

Sept. 20, 1932.

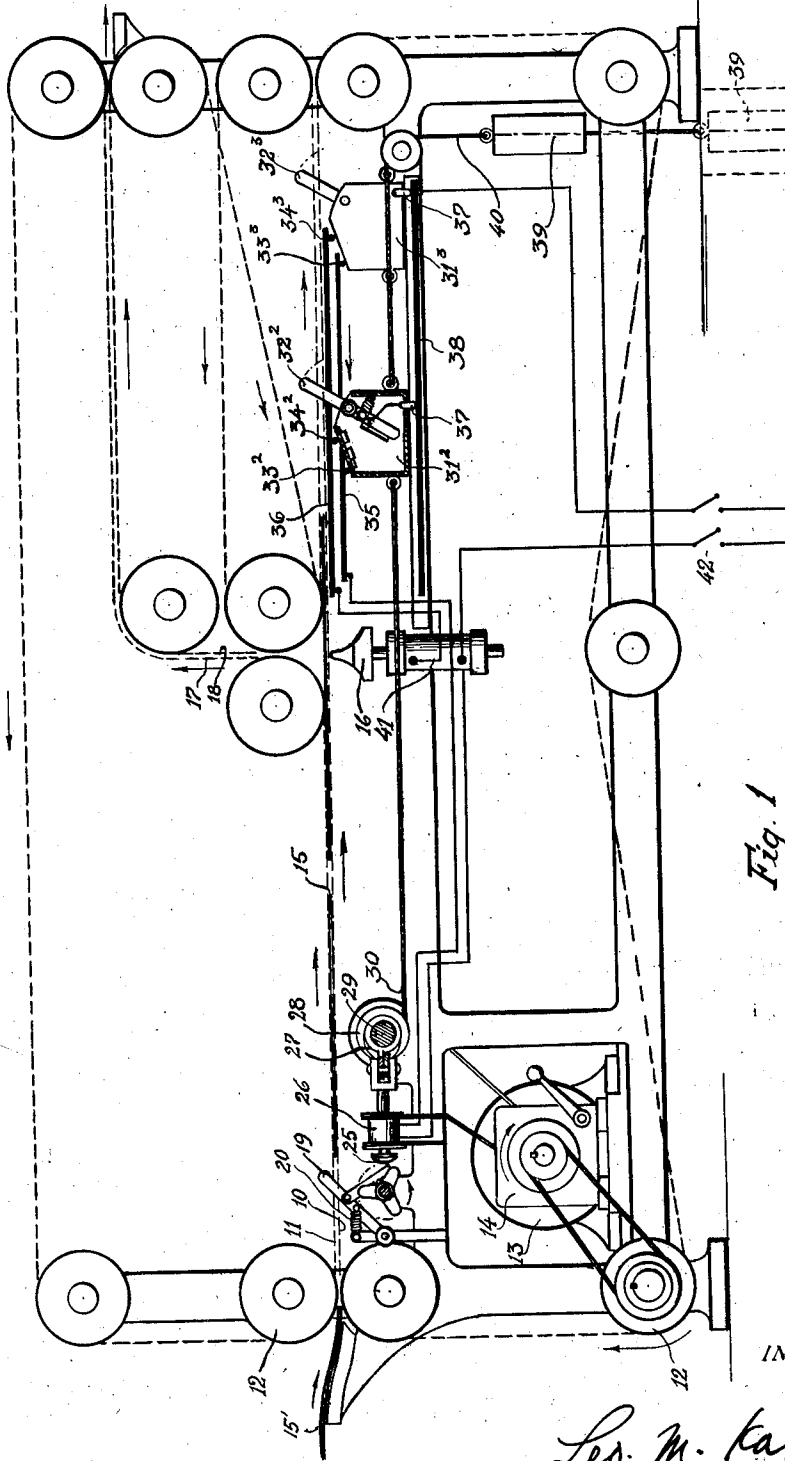
L. M. KAHN

1,878,404

FOLDING MACHINE

Filed April 19, 1930

2 Sheets-Sheet 1



Sept. 20, 1932.

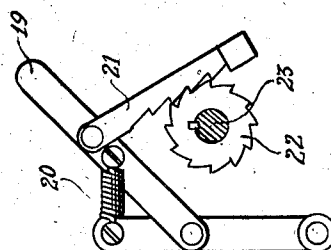
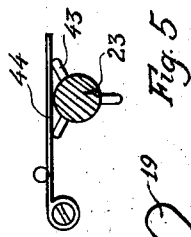
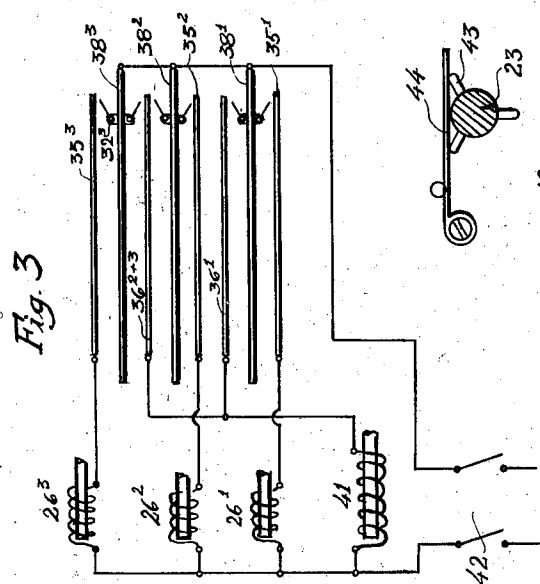
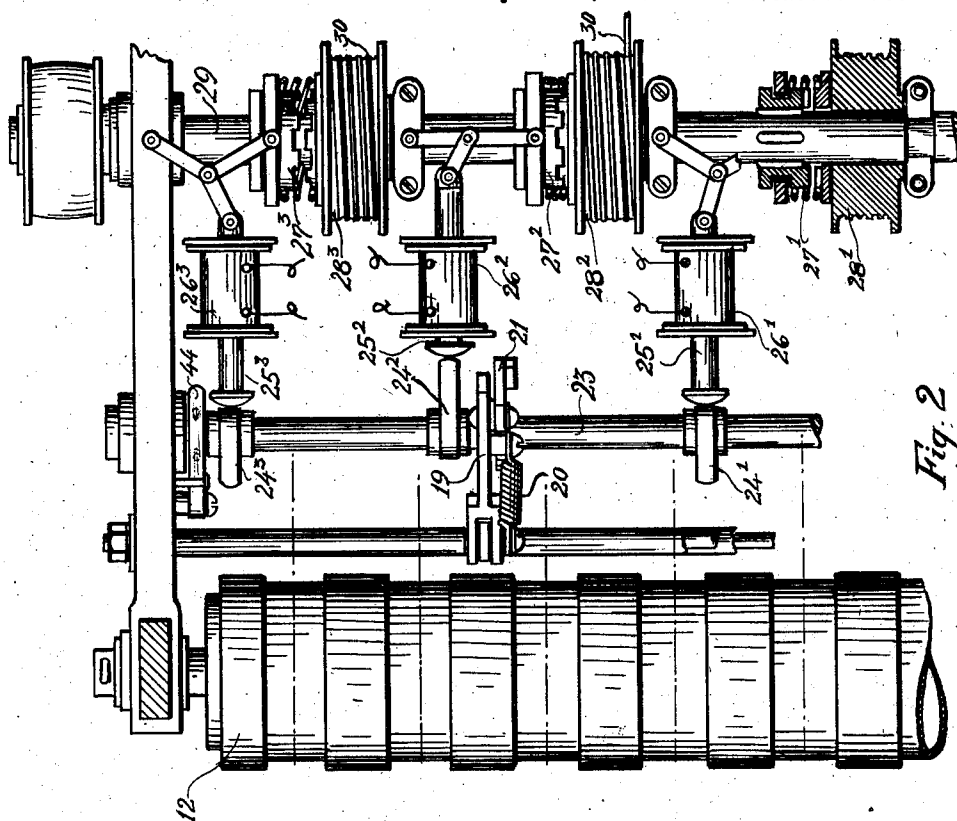
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2 Sheets-Sheet 2



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FOLDING MACHINE

Application filed April 19, 1930. Serial No. 445,716.

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 provide for the automatic folding of articles of varying sizes as they are successively fed into the folding machine one behind the other.

A further object is to achieve the folding through a reciprocating circuit closing member.

These and other objects are attained by utilizing the principle of proportionate distance covered by oppositely traveling bodies, 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 is a vertical elevation view of a folding machine embodying this invention.

Fig. 2 is a plan view of the control actuating mechanism.

Fig. 3 is an electric circuit diagram of the device.

Figs. 4 and 5 show details of the controller actuating mechanism.

A typical folding machine is illustrated in Fig. 1, and includes tapes 10 and 11 traveling continuously over rollers 12, which are driven by a motor 13 through a suitable transmission 14. Fabric articles 15 such as sheets, towels, tablecovers, napkins, etc. are adapted to be fed into the machine at one end (at left in the drawing) e. g. article 15', and to be moved between tapes 10 and 11 by friction over the folding devices 16 which, when actuated upwardly will wedge the article between the tapes 17 and 18 to be carried away by them in folded condition.

Since the articles are of varying sizes, a device will be here described which will effectively divide the article with respect to the folder 16 and will actuate the folder at the proper moment. A lever 19 is placed be-

tween the tapes 10, in the path of the articles 15, and is adapted to be depressed while the articles 15 pass over it, a spring 20 causing it normally to project above the tapes 10. As is best shown in Fig. 4, a pawl 21 is pivotally attached to lever 19 and is adapted to engage the ratchet 22 only on the return of lever 19 to its normal upward position. The ratchet 22 is keyed to a shaft 23 which carries a plurality of cams 24, such as 24¹, 24², 24³ which are placed in suitable angular position relative to one another. Thus when the lever 19 is released from its depressed position, the cams 24 are caused to revolve a fraction of the circumference, depending upon the number of cams. Each of the cams 24¹, 24², 24³ is adapted to push against one end of each of plungers 25, of solenoids 26, the other ends of plungers 25 being adapted to operate clutches 27, for engaging pulleys 28, to the revolving shaft 29. Ropes 30, are wound on the respective pulleys 28 and the free ends are attached to carriers 31, each having a pivoted member 32 projecting above the tapes in the path of the articles 15. Each of members 32 is adapted to close an electric circuit when depressed by the moving article 15, by contacting with 33 and 34 connected to bus bars 35 and 36 respectively, the contacting members 32 being themselves connected through contractor 37 to bus bar 38 along which they move. The carriers are adapted to move back to the starting point automatically, by means of a weight 39 attached thereto through rope 40. At one end of the shaft 23 a number of pins 43 are fastened radially thereto with respect to the cam position and adapted to bear against a spring leaf 44, so that at the proper position of the cams the spring will press equally strong on two of the pins 43, but will press heavier on one or the other of two of the pins 43 if the shaft 23 and cams 24 are not in their proper positions, thereby arresting or correcting the position of the cams.

As is clearly indicated in Figs. 1 and 3 the folder actuating solenoid 41 is connected to the line switch 42 through the carrier switches 31. Each of the solenoids 26 is like-

wise connected through the carrier switches 31 to the line switch 42.

The manner of operation is as follows: Article 15 is fed between tapes 10 and 11, and depresses the arm 19 as it passes over it. When the rear of the article has passed and allowed the lever 19 to be pivoted up by the spring 20, pawl 21 causes ratchet 22 to revolve shaft 23 and one of cams 24 such as 24² so that the corresponding plunger 25² is pushed into solenoid 26² and the clutch 27² engages pulley 28². The revolving pulley causes rope 30² to wind on its drum, pulling carrier switch 31² in a direction opposite to the traveling article. When the article 15 strikes the arm 32², the latter contacts with 33² and 34² closing the electric circuits through solenoids 26² and 41, whereby the solenoid plunger 25² is pushed outwardly by the energizing action of solenoid 26² so that clutch 27² is disengaged and carrier switch 31² is stopped from movement, the solenoid 41 at the same time actuating the folder 16.

The carrier switch 31 starts its movement at the same time that the rear end of the article leaves lever 19, the switch 31 at that moment being a distance on one side of folder 16 that the lever 19 is on the other side thereof. Hence, if the article 15 and switch 31 travel at the same speed when the front end of article 15 meets switch 31, the rear of said article is as far to one side of said folder 16 as the front end is to the other side of it. Accordingly, the folder will be actuated when the article is centrally over it. After the front end of the article had been removed from contact with switch 31 by the folder action 16 and the tapes 17 and 18, the switch 31 is opened breaking all circuits and the counterweight 42 moves switch 31 back to its starting position.

The lever 19 is placed a distance from the folder 16 to accommodate the largest article that may be fed into the machine. However if a number of small articles follow in succession, lever 19 may be tripped up by several articles before the completion of the measurement of the first of the group of articles approaching the folder 16. Consequently a plurality of carriers or measuring switches 31² and 31³ are provided to be actuated successively as cams 24 are caused to successively actuate the plungers 25 and associated mechanism. Thus uninterrupted feeding and folding of articles in rapid succession is enabled, regardless of their size, by the simple expedient of angular displacement of the cams 24, relative to one another.

The machine need not be limited to folding the articles in the middle. For by adjusting the starting point of the moving switches 31 and their speed relative to the articles approaching them the articles can be folded at any ratio of their length.

It will thus be seen that the embodiments

of the various features of this invention have been fully described, that they attain the various objects of the invention and are well suited to the requirements of practical use. Of course, many changes can be made in the above construction. Also many widely different embodiments of this invention could be made without departing from the scope thereof.

It is therefore intended that all matter contained in the description 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 fabric articles toward a folder, of a carrier switch, means actuated by the rear end of any of said articles for moving said carrier switch oppositely toward the front end of said article, and means for actuating said folder when said switch is contacted by the front end of said article.

2. In a machine of the class described, the combination with means for moving fabric articles toward a folder, of a plurality of movable switches, means actuated successively by the rear ends of said articles for moving said switches successively, oppositely toward the front end of said articles, and means for actuating said folder when each of said switches is successively contacted by the front end of each of said articles.

3. In a machine of the class described, the combination with means for moving fabric articles toward a folder, of a member adapted to be actuated by the rear edges of said articles before they approach said folder, a plurality of movable switches on the other side of said folder, means actuated by said member for moving said switches successively, oppositely toward the front end of said articles, means for actuating said folder when each of said switches is successively contacted by the front end of each of said articles.

4. In a machine of the class described, the combination with means for moving fabric articles toward a folder, of a member adapted to be actuated by the rear edges of said articles before they approach said folder, a plurality of movable switches on the other side of said folder, means actuated by said member for moving said switches successively, oppositely toward the front end of said articles, means for actuating said folder when each of said switches is successively contacted by the front end of each of said articles, and means for returning said switches to their starting position.

5. In a folding machine including means for moving articles to be folded toward a folder, a control device therefor, comprising a cam actuating member, a plurality of cams in angular relation to one another, a

plurality of switches in operative relation to said cams, means for moving said switches successively toward said articles actuating said member and electrically controlled means for stopping movement of said switches and actuating said folder.

6. In a folding machine including means for moving articles to be folded toward a folder, a control device therefor, comprising a pair of depressible members in spaced relation to and on opposite sides of said folder, means actuated upon release of one of said members for moving said other member toward the folder, and means for actuating said folder when said moving member is contacted by said approaching articles.

7. In a folding machine, in combination, means for moving fabric articles toward a folder, a switch, means in spaced relation to said switch actuated by the rear end of said one of articles for effective movement of said switch oppositely to said article in predetermined speed relation thereto, and means for actuating said folder when said switch is contacted by said article.

8. In a folding machine in combination, means for moving fabric articles toward a folder, a pair of members in the path of said articles, in spaced relation to and on opposite sides of said folder, means actuated upon release of one of said members by the rear of one of said moving articles for moving said other member toward the front end of said article and means for actuating said folder when said moving member is contacted by the front end of said article.

9. In a folding machine in combination, means for moving fabric articles toward a folder, a pair of members in the path of said articles, in spaced relation to and on opposite sides of said folder, means actuated upon release of one of said members by the rear of one of said moving articles for moving said other member toward the front end of said article in predetermined speed relation thereto and means for actuating said folder when said moving member is contacted by the front end of said article, whereby said articles will be folded in predetermined ratio of their lengths.

10. In a device of the class described including a conveyor of articles, the combination of a control member adapted to be actuated by said articles, an auxiliary member, and means for moving said auxiliary member in opposite direction to said article after said article has released said control member.

11. A measuring device for articles of various lengths, comprising a control member, a registering member, means for conveying articles past said members, an auxiliary member and means for moving said auxiliary member at a predetermined speed relative to said articles to effect a meeting of said aux-

iliary member and the leading edge of the controlling article a distance past said registering member equal to a predetermined fraction of the length of said article.

12. A measuring device for articles of various lengths, comprising a control member, a folding member, means for conveying articles past said members, an auxiliary member and means for moving said auxiliary member at a predetermined speed relative to said articles to effect a meeting of said auxiliary member and the leading edge of the controlling article a distance past said folding member equal to a predetermined fraction of the length of said article.

13. A measuring device for folding machines comprising in combination, a control member adapted to be actuated by articles to be folded before same reach said folding device, a plurality of cooperating members adapted to be successively actuated by said articles after same pass said folding device, means for moving said cooperating members toward said articles at a predetermined speed relative thereto and means for actuating said folding device when the leading edge of each controlling article actuates said corresponding cooperating member upon meeting same.

14. In a device of the class described including a conveyor of articles, the combination of a control member adapted to be actuated by said articles, an auxiliary member and means actuated by said control member for moving said auxiliary member oppositely to said articles controlling same at a predetermined speed relative to said article.

Signed at 507 Graybar Bldg. in the county of New York and State of New York this 15th day of April A. D. 1930.

LEO M. KAHN. 105

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