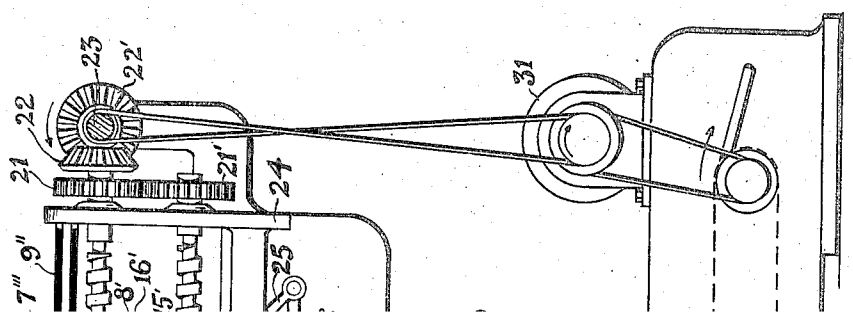
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FOLDING MACHINE

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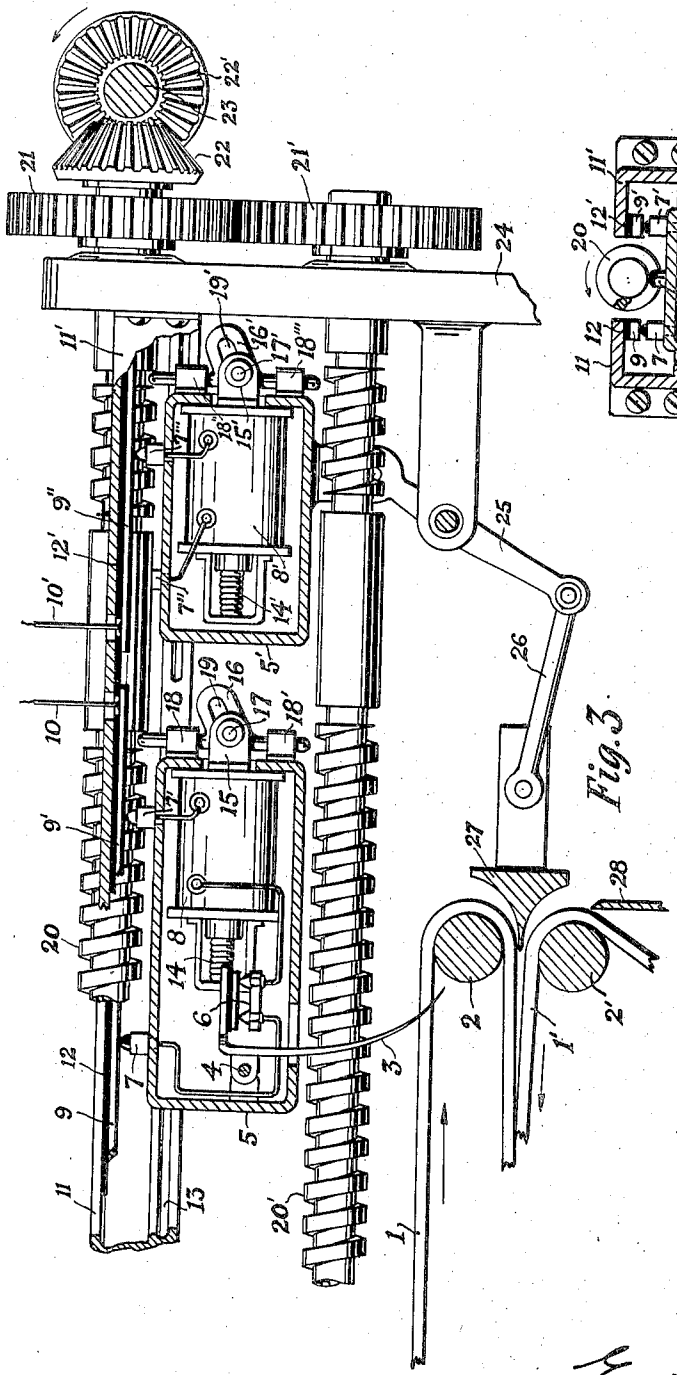


Fig. 3.

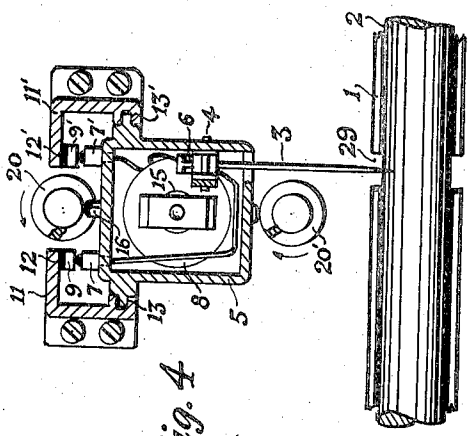


Fig. 4

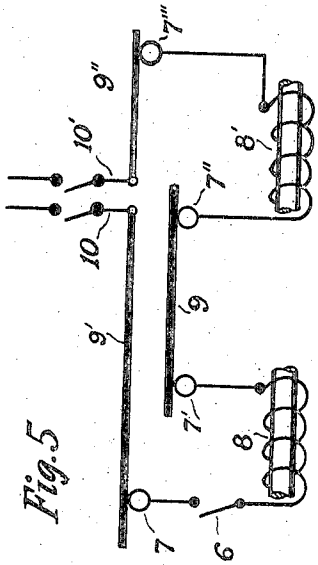


Fig. 5

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FOLDING MACHINE

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7 Claims. (Cl. 270—83)

This invention relates to folding devices and more particularly to the control mechanism for automatically timing the folding of fabric articles and the like.

One of the objects is to provide a control device actuated by the articles themselves for folding them in half or other predetermined ratio of their length. Another object is to automatically actuate the folder when the article passing the folder is in folding relation thereto.

Another object is to provide for the automatic folding of articles of varying sizes as they are successively fed singly into the folding machine.

These and other objects are attained by utilizing the principle of proportionate distance covered by bodies traveling oppositely from a common point, which principle is embodied in the device described in the specification and illustrated in the drawings forming part thereof, the novel improvements being specifically set forth in the claims.

In the drawings,

Fig. 1 shows a vertical elevation view of a folding machine embodying this invention.

Fig. 2 shows a plan view of the control mechanism.

Fig. 3 shows a detailed view of the side elevation of the control and knife actuating mechanisms.

Fig. 4 shows an end elevation view of the control mechanism to clearly illustrate its position.

Fig. 5 is an electric circuit diagram of the device embodied in this invention.

A typical folding machine is illustrated in Fig. 1, and includes belts 1 traveling over rollers 2, which are driven by a motor 31. Fabric articles as shown by 32, or other like articles such as sheets, tablecloths, towels, napkins, etc., are adapted to be fed onto belt 1 at point 33, and carried by belt 1 past folding device 27 which, when actuated toward rollers 2 and 2' will wedge the article between belts 1 and 1' to be carried away by them in a folded condition. Since the articles are of varying sizes, a device will be here described which will effectively divide each article with respect to the folder 27 and will actuate folder 27 at the proper moment.

At a point immediately preceding folder 27, a member 3 of control mechanism housed by 5 is placed in space 29 between belts 1, in the path of the articles to be folded, and is adapted by reason of pivot 4 to be elevated by the articles, its own weight causing it normally to extend below the surface of belts 1. As is best shown in the elevation details of side view shown in Fig. 3 and the elevation details of end view shown in Fig. 4, when member 3 is pivoted upward contact is broken at switch 6.

Thus, in the particular embodiment here illustrated, switch 6 is adapted to control an electric circuit to solenoid 8 of control mechanism 5 and solenoid 8' of folding mechanism 5', through bus bars 9, 9', and 9'' and contacts 7, 7', 7'', and 7''', from leads 10 and 10', best shown in wiring circuit diagram Fig. 5. Thus when member 3 is elevated by leading edge of article to be folded thereby breaking the electric circuit to solenoids 8 and 8' plunger 15 of solenoid 8 and plunger 15' of solenoid 8' are released by their respective solenoids to be pushed outward by their respective springs 14 and 14' to act by the nature of their construction upon keys 16 and 16' of their respective mechanisms.

Mechanisms 5 and 5' are movable and supported by tracks 13 and 13' which extend above and parallel to the path of articles carried by belts 1 and tracks 13 are parts of respective runners 11 and 11' swung between supports such as 24. Also supported by brackets 24 and 24', as best shown in Fig. 1, are two constantly revolving shafts 20 and 20' parallel to tracks 13 in working relation to mechanisms 5 and 5' and driven by motor 31 by means of shaft 23 and gears 22', 22, 21, and 21' and thereby synchronized to rollers 2 supporting belts 1. Shafts 20 and 20' are constructed to form threaded worm drives for propelling mechanisms 5 and 5' to their proper respective positions through action set up by member 3, inasmuch as member 3 controls the relationship of keys 16 and shafts 20

At the normal starting position of mechanism 5 as shown in Fig. 3 key 16 is elevated in guides 18 by reason of pin 17 of split end of solenoid plunger 15 acting upon cam-slot 1 to be engaged by threaded grooves of worm drive 20 and likewise at the normal starting position of mechanism 5' key 16' is elevated in guides 18'' and 18''' by reason of pin 17' of split end of plunger 15' acting upon cam-slot 19' to be engaged in threads of worm drive 20.

Thus, when member 3 is elevated by the leading edge of article breaking the circuit of electric power to solenoids 8 and 8' allowing respective springs 14 and 14' to thrust respective plungers 15 and 15' outward, respective pins 17 and 17' will act upon respective cam-slots 19 and 19' to withdraw respective keys 16 and 16' from worm drive 20 thereby engaging keys 16 to worm drive 20' revolving in a direction opposite to that of worm drive 20. Thus, control mechanism 5 is

drawn by worm drive 20' along supporting tracks 13 in a path above and parallel to the path of the moving article and in an opposite direction thereto. In like manner, folding mechanism is drawn in a like direction thereby withdrawing folder 27 from groove between rollers 2 and 2' by virtue of cooperating members 25 and 26 being coupled to folding mechanism 5', distance of withdrawal being governed by the length of the section of thread on worm drive 20' engaging key 16'.

Control mechanism 5 is adapted to be moved back to its starting position by the release of member 3 as it drops from trailing edge of moving article into space 29 between belts 1 thereby closing the electric circuit at switch 6 to energize solenoid 8 which draws in plunger 15 which acts to disengage key 16 from worm drive 20' and engage same key with oppositely-revolving worm drive 20. At the same instant, solenoid 8' becomes energized to draw in plunger 15' which acts to disengage key 16' from worm drive 20' and engage same key with worm drive 20, thereby folding mechanism 5' to be drawn in an opposite direction to act through cooperating members 25 and 26 to thrust folder 27 into groove formed by rollers 2 and 2' thus wedging article between belts 1 and 1' to be carried away by them in a folded condition.

It is clearly illustrated in Fig. 1 that at the time folder 27 is actuated to wedge the article into a fold between rollers 2, approximately as much of the article has been carried past the folder 27 as there yet remains on belt 1 by reason that control mechanism 5 has been caused to travel at approximately the same speed in one direction as the article was caused to travel in the opposite direction, both from a given point which was the starting position immediately preceding location of folder 27 as best shown in Fig. 3. The difference between the point of contact of the leading edge of article where it elevates member 3 and the folder 27 is balanced by the distance 27 is required to travel before it actuates a fold.

It is clearly indicated that this combination is adapted to fold articles as fast as they are fed singly into the machine, one behind the other, and it is clearly indicated that article might be fed into a like machine in two or more paths each path to be governed by a like folding control mechanism and folder and all powered by a common shaft 23.

The machine need not be limited to folding articles in the approximate middle of said articles. For by adjusting gears 21 and 21' on respective worm drives 20 and 20' to their proper ratio one to the other, thereby changing the ratio of speed between 20' and rollers 2 and 2', the ratio of speed between control mechanism 5 and belts 1 can be adjusted thereby to fold articles at any desired ratio of their length.

It will thus be seen that the embodiments of the various features of the invention have been fully described, that they attain the various objects of the invention and are well suited to the requirements of practical use. Many widely different embodiments could be made without departing from the scope of the construction herein illustrated.

It is therefore intended that all matter contained in the descriptive copy and drawings be interpreted as illustrative and not in a limiting sense.

Accordingly, what is claimed and desired to secure by Letters Patent, is:

1. In a machine of the class described, the combination with means for moving the articles to be folded toward a folder, of a carrier control device in close proximity to said folder, means actuated by the leading edge of any of said articles for simultaneously withdrawing said folder from the path of said article and moving said control device toward the trailing edge of said article, said means adapted to be actuated by said trailing edge of said moving article for thrusting said folder into engagement with said article at the same speed as conveying means.

2. In a machine of the class described, the combination with means for moving the articles to be folded toward a folder, of a carrier control device in close proximity to said folder, of a pivoted member of said control device in the path of said moving articles, means actuated by contact of the leading edge of any of said articles with said member of said control device for simultaneously moving said member toward the trailing edge of said article and withdrawing said folder from the path of said article, said member adapted to be actuated by the trailing edge of said article for simultaneously engaging said folding means with said article at the same speed as conveying means and returning said control device to its starting position at the same speed as conveying means.

3. In a machine of the class described, the combination with means for moving articles to be folded into folding position, a folding means and carrier control device therefor adapted to be driven by a pair of oppositely-revolving worm drive shafts parallel to and synchronized in predetermined speed relation with said conveying means, and means actuated by contact of the leading edge of any of said articles with a pivoted switch member of said control device for simultaneously engaging said control device and said folding means with one of said revolving drive shafts for withdrawing said folding means from the path of said article and moving said member toward the trailing edge of said article, said means adapted to simultaneously disengage said revolving drive shaft and engage said other revolving drive shaft for moving said folding means into engagement with said moving article and returning said member of said control device to its starting position when contact between said member and said moving article is broken.

4. In a folding machine including means for moving articles to be folded toward a folder, a control device therefor, comprising a circuit closing member pivoted in the path of said articles, a solenoid adapted to be excited by said circuit closing member, a key mechanism adapted to be actuated by said solenoid for engaging alternately each of a pair of oppositely-revolving worm drive shafts when said circuit closing member is contacted and released respectively by the leading and trailing edges of said articles.

5. In a machine of the class described, the combination with means for moving articles to be folded into folding position, a pivoted circuit closing member of a carrier control device adapted to be driven in and parallel to the path of said articles alternately by a pair of oppositely-driving worm shafts synchronized to said conveying means, a folding means comprising an electrically controlled key mechanism excited by said circuit closing member, a folding blade piv-

oted to said key mechanism adapted to be moved at the same speed as conveying means by engagement of said key mechanism with a said worm drive shaft when said circuit closing member is contacted and released respectively by the leading and trailing edges of said articles.

6. In a folding machine in combination, means for moving articles to be folded toward a folder, a circuit closing member of a carrier control device in the path of said articles in close proximity to said folder, means actuated upon contact of leading edge of any of said articles to be folded with said circuit closing member for simultaneously withdrawing said folder from the path of said article and moving said member of said control device toward the trailing edge of said article in predetermined speed relation thereto, said means adapted by release of said member by the trailing edge of said article to simultaneously move said folder into engagement with said article at the same speed as conveying means whereby said article will be folded in predetermined ratio of its length and said member will be returned to its starting position at the same speed as conveying means whereby said article will be folded in predetermined ratio of its length.

7. A measuring device for articles of various lengths comprising a control mechanism and a folding mechanism at a common folding station, means for conveying any of said articles past said mechanisms, common means actuated by any of said articles for simultaneously moving said mechanisms in opposite directions away from said station at a predetermined speed relative to said moving article, said means adapted to reverse said movement to effect simultaneously the folding of said article by said folding mechanism at a distance from the leading edge of said article equal to a predetermined fraction of the length of said article and return said control mechanism to its starting position.

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