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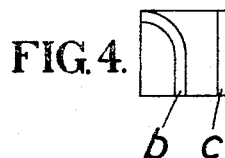
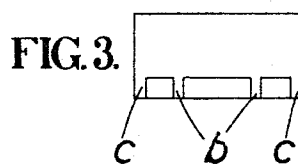
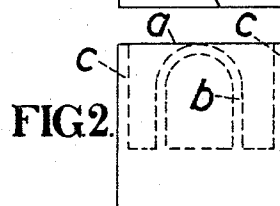
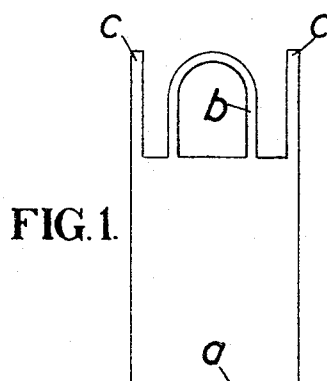
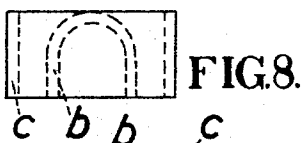
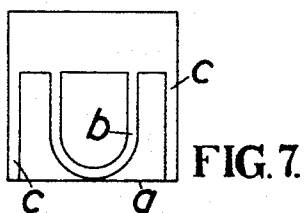
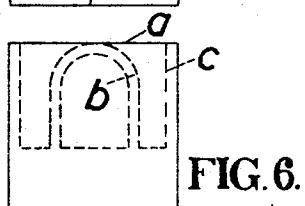
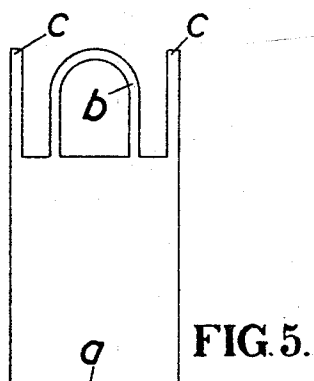
W. B. G. CRAN

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MACHINES FOR FOLDING LAUNDRY FLATWORK AND THE LIKE

Filed June 19, 1964

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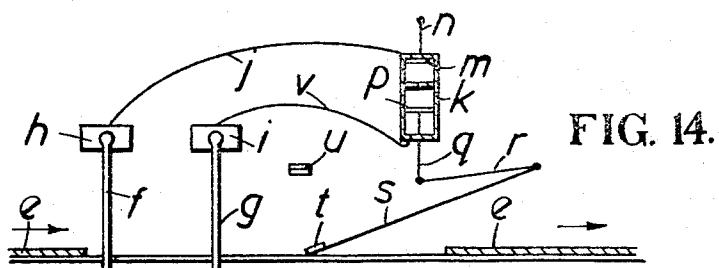
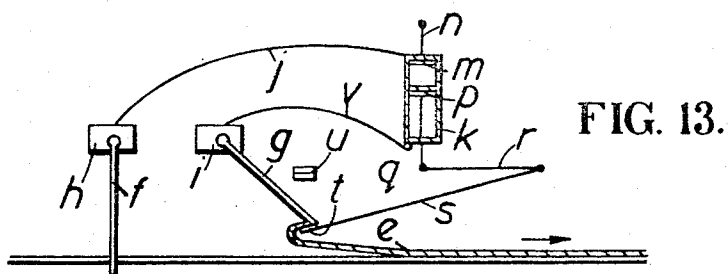
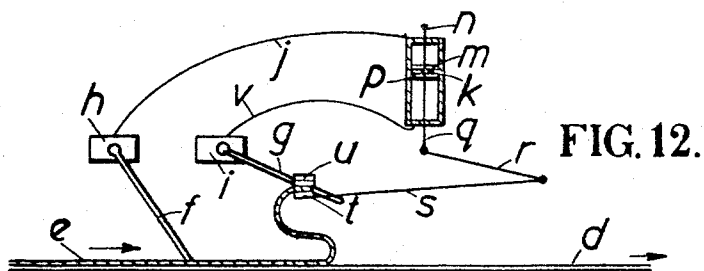
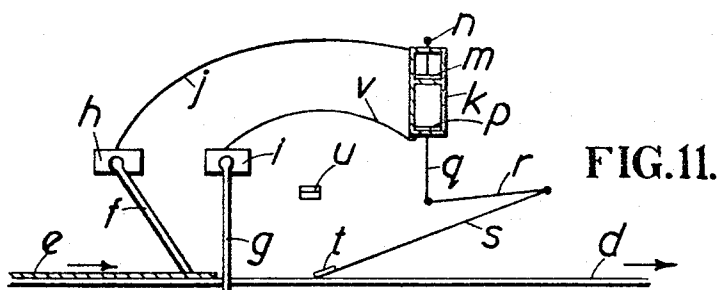
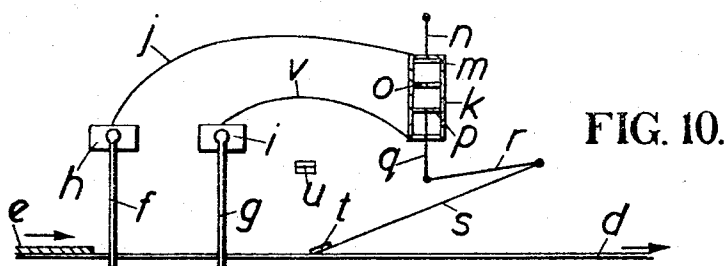
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MACHINES FOR FOLDING LAUNDRY FLATWORK AND THE LIKE

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MACHINES FOR FOLDING LAUNDRY FLATWORK AND THE LIKE

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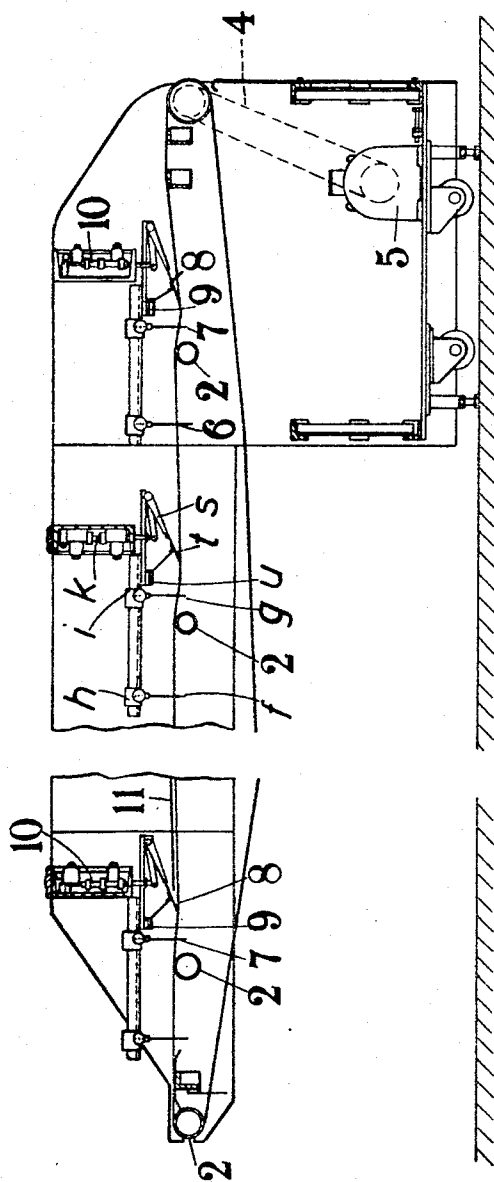


FIG. 15.

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MACHINES FOR FOLDING LAUNDRY
FLATWORK AND THE LIKE

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1 Claim. (Cl. 270-68)

This application is a continuation-in-part of Serial No. 121,442, filed July 3, 1961, and now abandoned.

In machines for folding laundry flatwork and the like of the type in which the articles are carried along a conveyor, the leading edge of each article travelling along the conveyor is lifted, and gripped whilst the remainder of the article travels under the gripped edge until the rear end of the article comes beneath the gripped edge, when the grip is released and the upper layer falls on the lower layer to form a fold. When the article has then to be cross folded it is sometimes found that the folded article is not in the most convenient form for further handling or cross folding. For example, when folding domestic aprons which comprise a part to go over the head and around the neck of the wearer and tape like parts to be tied around the wearer's waist, the apron after two folds and a cross fold has part of the neckband and of the tapes at the top side of the folded article, where they can readily become untidy and displaced.

The object of the present invention is to provide improved means to ensure that finally folded articles present a neat and acceptable appearance.

In accordance with the present invention, we provide means by which after a fold has been inserted in an article and before a cross fold is made therein, the article is completely turned over. Such means comprise a conveyor, along which the article which has been folded but not cross folded is conveyed, means for lifting the leading edge of the article above the conveyor and for holding such edge in an elevated position whilst the remainder of the article passes forward and from beneath such leading edge, when the latter is released and falls on the conveyor, the article being then effectively turned over. A time delay means such as shown in Patent No. 2,650,301 may be used to adjust the time of release of the article. Since the structure of time delay means is not part of the present invention, and since any of many known time delay means may be used in the present device, a specific time delay means is not described hereinbelow.

The turnover of the article may be effected after the first or a subsequent fold but before a cross fold.

Referring to the accompanying explanatory drawings:

FIGURES 1-4 show a domestic apron which is folded twice and then cross folded in the normal way.

FIGURES 5-9 show a domestic apron as in FIGURE 1 which is completely turned over between the first and second folding operations and then cross folded.

FIGURES 10-14 show means according to this invention for turning over an article in the several stages of the turning over operation.

FIGURE 15 shows an embodiment of a folding machine in accordance with the invention.

In FIGURE 1 a domestic apron is shown as a piece of laundry flatwork which is about to be folded; *a* indicates the leading edge of the article as it is moved along a conveyor (not shown); *b* indicates the neckband, and *c* the tapes by which the apron is tied around the wearer's waist.

In FIGURE 2, the apron has been folded once so that the leading edge *a* comes to the rear of the folded article and the neckband *b* and tapes *c* are beneath.

FIGURE 3 shows the article after a second fold when it will be seen that parts of the neckband and of the tapes

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are in the edge of the article and the remainder of these parts are in the underside of the article.

FIGURE 4 shows the article after a crossfold, when parts of the neckband and of a tape *c* come to the top of the article, the remainder of these parts being on the underside of the cross folded article. These parts can be readily displaced and make the finally folded article look untidy.

FIGURES 5 and 6 are similar to FIGURES 1 and 2. In FIGURE 7 the folded article of FIGURE 6 is shown turned over so that the top of the article in FIGURE 6 is at the bottom of the article in FIGURE 7.

FIGURE 8 shows the folded article as shown in FIGURE 7 folded a second time and it will be seen that both the upper and lower sides of the article are plain without any loose parts as in FIGURE 3.

When the article is cross folded to the shape shown in FIGURE 9 both top and bottom layers are plain and entirely different from what is shown in FIGURE 4. The neat and acceptable appearance of this final article is obvious.

Referring now to FIGURES 10-14 which show one form of turn-over mechanism for dealing with folded articles.

d is a travelling conveyor belt (consisting of a number of belts spaced laterally apart) upon which the folded article, indicated at *e*, is being moved forward. In the path of the article *e* are two pivoted feeler arms *f* and *g* which normally project downwards through gaps in the conveyor belt and which at their upper ends operate valve mechanisms in the boxes *h* and *i*. The pipe *j* leads compressed air into and from the upper end of a cylinder *k* having a piston *m* therein supported in a fixed position by a rod *n*. There is a division *o* in the cylinder *k* to divide it into upper and lower parts and in the lower part is a piston *p* connected by a piston rod *q* to a lever *r* which turns a lever *s* having a presser pad *t* thereon adapted as herein-after described to grip the leading edge of the article between itself and a fixed gripper member *u*. The latter and the lever *s* have gaps therein for the purpose of allowing the leading edge of the feeler arm *g* to pass therethrough as shown in FIGURES 12 and 13. A pipe *v* leads compressed air into and from the lower end of the cylinder *k* beneath the piston *p*.

In FIGURE 10, the article *e* has not reached the feeler arm *f* and the cylinder *k* is suspended from the piston *m*.

In FIGURE 11, the feeler arm *f* has been displaced and has caused compressed air to pass by the pipe *j* into the upper end of the cylinder *k* above the piston *m*, so that such cylinder has been raised without affecting the position of the piston *p*.

In FIGURE 12, the article *e* has moved the feeler arm *g* and the leading edge of the article has got on to the pad *t* on the lever *s*; the feeler arm *g* has simultaneously caused compressed air to pass by the pipe *v* into the cylinder *k* below the piston *p*, which is then raised and raises the end of the lever *s* with the pad *t* thereon so that the latter grips the leading edge of the article between itself and the fixed pad *u*. The conveyor *d* continues to carry the article *e* forward beneath its forward gripped end until the feeler arm *f* is free of the article as shown in FIGURE 13 so that the air pressure in the pipe *j* is released but only after a predetermined delay allowed for in the valve mechanism in the box *h* after which the cylinder *k* lowers and the gripper *t* moves from the fixed gripper pad *u* as shown. Before however the feeler arm *g* can return to its original position, the end of the article *e* has to fall off the gripper *t* on the lever *s* and pass beneath the said lever as in the FIGURE 14 position when the air pressure beneath the piston *p* has been released. Thus the article is free to pass along the conveyor and has been completely turned over.

The means for operating the lever *s* for gripping and

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releasing the leading edge of the article may be of any known kind and may be as included in our U.S.A. Patent No. 2,949,294.

The time delay associated with the movement of the feeler arm *f* when the article *e* moves clear of the arm may be varied manually or automatically to suit requirements and may be a standard commercial time delay, either electrical or pneumatic.

Referring to FIGURE 15, the machine for folding aprons comprises a conveyor 1 which passes over guide rollers 2 and is driven by a roller 3 connected by a chain drive 4 to a motor 5, the conveyor 1 consisting of a number of belts spaced laterally from one another. An apron carried on the conveyor with the bottom of the apron forming the leading edge passes first to a folding appliance, comprising feeler arms 6, 7, a pick up plate 8, a gripper bar 9 and a pneumatic cylinder 10 for operating the pick up plate 8 under the control of the feeler arms 6, 7, in order to fold the apron transversely in half in the known manner as described in applicant's prior U.S. Patent No. 2,949,294, with its ties underneath.

The apron then proceeds along the conveyor with its transverse fold 11 as the leading edge, until it reaches a turn-over appliance comprising feeler arms *f*, *g*, lever *s* with presser pad *t*, gripper member *u* and pneumatic cylinder *k*, where it is turned over in the manner illustrated in FIGURES 10-14 so that the ties are on top.

Then the apron travels to another folding appliance

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comprising feeler arms 6, 7, pick up plate 8, gripper bar 9 and pneumatic cylinder 10, where it is again folded transversely, the ties then lying inside the folded apron.

What is claimed is:

- 5 In the method of folding an apron passing along the conveyor of a folding machine with the bottom of the apron forming the leading edge and the apron ties forming the trailing edge, the steps of raising the leading edge and holding it stationary while the apron passes thereunder as a bight of material, releasing the leading edge to fall on the trailing edge so that the apron is folded in half with the apron ties below, raising the bight of material and holding it stationary while the folded apron passes thereunder the distance of the length of the folded apron releasing the bight of material, and subsequently folding the folded apron half on itself.

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EUGENE R. CAPOZIO, *Primary Examiner.*