Dec. 13, 1949 E. SUHAJDA 2,491,289

SHIRT FOLDING UNIT

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Fig. 1

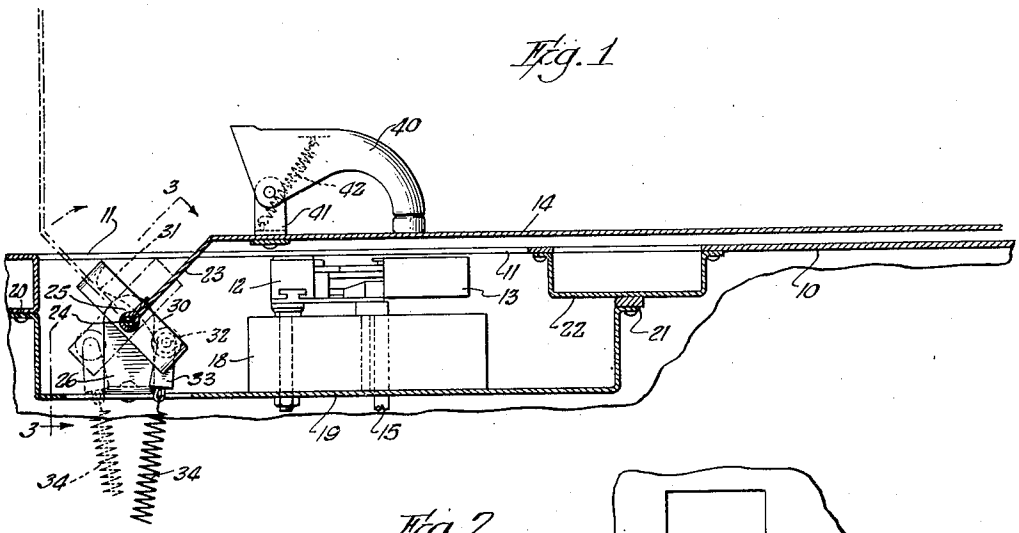


Fig. 2

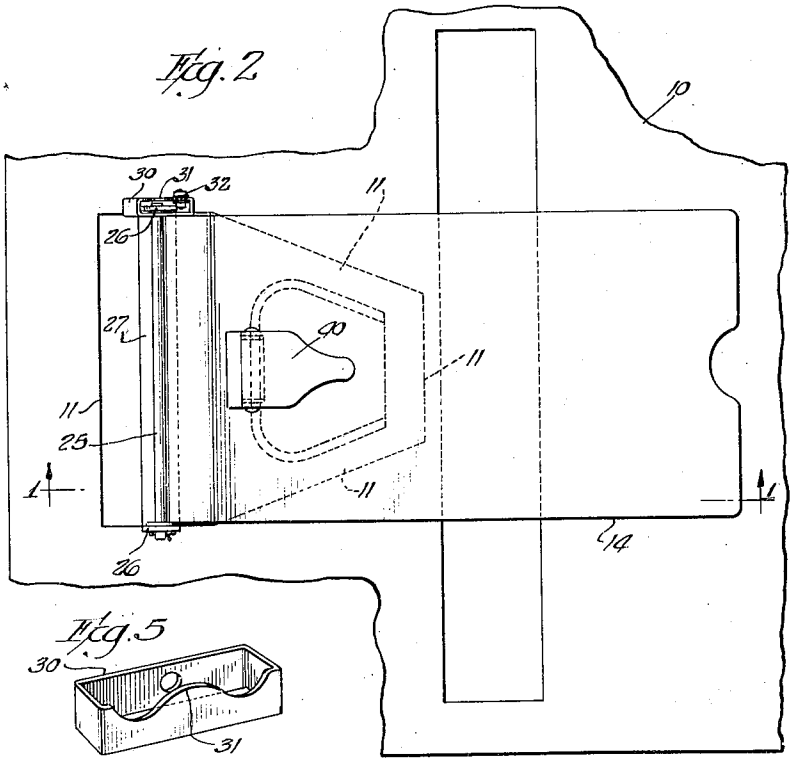


Fig. 3

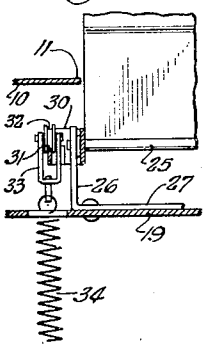
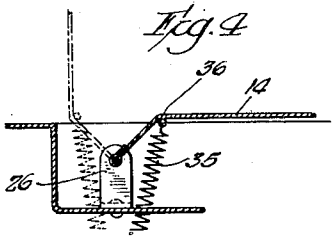


Fig. 5

Fig. 4



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SHIRT FOLDING UNIT

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Fig. 6

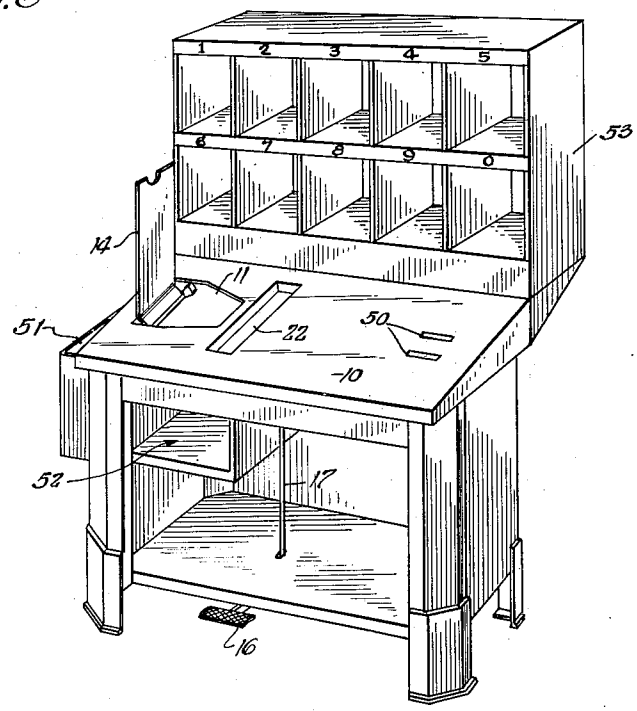


Fig. 7

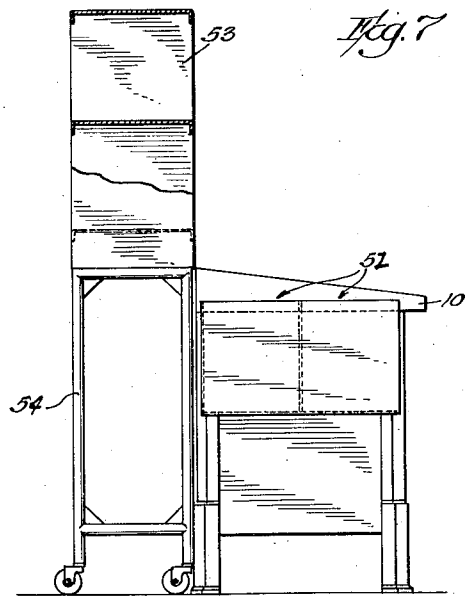


Fig. 8

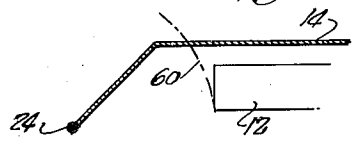
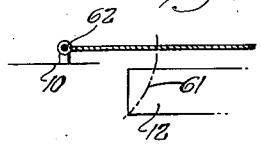


Fig. 9



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SHIRT FOLDING UNIT

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Fig. 10

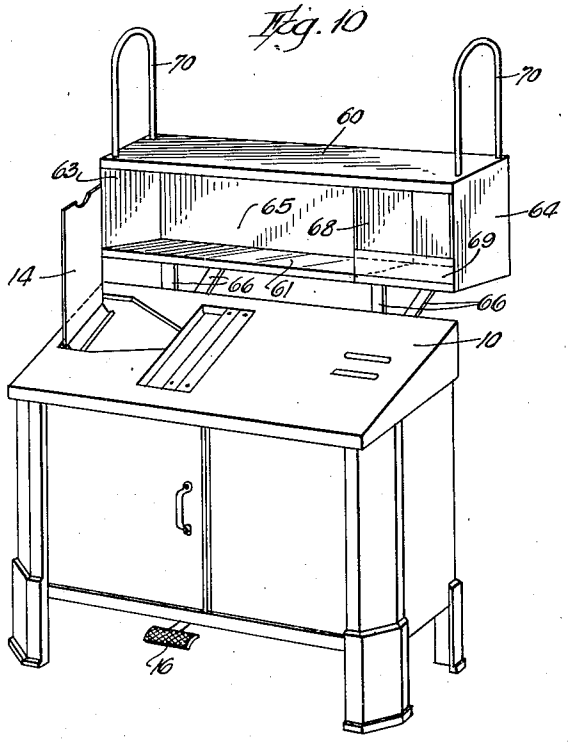
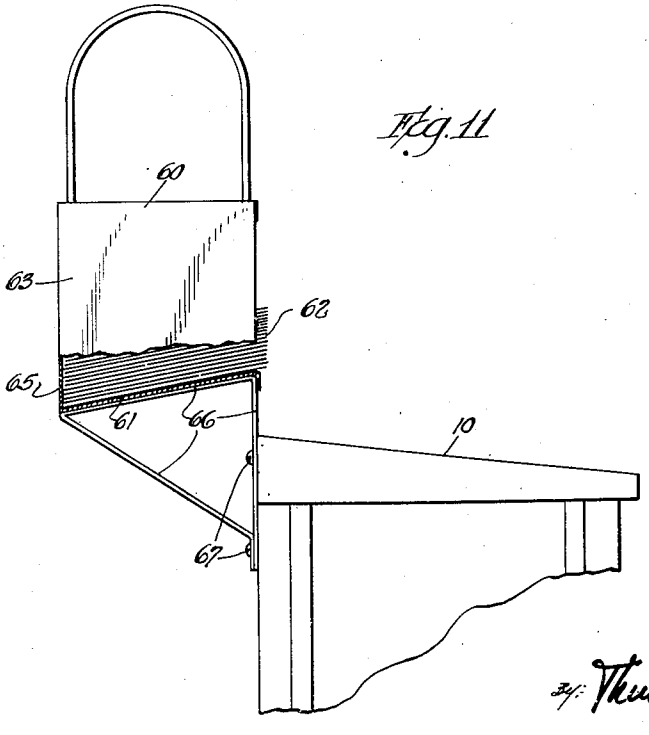


Fig. 11



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Patented Dec. 13, 1949 2,491,289

UNITED STATES PATENT OFFICE

2,491,289

SHIRT FOLDING UNIT

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Application March 28, 1946, Serial No. 657,827

9 Claims. (Cl. 223—37)

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This invention relates to shirt-folding tables of the general type shown in United States Letters Patent No. 2,369,607, dated February 13, 1945, to which reference may be had for the general purpose and operation of such tables and for certain details of construction.

In said patent, the folding blade and the shirt on it are bodily raised above the table in a direction perpendicular to the table at the conclusion of the folding operation to thereby free the collar from the forming devices and prevent the back of the collar particularly from scraping on the adjacent former and being injured, wrinkled and crushed thereby.

In the present invention, and that is one of its objects, the folding blade is so formed and hinged or pivoted at one end that the back of the collar is immediately withdrawn from contact with the back former when the blade is raised at the end of the folding operation and remains out of contact therewith in the further upward swing of the blade until the collar is entirely free of the former and the shirt may be withdrawn from the blade in perfect condition.

Another feature and object of the invention is the provision of a laundry-sorting rack in connection with the folding table whereby one step at least in the usual sorting process may be eliminated. Ordinarily the shirts are provided with customers' numbers or numbered tags as they go through the laundry, and are taken in piles from the folding tables to the place for sorting into customers' bundles. The first sorting step is usually to separate them into piles according to the last figure of their numbers; these piles are then further sorted until all the shirts are eventually sorted into the customers' piles.

The present invention contemplates the provision of a rack at the back of the table having bins or pockets numbered from 1 to 9 and 0, so that a shirt when folded is put into the proper bin for the first sorting, and saves that much time and work at the assorting table.

Further objects and advantages will appear from the description and claims to follow, in connection with the accompanying drawings, which show a folding table by way of example but not of limitation, embodying the invention, and in which:

Fig. 1 is a vertical section on line 1—1 of Fig. 2 through the end of a folding table on which the upper part of a shirt is placed face downward for folding, the depressed part of the table for the collar former and for the hinging or pivoting of the folding blade being shown;

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Fig. 2 is a plan view of the same portion of a folding table, the folding blade being shown in its down position where it would be pressing down upon the top, that is the back, of a shirt if one were being folded on the table;

Fig. 3 is a detail section on line 3—3 of Fig. 1, showing the over-center spring arrangement of the hinge or pivot of the folding blade;

Fig. 4 is a detail section showing a different arrangement of the over-center spring hinge or pivot of the folding blade;

Fig. 5 is a perspective view of the over-center cam of Fig. 3;

Fig. 6 is a perspective view of the folding table with sorting bin attachment for the folded shirts;

Fig. 7 is an end view of the folding table with sorting bin, the latter being shown in cross-section and as portable, that is, mounted on suitable casters;

Fig. 8 is a diagrammatic sketch showing the movement of the collar of the shirt with reference to the former when the shirt is being raised;

Fig. 9 is a similar view showing what tends to happen to the collar when the usual method of pivoting is employed; and

Figs. 10 and 11 are, respectively, perspective and end views showing a folding table having an improved shelf for the cardboards to be put into the shirts as they are folded.

The table top 10 on which the shirt is laid face downward for folding, as shown in said patent, is provided with an opening 11, which is large enough to uncover the collar former members 12 and 13 mounted below and to accommodate the rear end of the folding blade 14 which is downwardly bent and extends therethrough to its pivotal mounting in the recess below.

The collar former referred to may be of any suitable type which is expanded into the collar or neckband of the shirt when the latter is spread out front downward on the table for folding. The one illustrated, however, is the same as that shown in said Patent No. 2,369,607 to which reference is made for the full details of construction and operation. Suffice it to say here that the two back members 12 are laterally slidable to a limited degree and the forward member 13 is longitudinally slidable, so that when all are contracted a shirt collar may be readily slipped thereover and thereupon and when expanded the collar is engaged by them from the inside and is suitably formed. It will be understood that whenever the word "collar" is used herein, or "neckband," they are synonymous and their meaning is

not to be restricted, because shirts having attached collars may be folded on the table as well as shirts having neckbands only.

The construction is such, as shown in said patent, that the movement back and forth of the front former 13 simultaneously moves the back former members 12 laterally in and out so that they are all expanded and collapsed together. This movement of the front former member 13 is brought about by the forward and back longitudinal movement of the rod 15, Fig. 1, or, as shown in said patent, by a pair of such rods (one only showing in Fig. 1 hereof) joined together at their lower ends by a cross-head so that the two move in unison. An adjustable biasing spring arrangement (such as rod 21, spring 26, etc., of Fig. 7 of said patent) normally tends to expand said collar former members and when unrestrained does so expand them. In said patent a pneumatic cylinder is used to operate said members to contract them, but here a foot treadle 16 (Fig. 6) is used for that purpose, it being connected through rod 17 with suitable means such as a bell crank lever or cam in the bed of the table, so that pressure of the foot on the treadle 16 moves the pins or rods 15 to the left against the resistance of the spring refered to and contracts the collar-former members. On removal of the foot the spring again expands the collar-former members and raises the foot treadle.

The collar former is mounted on a suitable base 18 which in turn is carried by a plate 19, the ends of which are bent upwardly and secured by rivets, bolts or otherwise, as at 20, to the table structure, and at 21, the other end, to the bottom of the shirt band trough or receptacle 22.

The folding blade 14 is preferably bent downwardly at its end, as at 23, and is secured in any desired way to a pivotal or hinge shaft 24 by being bent and gripped around the same, as at 25, or otherwise. This shaft is mounted for rotation in the upwardly bent ends 26 of a long narrow bracket 27 extending underneath the shaft and secured to the plate 19 (Fig. 3).

The blade thus may be raised and lowered on this shaft, the fully raised position being shown in dotted lines in Fig. 1 and the lowered position being indicated in full lines.

In order that the blade may be yieldingly held in the one position or the other, an over-center spring arrangement is provided. In Figs. 1, 2, 3 and 5, a small rectangular frame 30 which may be of sheet metal is secured by its inner side member to the end of shaft 24 just inside the bracket end 26 and rocks back and forth with the shaft. The upper edge of the outer side member of this frame or loop 30 is curved, as indicated by the dotted line 31 in Fig. 1 (also see Fig. 5) or formed with depressions at the ends and a higher part between. A roller 32 travels on this curved edge 31 as a track and is mounted in and held on the track by a yoke 33 which is pulled downwardly by a spring 34, the lower end of which is secured to the structure of the table below the shaft 24, whereby when the blade is manually raised or lowered the roller or pulley 32 passes over the center of the track and tends to move the blade to the approaching end position. The track 31 is preferably so formed that the blade is held by the roller and spring without other stops in the open position and when lowered the plate presses upon the back of the shirt on the table.

In Fig. 4 another form of over-center spring connection is shown. Here a spring 35, corresponding to spring 34 of Figs. 1 and 3, is connected at is upper end directly to the blade 14, preferably by a pin 36 secured to the blade and projecting laterally therefrom beyond the bracket 26. The spring is secured to this projecting pin and in the movement of the blade urges it toward either end as it passes over the center. Again, the blade in its lowered position is pressed down upon the shirt on the table, and in the upper position (shown in dotted lines) a suitable stop may be provided therefor or it may tilt further back against the adjacent edge of the opening 11 in the table top.

By the arrangement described, that is, the location of the pivot of the folding blade below the top of the table and preferably below the lower edge of the collar of the shirt when on the collar former, the collar tends to be separated and draws away from the former when the blade with the folded shirt thereon is raised to lift the shirt from the former and table, and the collar or starch thereon is not scraped, crushed or injured by being crowded or jammed against the former. This relative lateral separation of collar and former, that is, to separate their engaging surfaces, is diagrammatically indicated in Fig. 8, where the arc 60, drawn from the pivotal center 24, shows the path of travel of the highest part of the collar or neckband of the shirt when the folding blade is raised to remove the folded shirt therefrom. The collar thus tends to and does draw away or separate from the former 12, so that it is not crushed or its starch injured by the former 12 in so raising. Fig. 9, on the other hand, shows at the arc 61 the path the same point on the collar tends to take when the folding blade is pivoted, as is common, at the point 62 above the table 10. The collar is thus crushed against the former 12 and its starch and ironing injured. This desired movement of the collar away from the forming device when the shirt is lifted is important for the reasons given and others, and may be accomplished in various ways, though the means here disclosed is simple and practical and requires no change in the standard former in which the back element is stationary so far as expansion and contraction longitudinally of the table is concerned.

The folding blade is provided with the usual clips on the under side, into which the usual cardboard stiffener may be inserted so that when the blade is swung down the stiffener is between the shirt and blade.

A hold-down clamp 40 is preferably located on the outside of the blade and may consist of a formed sheet arm, as shown, pivoted at its two rear edges to a bracket 41 suitably secured to the board and an over-center spring 42 secured thereto and to the blade or bracket so that the clamp is yieldingly held by the spring either in the open or closed position, the back edges of the arm forming a stop against the blade in the open position of the clamp.

The operation of folding a shirt will be obvious. When the shirt is placed front downward on the table, the foot treadle is operated to contract the collar-former, the collar of the shirt is placed around the former and the pedal is released as the shirt is spread out and arranged on the table, with the front button strip between or over the guide lamps 50 (Fig. 6) near the tail of the shirt. The collar-former members expand by the spring and shape and hold the collar and shirt in position. A tail clamp such as that disclosed in said patent may be used, and the folding blade 14,

previously supplied with a stiffener cardboard, is brought down on the back of the shirt and pressed down thereon by the spring. The sides of the shirt are then successively folded over the blade, the sleeves arranged and the tail folded up over the blade, and the clamp **40** then, as before, pulled down on the folded shirt pending the application of the paper band thereto. The paper bands are in the receptacle **22** and one is applied around the shirt while still on the blade.

When this is all done, the folded shirt is ready to be removed from the table. At this time or before, the clamp **40** is raised by hand, the foot pedal operated to contract the collar former, and the folding blade is manually tilted up to free the collar and shirt from the table. The raising of the blade, as previously explained, withdraws the collar backwardly from the former member **12**, so the band or collar is not scratched or jammed against the fomer and its starch broken or the collar crushed or wrinkled or injured thereby.

The folded shirt is removed from the blade by the operator by pulling it off over the end of the blade, the stiffener, of course, remaining with the shirt. This may be done at any time the collar is free from the former and on the way of the blade up to final position, or in that position. With only a few seconds per shirt allowed normally for complete folding, the shirt is most apt to be removed before the blade reaches final position.

Referring now to Figs. 6 and 7, the folding table may be provided with tail locating lamps **50**, preferably two, like those of the said patent, or others. It may have receptacles **51** for the stiffener cards, a receptacle **52** for collar supports, and it may be equipped with bins **53** for the subassembly and sorting of the folded shirts, said bins being attached at the back of the table in convenient reach of the operator while standing at the front of the table for folding the shirts.

These bins may be made of sheet metal, wire mesh or other desired material and comprise preferably ten bins or receptacles as indicated, open front and back, and numbered, respectively, both front and back, from 1 through 9 and 0, to agree with the sorting system usually employed in laundries. Of course they may be labeled in any desired way. In the usual laundry the customers' shirts are numbered, so that they may be sorted and the proper shirts given to the customer. This requires considerable time. By the use of these bins, however, the first sorting at least, that is, according to the last figure in the customer's number, may be done with scarcely any added time, the shirts being placed in the respective bins as folded. They may then be removed from the back of the bins and taken to the proper place for further attention.

If desired, these bins may not be attached to the table but be mounted on a suitable support **54** provided with casters or wheels, and placed at the back of the folding table. Then when filled, the rack may be moved to the desired place and the further sorting carried on directly therefrom, its place at the folding table being taken by an empty rack, or the same one when emptied.

In Figs. 10 and 11, a folding table, which may be of the kind hereinbefore described, is shown provided with a rack or shelves in the rear, that is, on the opposite side of the table from the folding operator's stand, and which may be attached thereto, as by suitable supporting brackets. This rack, in this instance, comprises a horizontal

upper shelf on which the shirts are stacked by the operator as the folding is finished and from which the stacks may be taken from the rear of the shelf and carried to sorting tables or other places. A lower shelf is provided for the supply of cardboards to be used in folding. The operation of folding is carried out so expeditiously—nearly two per minute in large plants—that it is important to place the cards where they can be reached by the folding operator with least effort and motion and be easily yet positively and singly withdrawn from the supply for inclusion in the garment being folded and at the proper moment in such folding operation. Accordingly this shelf is placed at the rear side of the folding table, slightly above the same, and is sloped downwardly toward the rear. The cardboard packs or piles are placed on this sloping shelf with their edges projecting slightly over the forward edge of the shelf toward and in front of the operator. When a card is desired, the operator reaches forward, presses the fingers on the top board or sheet and simultaneously draws forwardly. This causes the top sheet readily to move forward beyond the others in the pack, when it may be grasped and properly placed on the shirt being folded. The backward tilt of the shelf tends by gravity and friction to retain the remainder of the pack in place thereon and the upward slope of the shelf renders application of the withdrawing pressure of the fingers easier and more effective in sliding the top sheet only forward to position where it may be readily and positively grasped.

The shelves in this instance are embodied in a long box-like structure preferably of sheet metal, the top of which forms the upper shelf **60** for stacking the finished folded shirts and the bottom forms the lower sloping shelf **61** for holding the supply pile or piles of cardboards, indicated at **62**. The ends **63** and **64** and back **65** of the box-like structure enclose and support these shelves, and the whole may be and is shown attached to the rear of the table and supported in position by the angle brackets **66** near the ends, and which may be attached by screws or bolts **67** to the table or otherwise.

The space between the upper and lower shelf is preferably divided by a cross-partition **68** to provide, at the right, a bin for collar supports, usually of pasteboard, for the shirts having collars attached or special shirts. A strip **69** may extend across the front of this bin at the lower edge. The ends of the upper shelf may be provided with standards in the form of metal wire or rod loops **70** or otherwise to prevent the stacked shirts from falling off at the ends of the shelf.

The cardboards for the bodies of the shirts are in piles **62** with their forward edges projecting slightly therefrom, as indicated. Several of such piles may be placed on the shelf **61**, with their ends so protruding as to be conveniently reached by the operator.

By pressing lightly with the fingers of the open hand on the top sheet of the pile and drawing forwardly, the top sheet is slid out from the pile by the operator standing in front of the table so that it may be grasped readily between fingers and thumb and directed to the proper place on the shirt on the table. The tendency of the remainder of the pack is to hold back because of the sloping bottom and only the top sheet to be so drawn forwardly. Thus the work of folding is expedited and without undue strain upon the operator.

Without further elaboration, the foregoing

will so fully explain the gist of this invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, without eliminating certain features which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured by the following claims:

1. A shirt-folding device comprising a table having a shirt-folding bed on which a shirt may be placed face downward for folding and having an opening therein to receive the collar of the shirt when so placed, an inside collar former in the opening to receive and form the back portion of the collar around the same, and a shirt-folding and carrying blade hinged at one end to the table and adapted to be swung down over the shirt on the bed and to have the shirt folded over it, said blade being hinged relatively below the collar-forming surfaces of the said collar former whereby when the blade is tilted upwardly to remove and carry the folded shirt from the bed the collar is withdrawn away from said forming surface.

2. A shirt folder comprising a table having a shirt-folding bed on which the unfolded shirt is placed face downward, an inside collar former in the table to receive the collar of the shirt around it and expansible to form the collar and hold the shirt in position while being folded, and a hinged shirt-folding and carrying blade adapted to be swung down upon the shirt on the bed in position for the shirt to be folded around it, the blade moving away from the collar former to free the collar from the said former when the blade is tilted upward to lift and carry the folded shirt from the bed.

3. In a table for folding shirts having an inside former for the back of the collar of the shirt, a swinging folding and shirt-carrying blade adapted to be swung down upon the shirt and the shirt to be folded around it, and a mounting for said blade on the table to withdraw the blade away from the sad collar former when the blade is first swung upward to lift and carry the folded shirt from the table.

4. In a table for folding shirts having a shirt-folding bed and an inside former for the back of the collar of a shirt placed face downward upon the bed for folding, a hinged folding and shirt-carrying blade adapted to be swung down upon the back of the shirt and around which the shirt is folded, and mounting means for the blade for moving the blade away from the former to free the collar from the collar former as the blade is raised to lift and carry the folded shirt from the bed.

5. In a table for folding shirts having a shirt-folding bed and an inside former for the back of the collar of a shirt when placed face downward upon the bed for folding, a swinging folding and shirt-carrying blade adapted to be swung down upon the back of the shirt on the bed and around which the shirt is folded while held upon the bed, and mounting means for said blade for withdrawing the blade away from the former to free the collar from engagement with the collar former when the blade is initially raised to lift and carry the folded shirt from the bed.

6. In a table for folding shirts having an inside former for the back of the collar of a shirt when placed face downward upon the bed for folding, a shirt-folding and carrying blade adapted to be placed upon the back of the shirt and around which the shirt is folded while held upon the table, and means for withdrawing the blade and collar away from said former to free it from engagement with the collar former when the blade is lifted with the folded shirt carried thereon.

7. In a table for folding shirts having a shirt-folding bed and an inside former for the back of the collar of a shirt placed face downward upon the bed for folding, a swinging shirt-folding and carrying blade adapted to be swung down upon the back of the shirt and around which the shirt is folded, and a pivotal mounting for said blade below the level of the collar-forming surfaces of the collar former whereby the collar moves away from engagement with the collar former when the blade is swung up to raise and carry the folded shirt from the bed.

8. A shirt-folding table having a shirt-folding bed, a swinging shirt-folding and carrying blade adapted to be swung down upon a shirt on the bed and around which the shirt is folded and carried, and an over-center spring connected with said blade to resiliently move and hold the blade either down upon the shirt or in an upright position.

9. A shirt folder comprising a table having a shirt-folding bed on which the unfolded shirt is placed face downward, an inside collar former in the table to receive the collar of the shirt around it and expansible to form the collar and hold the shirt in position while being folded, and a hinged shirt-carrying blade adapted to be swung down upon the shirt on the bed in position for the shirt to be folded around and carried by it, said blade having an extension at its hinged end to a plane below the collar-forming surfaces of said collar former, and a hinge at the end of said extension.

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