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MANUAL SHIRT FOLDING DEVICE

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11 Claims. (Cl. 223—37)

1 This invention relates to manual shirt folding devices.

An object of this invention is to provide in a device of the character described, highly improved means to center and hold down an unfolded shirt to be folded, at the neck and at the shoulders to prevent the shirt from slipping out of place during the entire shirt folding operation, whereby to facilitate the handling of the shirt during such operation and to insure a neat fold.

Another object of this invention is to provide a highly improved device of the character described comprising a central panel and a pair of wings hinged to opposite sides of the central panel by means of spring hinges with the wings normally lying somewhat above the plane of the central panel, to provide a platform on which an unfolded shirt can be placed flat, with the neck of the shirt at the upper or rear end of the central panel, and the tail of the shirt extending beyond the lower or front ends of the panel and wings, said panel being hinged about its upper end so that after the shirt is laid on the panel and wings, said panel together with its wings may be swung up about said rear panel hinge so that the tail of the shirt will fold down and hang over the undersides of said panel and wings.

Yet another object of this invention is to provide a device of the character described having means to support the panel and wings in upwardly and rearwardly inclined position after swinging said panel and wings upwardly, the construction being such that said panel and wings remain in said inclined position during subsequent shirt folding operations, to relieve fatigue of the operator.

After swinging the central panel and its wings upwardly to rearwardly inclined position, the sleeves can be folded inwardly one over the other and over the tail of the shirt. When the wings can be folded first one over the central panel and then the other over the folded wing, thereby taking out looseness, the spring at the spring hinges for the wings being such that the wings or side flaps remain in folded position, after folding the springs not having enough tension to open the wings.

Yet another object of this invention is to provide in a device of the character described, improved means to limit rotation of the central panel, and also means to limit opening or unfolding movement of the wings (when the folded shirt is removed) to a position where the wings are substantially in the plane of the center panel.

Still another object of this invention is to provide a device of the character described which comprises a complete unit that may be mounted on any suitable table or support, and it does not depend on foot levers or any specially designed supporting frames, the device furthermore being such that shirtfolds of different lengths can be made thereon extremely rapidly and without necessity for any special skills.

Yet another object of this invention is to provide in a device of the character described, means to support a supply of bands for banding the folded shirt, said support being adjustable to retain the bands in such position that the ends of the band may be easily brought around a shirt, folded on the panel and wings and adhered to each other.

Still another object of this invention is to provide a device of the character described comprising a support provided with rails, and a carriage slidable back and forth thereon and to which the central panel is hinged, the neck clamp for the shirt being hinged to the carriage and means being provided to open the clamp when the folded and banded shirt on the panel and wings, is moved from a rearwardly inclined to a vertical position to facilitate pulling the folded shirt off said panel and wings.

Yet another object of this invention is to provide a strong, durable and compact device of the character described which shall be relatively inexpensive to manufacture, easy to manipulate, and which shall yet be practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawings, in which is shown various possible illustrative embodiments of this invention:

Fig. 1 is a top plan view of a device embodying the invention and showing a shirt to be folded thereon, in dot-dash lines;

Fig. 2 is a side elevational view of said device but showing the center panel and wings in raised position;

Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a cross sectional view taken on line 4—4 of Fig. 1.
Fig. 5 is a side elevational view of the device with the carriage pulled forwardly and the panel, with the wings folded thereover, swung to rearwardly and upwardly inclined position;

Fig. 6 is a partial bottom plan view of said device;

Fig. 7 is a cross sectional view taken on line 7—7 of Fig. 4;

Fig. 8 is a cross sectional view taken on line 8—8 of Fig. 4;

Fig. 9 is a cross sectional view taken on line 9—9 of Fig. 4;

Fig. 10 is a cross sectional view taken on line 10—10 of Fig. 9;

Fig. 11 is a front view of the device with the central panel and outwardly extending wings in rearwardly and upwardly inclined position and showing a shirt thereon with tail of the shirt folded down over the back or underside of the central panel and wings, and with the sleeves of the shirt hanging down;

Fig. 12 is a view similar to Fig. 11, but showing the sleeves folded across the tail, one over the other;

Fig. 13 is a view similar to Fig. 12, but with the wings folded in one over the other and with a paper band thereon;

Fig. 14 is a view similar to Fig. 13 but showing the folded shirt being pulled off in a vertical position;

Fig. 15 is a view similar to Fig. 14, but showing the wings swung out after the shirt is removed, from which position the central panel and its wings swing forwardly and down, so that the carriage can be slidably moved rearwardly back to the position of Fig. 1;

Fig. 16 is a top view of a shirt folded and banded on the device embodying the invention;

Fig. 17 is a cross sectional view taken on line 17—17 of Fig. 13; and

Fig. 18 is a cross sectional view taken on line 18—18 of Fig. 13.

Referring now in detail to the drawing, 10 designates a manually operated shirt folding device or machine embodying the invention, for folding a shirt 11 and banding it with a band 12.

Said device comprises a support 15 which may be mounted on any suitable frame or table, at table height, to facilitate operation of device 10, as will become apparent when the operation of the device is described.

The support 15 comprises a horizontal rectangular base 16 having a front edge 16a, side edges 16b and a rear edge 16c. Said base 16 is formed with a pair of parallel slots 17, equidistant from the side edges 16b, terminating short of the front edge 16a and extending to the rear edge 16c of said base. Fixed to the undersides of said base 16 are a pair of parallel, transverse front and rear angle brackets 18 and 19 having downwardly extending flanges 18a and 19a, respectively formed with pairs of aligned openings receiving the ends of a pair of parallel rails 20, preferably formed of round stock, and disposed below said base. Cotter pins 21 at the ends of the rails keep them from sliding off the brackets. Said brackets 22 also of angle iron, are attached to the underside of base 16, and have downwardly extending flanges 22a contacting the outer side of the mid-portions of the rails 20 to keep them from flexing outwardly.

Slightly mounted on the rails 20 is a carriage 25. The same comprises a pair of parallel co-extensive bars 26 interconnected by a cross-bracing plate 27 attached thereto by screws 28.

Screwed to the ends of the bars 26 are vertical screws 29 serving to attach hubs 30 to the underside of said bars. Mounted for rotation on said hubs 30 by means of ball bearings 32 are wheels 33 having transversely curved annular outer grooves 34 engaging the parallel rails 20.

Bars 26 have upwardly and rearwardly inclined arms 35 projecting upwardly through the slots 17. Adjustably mounted on arms 17 is a bracket 36 to hold a supply of bands 12 for banding shirts on 11 fixed to the device 10. Said bracket 36 may be made of sheet metal or other suitable material and comprises a wall 37 resting on arms 17 and formed with parallel slots 38 through which extend screws 39 passing through openings in arms 35 and having heads at their upper ends contacting said wall and shanks projecting below said arms receiving wing nuts 40 to tighten the bracket 36 in adjusted position. By loosening the wing nuts 40, the bracket 35 may be adjusted up or down to desired position.

Extending from wall 37 are forwardly and outwardly extending walls 41. Extending from the lower ends of walls 37, 41 is a wall 42 in a plane at right angles to walls 37, 41. A supply of bands 11 is mounted on bracket 36 with the lower edges of the bands contacting wall 42 and with the bands resting back against walls 37, 41.

The carriage 25 further comprises a pair of angle brackets 45 having inwardly extending arms 46 at their lower ends, contacting the top of cross brace 27 and attached thereto by screws 47. Extending upwardly from arms 46, are vertical arms 48 projecting through slots 17. Arms 48 have openings 49 through which pass the ends of a rotary horizontal transverse shaft 50. The outer ends 51 of shaft 50 project beyond the arms 48.

Means are provided to limit rotation of shaft 50. To this end, the upper end of one arm 48 is provided with a curved upper edge 52 having end shoulders 53 received on shaft 50, just under said arm 48, and fixed thereto by a set screw 54 in a collar 55 to which is fixed a horizontal pin 56 contacting edge 52. As the shaft 50 rotates, pin 56 rotates therewith, and engagement of said pin with shoulders 53 will stop rotation of said shaft in either direction.

On shaft 50, are washers 57 disposed at the outer sides of arms 48. Fixed to the outer ends 51 of shaft 50 are similar, symmetrically disposed brackets 58. Each bracket 58 comprises a wall 59 perpendicular to the axis of shaft 50 and formed with a through opening 50 receiving the end 51 of shaft 50. Brackets 58 are fixed to the ends 51 of shaft 50 by set screws 61 passing through suitable threaded openings in walls 59.

Extending from the ends of each wall 59 are parallel walls 62 formed with openings 63 through which pass the ends of a rotary pin 64. The outer ends of each pin 64 extend beyond walls 62. Mounted on each pin 64 for rotation about its axis, is a rotary bracket 65 having a top wall 67 and parallel side wall 68 extending therefrom and formed with openings 65 receiving the outer ends of said pin. The ends of pin 65 may be fixed to walls 59 by set screws or in any other suitable manner.

Fixed on pin 64 and disposed between walls 62, is a collar 70. Surrounding each pin 64 is a torsion spring 71 attached at one end 72 to said collar 70 and at its other end 73 to one of the
walls 62. Attached to the top wall 67 of one bracket 66 is a spacer plate 74.

Fixed to brackets 66 are similar, symmetrically disposed wing flaps 75. Each wing 75 has a forwardly projecting portion 76 formed with parallel inner and outer edges 78, 80, a forward edge 81, and a rear, forwardly and outwardly inclined edge 82. It will now be understood that the left wing 75 is in a higher plane than the right wing 78, as seen in Fig. 4, due to spacer 74. The forward edges 81 of said wings are each formed with a notch 83 for the purpose hereinafter appearing.

The wings 75 are swingable about the axes of pins 64 downwardly looking at Fig. 4. They are swing upwardly by the torsion springs 71. Means are provided to limit upward swing movement of wings 75 to horizontal position. To this end, there is fixed to arms 48 of brackets 45, angle shaped brackets 90, preferably of square stock having outwardly extending arms 91 formed with flat, parallel end faces 92, contacting the inner surfaces 93 of brackets 66 when the flaps or wings 75 are in a horizontal position.

Fixed to the center portion of shaft 50, in any suitable manner, is a thick plate 905 having a half groove 912a at its underside to partially receive the shaft attached to the underside of the front end of plate 90a in a center panel 92d projecting forwardly therefrom and disposed below the planes of the wings 75.

Said center panel has side edges 92a parallel to and spaced inwardly of edges 76 of the side wings, It has a front end edge 94 in alignment with the edges 81 of the side wings. Said front end edge 94 is formed with a central notch 95. A shirt 11 to be folded may be placed on the center panel and outfolded side wings, as shown in Fig. 1, with the collar of the shirt on the center panel near its rear end, and with the shoulders of the shirt on the side wings, with the sleeves hanging down, and with the low or tail end of the shirt hanging down from the front edges 81, 94 of the wings and center panel. The center panel and wings thus provide a platform or table for the shirt. Before placing the shirt on such platform, a shirtboard 92a (dot-dash lines in Fig. 1) is placed on the center panel. A clip 92b is fixed by screws 92c to the panel. The front edge of the clip is upturned somewhat so that the rear edge of the shirtboard can be easily slipped between the clip and said panel. The shirtboard substantially overlies the center panel as shown in Fig. 1. Thus, the middle of the upper end of the shirt overlies the shirtboard.

Fixed to the plate 90a is an upstanding bracket 97 having apertured side walls 98 supporting aligned pivot pins 99. Hinged on said pins 99 is a swinging bracket 100 having a back wall 101 and side walls 102. Side walls 102 support a cross pin 103 connected by tension spring 104 to a cross pin 105 supported on side walls 99 and disposed below the pins 99. When bracket 100 is swung up to position of Fig. 3, the line of spring 104 is on the rear side of pins 99, to maintain said bracket in raised position. When said bracket is swung down, to the dot-dash position of Fig. 3, the line of spring 104 moves to the front side of pins 99 to maintain said bracket in its downward position.

Means are provided in the bracket 100 to clamp the shirt placed on the platform adjacent its collar to the center panel. To this end, there is fixed to the upper end of bracket 100, by screws 118, a shirt clamp 111 of U-shape adapted to straddle the collar of the shirt. Said shirt clamp 111, a free arm 112, the outer end 113 of which is adapted to contact the shirt adjacent the inside of the back of the shirt collar 114 of shirt 11.

Attached to clamp 111 is a clamp 115 to hold down the portions of the shirt on opposite sides of the collar, when said clamp is swung from full line position of Fig. 3 to the dot-dash lines of said figure.

To this end, there is welded or otherwise secured to the portion 116 of clamp 111 which is screwed to bracket 100, a cross wire 117 having a transverse horizontal portion 118 from the outer ends of which extend forwardly arms 119. Either arm 119 may be grasped by the operator to swing the clamp 111 down, arms 113 serve to hold the shirt down against the center panel on opposite sides of the shirt collar.

Means are provided to hold down the shoulder portions of shirt 11 to the wings 75. To this end there are fixed to the top surface of said wings, adjacent their outer edges 96, straps or clips 120. The rear ends 120a of said straps contact the wings, and said ends are secured to said wings by screws or rivets 121. Extending forwardly from the rear secured ends 120a are spring clip arms 123 adapted to press the shoulder portions of the shirt slipped thereunder, against the wings.

Means are provided to open the shirt clamp 111 upon swinging the shirt folded on the center panel and folded side wings, from the upwardly and rearwardly inclined position thereof (shown in Figs. 5, 11, 12, 13) to the vertical position of Fig. 14, in which position the folded shirt is pulled off. To this end, there is fixed to the top of table or plate 16 between slots 17, a hook 130 having a forwardly extending arm 131 spaced above the upper face of said table and formed with a downwardly extending bump 131a at its outer end. Fixed to the upper end of bracket 100 is a rearwardly extending arm 133 having an offset foot 134. When the carriage is swung up about the axis of shaft 50 to an upwardly and rearwardly inclined position, and slidably moved forward to the position of Fig. 5, foot 134 engages beneath hook arm 131. After the shirt is fully folded and banded, and is swung up to vertical position, the clamp 111 is opened up to release said clamp from the shirt so that it could be pulled off. The bump 131a keeps the carriage from accidentally slipping backwardly.

The sequential operation of the device will now be described. A shirtboard is first placed on the center panel with its upper end slipped under clip 92a. A shirt to be folded is placed over the shirtboard and wings. The shirt is preferably buttoned or partially buttoned at the front. The shoulder portions of the shirt are slipped beneath the clip arms 123. The clamp 111 is then swung down to clamp the shirt near its collar. At such time the shirt sleeves are hanging downwardly, and the front ends of the shirt are also hanging downwardly. At this time, the carriage is at the rear end of its rearward movement.

The carriage is then swung upwardly and rearwardly and slid forwardly to the position of Figs. 5 and 11, in which position the foot 134 engages beneath the hook 131. During the swinging movement, the tail of the shirt folds over the aligned edges 81, 94 and rests on the undersides of the center panel and wings.
this time, the shirt sleeves hang down as shown in Fig. 11.

The sleeves are then folded across the folded shirt tail, one over the other as shown in Fig. 12. The sleeves may be folded straight across or slightly inclined upwardly. Thereafter the portion of the shirt tail which projects below the folded sleeves, is folded up over said sleeves as shown in Fig. 13.

Then the right wing is swung inwardly about its pin 64, tensioning its torsion spring 71. One side of the shirt is of course folded with the right wing. Then the left wing is folded over the folded right wing, thereby folding the left side of the shirt. The torsion springs are not sufficiently tensioned to open up the folded wings, the weight of the wings (being made of metal) being sufficient to retain them in folded position.

Such position is illustrated in Fig. 13.

It will be noted that when the folded center panel and wings are inclined upwardly and rearwardly, they overlie the middle of the band holder or bracket 35. The topmost band 12 on the bracket 35 is then folded about the folded shirt as shown in Fig. 13. It will be noticed that when the wings are folded, the notches 83 register with the notch 95. The operator then swings the folded shirt to vertical position, grasps the shirt at the registering notches, and pulls the shirt up, as shown in Fig. 14. The shirt comes up folded about the shirrboard and banded. As soon as the shirt is pulled off, the wings are released and swing outwardly (Fig. 15) under the influence of the tensioned torsion springs 71. As the wings swing forwardly, their weight causes the center panel to swing down and forwardly about axis of shaft 50, and the wings fly out to horizontal positions face upwardly. The stops 90 limit outward swinging movement of the wings.

The carriage is then slidably moved back to the position of Fig. 1, and another shirt is then placed on the device for folding.

The entire device may be placed or mounted as a unit on any suitable support, frame or table, so as to be at table height, where it can be manipulated without foot levers or other connections to any special frame. The operation of the machine being at table height relieves fatigue of the operator, thus making for speed without the necessity for exceptional skill. The straps or clips 123 are so located as to help retain the folded wings in folded condition.

Each strap fits into a space between a wing and the central panel. The spacer beneath the left wing provides a little extra space needed so that the left wing can be folded over the right wing.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense, except as set forth in the claims.

While the device has been described as a shirt folding device, it will be understood that other garments such as pajamas, underwear and the like may be folded thereon.

Thus, the term "shirt" as used in the specification and claims is intended to mean any garment or article which is foldable on said machine.

I claim:
1. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hinged connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged relative to said center panel adjacent its rear end and movable therewith, and having means to clamp a portion of shirt placed on said center panel and wings, adjacent the collar, to said center panel and clip means on the wings hinged to shoulder portions of the shirt against said wings.

2. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hinged connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged relative to said center panel adjacent its rear end and movable therewith, and having means to clamp a portion of shirt placed on said center panel and wings, adjacent the collar, to said center panel and clip means on the wings hinged to shoulder portions of the shirt against said wings.

3. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hinged connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged relative to said center panel adjacent its rear end and movable therewith, and having means to clamp a portion of shirt placed on said center panel and wings, adjacent the collar, to said center panel and clip means on the wings hinged to shoulder portions of the shirt against said wings.

4. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hinged connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged relative to said center panel adjacent its rear end and movable therewith, and having means to clamp a portion of shirt placed on said center panel and wings, adjacent the collar, to said center panel and means on said support to open said clamp upon rotating said center panel relative to said support in one position of said carriage relative to said support.

5. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hinged to the sides of said center panel and being swingable one over the other and both over the back of said center panel, and means to support said panel in upwardly and rearwardly inclined position, said means being mounted on said carriage and movable therewith.

6. In a shirt folding machine, a flat support formed with slots running from front to rear, rails fixed to the underside of said support, a carriage having wheels engaging said rails, arms fixed to the carriage and projecting up through said slots, a horizontal transverse shaft rotatably mounted on said arms, members fixed to said arms and carrying pins perpendicular to
said shaft, wings hinged to said pins, torsion springs on said pins to turn said wings about said pins, and a center panel fixed to said shaft.

7. In a shirt folding machine, a flat support formed with slots running from front to rear, rails fixed to the underside of said support, a carriage having wheels engaging said rails, arms fixed to the carriage and projecting up through said slots, a horizontal transverse shaft rotatably mounted on said arms, members fixed to said arms and carrying pins perpendicular to said shaft, wings hinged to said pins, torsion springs on said pins to turn said wings about said pins, and a center panel fixed to said shaft, and means to limit rotation of said shaft.

8. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hingedly connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged relative to said center panel adjacent its rear end and movable therewith, and having means to clamp a portion of shirt placed on said center panel and wings, adjacent the collar, to said center panel, and means to limit rotation of said wings relative to said center panel, and means to limit rotation of said center panel.

9. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hingedly connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged relative to said center panel adjacent its rear end and movable therewith, and having means to clamp a portion of shirt placed on said center panel and wings, adjacent the collar, to said center panel, and means to limit rotation of said wings relative to said center panel, and means to limit rotation of said center panel.

10. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hingedly connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged to the center panel, a hook fixed to said support, and means on said clamp to engage said hook when the carriage is slidably moved forwardly and said center panel and its wings are rotated to upwardly and rearwardly inclined position.

11. A shirt folding device, comprising a support, a carriage slidably mounted thereon, a center panel hinged about its rear end to said carriage, for upward swinging movement, wings hingedly connected to said center panel and being swingable one over the other and both over the back of said center panel, a clamp hinged to the center panel, a hook fixed to said support, and means on said clamp to engage said hook when the carriage is slidably moved forwardly and said center panel and its wings are rotated to upwardly and rearwardly inclined position, and means to retain said wings in planes parallel to the plane of the center panel.

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