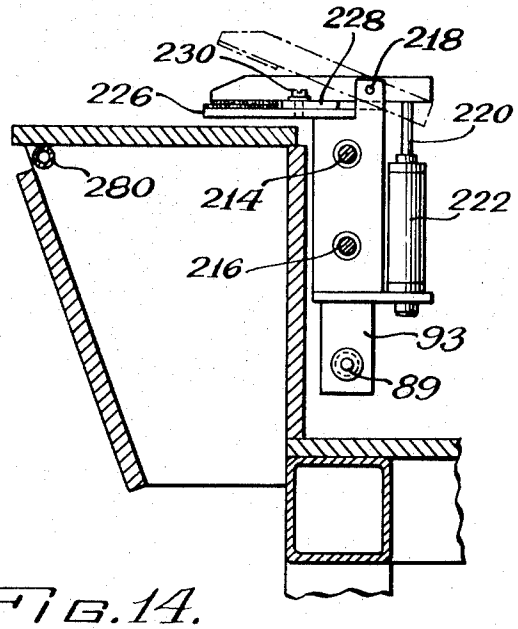


FIG. 13.

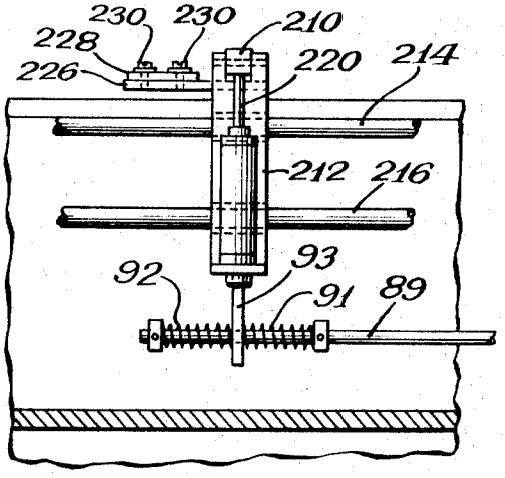
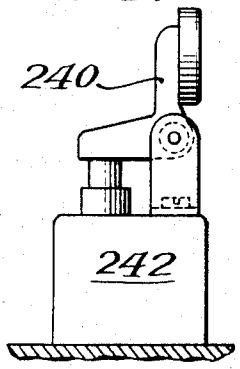


FIG. 14.



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GARMENT WORKING MACHINE

BACKGROUND OF THE INVENTION

This invention pertains to an improved garment working machine and more particularly, to an improved machine for affixing buttons to a garment, for example a shirt front, in predetermined spaced relationship and to a start point.

At one time, shirt making was done entirely by hand. Machines of different types have been devised to speed up and improve shirt making procedures. Several forms of machines are known for sewing buttons onto garments, for example, shirt fronts. One such machine includes an endless track arrangement for carrying the shirt front past a sewing machine to affix buttons selectively to the shirt front. The endless track mechanism is complex and thus quite readily subject to possible malfunction and stoppage of the sewing operation.

Another known button sewing machine includes a table which is moved selected increments past a sewing machine to permit the sewing machine to sew buttons onto the shirt front. Such machine is considered an improvement over the machine including an endless track arrangement; however, it too has drawbacks as the shirt moving parts including the table are relatively heavy, thus slowing the indexing operation or alternately causing relatively high-shock factors as the machine indexes in operation. Operation is also slowed by the fact that the shirt-moving part must return to the start position before the completed shirt front can be stacked.

An object of the present invention is to provide an improved garment working machine having a novel indexing mechanism for moving the garment so as to permit working thereof at predetermined selected intervals, such working comprising sewing buttons or forming button holes.

Another object of this invention is to provide a relatively simple garment sewing machine which will automatically sew buttons to a shirt front in predetermined spaced relationship to one another and to a start point after the shirt front is loaded or positioned in the machine.

Yet another object of the present invention is to provide an improved machine for sewing buttons to the shirt front of either a man's shirt or a woman's shirt, without necessity for relocating any components of the machine.

These and other objects of the present invention will be made more apparent in the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a plan view of the garment sewing machine embodying principles of the present invention;

FIG. 2 is a front elevation view of the garment sewing machine;

FIG. 3 is an end view of the garment sewing machine for sewing buttons on a shirt front, illustrating the stacker in position away from the machine frame;

FIG. 4 is a detail plan view better illustrating the relationship between the indexing lever and the switch of the indexing mechanism;

FIG. 5 is a detail elevation view illustrating the neck clamp mechanism;

FIG. 6 is a cross-sectional view taken generally along the line 6—6 of FIG. 5;

FIG. 7 is a cross-sectional view taken generally along the line 7—7 of FIG. 5;

FIG. 8 is a rear elevation view of the indexing mechanism;

FIG. 9 is a cross-sectional view taken generally along the line 9—9 of FIG. 8;

FIG. 10 is a cross-sectional view taken generally along the line 10—10 of FIG. 8;

FIG. 11 is a detail plan view of the tail clamp mechanism;

FIG. 12 is a cross-sectional view of the tail clamp mechanism taken generally along line 12—12 of FIG. 11;

FIG. 13 is a detail rear elevation view of the tail clamp mechanism;

FIG. 14 is a cross-sectional view taken generally along line 14-14 of FIG. 11.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Overall Components

Referring now to FIGS. 1, 2 and 3, there is shown a garment sewing machine identified generally as "GSM," which embodies principles of the present invention. The garment sewing machine GSM comprises as major components a frame F, a hopper or supply drum H, a sewing machine SM, a loader and aligner mechanism LA associated with the sewing machine and the hopper, an indexing mechanism IM, and a stacker S.

THe hopper or supply drum H, which is mounted on the frame F, may be of a known vibrating type constructed and arranged so as to retain a supply of buttons and to feed buttons from the supply drum H one at a time to the loader and aligner mechanism LA through a connecting resilient chute. The loader and aligner mechanism LA receives aligned buttons and positions a button in a predetermined relationship with respect to the needle of the sewing machine so that the openings in the button are properly oriented with respect to the needle of the sewing machine SM. A garment indicated generally at G is supported in position on the frame F by means of clamp mechanisms which are part of the button indexing mechanism IM. The indexing mechanism retains the garment G in a predetermined initial position and then moves or indexes the garment G relative to the sewing machine SM so as to properly affix buttons to the garment at predetermined selected intervals. After the button sewing operations are completed on a garment G, the garment is released from the clamp mechanisms and moved onto the stacker S. After a predetermined number of garments have been stacked on the stacker S, they may be removed by the operator.

The structure and operation of the various major components of the garment sewing machine GSM will be considered in further detail hereafter.

Frame

The frame F is comprised basically of a planar table top or base 12 carried on subframe channel members 14. Depending from the subframe 14 are angle members 16 and 18. The rear members 18, which may be channel members as shown or angle members, extend to the floor and define legs for supporting the frame F. Adjustable extension means 20 may be provided for ad-

justing the position of the legs **18** with respect to the floor upon which the garment sewing machine GSM rests. Depending from the front of the subframe **14** are angle members or channel members **16**. Extending from the channel members **16** are leg portions **21**, which include a downwardly and forwardly curved portion **21***a* and a vertically extending portion **21***b*. Adjustable extension means **23** may extend from leg portions **21** to assist in adjusting the frame F relative to the floor and leveling the top of the frame. Transverse cross-members **22** and **24** are provided to brace and rigidly connect the members **16** and **18**. A support table **26** is secured to the front of frame F by brackets **27** which are secured to the frame and to the support table by suitable fastening means, for example, bolts **28**.

Hopper or Supply Drum

The hopper or supply drum H is preferably of the well-known vibratory type which includes a cylindrical bowl **36** for containing a supply of buttons to be fed one at a time to the loading and aligner mechanism LA. The hopper may be of the type shown, for example, in Hopkins U.S. Pat. No. 3,494,311 granted Feb. 10, 1970. The hopper per se does not form part of the present invention and accordingly will only be described generally hereafter. The buttons in the cylindrical bowl **36** will travel upwardly around the spiral turns **38** when the hopper H is vibrated by the vibrating motor mounted therein. The buttons, identified generally by the numeral **40**, are fed from the upper spiral of the hopper one at a time to a discharge chute **50**, which extends downwardly from the hopper H and communicates the hopper H with the loader and aligner mechanism LA.

Loader and Aligner Mechanism

The loader and aligner mechanism LA is adapted to receive buttons from the chute **50**, which may be comprised of a resilient spring-like member, generally rectangular in cross-section, and to position the buttons one at a time relative to the needle of the sewing machine SM. The loader and aligner mechanism LA may be of the type shown in McKee et al. U.S. Pat. No. 3,499,405 granted Mar. 10, 1970, and reference may be made to the patent for a more detailed description of the structure of the loader and aligner mechanism. It will be understood that buttons fed from the chute **50** will be received in the loader and aligner mechanism and each button will be individually rotated so as to position the needle of the sewing machine SM relative to the openings in the button for proper sewing.

Sewing Machine

The sewing machine SM is of conventional design and includes a sewing machine head **60** with the operating components therein driven from a motor **62** secured on the subframe **14** of the frame F. The motor **62** is operatively connected to the sewing machine SM via a belt and pulley drive mechanism **64**. The needle **66** of the sewing machine is adapted to be reciprocated so as to properly sew a button **40** unto the garment G as desired.

Indexing Mechanism

A feature of this invention is the indexing mechanism IM which is adapted to clamp a garment in position and then to move the garment relative to the needle **66** of the sewing machine SM so as to sew the buttons unto the garment in a predetermined relationship in an expedient fashion.

The garment indexing mechanism IM is comprised of first and second clamp means **80**, **82** for positively engaging and retaining a garment G and carriage mechanism **84** secured to the clamp means for moving the garment and the buttons sewn thereto relative to the needle of the sewing machine SM in a predetermined manner. The carriage mechanism **84** is adapted to be driven from a motor **86** through a speed-reducer **87** and a clutch mechanism **88**. The clamping means **80** and **82** are maintained in a desired predetermined relationship and are operatively connected to one another by means of a connecting rod **89** secured at one end of the clamping means **80** and at the other end to the clamping means **82**. The connection of rod **89** to the clamping means **80** is rigid, whereas the connection of the rod **89** to the clamping means **82** is through the resilient spring members **91**, **92** disposed on opposite sides of the depending member **93** of the clamping means **82**.

The carriage mechanism **84** is operatively connected to the motor **86** and clutch **88** via chain drive mechanism **96**. At one end, the chain **96** is connected to the body member **98** of the clamping means **80**, and at the other end the chain is connected to the body member **98** through a resilient member **99**, which may take the form of a coil spring. The clamping means **80** includes a pivoted arm member **101** having a planar end portion **102** cooperating with guide plate **81** for gripping the garment G upon which buttons are to be sewn. In the case of a man's shirt, the clamping means would grip the shirt in the region of the collar, and in the case of a woman's shirt the clamping means **80** would grip the shirt adjacent the tail. Pivot pin **103** is secured to the body member **98** for centrally pivoting the clamping arm **101**. The end of the clamping arm **101** opposite the flattened gripping end **102** is connected to a cylinder mechanism **104**, which functions to move the end **102** into and out-of gripping engagement with a garment G. The rod **106** of the cylinder mechanism **104** is pivotally secured at **107** to a depending arm **108** of the clamping means **80**. The cylinder **104** is pivotally connected at **110** to a bracket **112** which depends downwardly from and is secured to a planar member **114** that is in turn secured to body member **98** of clamping means **80**.

Two plates are adjustably supported on the guide plate **81** for permitting accurate positioning of an end of the garment G in clamping means **80**. Plate **113** is provided with slots **115** so as to permit movement of the plate **113** toward and away from the front of the garment sewing machine. Plate **113** is adjustable to vary the position of the button from the lead edge of the shirt front. Bolt **116** or like fastening means is provided to fix the plate **113** in desired adjusted position. Plate **117** is provided with slots **118** to permit adjustment of the plate **117** laterally of the frame F. The plate **117** is affixed in adjusted position by bolts **119**. This adjustment properly positions the end of the garment relative to the needle to assure that the first button is at a desired distance from the left end of the garment G.

The indexing mechanism includes a threaded rod **120** carried fixedly at the ends between supports **121** and **122** extending upwardly from base of frame F. Sets

of pairs of stop nuts **124, 125** are movable on the threaded rod for adjustment of one pair relative to another pair. One nut of each pair is positioned as desired and the second nut is then threaded against the first to lock same in place. The stop nuts **124, 125** are adjusted for the purpose of setting the spacing between the buttons to be sewn unto the garment G as will be explained more fully hereafter.

The chain **96** is trained at one end on a pulley **128** journalled on the upstanding bracket **122** and at the other end on a pulley **130** operatively driven from the clutch mechanism **88**. The input of the clutch mechanism is operatively connected to the speed reducer via a belt and pulley drive mechanism **132**.

Fixedly carried on the frame F in position to be engaged by the body **98** at the limits of its movement are switches **140** and **141**. Also, in circuit with the switches **140** and **141**, is a switch mechanism **142** which is adapted to be actuated by a pivoted lever **144** on the body **98**.

Turning now to FIGS. **4–10**, there is better illustrated the detail of the carriage mechanism. The body member **98** of the clamping means **80** is carried slidably on a pair of rods **150, 152** which are carried at their ends in supports **121, 122**. The lever **144** is adapted to be pivoted about two axes. Lever **144** is comprised of two parts, **144***a* and **144***b*, operatively connected so as to be pivoted about pivot pin **160** for movement toward and away from engagement with the stops **124, 125** on the screw shaft **120**. Spring **161** disposed between body **98** and an end of lever **144** functions to bias an end of the lever **144** toward the shaft **120** where it can engage with the stops on the shaft **120** and the lever **144** is urged in the opposite direction by the piston rod **164** extending from the cylinder means **166**

The lever **144** is also mounted for movement about the axis through the pivot member **168**, which secures parts **144***a* and **144***b* together. Spring means **170** are provided for biasing the lever **144** into engagement with the adjustable stop **172**, so as to establish the proper relationship of the rear end of the lever with the actuating mechanism of the switch **142**, which actuating mechanism may preferably be a roller member **143**. Such spring means **170** may comprise a coil spring secured to the pivot member **168** and to the L-shaped part of lever **144**.

The end brackets or supports **121** and **122** are secured to the frame means F by suitable fastening means, for example, bolts **123** as seen in FIGS. **9** and **10**.

Turning to FIGS. **11, 12, 13** and **14**, there is further illustrated detail of the clamping means **82**. The clamping means **82** includes a pivoted lever **210** disposed on a bracket **212** secured slidably on upper and lower rods **214, 216**. The lever **210** is pivoted about the pivot pin **218** secured to bracket **212** by the rod **220** of the cylinder mechanism **222** that is suitably fixed to the bracket **212**. The rods **214** and **216** are connected at their ends in the frame F by suitable brackets. Secured to the bracket **212** is a generally horizontally extending plate member **226** which adjustably carries thereon an adjustment plate **228** having a plurality of slots **229** therein for adjusting the position thereof forwardly and rearwardly relative to the front of the machine GSM. Retainer members, for example bolts **230**, secure the plate **228** in a selected adjusted position. Adjustment plate **232** is adjustably carried on the frame F in spaced position relative to the plate member **226**. The plate member **232** has a slot **235** therein and may be retained in selected adjusted position by bolt **234**. The purpose of the adjustment plates **232** and **228** is to establish the position of the leading edge of the garment relative to the sewing machine so as to establish the distance the button will be sewn from the lead edge of the garment.

Pivoted on the frame proximate the clamping mechanism **82** on the right side is an actuator comprising a pivoted member **240** that is adapted to be engaged manually to initiate the operating switch **242**.

Stacker

The garment sewing machine GSM of the present invention also includes a stacker which has been identified by the letter S in FIGS. **1, 2** and **3**. The stacker S comprises a centrally disposed plate member **250** secured at its lower end to a rod **252** that is pivoted in bearings **254** and **255** on the lower parts of the legs **21**. A bracket member **260** is secured at the upper end of the stacker plate **250**. On the face of the bracket **260** is provided a resilient material, for example, polyurethane, from upon which garments having the buttons sewn thereto may be collected. The stacker S is movable toward and away from the forward portion of the machine GSM by means of a cylinder mechanism including a cylinder **270** pivoted at its rear end about pivot pin **271** carried in projections extending from angle member **273** fixed to the frame F. The cylinder mechanism includes a rod pivotally secured at the forward end at **276** to the member **250** for moving the stacker S.

As best seen in FIGS. **6** and **7**, there is provided at the front of the table of the frame F a longitudinally extending tubular member **280** which receives compressed air and selectively discharges same forwardly through a plurality of spaced longitudinally extending openings or through a longitudinally extending slot **281**. Air pressure is selectively supplied to the tubular member **280** at the end of a garment button sewing operation so as to remove a completed garment from the top of the table and urge same unto the bracket **260** of the stacker S. The cylinder mechanism **270, 275** will be suitably actuated at the end of each garment sewing cycle so as to effect stacking of a plurality of completed garments on the plate **260**. When a predetermined supply has been accumulated, the operator will then remove same for further processing.

Operation

Initially, a garment to be worked on is placed against the adjustable stops or guides **113** and **117** on the clamping means **80**. The garment G is then stretched out along the table guide surface to a position where it may be clamped by the clamping means **82**. The garment is against the adjustable stops or guides **228, 232**. The clamping means **80** is positioned initially in a predetermined relationship on the carriage mechanism so that the first button will be sewn at a predetermined dimension from the left end or collar end. For example, for most mens' shirts, the primary adjustment is 3½ inches. The buttons sewn will be properly spaced inwardly from the lead edge of the shirt or garment because of the extended guide surface abutting the lead edge of the shirt, such guide surface being provided for

example by the guide members or adjustable stop members **113**, **228**, and **232**. The stops **124**, **125** are adjusted on the shaft and then locked in place at predetermined distances corresponding to the distances between buttons.

Upon actuation of the switch **242**, the clamping means **80** and **82** will be simultaneously actuated to retain the shirt front or garment G. At the same time, the operation of the sewing machine SM is initiated and the button in alignment with the needle **66** on the loader and aligner mechanism will be sewn onto the garment. At the end of the sewing cycle, the cycling cam on the sewing machine SM will close the circuit to a delay relay (not shown) energizing the cylinder mechanism **166** to extend the rod **164** thereof and raise the lever **144** from the stops **124**, **125** on the threaded rod **120**. Motor **86**, which may be of a type commonly made by Bodine Electric Company then drives upon engagement of clutch **88**, the chain **96** and thereby indexes the carriage until the next stop position wherein the lever **144** engages the next pair of stops on the threaded shaft **120**. The cycling operation continues until all buttons are sewn in place and then at the end of the cycling operation, the body **98** of the clamping means **84** will strike the stacker-in switch **140** at the left end of the carriage as viewed in FIG. **1**, for example.

Upon actuation of stacker-in switch **140**, the cylinder mechanism **270**, **275** will be actuated to move the plate **262** toward the frame. A stacker forward switch **290** on the front of the machine will be contacted by the plate **260**. Actuation of the switch **290** will cause air to be blown through the opening **281** in the tubular member **282** to blow the shirt unto the stacker S. The stacker forward switch **290** also, functions to reverse the carriage to return same to the start position.

Although the device has been described as comprising a garment sewing machine, it will be understood that the sewing machine may have a button hole former substituted in its place and then the machine will be used in the same manner to form holes in predetermined spaced relationship along the shirt front or like garment.

A feature of the present device is that both men's shirts and women's shirts can be set up with equal facility. It is only necessary to reverse the shirt ends for securement on the machine to establish the proper spacing from the collar. In prior known devices, it is necessary that components of the machine be relocated in order to effect sewing of both the men's shirts and women's shirts.

A further feature of the present invention is that only the shirt and indexing mechanism move. The table and frame components are stationary and do not move during the indexing operation in the present device.

There has been provided by the present invention an improved garment sewing machine for more rapidly sewing buttons unto a garment in predetermined relationship, whether the garment be a man's shirt or a woman's shirt.

While a presently preferred embodiment of the invention has been shown and described, it is apparent that various changes and modifications may be made therein without departing from the invention. Therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. In a machine for performing a work operation on a garment including a frame, garment working means, on the frame, and means on the frame for moving the garment past the garment working means, the improvement comprising said garment moving means including first clamping means for clampingly engaging a garment at one end, second clamping means for engaging the garment at a remote place, said first clamping means including a stop for establishing a first position from which work to be performed on the garment is gaged, and a pivoted lever carriage means for moving the clamping means predetermined increments from a first position to a second position to permit work to be performed on the garment at spaced intervals between said first and second positions corresponding to the said predetermined increments, said carriage means including longitudinally extending support rods for carrying the first clamping means, drive means comprising a motor and a clutch for moving same, with chain means connected between the clutch and first clamping means and indexing means cooperating with the drive means for moving the carriage means and the clamping means said predetermined increments, said indexing means including an indexing rod carrying stops selectively engaged by said pivoted lever and released therefrom at the end of a work operation, said first and second clamping means including adjustably mounted guides for gaging the distance from the front edge of the garment to the work places on the garment.

2. A machine as in claim **1** including a stacker on the frame for receiving finished garments after the work operation has been completed.

3. A machine as in claim **2** including pneumatic transfer means for positioning a garment on the stacker, said transfer means being operative upon release of the garment by the clamping means upon positioning of the garment at said second position and completion of the last sewing operation on the garment.

4. A machine as in claim **3** wherein the garment working means is a sewing machine, and a button loader and aligner mechanism is associated with said sewing machine for properly positioning a button so that it can be sewn in place at spaced intervals on the garment.

5. A machine as in claim **1** wherein said first clamping means includes a second adjustably mounted guide for gaging the distance from the end of the garment to the first work place.

6. A machine as in claim **5** wherein each of the guides includes an adjustment plate having slots therein for adjustably securing said plate on the respective clamping means.

7. A machine as in claim **1** wherein the indexing rod is externally threaded and the stops are adjustably connected to the indexing rod by internal threading and lock means.

8. A machine as in claim **1** wherein the pivoted lever is pivoted about two axes so as to be movable toward and away from engage-ment with the stops on the indexing rod and movable toward and away from a switch mechanism for actuating same.

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