

Oct. 29, 1957

W. B. G. CRAN ET AL

2,811,350

FOLDING MACHINES FOR LAUNDRY USE

Filed July 23, 1954

4 Sheets-Sheet 1

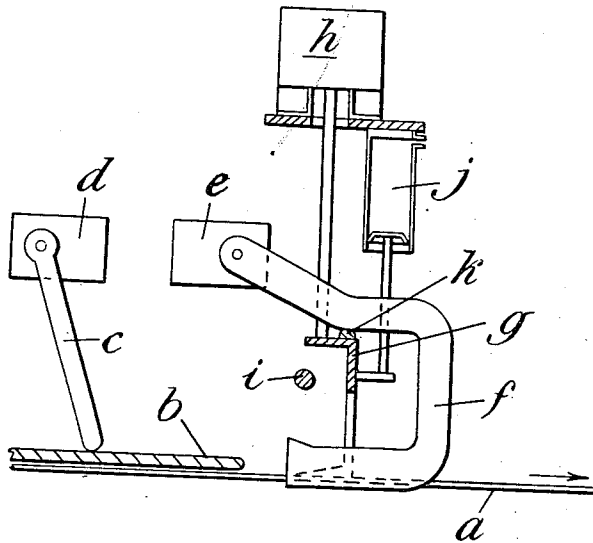


Fig. 1.

Fig. 2.

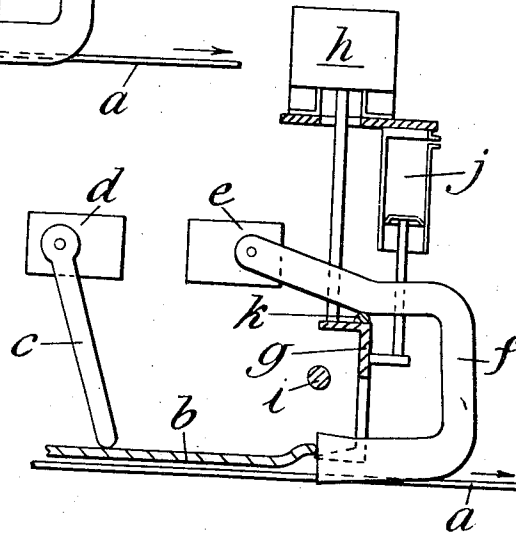
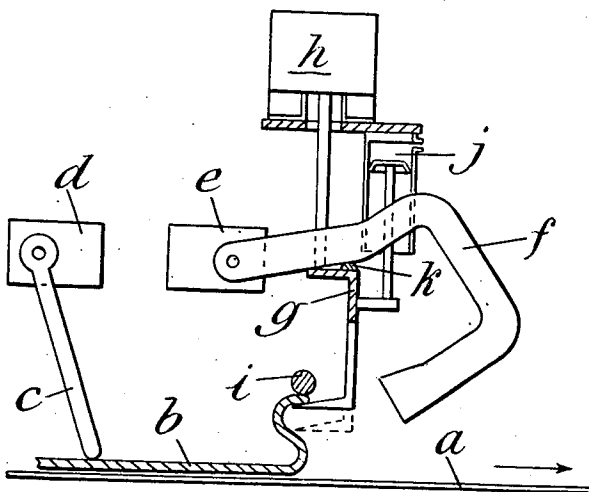


Fig. 3.

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4 Sheets-Sheet 2

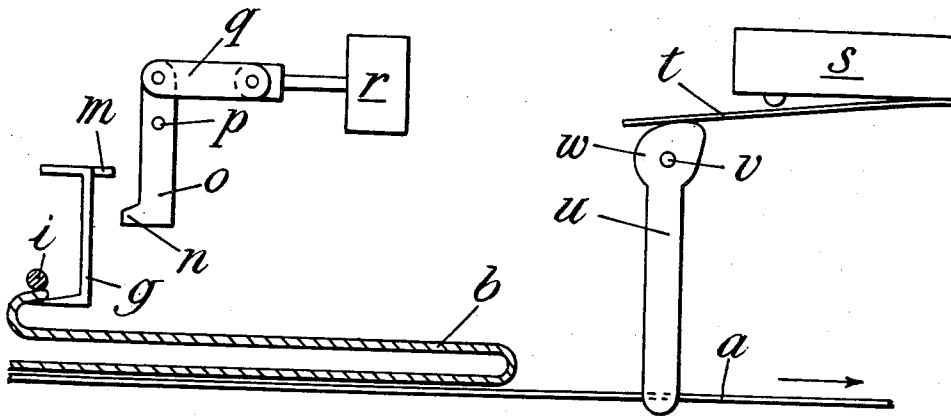


Fig. 4.

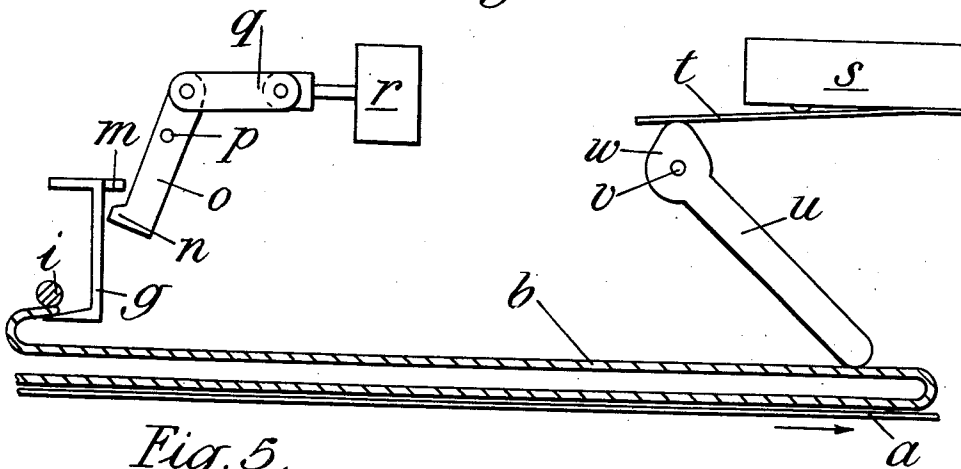


Fig. 5.

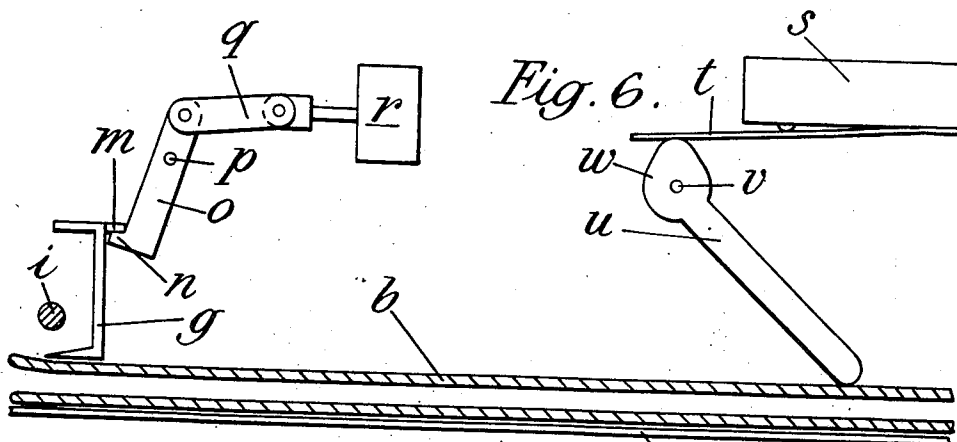


Fig. 6.

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4 Sheets-Sheet 3

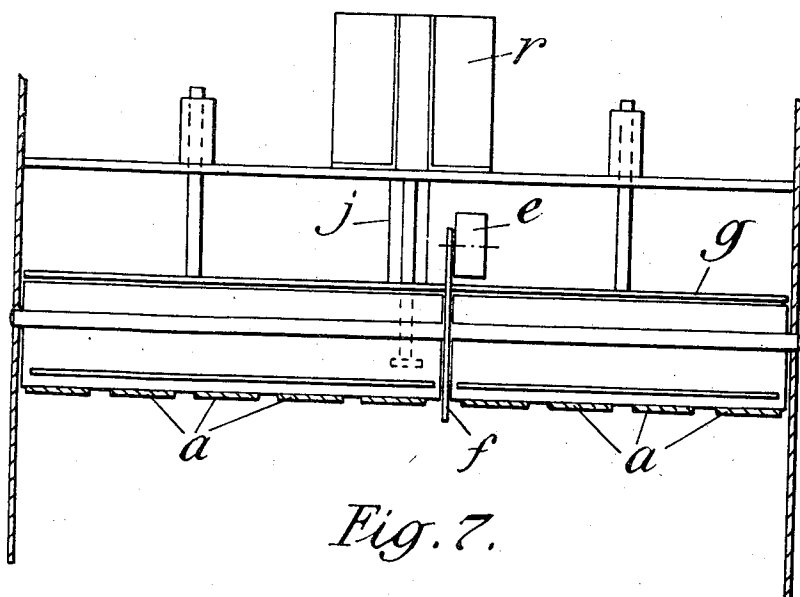


Fig. 7.

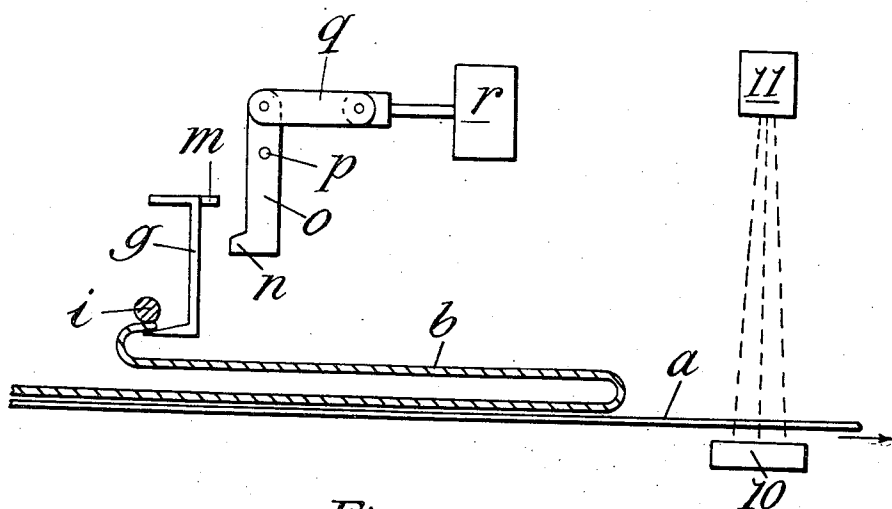


Fig. 8

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4 Sheets-Sheet 4

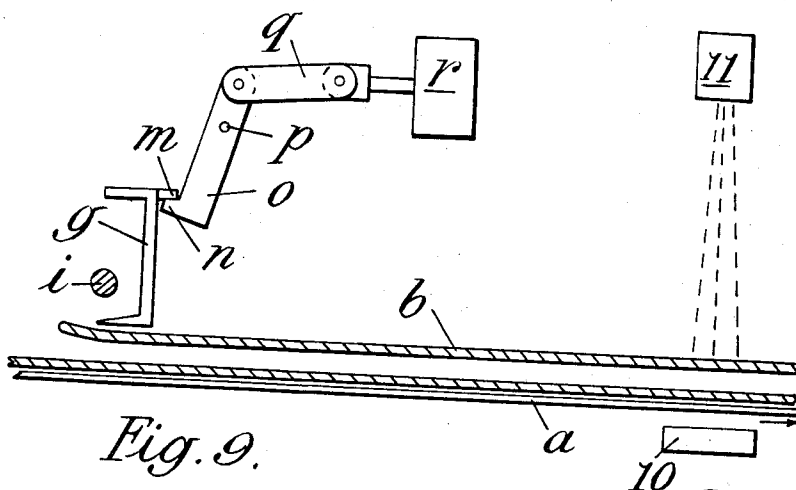


Fig. 9.

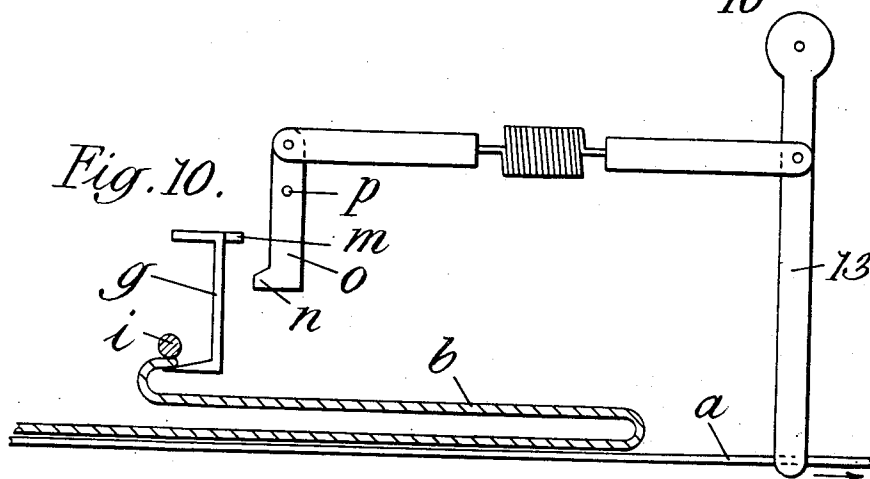


Fig. 10.

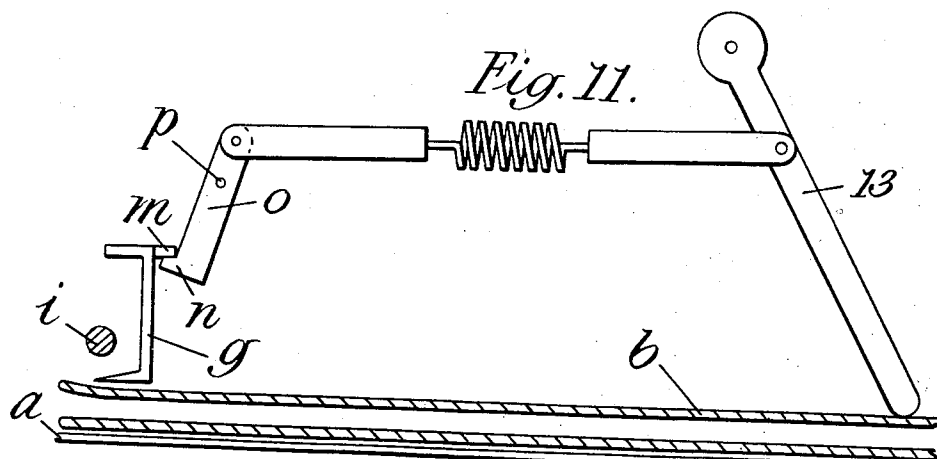


Fig. 11.

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FOLDING MACHINES FOR LAUNDRY USE

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Application July 23, 1954, Serial No. 445,386

Claims priority, application Great Britain
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8 Claims. (Cl. 270—68)

This invention relates to machines for folding towels, pillowcases, sheets and other flatwork in laundries.

In the conventional type of folding mechanism, the leading edge of the article to be folded is lifted by means of a moving plate or bar (hereinafter called moving plate) and nipped against a fixed bar. One method of causing the actuation of the moving plate is for the leading edge of the article to move in sequence two arms situated in the path of the article as it moves along a conveyor. These arms actuate electrical switching means or compressed air valves. To ensure that the leading edge of the article reaches the moving plate before this is lifted by its solenoid, compressed air piston or other operating means, the second arm which causes the actuation of said operating means is positioned at or slightly before the rear edge of the moving plate. When the leading edge of the article moves the said second arm, and so brings the aforesaid moving plate operating means into action, such plate travels upwards carrying with it the leading edge of the article. Due to variations in the articles being folded there is danger of mutual jamming between the fixed bar, the article being folded and the second arm, either during the pick up or at a later stage when the tail of the article passes the arm which actuates means causing the release of the leading edge of the article which should fall clear on to the rear edge and complete the fold. In both cases there is a possibility of damage to the second arm, and in the second case there will be a poor fold even if the article eventually frees itself.

The object of the present invention is to provide simple and efficient means for obviating the disadvantages above indicated due to mutual jamming between the fixed bar, the article being folded and the second arm.

The invention consists in a folding machine comprising in combination, a conveyor for the articles to be folded, a first switch arm engaged first by the leading edge of each article to be folded, a second switch arm engaged secondly by the article to be folded, a moving plate adapted to be raised by a solenoid when the article has moved both switch arms and holds them in their displaced position when the circuit of the solenoid is closed, characterised in this that the second arm which normally extends behind and at its bottom end projects forward through a slot in the moving plate, is supported by a part of said moving plate so that when the latter is raised to grip the leading edge of the article against a fixed bar, the second arm is moved by the moving plate backwards so that its bottom end is clear of the position where the article is clipped and so cannot become jammed between the fixed bar and the moving plate and cannot interfere with the folding of the article.

The invention further comprises a folding machine as aforesaid in which a catch prevents the final descent of the moving plate until the folded article has passed from under the moving plate.

The invention further comprises a folding machine as aforesaid in which the catch is brought into operative posi-

tion to prevent the final descent of the moving plate by a solenoid which is energised by current through a switch operated by the article being folded.

The invention further comprises a folding machine as aforesaid in which the first switch closes the solenoid circuit when the article passes from beneath the first switch arm, such circuit being maintained for a predetermined interval of time during which the article passes from beneath the moving plate.

The invention further comprises a folding machine as aforesaid in which a third arm operated by the folded article beyond the second arm actuates a switch in the solenoid circuit to energise the solenoid and cause the catch to hold up the descent of the moving plate whilst the article is beneath the third arm.

Referring to the accompanying explanatory drawings:

Figures 1, 2 and 3 are diagrams showing three positions of the parts which control the gripping of the leading edge of the article which is being folded as it is being carried along on a conveyor, such parts being arranged in one convenient form in accordance with this invention.

Figures 4, 5 and 6 show three positions of the parts arranged in one convenient form in accordance with this invention, which control the descent of the moving plate after it has released its grip of the leading edge of the article which is being folded.

Figure 7 is an end view of the parts shown in Figure 1, looking from right to left in that figure.

Figure 8 and 9 show a modified arrangement for controlling the descent of the moving plate after it has released its grip on the leading edge of the article which is being folded. Figure 8 shows the moving plate gripping the leading edge of the article whilst folding proceeds and Figure 9 shows the leading edge of the article which has just been released but the folds are still beneath the moving plate.

Figures 10 and 11 are views similar to Figures 8 and 9 but showing a further modified arrangement for controlling the descent of the moving plate.

In Figures 1, 2 and 3, *a* indicates a conveyor belt upon which articles to be folded are carried through a folding machine, *b* indicates a portion of such an article. As the latter is being carried forward, its leading edge engages and moves an arm *c* which operates an electric switch *d* in series with an electric switch *e* actuated by an arm *f* also adapted to be displaced by the leading edge of the article *b*. There is a vertically movable plate *g* actuated by a solenoid *h* in the electric circuit containing the switches *d* and *e* so that when both switches have been closed by the article *b* engaging and moving the same *c* and *f* respectively, the solenoid *h* raises the moving plate *g* and the latter clips the leading edge of the article *b* against the fixed bar *i* as shown in Figure 3. A dashpot *j* restrains the downward movements of the moving plate *g* so as to ensure that the rear edge of the folded article *b* has passed clear of the moving plate *g* before this again comes into contact with the conveyor *a*.

The arm *f* is adapted to rest on a projection *k* on the moving plate *g* so that when the moving plate *g* rises to clip the article, it moves the forward end of the arm *f* backwards clear of the position in which the article is clipped between the moving plate *g* and the bar *i* so that jamming between the fixed bar *i*, the article *b* and the arm *f* is positively obviated.

It will be understood that the moving plate *g* and the bar *i* extend the full width of the folding machine whilst the arm *f* is narrow and projects, when in its lower position, through a slot in the moving plate *g*. This is shown in Figure 7.

It will be noted that the moving plate *g* is of channel shape with its open side facing the article *b* moving forward to be folded. The bottom side of the channel

is of wedge shape to pick up the leading edge of the article so that it can be lifted to clamp it against the bar *i*. The arm *f* rests on the top of the channel and its lower end is raised rapidly when the moving plate rises.

Ordinarily when the article passes beyond the switch arm *c*, the latter causes its switch *d* to open which de-energizes the solenoid and allows the moving plate *g* to fall. Such plate may in certain cases fall so quickly that it traps the trailing edge of the article. To obviate this, we may arrange to stop the downward movement of the moving plate *g* by means of a catch which is released only when the folded article has been conveyed beyond the folding mechanism.

Referring to Figures 4, 5 and 6, the moving plate *g* has a rearwardly projecting part *m* which can be engaged by the end *n* of a lever *o* pivoted at *p* and connected by a link *q* to a solenoid *r* energized by electric current obtained through a switch *s* operated through a blade spring *t* from an arm *u* pivoted at *v* and having a cam shaped end *w* which engages the blade spring *t*. In Figure 4, the conveyor *a* is folding the article *b*, the leading edge of which is held between the moving plate *g* and the bar *i*. In Figure 5, the folded article has turned the arm *u* and through its cam end *w* forced the blade spring *t* to close the switch *s*. This results in the energizing of the solenoid *r* and in the end *n* of the lever *o* coming into a position to be engaged by the projection *m* on the moving plate *g*. In Figure 6, the moving plate *g* is shown held up by the lever *o*. When the folded article passes beyond the arm *u*, the latter returns to its Figure 4 position. The switch *s* opens the circuit containing the solenoid *r* so that the latter is de-energized. The weight of the moving plate *g* then presses the lever *o* clear of the projection *m* so that the moving plate falls on to the conveyor *a*.

We do not limit ourselves to the details of the mechanism for operating the catch lever *o*. For example, when the article *b* passes the arm *c* of the switch *d*, it may close the circuit of the solenoid *r* and such circuit will remain closed for a predetermined interval of time which may be for example two seconds during which the downward movement of the moving plate *g* will be arrested.

Figures 8 and 9 show a modification of the means for energising the solenoid *r* of the arrangement illustrated in Figures 4, 5 and 6 to control the catch *o* which holds up the descent of the moving plate *g* until the folds of the article pass from beneath the moving plate. In Figures 8 and 9 a light sensitive cell 10 receives a beam of light from a light source 11 through the spaces between the narrow belts which make up the conveyor *a* and when the cell 10 is energised, the solenoid *r* is inoperative. When the folded article *b* comes between the light source 11 and the light sensitive cell 10, the solenoid *r* is energised, resulting in the end *n* of the lever *o* coming into the path of the projection *m* on the moving plate *g*. The latter cannot therefore fall until the folded article passes out of the beam of light from the light source 11, when the solenoid *r* will be de-energised and the moving plate will press the lever *o* clear of its path and fall on the conveyor *a*.

In Figures 10 and 11, the lever *o* is actuated mechanically by the feeler arm 13 which when displaced by the folded article *b* causes the lever *o* to move from its out-of-service position in Figure 10 to its service position in Figure 11. When the folded article *b* passes from

beneath the feeler arm 13, the lever *o* moves clear of the moving plate *g*.

We claim:

1. A folding machine comprising in combination a conveyor for the articles to be folded, a first switch having an actuating arm so placed with regard to the conveyor that said first switch is closed by the leading edge of an article passing over the conveyor, a second switch having an actuating arm so placed with regard to the conveyor that said second switch is closed by the leading edge of said article passing over the conveyor subsequent to the closing of said first switch, a solenoid connected through both said switches, a plate positioned to receive said leading edge thereover and adapted to be raised by said solenoid when the article has closed both switches, a stationary gripper bar arranged above said plate, so as to clamp said leading edge against said plate said second switch actuating arm being so located with respect to said plate that said actuating arm is moved upwardly and rearwardly by movement of said plate, and said second switch is held in closed position so long as said plate is raised.

2. The folding machine of claim 1 in which a dash-pot is connected to said plate to restrain the rate of descent of the plate when released by said solenoid.

3. The folding machine of claim 1 in which a lateral projection is mounted on said moving plate and a catch is provided which is so located as to engage said projection to hold said plate in slightly raised position after release of said plate by said solenoid.

4. The folding machine of claim 3 in which said catch is brought into operative position by a second solenoid energized through a switch operated by the article being folded.

5. A folding machine as claimed in claim 4, in which the first switch closes the circuit to energize said second solenoid when the article passes from beneath the first switch arm, such circuit being maintained for a predetermined interval of time during which the article passes from beneath the moving plate.

6. A folding machine as claimed in claim 4, in which a third arm operated by the folded article beyond the second arm actuates a switch in the second solenoid circuit to energize the second solenoid and cause the catch to hold up the descent of the moving plate whilst the article is beneath the third arm.

7. A folding machine as claimed in claim 4, in which the energization of the second solenoid is controlled by a light sensitive cell on to which a beam of light is projected when the folded article comes into the path of the beam at the delivery side of the moving plate, said second solenoid being energized and the catch made operative whilst the folded article is obstructing the beam of light.

8. A folding machine as claimed in claim 3, in which the catch is connected to a feeler arm which is displaced by the folded article at the delivery side of the moving plate to render the catch operative to prevent the final descent of the moving plate.

References Cited in the file of this patent

FOREIGN PATENTS

126,864	Australia	Mar. 4, 1948
706,093	Great Britain	Mar. 24, 1954