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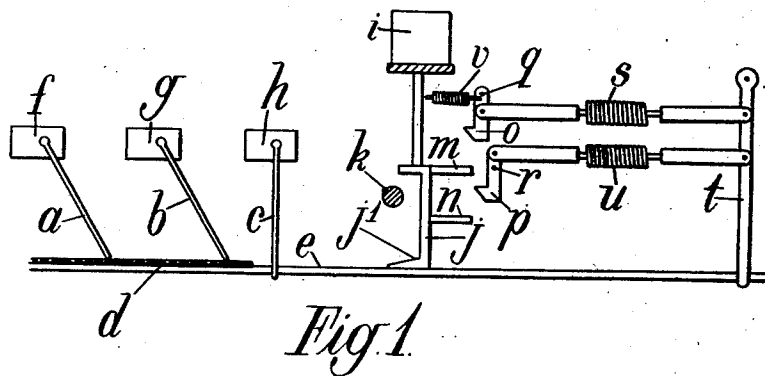
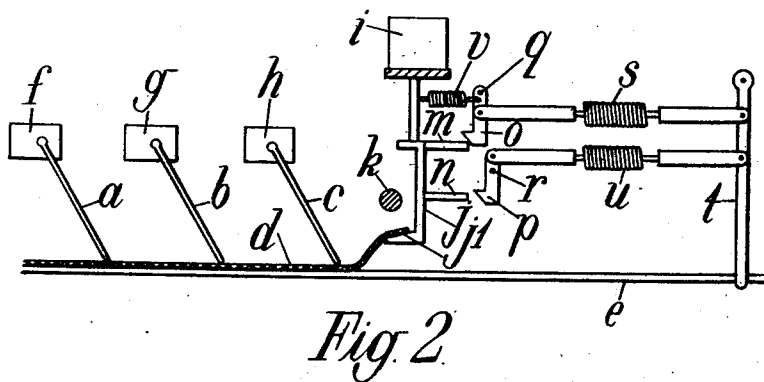
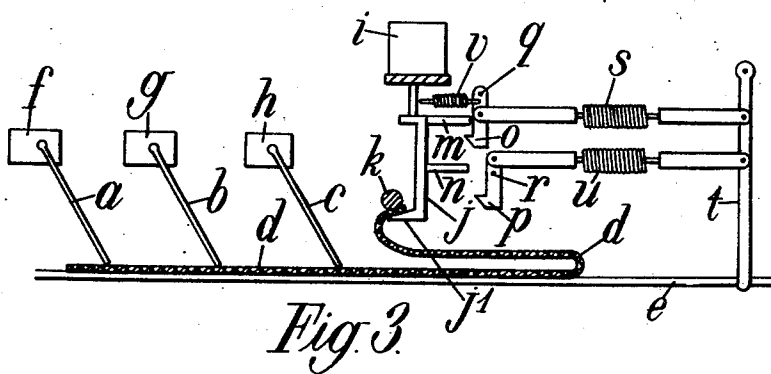
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2,815,946

FOLDING MACHINES FOR LAUNDRY USE

Filed March 30, 1956

2 Sheets-Sheet 1



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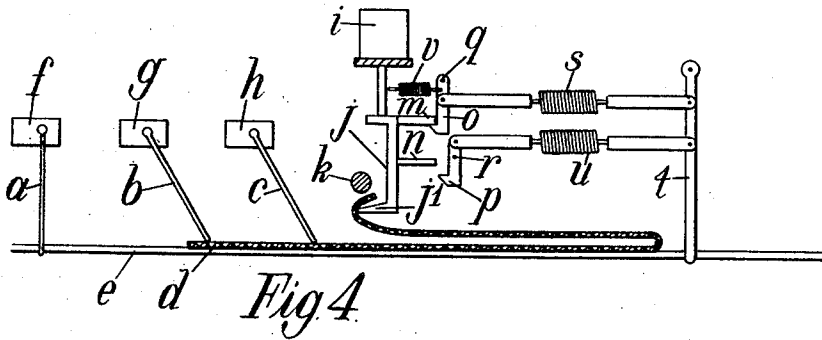
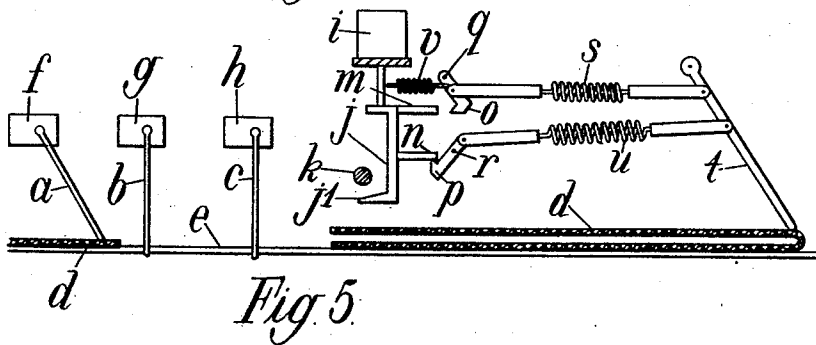
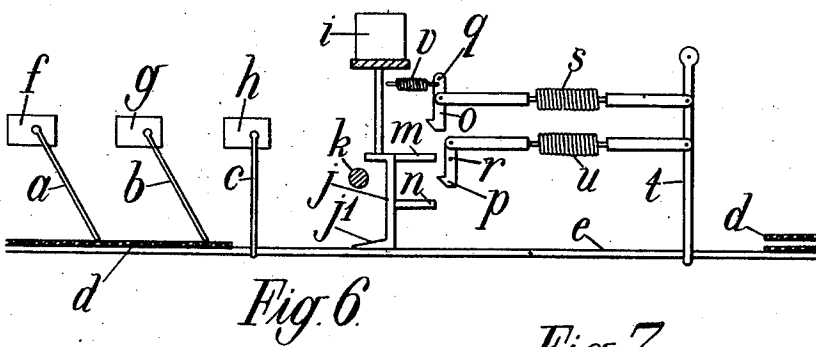
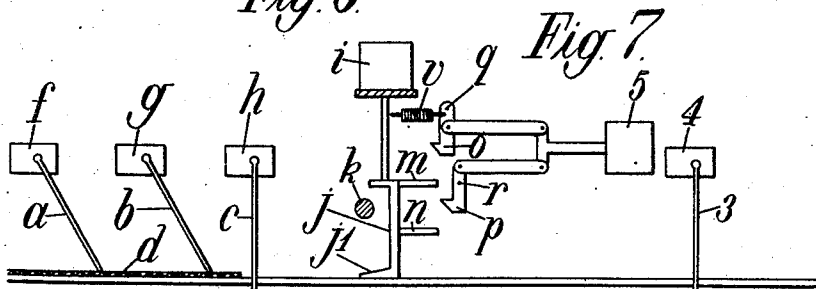
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FOLDING MACHINES FOR LAUNDRY USE

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2 Sheets-Sheet 2



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2,815,946

FOLDING MACHINES FOR LAUNDRY USE

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Claims priority, application Great Britain April 7, 1955

3 Claims. (Cl. 270—68)

This invention relates to control means for use in connection with folding machines of the type in which the article to be folded is carried along a conveyor, and the leading edge is lifted by the moving member of gripping means and then gripped against a fixed member of the gripping means whilst the rest of the article passes beneath to form a fold.

The picking up the leading edge of each article and its release at the correct moment to form the fold are controlled by suitable means dependent upon the passage of the article along the conveyor.

In such folding mechanisms, when the leading edge is released to complete the fold, it is essential that the downward fall of the moving member of the gripping means which has been gripping the leading edge of the article against a fixed member, is delayed slightly to ensure that the folded article is clear before the moving member again rides on the conveyor tapes in readiness to lift up the leading edge of the next article. This delay may be obtained either by some form of delay mechanism such as a brake, dashpot, mechanical time lag, electrical time lag or oil damper, or preferably by a positive latch of the type described in application Ser. No. 445,386, filed July 23, 1954.

On folding machines, it is customary for the conveyor belt to run at a higher speed than the ironing machine which precedes it. This is to ensure that, even though the articles are fed into the ironing machine without any gap between the trailing edge of one article and the leading edge of the next succeeding article, such a gap is formed by the speed differential before the articles reach the folding mechanism. The size of the gap thus formed depends on the speed differential, the length of the articles, and the length of conveyor on the folding machine before the first folding mechanism is reached.

In practice it is found that under certain conditions the leading edge of an article which is gripped by the gripping means may be released very shortly after it has been picked up and the moving member may drop down without any delay and may trap the article, so putting the machine out of action. Under other conditions, the folding may not be completed when the moving member is released. This also results in the article being trapped.

The object of the present invention is to provide improved means for ensuring that the moving member of the gripping means cannot be dropped on to the conveyor until the article which has been gripped has moved clear of the moving member.

The invention consists in a folding machine for laundry use of the type specified in which the moving member of the gripping means has two vertically spaced projections thereon with two catches each to engage one projection, the first catch being in position to engage the upper projection and hold the moving member in an elevated position until the folded article causes the actuation of detector means, when the first catch is moved out of position and the second catch is moved into position to en-

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gage the lower projection on the moving member as the latter falls and to hold such member clear of the conveyor of the articles to be folded, the second catch being displaced to allow the moving member to fall on to the conveyor when the folded article moves clear of the detector means.

The invention further comprises a folding machine as aforesaid in which the detector means is a lever adapted to be displaced by the folded article on the conveyor, the lever when not displaced keeping the first catch in operative position to engage the upper projection on the moving member, and when displaced putting the first catch out of action and the second catch in position to engage the lower catch on the moving member, the said lever when the folded article has passed beyond the lever putting the second catch out of action, so allowing the moving member to fall on to the conveyor and restoring the first catch to its operative position.

Referring to the accompanying explanatory diagrams:

Figure 1 is a general view of the article gripping and folding mechanism of a folding machine constructed in one convenient form in accordance with this invention. The article to be folded is shown being conveyed towards the moving member of the gripping means.

Figure 2 is a view similar to Figure 1 but showing the leading edge of the article to be folded riding on the moving member of the gripping means which is rising to grip the said edge against the fixed member of the gripping means.

Figure 3 shows the leading edge of the article gripped by the gripping means and the folding of the article taking place beneath the moving member of the gripping means.

Figure 4 shows the gripping means releasing the article, but the moving member of the gripping means being supported to prevent it dropping on to the conveyor.

Figure 5 shows the folded article engaging means to release the catch which was operative in Figure 4 and bring a further catch into action to hold up the moving member.

Figure 6 is substantially similar to Figure 1 but shows the rear end of the folded article clear of the means which control the catches of the moving member hold-up means.

Figure 7 is a view similar to Figure 1 but showing a modification.

There are three switch actuating arms *a*, *b* and *c* which are adapted to be displaced by the article *d* which is to be folded and which is carried forward by conveyor belts *e*, between which the switch arms can pass when not displaced by the article *d*. The arms *a*, *b* and *c* actuate switches *f*, *g* and *h* which are in series in the electric circuit of a solenoid *i* which when energised raises the moving member *j* of a gripping device, the fixed member of which is the rod *k*. On the moving member *j* are two projections *m* and *n* adapted to be engaged by pivoted catches *o* and *p*, the catch *o* being pivoted at *q* and the catch *p* being pivoted at *r*. The catch *o* is connected through links and a spring *s* to a detector lever *t* and the catch *p* is likewise connected by links and a spring *u* to the said detector lever *t*. The connection between the detector lever *t* and the catch *p* is to a point above the pivot point of said lever, whilst the connection between the detector lever *t* and the catch *o* is to a point below the pivot point *q* of said catch *o*.

As shown in Figure 1, the switch arm *c* has not been displaced by the article *d* and so the electric circuit through the solenoid *i* is open and the moving member *j* is in its lowered position riding on the conveyor *e*. The detector lever *t*, which is adapted to be displaced by the folded article as shown in Figure 5, is in Figures 1-4 and 5 substantially vertical, so that the catch *o* is in position to pass below the projection *m* on the moving member *j* after this

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has been raised by the solenoid as shown in Figure 3. A spring *v* pulling on the catch *o* holds this normally in a vertical position as shown in Figures 1 and 2, but allows the catch *o* to move when pressed upon by the projection *m* and to pass below such projection as shown in Figure 3.

In Figure 2, all the switch arms *a*, *b* and *c* have been displaced and all the switches *f*, *g* and *h* closed to cause the solenoid *i* to be energised. The leading edge of the article *d* has been fed by the conveyor *e* on to the inclined face *j*¹ of the member *j*. The raising of the moving member *j* carries the edge of the article *d* into engagement with the fixed member *k* (see Figure 3) so that the said edge is gripped and the remainder of the article is folded and propelled forward as shown in Figure 3.

In Figure 4, the rear edge of the article *d* has passed beyond the switch arm *a* so that the electric circuit of the solenoid *i* is broken and the moving member *j* commences to fall but it is held up by the catch *o*. The edge of the article which was gripped between the members *j* and *k* is now released and the folded article continues to move forward. When the fold engages the detector lever *t* as shown in Figure 5 and such lever is displaced, it pulls the catch *o* away from the projection *m* on the moving member *j* so allowing the latter to fall until its projection is engaged by the catch *p* which has been displaced by the detector lever in the opposite direction to the catch *o*. This positioning of the catches and moving member *j* continues until the folded article moves clear of the detector lever *t* as shown in Figure 6, when the parts return to the Figure 1 positions and the cycle of operations is repeated.

Instead of employing a detector *t* directly operated by the folded article *d* and directly operating the catches *o* and *p*, we may as shown in Figure 7 employ an arrangement in which the detector lever 3 operates an electric switch 4 which will control a solenoid 5 which will pull on the catches *o* and *p* to give a result the same as obtained by the detector lever *t* pulling on the catches *o* and *p* in Figures 1-6. In another modification a beam of light is projected on to the path traversed by the folded article *d* and energises a light sensitive cell which through a solenoid will operate a lever similar to the detector lever *t* of the present application and ensure that when there is no interference with the beam of light, the moving member is held up by the upper catch *o*, and if the moving member is released too soon from its gripping position and is released by the upper catch *o* it will be held up by the lower catch *p* so long as the folded article is preventing the beam of light energising the light sensitive cell.

It will be seen that with the present improvement, the moving member *j* of the gripping means cannot descend

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on to the belt *e* until the folded article has moved clear of the detector lever *t* or its equivalent.

What I claim is:

1. A folding machine for laundry use comprising a conveyor along which the articles to be folded are carried, a vertically movable article edge lifting member, the conveyor feeding the leading edge of the successive articles on to said lifting member, a stationary clamp in the path of the lifting member against which the edge of an article on said lifting member is raised and clamped, article detector means located in advance of the lifting member in the path of the articles carried by the conveyor, means responsive to the detector for raising the lifting member when it has the leading edge of an article thereon, and allowing it to fall if no article is displacing the detector means, two vertically spaced projections on the lifting member, two catches each to engage one projection when the lifting member is raised, further detector means at the delivery side of said lifting means which are displaced by folded articles on the conveyor, one catch releasing its projection when a folded article contacts the further detector means and the other catch then engaging its projection and hold the lifting means in a lower position than when it is held by the first catch, and the other catch being released when the folded article displaces the further detector means, the lifting member then descending into position to receive the leading edge of the next article on the conveyor.

2. A folding machine as claimed in claim 1, in which the further detector means is a lever adapted to be displaced by the folded article on the conveyor, the lever when not displaced keeping the first catch in operative position to engage the upper projection on the lifting member, and when displaced putting the first catch out of action and the second catch in position to engage the lower catch on the lifting member, the said lever when the folded article has passed beyond the lever putting the second catch out of action, so allowing the lifting member to fall on to the conveyor and restoring the first catch to its operative position.

3. A folding machine as claimed in claim 1, in which the further detector means is a switch arm adapted to be displaced by the folded article on the conveyor which operates a switch arranged in series with a solenoid, the latter operating the two catches which control the descent of the lifting member of the article clamping means.

References Cited in the file of this patent

FOREIGN PATENTS

745,778 Great Britain _____ Feb. 29, 1956