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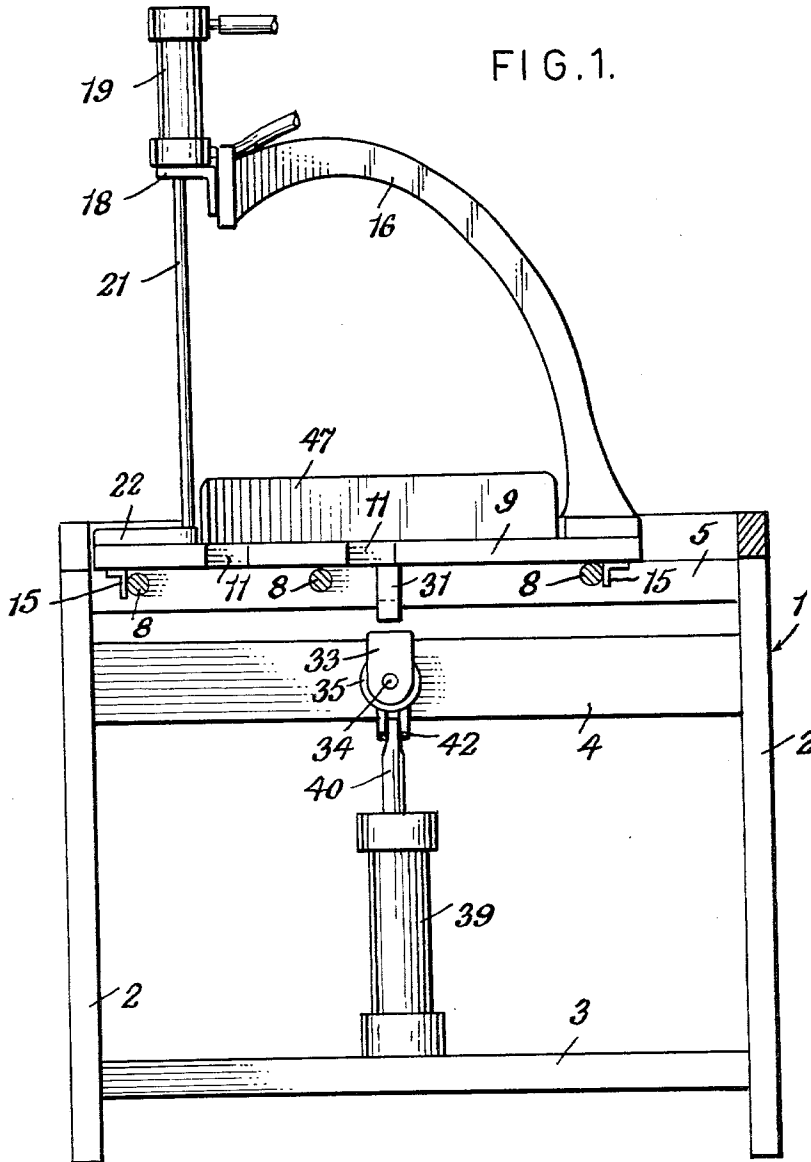
I. R. KREMER ETAL

3,228,364

APPARATUS FOR FACILITATING THE ATTACHMENT OF BUTTONS

Filed Jan. 14, 1963

4 Sheets-Sheet 1



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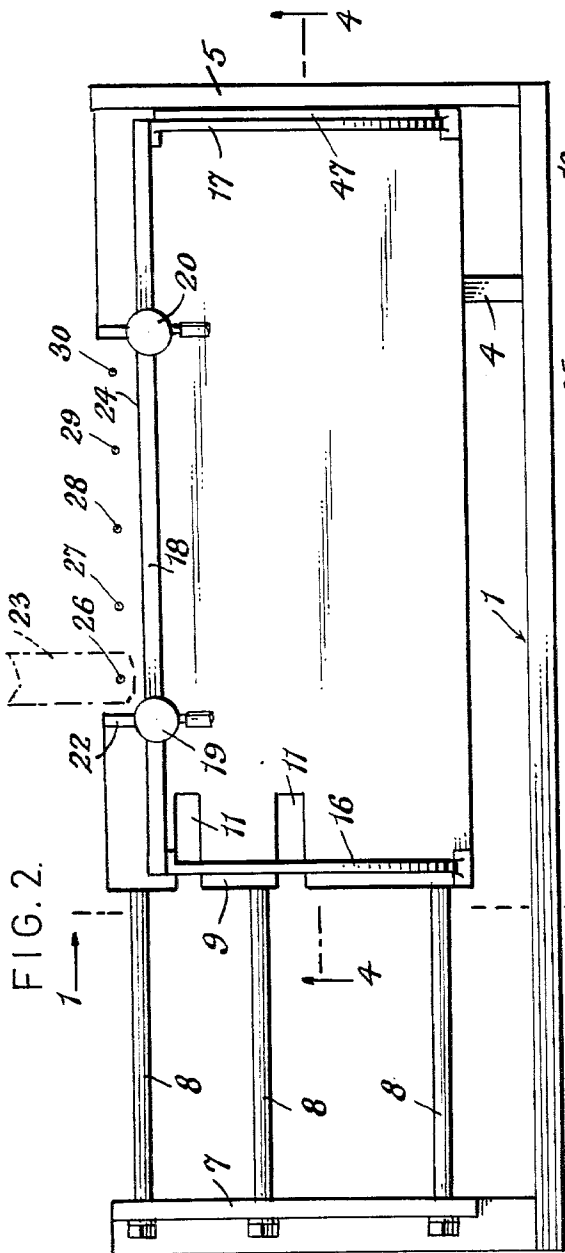
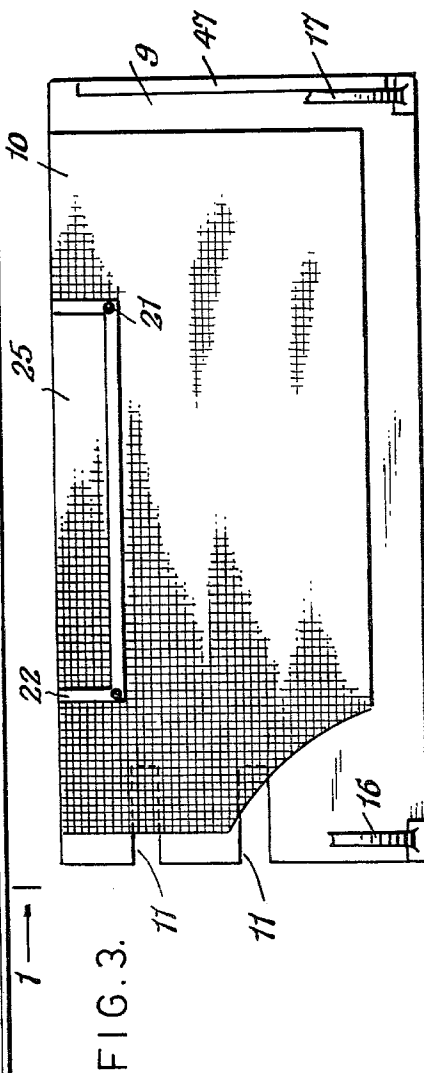
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APPARATUS FOR FACILITATING THE ATTACHMENT OF BUTTONS

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4 Sheets-Sheet 2



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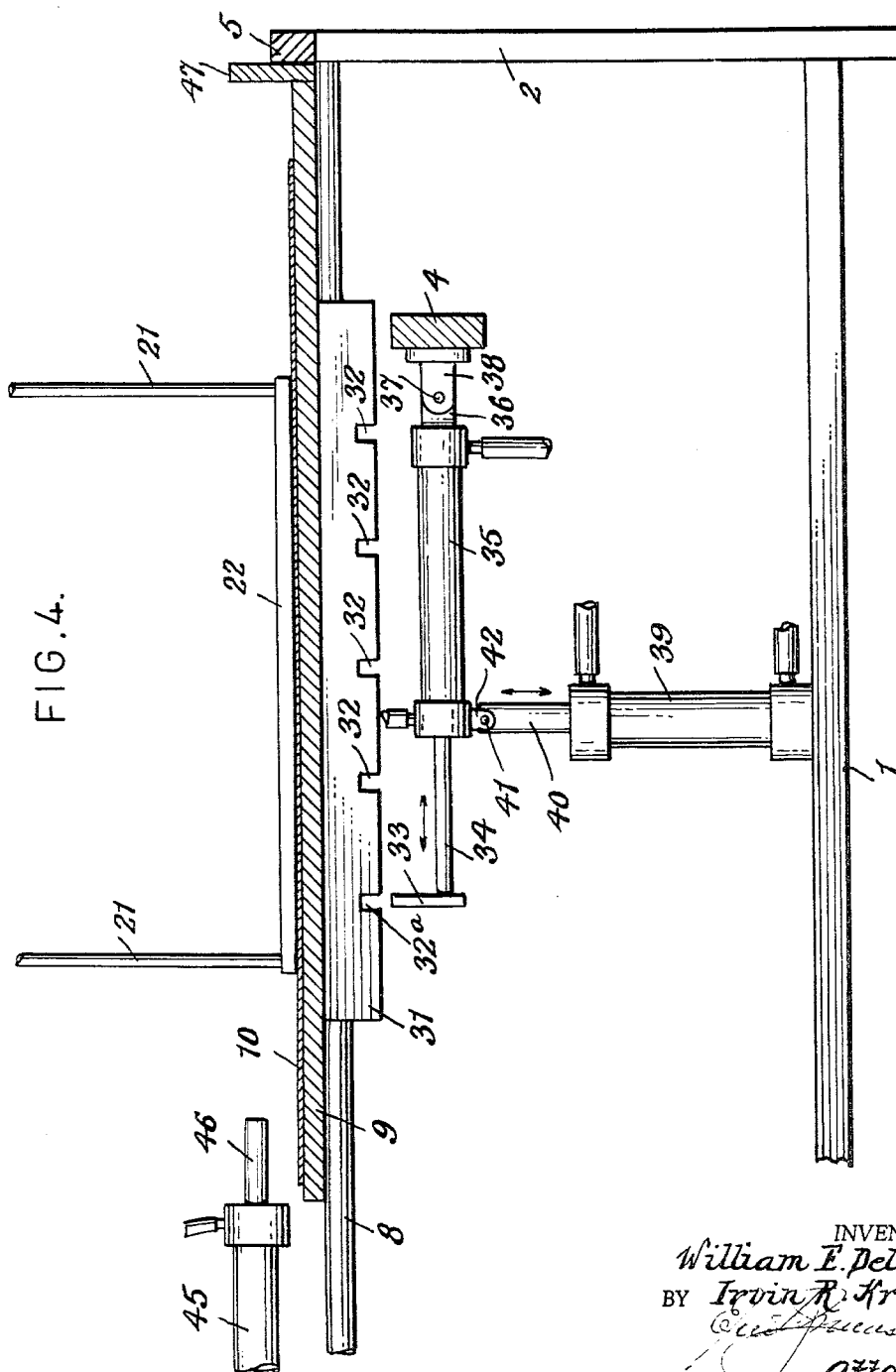
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APPARATUS FOR FACILITATING THE ATTACHMENT OF BUTTONS

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4 Sheets-Sheet 3



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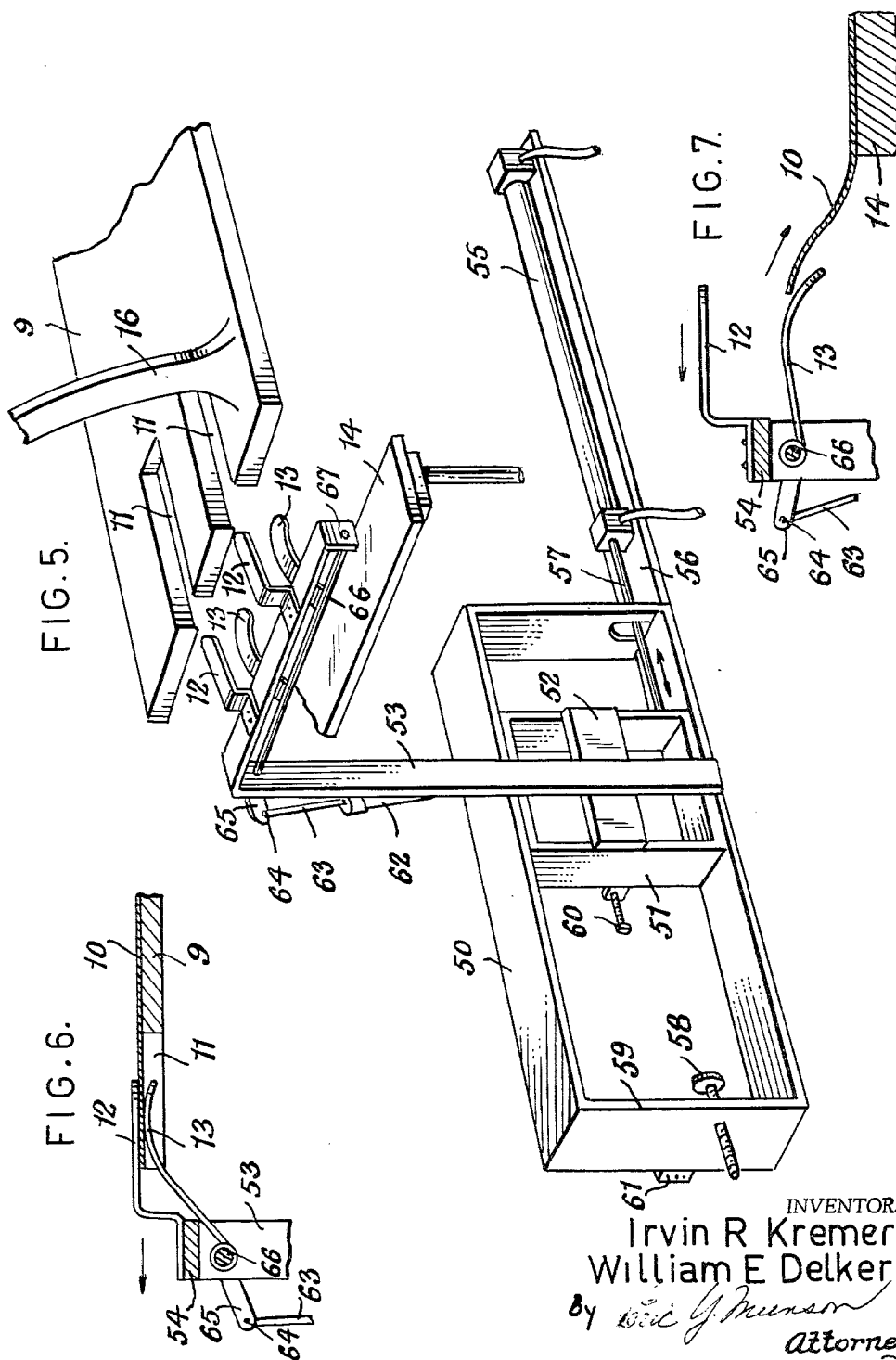
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APPARATUS FOR FACILITATING THE ATTACHMENT OF BUTTONS

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4 Sheets-Sheet 4



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3,228,364

APPARATUS FOR FACILITATING THE ATTACHMENT OF BUTTONS

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4 Claims. (Cl. 112—2)

This invention relates to an apparatus for facilitating the attachment of buttons, or for the production of button-holes in garments, such as shirts, and it has for one of its objects the provision of means which will transport a shirt front or similar garment part to a button-sewing or button-hole making machine, with halts thereat at points along the garment where the several buttons will be affixed or button holes completed by the machine.

At the present time, buttons are applied to shirts and to similar garments by a machine at which an operator is seated, and the operator holds the cloth in position on the machine while a button is applied, and then moves the shirt front for the required distance to enable the second button to be sewn in place, and continues this procedure until all of the buttons down the front of the shirt have been sewn in place. The shirt front is then placed in a pile on a suitable support near the machine. The operation as above described is time-consuming and production is limited because an operator can operate only one machine at a time.

With an apparatus of the present invention, the shirt front is moved automatically from one button position to the next, until all of the buttons on the front of the shirt have been applied. As a result, one operator can operate a button-sewing machine as well as two automatic button-hole sewing machines simultaneously. Equally satisfactory work is produced, with much greater output and with a resultant reduction in manufacturing cost.

More particularly, the invention contemplates the provision of a support on which a shirt front or similar garment part is rested and carried, and which support automatically moves the garment part to a button-sewing or button-hole machine, with halts or pauses at the positions on the carried garment where the several buttons are successively applied.

The invention further contemplates the provision of means by which the shirt fronts or other garment parts are automatically removed from off the support at the conclusion of the button-applying or button-hole completing operation and are stacked.

In describing the operation of the improved shirt-front carrying device we wish to be understood, when referring to a button-applying machine as also meaning a button-hole finishing machine or other machine at which successive operations are to be performed.

With these and other objects to be hereinafter set forth in view, we have devised the arrangement of parts to be described and more particularly pointed out in the claims appended hereto.

In the accompanying drawings, wherein illustrative embodiment of the invention is disclosed,

FIG. 1 is a transverse sectional view of the apparatus near one end thereof, the view being taken substantially

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on the line 1—1 of FIG. 2, looking in the direction of the arrows;

FIG. 2 is a top plan view of the transporting apparatus;

FIG. 3 is a top plan view of the slidable table, with a shirt front portion in position thereon preparatory to the application of the buttons;

FIG. 4 is a sectional view, taken substantially on the line 4—4 of FIG. 2, looking in the direction of the arrows;

FIG. 5 is a perspective view of the means which removes the shirt from the table after the buttons have been attached;

FIG. 6 shows how the gripping fingers engage the shirt front preparatory to removing the same from the table, and

FIG. 7 shows how the shirt front is released from the gripping fingers and is received upon a stacker or support.

Referring to the drawings, 1 generally indicates the supporting frame of the main portion of the apparatus, or that part thereof which carries the shirt front to the button-applying or button-hole finishing machine. The frame 1 includes supporting legs 2, connected by the cross members 3 and 4 and such other bracing members as may be required. At its opposite ends, the frame is provided with cross pieces shown respectively at 5 and 7 which are connected by a plurality of parallel, longitudinally-extending, spaced-apart rods 8 which support a slidable or traveling table 9 upon which a shirt front 10 is rested and is held during the attachment of the buttons or for the completion of button-holes.

The table 9 consists of a flat panel provided at one end with a pair of longitudinally-extending slots 11 for the entry of gripper fingers 12 and 13 (FIGS. 5, 6 and 7) to grip the shirt front 10 at one end to slide it from off the table after the attachment of the buttons to the shirt front, or the production of the button-holes, and then release it to bring it to rest upon a stacking table or other support 14 (FIG. 7).

The bottom of the slidable table 9 may be provided with guide bars 15 (FIG. 1) or other suitable guiding means by which it will be assured of true linear sliding movement along the length of the rods 8 with halts or pauses at each point where a button is to be affixed to the shirt front or a button-hole is to be completed.

Secured to and extending upwardly from the top of the table 9 is a pair of goose-neck brackets indicated respectively at 16 and 17. These brackets are connected at their ends by a longitudinally extending bar 18 positioned above the table 9. Supported on the bar 18 is a pair of air cylinders shown respectively at 19 and 20, and the piston rods 21 extending vertically downward therefrom are attached at their lower ends to a U-shaped foot 22, the function of which is to hold the shirt front 10 down flatly on top of the table 9 during the button-attaching or button-hole completing procedure and to insure that portion of the shirt front on which the work is to be done being held flat and wrinkleless while the buttons are being applied or the button-holes are being completed.

The button-affixing or button-hole machine station is diagrammatically indicated at 23 and the constructional details of the machine indicated in FIG. 2 are not provided because the machine there employed may be any

one of a number of commercial types. The machine operates in properly-timed relation to the shirt-front supporting and carrying device, to apply one button or complete one button-hole after another on the shirt front. The table 9 is suitably notched or cut out in the area indicated at 24 in FIG. 2, which is an area defined by the foot 22 so that the part of the shirt front indicated at 25 in FIG. 3, which is the part of the shirt front to which the buttons are to be affixed, will be located in the area 25 and will be so disposed that the buttons can be readily successively sewed in place.

The conventional men's shirt is provided, in addition to the collar button, with five front buttons and the present apparatus is effective to move the shirt front to successively locate the five positions indicated at 26, 27, 28, 29 and 30 in FIG. 2, at the required location in respect to the machine 23, to there receive the application of successive buttons or button-holes. The table 9 is therefore intermittently moved along on the rods 8, from right to left as viewed in FIG. 2, with a halt or pause at the machine 23 for the work to be performed thereby at each of the locations 27 to 30 inclusive.

The means for intermittently moving the table 9 in one direction, or from right to left as viewed in FIGS. 2 and 4, includes a notched bar 31 attached to the underside of the table 9 and extending longitudinally thereof. The notches 32 and 32a in said bar correspond in number (5) to the number of buttons or button-holes for each shirt front. Adapted to successively engage in each of the notches 32 and 32a is a dog 33 secured at the end of a piston rod 34 attached to the piston in an air cylinder 35. The air cylinder 35 is provided at one end with a lug 36 pivotally attached at 37 to a clevis 38 mounted on the frame cross member 4. This arrangement is such that the air cylinder is capable of upward swing when required, to enable the dog 33 to engage in one or the other of the notches 32. In its lowered position, the dog 33 is free of the notches as shown in FIG. 4.

The means for raising or lowering the cylinder 35 and hence the dog 33, consists of an air cylinder 39 mounted vertically in the frame and having its piston rod 40 pivotally attached at 41 to a clevis 42 provided on the air cylinder 35. By means of the construction above described, the dog 33 becomes engaged with one of the notches 32 each time that the cylinder 35 is raised and then when the piston in said cylinder is moved toward the left the bar 31 and table 9 to which said bar is attached, will be moved toward the left for a distance corresponding to the distance between the buttons or button-holes.

For example, in FIG. 2 the table 9 is in a position where the point 26 at which the top button is to be applied is located at the button-applying position. The shirt front is placed by the operator on the table 9 in this position. At this time the dog 33 is engaged with the first notch shown at 32a. As soon as the first button is sewn on the shirt front at the location 26, the button-sewing machine 23 will then, by means of a known device, close circuit to a switch which will open a valve to the air cylinder 39 causing it to withdraw the dog from the notch 32a. The cylinder 35 will be actuated to draw the dog 33 to the right while it is so disengaged from the notches, and for a distance to position it below the second notch 32 from the left end of the bar 31. Cylinder 39 will then swing the cylinder 35 upwardly to bring the dog 33 into engagement with said second notch. Piston rod 34 is then extended toward the left for a predetermined distance, or that required to bring the shirt front where the point 27 is positioned at the machine 23. The dog 33 remains in the second notch, holding the table 9 against movement while the button is being sewn at the point 27, whereupon the procedure above described is repeated until a halt or pause has been had for each of the locations 26 to 30 at the station 23 and a button applied or a button-hole formed.

The switches and valves for effecting the timed operation of the several air cylinders are of known construction and may be of the type known commercially as "Pulsapak" which is a standard electronic unit which delivers an electronic impulse for a relatively short duration sufficient to operate the air cylinders.

Any other suitable indexing means for effecting the control and operation of the valves and switches can be used and an example of a suitable arrangement for the purpose is found in FIG. 10 of the patent to Thompson, No. 3,085,452, dated April 16, 1963, and hence are not described in detail herein. The distance between the points of button-application or button-hole formation can be readily regulated by arrangement of the notches 32 and the regulation of the length of throw or extension of the piston rod 34.

After the last button or button-hole at the point 30 has been provided on the shirt front, the shirt front is removed from the table 9 either manually or by means of the apparatus shown in FIGS. 5 to 7 to be presently described. At the completion of the last operation by the machine 23, the dog 33 is lowered out of the last notch 32, or that near the right end of the bar 31, and the table 9 is then ready for its slidable return to its initial position. For this purpose a suitably-positioned air cylinder 45 is so located that its piston rod 46 will contact with an abutment on the table 9, such as the upstanding end wall 47, and will slide the table 9 toward the right until its movement is halted by contact with the cross piece 5, the same acting as a stop to limit the sliding movement of the table toward the right.

The means for automatically removing the shirt front from the table after it has been operated upon by the machine 23, is shown in FIGS. 5, 6 and 7. The structure therein shown is located at the left end of the frame 1 and so positioned that the gripper fingers 12 and 13 can enter the slots 11 in the table and grip the end portion of the shirt front between them and draw it from off the table. The shirt-front removing device includes a rectangular frame 50 constituting an outer guide frame, within which an inner frame of carriage 51 is slidably mounted. Secured to the inner frame or carriage 51 and to its cross piece 52 is a vertical post 53 at the top of which is provided a laterally-extending horizontal arm 54. The upper gripper fingers, or those shown at 12, are, in the arrangement shown, fastened to the arm. The lower gripper fingers 13 are mounted for pivotal movement to or from the fingers 12. As shown in FIG. 6, the gripper fingers 12 and 13 engage the shirt front 10 between them, and then as the carriage 51 and parts associated therewith are moved away from the table 9, the shirt front will be drawn from off the table 9 and brought across a support 14 on which it will be deposited when released by the gripper fingers as shown in FIG. 7.

The means for slidably reciprocating the inner frame or carriage 51 within the outer frame 50, consists of an air cylinder 55, supported on an extension 56 of the outer frame 50, and said air cylinder has its piston rod 57 attached to the frame 51. An adjustable stop 58 extends through the end wall 59 of the outer frame 50 and limits the sliding movement of the inner frame 51 in one direction. Co-operating switch elements 60 and 61 carried by the inner frame or carriage 51 and the outer frame 50 respectively, control the operation of the air cylinder 55 through a suitable known valve arrangement.

The movable gripper fingers 13, co-operating with the fixed gripper fingers 12 can be made to grip and release a shirt front as required by means of an air cylinder 62 mounted on the post 53 or elsewhere, said air cylinder having one end of its piston rod 63 pivotally connected at 64 to a radially-extending arm 65 projecting from an oscillating shaft 66 mounted to oscillate in the post 53 and in a plate 67 located at the free end of the arm 54. The fingers 13 are secured on the shaft 66 so that when the

shaft is rotated in one direction, the fingers 13 will be swung upwardly toward the fingers 12 into gripping co-operation with the fingers 12, as shown in FIG. 6. When the shaft 66 is rotated in the opposite direction, the fingers 13 will be lowered, as shown in FIG. 7 and the shirt front will then be released from the grip of the fingers to cause it to descend upon and drape across the support 14 and on which the successive shirt fronts will pile up until manually or otherwise removed.

From the foregoing, the operation of the described apparatus will be apparent. The operator places the half of a shirt front 10 or that half on which the buttons are to be applied, or the opposite half in the case of a button-hole machine at the station 23, on top of the traveling table 9, substantially as shown in FIG. 3. The foot 22 is then brought down and it holds the shirt front flatly on top of the table 9 while serving to define the area thereof in which the work is to be performed by the machine 23. The shirt front, when placed on the table 9, was so positioned that the point 26 at which the first button or button-hole is to be located, was in position at the machine 23. When the first button or button-hole has been provided on the shirt front, the table 9 is moved by the mechanism heretofore described to bring position 27 at the machine 23 for the next operation. After the second operation the table is then moved to bring position 28 in place at the machine 23 and this procedure continues until the five buttons or button holes have been provided on the shirt front. The foot 22 is then raised and the carriage 51 carrying the gripping fingers 12 and 13 is then moved to bring the gripping fingers into the slots 11, with the upper fingers 12 located above the shirt front at one end thereof and the movable lower fingers below the shirt front. The movable fingers 13 are then swung upwardly, as shown in FIG. 6 so that the shirt front is gripped between the fingers 12 and 13. The carriage 51 is then moved toward the left and away from the table 9 as indicated by the arrow in FIG. 6, sliding the shirt front from off the table 9 and permitting it to fall down upon the support 14 when released by the separation of the gripper fingers as shown in FIG. 7.

While I have herein described a single embodiment of the invention, it is possible that various modifications may be made without departing from the spirit of the same. While the apparatus is described as being used for the performance of operations on shirt fronts, it can be used for other purposes. The table and the actuating means therefor shown in FIGS. 1, 2 and 4 can be used independently of the shirt-front removal means shown in FIG. 5, with the shirt fronts placed on and removed manually or otherwise from the table 9. The means for opening and closing the gripper fingers may be different from that disclosed and various other modifications as to control and use of the apparatus are possible as is contemplated by the scope of the claims appended hereto.

What we claim is:

1. In an apparatus for performing operations on shirts and similar garments, a shirt-part supporting table having a notched edge over which a part of a shirt front is deposited for the application of buttons, a frame movable up and down above the table for holding the shirt part flatly on the top of the table and defining an area within which the buttons are to be applied, the frame being raised or lowered to thereby respectively release the shirt part or to clampingly hold it down upon the top of table, said table having slots in one end thereof shirt-gripping means consisting of fingers which enter said slots in the table for engagement with the shirt part at one end thereof while the shirt part is released by the frame, means for moving said fingers in a direction away from the table, said gripping means being adapted to separate said fingers to release the shirt part after it has been drawn by the fingers from off the table.

2. A button-applying sewing apparatus having a table over which a shirt-front is rested while buttons are being

sewed on it, means for delivering the shirt front from the table at the completion of the button-applying operation, said means including slots in the table at one end thereof and over which parts of the shirt-front extend, fingers entrant into the slots and adapted to grip parts of the shirt front which are disposed over the slots, means for slidably moving the fingers away from the table and causing the shirt-front to be slid across the surface of the table and away and from off the table, and a shirt rest over which the shirt-front is carried by the fingers and caused to receive and hold the shirt-front after the shirt-front has been brought to a position across the rest and has been released by the separation of the fingers, the table being notched along one of its edges, a hold-down frame for holding parts of the shirt-front disposed across the notch and on top of the table, pneumatic means for raising and lowering the frame, a carriage on which the gripping fingers are carried, pneumatic means by which the carriage is reciprocated, and pneumatic means for opening and closing the fingers to thereby cause the fingers to close upon the shirt-front while the same is on the table and to open and release the shirt-front when the same is disposed across the rest.

3. In a button-applying apparatus including a support on which a shirt-front is rested and moved, hold-down means operative above the support for holding a shirt-front down on the support, means for applying buttons at spaced positions to a shirt-front resting on the support, the support having slots at one of its ends over which parts of the shirt front extend during the button-applying operation, means for removing the shirt-front from off the support including a carriage, means for sliding said carriage toward and away from the slotted end of the support, the shirt-front removal means including gripping fingers entrant into the slots in the support and gripping the end of the shirt-front and slidably withdrawing it from off the support while the hold-down means is in a shirt-front release position, and means for separating the fingers when the carriage reaches the end of its travel in a direction away from the support and is positioned remotely from the support, and a rest located adjacent to the end of the travel of the carriage and positioned to receive a shirt-front when the fingers are separated to release the shirt-front.

4. An apparatus for performing operations on shirts and similar garments comprising, a shirt-front supporting table having a forward edge provided with a notch over which a part of a shirt-front is deposited for the attachment of buttons, said notch being of a length to be disposed below that portion of the shirt-front to which all of the buttons required for a shirt-front are to be affixed thereon, a substantially U-shaped hold-down frame movable up and down above the table and in its lowered position coming into contact with parts of the shirt-front adjacent to the edges of the notch and defining the area of the shirt-front within which all of the buttons are to be applied in spaced relation, means for raising and lowering the frame to thereby respectively release the shirt-front or to clampingly hold it down upon the top of the table, the table being provided with slots in one end and over which parts of the shirt-front are extended during the button-applying operation, shirt-front gripping means including fingers which enter said slots in the table for engagement with the parts of the shirt-front which overlie said slots, while the shirt-front is released by the raising movement of the hold-down frame, means for moving said fingers while gripping the shirt-front and in a direction away from the table, said gripping means being adapted to separate said fingers to release the shirt-front after the same has been drawn by the fingers from off the table, and a rest over which the shirt-front is deposited by the opening of the fingers when said fingers reach the limit of their travel in a direction away from the table.

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JORDAN FRANKLIN, *Primary Examiner.*