April 28, 1942. L. M. KAHN 2,280,954

FOLDING MACHINE

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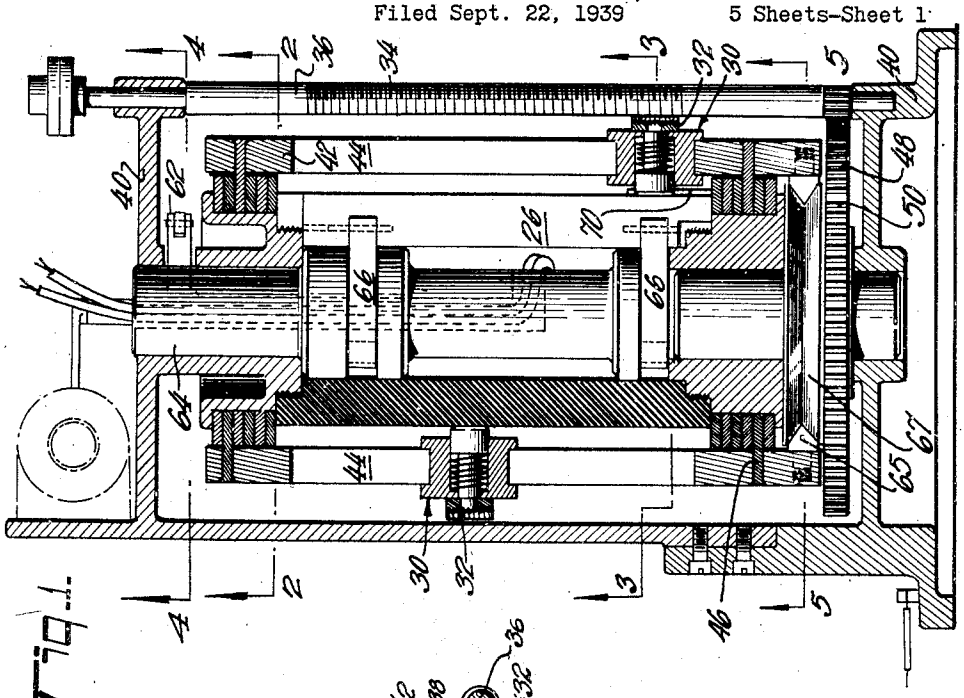


Fig. 1.

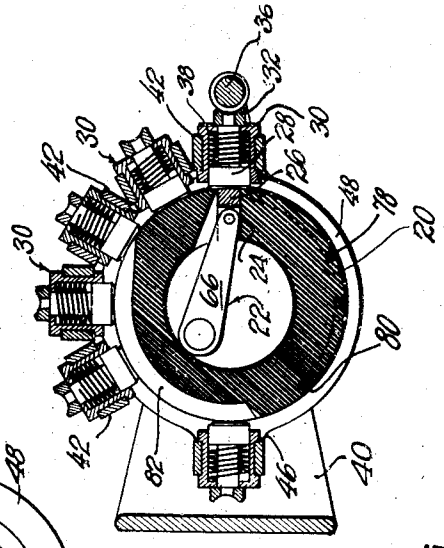


Fig. 3

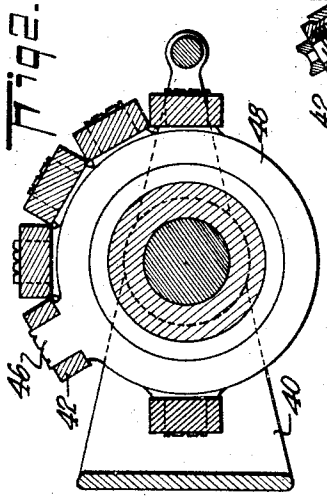


Fig. 2.

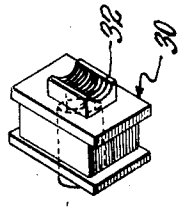


Fig. 6

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Fig 4

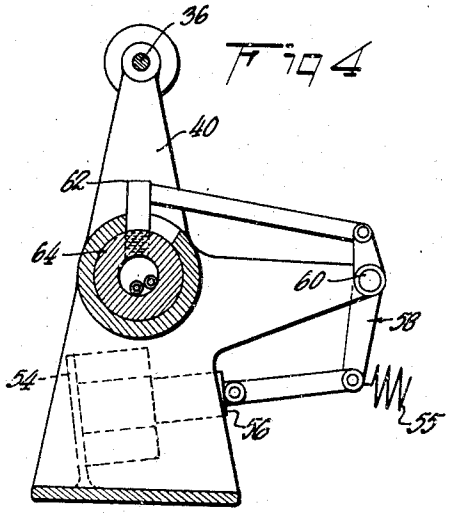


Fig 5

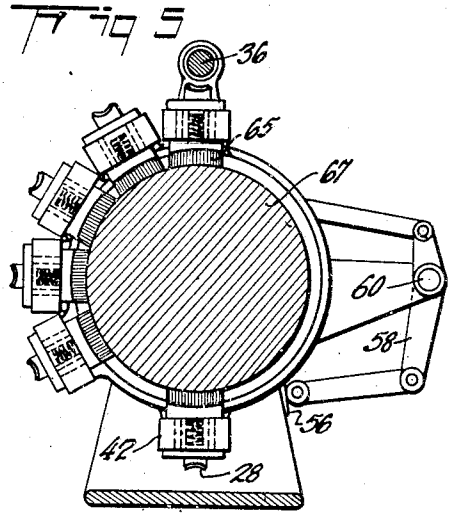
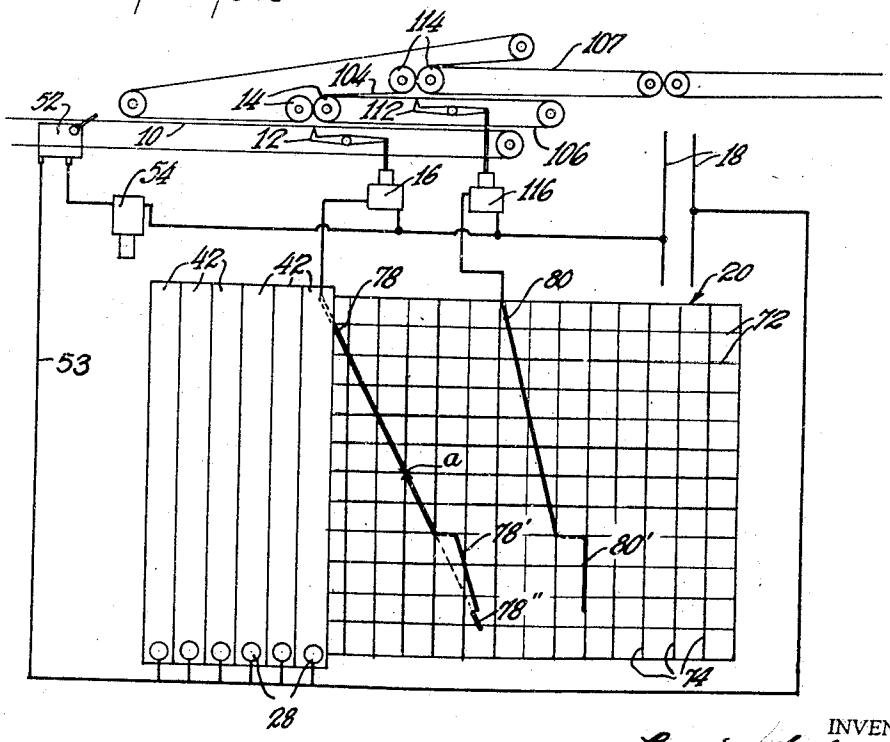


Fig. 7.



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Fig. 8.

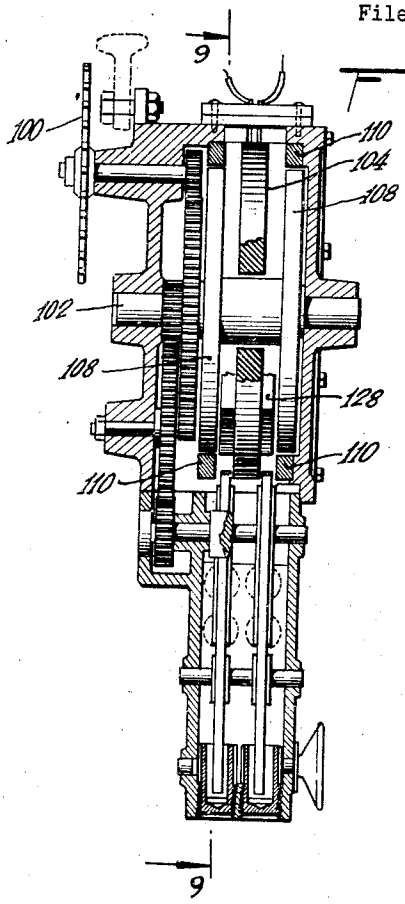


Fig. 9.

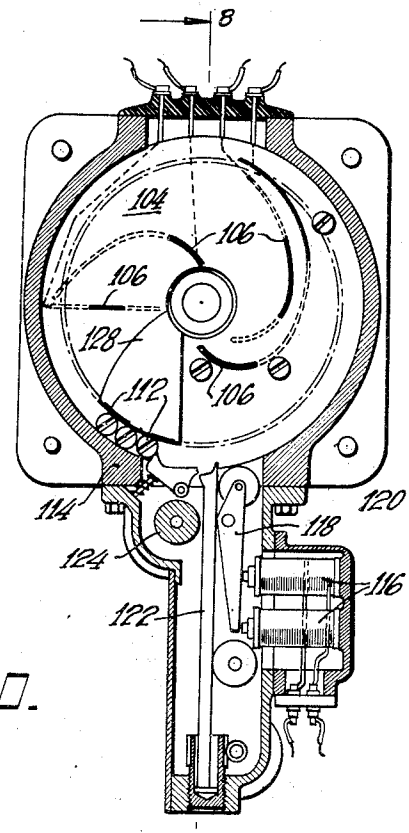


Fig. 10.

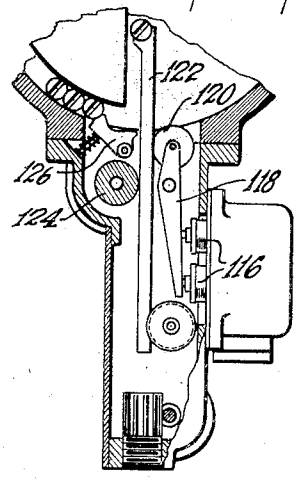
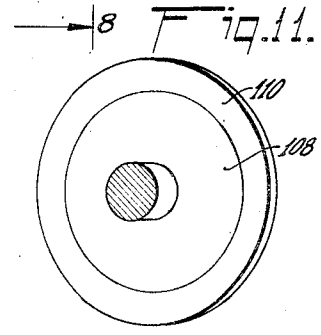


Fig. 11.



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Fig 12

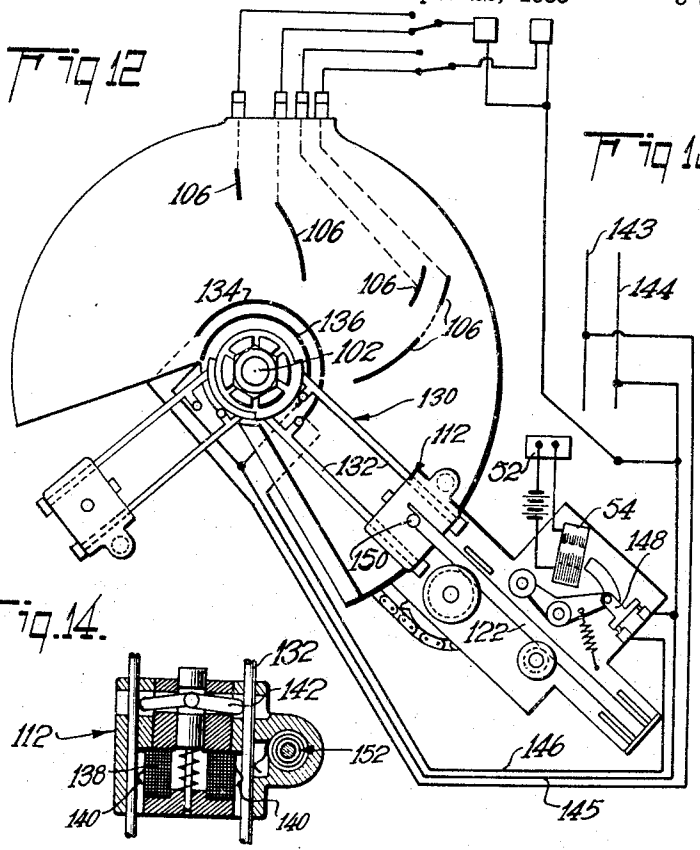


Fig 13

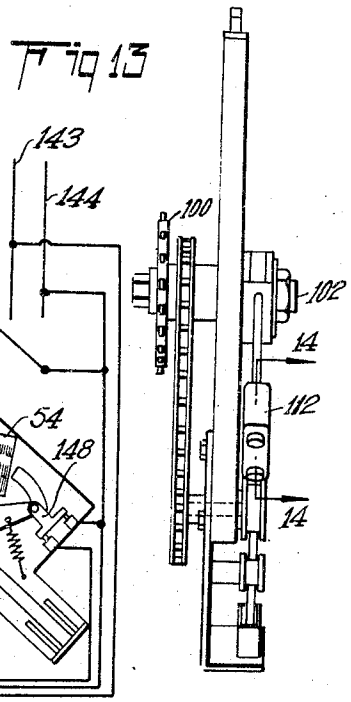


Fig. 14.

Fig 15

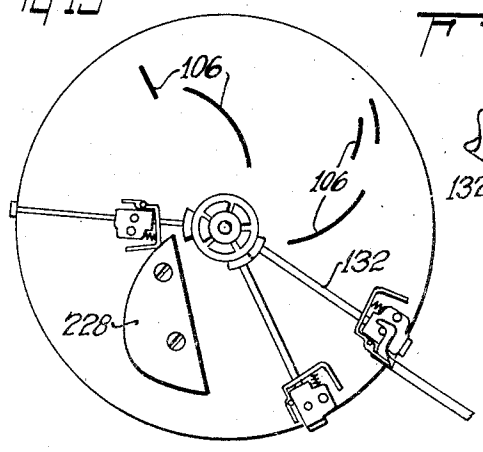
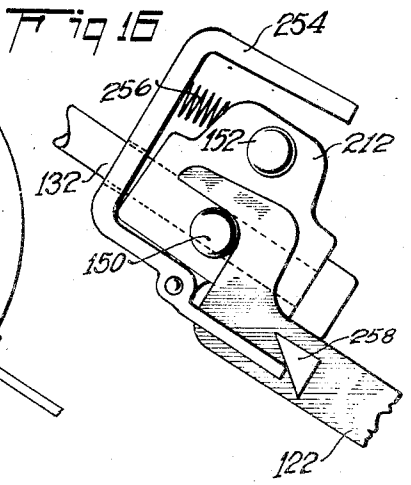


Fig 16



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FOLDING MACHINE

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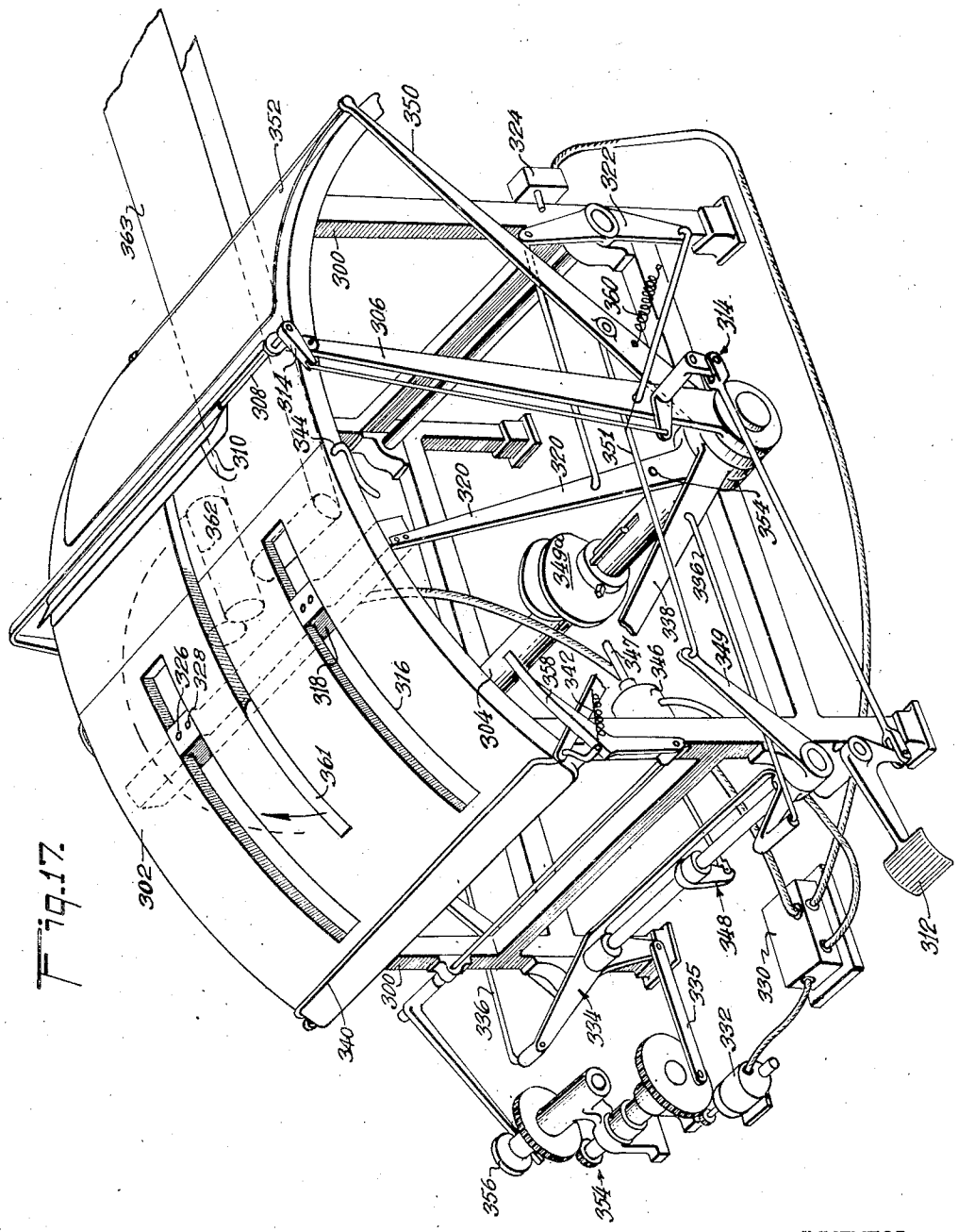


Fig. 17.

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Patented Apr. 28, 1942

2,280,954

UNITED STATES PATENT OFFICE

2,280,954

FOLDING MACHINE

Leo M. Kahn, New York, N. Y., assignor to The American Laundry Machinery Company, Norwood, Ohio, a corporation of Ohio

Application September 22, 1939, Serial No. 296,059
In Great Britain September 22, 1938

5 Claims. (Cl. 270—81)

This invention relates to folding machines such as are used in laundries for folding towels, sheets and the like, and relates more specifically to the timing mechanism in such machines.

The folding machine timing mechanisms herein described are of the type which operates selectively in accordance with the length of the article which is fed into the machine, i. e., which folds the article in two, three, or four, according to its length.

In this general type of timer, the motions of the folding blades have been controlled by electric circuits which have been opened and closed by roving contacts. In a Mayer machine, these contacts moved with the same speed over varying paths with electrodes at various points thereof (see United States Patent No. 1,581,753). The movable contacts were magnetized buttons at all times gripped magnetically between the disks, two of which were of iron. A large portion of the time, including all periods when the machine was in operation and no articles were being fed into it, the buttons which were in contact with the disks were restrained from moving with them. The resulting friction between the disks and the buttons had serious consequences. The buttons became worn and would jamb. The heat of the friction destroyed the buttons' magnetism.

It is an object of this invention to provide a timer which utilizes movable contacts of the kind described above but which does not use magnetism and in which friction is reduced to the amount normally present in any machine; to provide such a timer in which the movable contacts are positively and mechanically moved along their paths; to provide such a timer in which there is relatively no friction between the movable contacts and the element which moves them, even while they are motionless and that element is moving.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings, in which:

Figure 1 is a view in elevation, partly in section, of a control unit for a folding machine, which unit embodies one form of the invention;

Figs. 2–5 are cross-sectional views, in elevation, of the machine shown in Fig. 1 and taken, respectively, along the lines 2—2, 3—3, 4—4 and 5—5 of Fig. 1;

Fig. 6 is a perspective view of a detail of the machine shown in Fig. 1;

Fig. 7 is a diagrammatic view of a folding machine and the control unit shown in Fig. 1;

Fig. 8 is a view, in elevation and partly in section, of a different form of the device shown in Figs. 1–7 and taken along the line 8—8 of Fig. 9;

Fig. 9 is a view, in elevation and partly in section, of the device shown in Fig. 8 and taken along the line 9—9 of Fig. 8;

Fig. 10 is a view similar to Fig. 9 of a portion of the device shown in Figs. 8 and 9 but with the parts at a different stage of their operation;

Fig. 11 is a perspective view of a modification of an element shown in Figs. 8–10;

Fig. 12 is a view in elevation, partly diagrammatic, of a modification of the device shown in Figs. 8–11;

Fig. 13 is a view in end elevation of the device shown in Fig. 12;

Fig. 14 is a view in cross-section, taken along the line 14—14 of Fig. 13, of a detail of the device shown in Fig. 12;

Fig. 15 is a view in elevation of a different form of the device shown in Fig. 12;

Fig. 16 is a view of a detail of the device shown in Fig. 15; and

Fig. 17 is a perspective view of a different form of the devices shown in Figs. 1–16.

In the preferred form of the invention, the position of the fold to be made in an article is determined by, and the fold itself is made as a result of, the movement of a rider on a cylindrical surface, which movement is controlled by the passage of the article through the machine.

The bed of the machine over which the article to be folded passes comprises a pair of horizontally spaced conveyors 10 between which is disposed a so-called folding finger or blade 12 provided with means for being moved at appropriate times transversely to the direction of movement of the article so as foldingly to lift the latter and present it to a pair of folding rolls 14. It is this finger which is automatically operated so as to cause the article to be folded along the desired line.

Blade 12 may be operated by any motive means such as a friction clutch or solenoid 16 to which is brought power from electric mains 18 and which may be in series with a relay. The riders, set in motion by the article to be folded, in their turn operate the relay and solenoid and, thereby, blade 12, as will next be explained.

The timing unit shown in the drawings may be placed anywhere as there need be only electric connections between it and the actual arti-

cle-carrying and folding parts. A hollow, cylindrical body 20 is preferably positioned with its axis 22 vertical. A longitudinal slot 24 extends from the outer to the inner surfaces of the body 20. A lifting bar 26 lies lengthwise of the slot and is movable radially at the body. When it moves out of the slot, it pushes against a contact button 28 in whatever electrical contact carrier 30 happens to be overlying the slot and moves a grooved element 32, attached to the contact button, against the threads 34 of a shaft 36. Spring means 38 normally maintain element 32 away from the shaft 36.

The axis of the shaft 36 is fixed and parallel to the axis of the body. The shaft is rotatably supported in the frame 40 which also supports the body 20. The rotation of the shaft may be synchronized with the motion of the conveyors 10 and may be driven from the same source.

Whenever the grooved element 32 of any contact carrier 30 is pressed against the rotating shaft 36, the contact is caused to move parallel with the shaft. Any suitable means permitting that parallel motion may be provided. As shown, these comprise, for each contact, a rail 42 extending parallel with the axis 22 and having a longitudinal slot 44 therein. The sides of the rail which form the slot act as guide means for the contact while it is moving parallel to shaft 36 and to axis 22 of the main body.

Means are provided for moving the rails 42 and their respective contacts around the outer surface of the cylindrical body 20. A convenient arrangement includes a pair of supporting radial arms 46 which carry the rails 42 and which may be integral with a ring 48 which is concentric with the axis 22 and rides on the fixed hub 50 which is attached to the body 20. The various rails 42 are spaced around the surface of the body 20. The various rings 48, for the supports 46 of the rails 42, may be positioned next to each other and longitudinally of the axis 22, each pair of projecting supports 46 being staggered with respect to the next pair.

The following mechanisms operate to cause the grooves on the contact carrier to engage the shaft 36. A switch 52 is opened and closed by the passage of the front and rear edges of an article on the conveyors 10. This switch closes and opens an electric circuit in which there is an electric solenoid 54. The latter operates a plunger 56 which, in turn, operates the bell crank 58 pivoted on shaft 60. The crank, in turn, moves an arm 62 which is attached to the hollow crank shaft 64. The latter is coaxial with, and rotatable within, the body 20. A pair of connecting rods 66 are each pivotally attached at one end to the crank shaft 64 and at the other end to the lifting bar 26. Thus, the passage of a leading edge of a sheet over switch 52 causes lifting bar 26 to rise whereby the grooves in a contact carrier 30 engage shaft 36 and the contact moves parallel to that shaft a distance proportional to the length of the article because, when the trailing edge of the moving article passes and opens switch 52, solenoid 54 becomes inoperative, spring 55 rotates bell crank 58, rods 66 and bar 26 moves inward, whereby contact 30 no longer has connection with shaft 36 and ceases to be moved parallel thereto.

The disconnecting of a contact carrier 30, on its rail 42, from shaft 36 frees the rail to move around body 20 and parallel to its axis 22, due to the friction between shoe 65, fixed to the rail, and the friction pulley 67. The latter is constantly revolving, being geared to shaft 36.

As one contact 30 starts around the body or drum 20, the next contact 30 is frictionally and similarly moved around the drum to a point opposite shaft 36 where it is halted by stop 70 to avoid which it must be moved along shaft 36 for a minimum distance.

In Fig. 7, the surface of the cylindrical body 20 is shown diagrammatically as spread out flat. The lines 72 represent no actual element in the device but do represent possible circles on the body surface perpendicular to the body axis 22. Similarly, lines 74 represent possible straight lines on the surface of body 20 and parallel to axis 22. Let it be assumed that the longest article to be folded is one hundred and twenty inches in length. The blade 12 is positioned at a distance from the switch 52 equal to one-half the length of the longest article to be folded, in this case sixty inches. When the front edge of the one hundred and twenty inch article has gone one hundred and twenty inches beyond switch 52, it is time for the blade 12 to rise and push the center of the article up between the rolls 14 so that the latter may draw the article, doubled upon itself, up between the rolls and between the conveyors 104 and 106. The article passes along on top of conveyor 106 and may be removed therefrom by an operator. The mechanism which causes blade 12 to operate, e. g., when the one hundred and twenty inch article has passed beyond the switch 52 by one hundred and twenty inches, comprises a metallic conducting strip 78 fixed on the surface of the body 20. One end of strip 78 is electrically connected to solenoid 16. Each of the contact carriers 30 is connected electrically to one of the power mains 18 through the bearing 48 and the frame of the device. The gearing is so arranged that a contact carrier 30 moves the entire distance along shaft 36 in just the time necessary for the longest article to pass by and off from switch 52. When the forward edge of the one hundred and twenty inch article closes switch 52, the foremost contact 30 in Fig. 7 starts to move parallel to the lines 74 and has just time enough to go the entire length of one of these lines (the length of shaft 36) by the time switch 52 is opened. At that moment, solenoid 54 is deenergized. Bell crank 58 thereby operates to pull bar 26 away from the contact 28 and the latter drops away from the threads on shaft 36 so that the contact carrier 30 no longer moves parallel to the axis of the machine. At the same time, the contact starts around the periphery of body 20. As shown in Fig. 7, the contact 28 immediately contacts strip 78 to form a closed circuit for solenoid 16 which thereupon operates the folding blade 12. The contact 28 then passes beyond strip 78, the solenoid 16 is no longer operated, and blade 12 drops back to its former position. As described above, as soon as the first contact starts around the form, the next is brought up to position ready to start its motion parallel to the axis of the machine whenever the next article passes switch 52.

Strip 78 can be so shaped that no matter what the length of the article, the latter will always be folded in half. For example, if a sixty inch article starts to pass switch 52, one of the contact carriers 30 starts along shaft 36. By the time the front edge of the article reaches the blade 12, the rear edge will pass off switch 52.

The contact 30 will have moved half way along the length of the threads on shaft 36. The switch 52 will then open the circuit and contact 30 will stop its motion parallel to the axis but will immediately begin to be carried around the body 20. When the front edge of the sixty inch article has gone thirty inches beyond the blade 12, it is time for the blade to operate. Assume that the speed of rotation of the friction pulley 67 brings the contact at that instant to the point *a* on the diagram. The strip 78 must, therefore, pass through that point. It will be seen that the positions of the various points of the strip may be empirically determined for the strip.

Means are provided for folding again any already once folded article. These comprise a blade 112 positioned to push the article up off conveyor 106 and to insert it between rolls 114. The blade 112 may be operated by a solenoid 116 in circuit with another strip 80, the position of which may be determined by considering the relative speeds of the parts and the distance between blades 12 and 112. An article so folded twice may be removed from conveyors 107 by an operator.

It may be desired to fold articles of a certain length, say from fifteen to forty inches long, into three layers rather than into four or two. In that case, a conducting strip 78' may be fixedly placed on the body 20 in such position that blade 12 operates when two-thirds of the article has passed beyond that blade. A second strip 80' will cause the second blade to be operated to fold the remaining part of the article in half.

If it is desired to fold an article only in half, no strip 80 is provided. Thus, a machine built in accordance with Fig. 7 will fold articles, which are from ten to fifteen inches long, in halves only, there being no second strip beyond the portion 78'' of the first strip. Obviously, where there are no strips corresponding to any particular length article, such an article will go through unfolded.

There must be means for returning each contact, after it has left the contact strips 78, 80, etc., to the end of the device where the threads 34 begin, i. e., with the arrangement shown in Fig. 1, the bottom end. A portion of the surface of drum 20, beyond the contact strips, is cut away as at 82. When any contact arrives there, it falls under gravity along its rail 42 until it reaches the lower end of its slot 44. Mechanical means may be provided to accomplish the same end.

The operation of the device has been described in connection with the several parts.

Although it is convenient to have the first part of the path of any contact be a straight line parallel to the axis, this need not be so and where the first part of a path is not a straight line, the shape of the conducting strips may be altered to take that into account.

The timing device shown in Figs. 8–11 is similar to that described above in that there are movable contacts for completing circuits at various times in order to operate folding means. In this device, also, each moving contact is carried along a straight path for a distance proportional to the length of the article being folded at the moment and each contact is then moved along a circular path as before, but, in this case, the circular path is co-planar with the straight path, while in the device first described the circular path forms a plane perpendicular to the straight path.

In Fig. 8, 100 denotes a sprocket whereby the motion of the timer is synchronized with the motion of the conveyors of the folding machine. Gearing connects the sprocket to horizontal shaft 102 which passes through a fixed insulating disk 104 having metallic strips 106 on or flush with its surface. The strips correspond in function with strips 78, 80, etc. of Fig. 7. Two disks 108, one on each side of disk 104, are attached to and movable with shaft 102 and are of magnetic material. They operate alike in controlling the motion of the contacts 112 against the strips and only one will be further described. A non-magnetic annulus 110, for example of brass, is fixedly positioned around and co-planar with disk 108. It may be attached as a rim to disk 108 (see Fig. 11). A plurality of movable, permanently magnetized contacts 112 lie between the magnetic and the fixed disks and are supported by a part of the frame 114 which surrounds the disks. The operation of the device is as follows. An article entering the folding machine closes a switch (like switch 52 of Fig. 1). Solenoid 116 is energized and attracts armature lever 118 which pivots and presses idler 120 against measuring plunger 122. The latter comes in contact (see Fig. 10) with friction feed roll 124, geared to sprocket 100. The second solenoid and plunger shown are for the second magnetic disk and operate similarly. The plunger then tips a trip 126, allowing one contact 112 to fall into the cup on the end of the plunger. When the rear edge of the article on the folding machine passes the switch mentioned, the switch opens, solenoid 116 is deenergized, idler 120 ceases to press the plunger against roll 124, and the plunger falls, leaving the contact 112 to be carried by the magnetic disk 108 past strips 106. The contact of the strips and a contact completes respective circuits through the strips and the metallic rotating disk, too. These circuits actuate the folding mechanisms as described in connection with the device of Figs. 1–7. After a contact has contacted its last strip, it is brought against a cam surface which directs the contact back to its original support 114 where it is adjacent fixed annulus 110 or non-magnetic rim 110. When in this position, there is no force holding the contacts other than gravity. Hence, the contacts are not worn away.

The device shown in Figs. 12–14 is another form of the device of which one form is shown in Figs. 8–11. In this form there need be no magnetic disk and the contacts are not magnetic. They are each carried past the strips by one of the supports 130 frictionally engaged and rotatable with shaft 102.

A support 130 comprises a pair of parallel rods 132 generally radial to shaft 102. Each contact 112 has a pair of passageways through which one pair of rods 132 lies or loosely passes. One of each pair of rods is in contact, as it moves about shaft 102, with an arcuate electrode 134. The other rod is similarly in contact with an arcuate electrode 136 of smaller radius. Each contact 112 contains a solenoid 138 which has connections 140 to the rods and which operates a toggle 142 for jambing the rods against the contact passages to fix the contact 112 radially. The independent, subsidiary, electric circuit for fixing a contact radially comprises main 144, conductor 145, electrode 136, rod 132, connector 140, solenoid 138, connector 140, rod 132, electrode 134, and main 143. When that circuit is open, the toggle is not in effect and the contact 112 is slidable along the rods 132.

There are breaks in electrodes 134 and 136 so

that contacts which are moving around shaft 102 may have their jambing circuits closed (contacts 112 held radially in position) while the contacts which have not started around shaft 102 may have their jambing circuits open and hence be slidable radially. The end portion of electrode 134, which is disconnected from the rest of electrode 134, is independently connected to main 146 by conductor 146 which may be broken at switch 148. The result of this arrangement is that when one of the rods 132 is in contact with 134, and when the switch is open, there is no current through solenoid 138 and the contact 112 is movable along those rods. At the same time, another contact 112 on a moving rod is held fixed on that rod by the activated solenoid. The area of the rods against electrodes 134 and 136 is large enough to bridge the breaks which are so close to starting position of the rods that one pair will have crossed the breaks before another pair has reached the starting position.

The operation of the device is as follows. An article on the folder passes and closes switch 52. This operates solenoid 54 which causes plunger 122 to rise and push contact 112 toward shaft 102. Simultaneously, solenoid 54 opens switch 148, opening the circuit through solenoid 138 so that contact 112 is free to slide along its rods 132. When the article leaves switch 52, it opens again, causing plunger 122 to fall away from knob 150, freeing it, contact 112, and rods 132, which latter are connected frictionally with shaft 102, to rotate about shaft 102. Brush 152 of contact 112 is available to contact the strips 106 whereupon the various folding mechanisms are set in play as described in connection with Fig. 7. While contact 112 is in contact with strips 106, the electrical circuit is through conductor 145, electrode 136, rod 132, electrode 134, the folder mechanisms and back to conductor 145. When the rods leave electrodes 134 and 136, the circuit through solenoid 138 is broken, toggle 142 is inoperative, and gravity pulls contact 112 back to its starting position.

Figs. 15 and 16 show a modification of the last described device wherein the jambing of the contact on the rod 132 is entirely mechanical. There is but one rod for each contact 212. Pivoted to contact 212 is an element 254 through which, and through the contact, the rod 132 extends loosely. A spring 256 between the contact and element 254 holds them in a position to bind against rod 132 whereby they are fixed against the rod. Plunger 122 has a cam surface 258 which pivots element 254 against the action of spring 256. The contact and element are no longer bound against rod 132 and are free to be slid thereagainst by the force of plunger 122. A permanently positioned cam 226 similarly releases the bind between contact and element, after the contact has passed by electrodes 134, so that gravity may here too bring the contact back to its starting point at the end of rod 132.

The device shown in Fig. 17 comprises a supporting frame of four uprights 300 which carry a table 302 which is a section of a right circular cylinder. They also carry a shaft 304 positioned along the axis of the table. A pair of arms 306, fixed to shaft 304, extend beyond the table and carry between their outer ends a rod 308 having a spring clasp 310 thereon. A pivoted pedal 312 at either end of the machine may be moved by the person running the machine. It is connected by linkage 314 both to the clasp 310 and arms 306. The linkage is such that a motion of the pedal first shuts the clasp and then moves the arms 306 away from their normal central position.

There is at least one slot 316 in the table and perpendicular to shaft 304. A bar 318 lies under the table and parallel with its axes and is carried by arms 320 which are rotatable about shaft 304 and connected by linkage 322 to arms 306 in such fashion that they move in one direction from an upright position at the same speed that arms 306 move in the other direction. When arms 306 and 320 are upright, the machine is in neutral and a general switch 324 may be held open by any convenient part such as linkage 322.

An article to be folded is attached at its forward end to clasp 310 and the rod 308 is pushed away from the operator. That motion may be brought about (1) by moving pedal 312 or (2) automatically upon the closing of the clasp or (3) by hand. Simultaneously, bar 318 moves backward until it meets the rear end of the article. When the article is first laid over the slot 316 and the first motion of arms 306 connect the main switch 324, a light 326 in rod 308 shines through slot 316, is reflected from the under surface of the article, and enters photoelectric cell 328 to get in readiness a clock-operated switch mechanism 330. When the trailing edge of the article passes off the cell 328, the latter ceases to function and thereby causes mechanism 330 to begin to act. At this moment, since arms 306 and 320 move with the same speed, the mid-point of the article is at the starting point of those arms. Mechanism 330 starts motor 332 which, through linkage 334, pushes connecting rod 336 and so rotates arms 338 about shaft 304. A bent rod 340 is rotatably held in the outer ends of arms 338 and normally held as far as possible above table 302 by spring 342. When arms 338 have reached vertical position (or slightly beyond—to take into account the time of action of these arms), cams 344 rotate rod 340 down so as to tightly press the mid-point of the article against the table.

At about the same time, but determined by mechanism 330, solenoid 346 begins to pull linkage 348 whereby levers 349 are pulled, drawing with them arms 350 by means of links 351 so as to rotate about shaft 304. The levers 349 carry at their ends a stiff apron 352 above table 302. Arms 350 normally are at the far end of the machine and the apron extends back toward the top or center of the machine and from side to side. The apron pushes between clasp 310 and rod 340, pulling the front end of the article from the former and folding it back over the rod 340.

The extent of the motion of the apron is governed by extent of the motion of linkage 348 and that in turn is controlled by the solenoid-operated rod 347. The latter's motion is limited by a cam 349a on shaft 304. The farther rod 308 must be pushed before the mid-point of the article is at the mid-point of the table, i. e., at the starting point of arms 306, the more of the article there is to be folded back and the farther the apron 352 must push. Cam 349a turns with arms 306 and is so shaped that the farther they go the farther rod 347 may go and so the farther apron 352 may go.

The article has now been folded in two. Lever 312 may be released. Arms 306 come back to neutral, shutting off the main switch and the other parts return to their neutral positions. The folding apron is equivalent in result to a fold-

ing blade for pushing the article double between two rolls.

The machine shown in Fig. 17 may also be adjusted so as to fold an article into three layers. Linkage **322** is connected to each of the arms **320** at a point half as near to shaft **304** as in the case of a single fold. This results in bar **318** moving twice as fast in one direction as does rod **308** in the other. Hence, the latter comes out from under the rear edge of the article when that rear edge is twice as far from the table mid-point as is the leading edge. Therefore, rod **340** overlays the article at one-third its length and apron **352**, by moving over it, causes the first fold there.

Next, the linkage **334** is caused, by the connecting rod **335** connecting it to motor **332**, to reverse direction and draw rod **340** out of the first fold. After it has returned to its starting point, it is carried forward again, first under the rear end of the article and then over the apron so as to fold the last third of the article over the edge of the apron which has stopped (by cam **349***a*) as far beyond the table mid-point as the rod **308** went on the other side. The pedal may then be released and the entire machine comes to rest.

It will be seen that rod **340** makes two complete sweeps back and forth for one sweep back and forth of the apron **352**. While the rod **340** is forward the first time, it overlies the article so that the apron can make the first fold. Then the rod returns to its starting position at the end of the machine. The second sweep forward begins with the rod close to the table so as to be under and to pick up the rear end of the article and continues with the rod elevated slightly more above the table so as to pass over to fold the article over the apron which has not returned to its starting position. The starting positions of rod **340** and the apron are shown in Fig. 17. Rod **308** and bar **318** are there shown as just having left their starting positions.

The mechanism next described is the second stroke which causes the rod **340** to be pressed upon the table only during the starting portion of its second sweep forward. Its forward and backward motion is caused by connecting rod **335**. Gearing **354**, run by motor **332**, gives cam **356** one revolution while the end of connecting rod **335** is carried twice about a circle. Pivoted cam **358** has one end in contact with cam **356** and the other end lying along the edge of the table at the starting point of the path of the end of pivotable rod **340**. With every second swing forward of the rod **340**, cam **358** swings into the path of the end of the rod and depresses the rod, whereby the latter is brought into contact with the surface of the table so as to get under the trailing edge of the article to be folded over the apron **352**. Normally rod **340** is held above the table surface by the spring **342**.

A spring **360** is positioned from the frame of the machine to the lever **350** to return the same to its starting point after the operation is complete. At this final stage, a lever **361** may now make a fourth fold by rotating 180 degrees and pressing the already folded article between the folding rollers **362** onto the carry-off conveyor **363** to the stacking machine.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a timing device for a machine for folding articles, the combination comprising an element, means for moving said element along a two-directional path for a distance which is a function of the length of an article to be folded, and folding means set in operation by said element at the end of said path and adapted for folding said article, said path lying on a cylindrical surface and including a portion parallel to the axis of said cylinder and a circumferential portion.

2. In a device for folding articles, the combination comprising a contact element free to move parallel to a predetermined line, a spirally grooved shaft having an axis parallel to said line and rotatable about said axis, a surface of said element being formed to mesh with the grooves of said shaft, means for causing said surface and said shaft to engage, and means for moving said contact element around said line.

3. In a device for folding articles, the combination comprising a contact element free to move parallel to a predetermined line, a spirally grooved shaft having an axis parallel to said line and rotatable about said axis, a surface of said element being formed to mesh with the grooves of said shaft, means for causing said surface and said shaft to engage, means for moving said contact element around said line comprising track means parallel to said shaft for said element to move in, and an arm radial to said line and supporting said track means.

4. The combination in a timing mechanism, with a rotary contact carrier and a support provided with a fixed contact adjacent the path of said carrier, of a contact button movable relative to and by said carrier, electric circuits connected with said fixed contact and with said button, a button shifting device spaced radially from said carrier, means for moving said button radially on said carrier into operative relation with said device, and means for rotating said carrier when a button is released from said device, whereby said button completes an electrical circuit through said fixed contact.

5. In a timing device, a fixed cylinder, a fixed electrical contact thereon, a carrier including a bar parallel to the axis of said cylinder, an electrical contact button slidable along said bar and adapted to engage said fixed electrical contact, means engageable with said button for sliding it along said bar, means controlled by an article to be folded for causing actuation of said last named means, and means for rotating said carrier about said cylinder when said button is disengaged from said button sliding means, whereby to carry said button into engagement with said fixed contact.

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