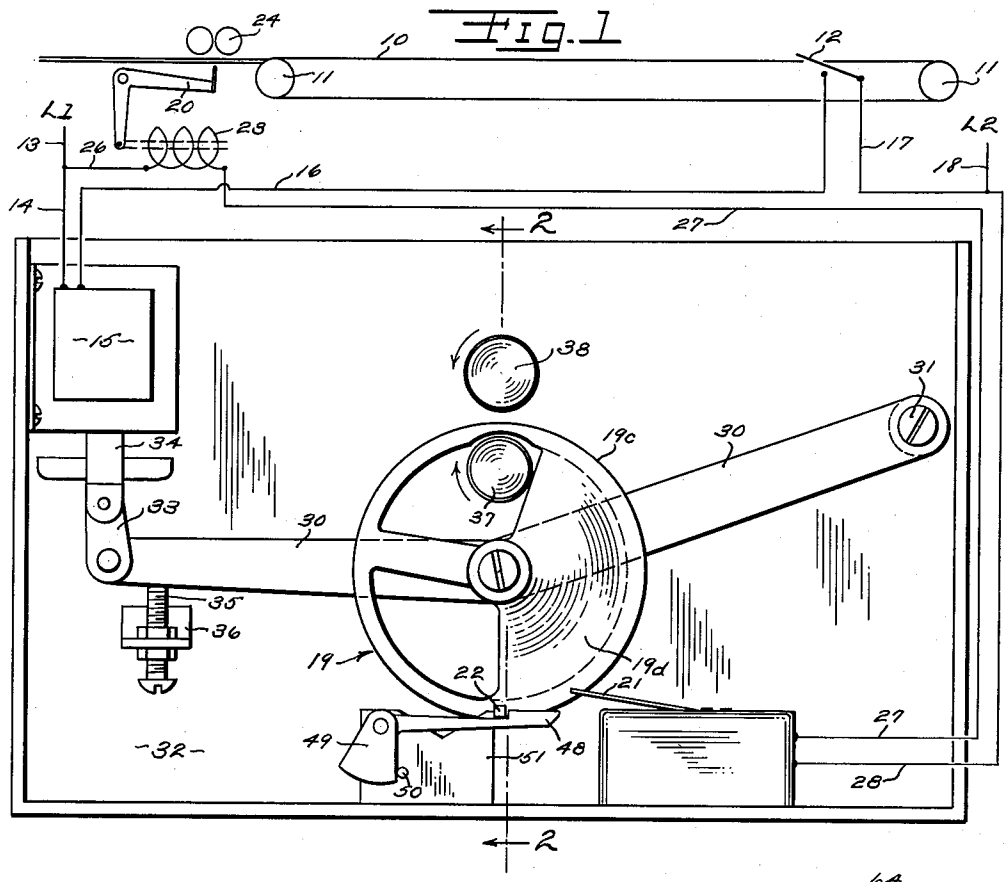
May 1, 1956 J. R. PETRE 2,743,920

PROPORTIONAL MEASURING TIMER

Filed Dec. 19, 1952

Fig. 1



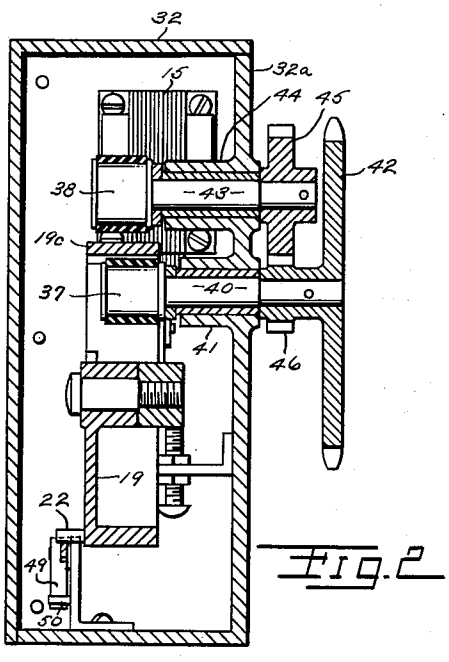


Fig. 2

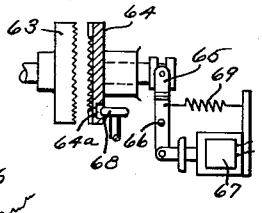


Fig. 4

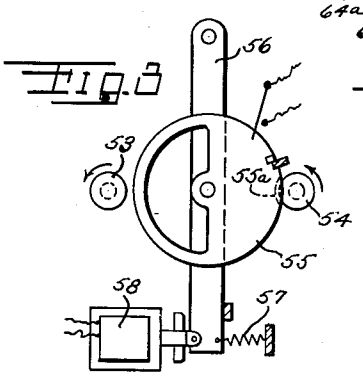


Fig. 3

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United States Patent Office 2,743,920 Patented May 1, 1956

2,743,920

PROPORTIONAL MEASURING TIMER

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Application December 19, 1952, Serial No. 326,943

11 Claims. (Cl. 270—80)

This invention relates to improvements in proportional measuring timers such as are used to control the performance of an operation on a traveling article at a point proportional to the length of the article, such as the half point or the quarter points. It is particularly applicable to the control of folding operations on traveling laundry articles such as sheets, towels or the like.

Referring for the time being to laundry folding operations, but being mindful of the fact that there are other useful adaptations, those skilled in the art are now familiar with the fact that mechanisms are being manufactured and used for controlling the performance of folding operations on a traveling series of flatwork articles often varying in length. Some of these mechanisms were of somewhat complex electrical character, requiring the use of one or more electronic tubes and associated resistors, capacitors, and necessary electrical circuit elements, so that specially trained service men were needed for installation, adjustment, or repair. Others were mainly mechanical in type but required the movement of special timing arms traveling at different speeds, said arms being started and stopped at critical times, with driving means which had to be moved into and out of driving engagement with driven means by cams, springs, etc., when a measuring or timing operation was completed. Since all such devices required driving of a timing member at speeds which are varied at the expiration of measured times in the operation, clutching means were engaged or disengaged by outside forces, the clutching operation being sometimes dependent on positive interlock, and sometimes on a continuous frictional engagement periodically rendered inoperative by a positive stop, or a positive interlock which predominated over the frictional engagement.

An object of the present invention is to provide a timer wherein the cessation of timing member rotation at zero position is effected without an external releasing action or a slipping engagement.

A further object of the invention is to provide for actuation of the driven member by a plurality of driving members, in predetermined sequence, and by means of a peripheral engagement of planetary type which terminates at the zero position by automatic disengagement between the driving and driven members entirely as a result of a discontinuity of one of the engaging surfaces, normally that of the driven member.

A further object of the invention is to provide a timer which is of simple sturdy construction, manufactured from conventional structural parts, readily assembled or serviced by any mechanic, although not likely to get out of working order.

Other objects and advantages will be apparent from a study of the following description, in conjunction with the accompanying drawings in which:

Fig. 1 is a front elevational view of the timer with a diagrammatic showing of electric circuits, a work conveyor and a folding mechanism.

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1.

Figs. 3 and 4 are fragmentary views showing modified embodiments of the invention.

Speaking first generally, my timer includes a driven member which operates a switch at the completion of a timed operation to effect a folding operation at a proportional point on a traveling article. It also includes two driving members adapted in turn to be brought into driving contact with the driven member to drive said driven member at respectively different speeds, related to the speed of travel of the article whereby the aforesaid switch is actuated when the folding line of the article comes to registry with the folding member. This general method of operation is known in the art, but the presently disclosed apparatus is novel, and represents a distinct improvement over previously known apparatus.

Referring now to Figs. 1 and 2, with more specific reference at the start to Fig. 1, I show an endless conveyor **10** rotatable around supporting rolls **11**. Adjacent to the top flight of the conveyor is an electric switch **12** adapted to be operated by the leading edge of a laundry flatwork article traveling from right to left on the top flight of the conveyor. This closes a circuit L1 through conductors **13** and **14**, a solenoid **15** and conductors **16**, **17** and **18** to L2. As will appear this causes a timing wheel **19** to be rotated at a speed bearing a proportional relation to the speed of the travelling article. When the trailing edge of the article passes switch **12** it permits opening of the switch (which is biased to open position) thereby de-energizing solenoid **15**, whereupon timing wheel **19** is caused to travel at the same linear rate as that of the moving article, as will appear. When the folding line of the article comes to registry with folding blade **20**, a switch **21** is closed by a finger **22** on timing wheel **19**, thereby closing an electric circuit to solenoid **23** to operate blade **20** which inserts the article between folding rolls **24** as is customary.

The circuit for operation of the solenoid **23** is as follows: from L1, through conductors **13** and **26**, solenoid **23**, conductor **27**, switch **21** now closed, and conductors **28** and **18** to L2.

The construction and operation of the mechanical elements of the apparatus is as follows:

The switch **21** is responsive, eventually to the rotation of the timing wheel **19** as already explained. The timing wheel is carried on a swingable arm **30** pivoted at **31** on the wall of a housing **32**. The swinging end of the arm is connected by a link **33** to the armature **34** of solenoid **15**. Movement of the arm downwardly is limited by a stop consisting of a set screw **35** adjustable in a bracket **36** attached to housing **32**. The timing wheel is the driven member adapted to be rotated either by driving member **37** or driving member **38** which are respectively contactable either with the inner periphery or the outer periphery of the wheel flange **19***a*, as best shown in Fig. 2. When the wheel is in the upper position it is driven by driver **38**, and when in the lower position by driver **37**. In the position shown in Fig. 1 the timing wheel is down, but there is a cut-away portion **19***a* of the wheel flange in registry with driver **37** so that even though driver **37** is rotating clockwise, as indicated by the arrow on the drawing, the timing wheel is idle. As will appear, initiation of rotation of the timing wheel from the position shown is achieved by lifting arm **30** so that wheel **19** contacts driver **38** which is rotating counterclockwise.

Drivers **37** and **38** have a frictional type facing or tire, such as rubber or long wearing composition material, although the facing could be on the flange **19***c* of the timing wheel.

Driver **37** is the full speed element, while driver **38** drives at a fractional speed, in this case one-half speed. Driver **37** is fixed to a shaft **40** which is journalled in a bored boss **41** in wall **32***a*. Pinned to shaft **40** is a

sprocket wheel 42 which is preferably chain driven from the endless conveyor drive so as to always bear a direct relationship thereto.

Driver 38 is fixed to a shaft 43 which is journalled in a bored boss 44 in wall 32*a*. Pinned to shaft 43 is a gear 45 which is in mesh with a pinion 46 integral with sprocket 42. The relationship between gear 45 and pinion 46 is such, having in mind the dimensional relationship of the outer periphery of flange 19*a* to its inner periphery, that driver 38 drives timer 19 at one half the rate of driver 37. As will be seen, this arrangement rotates shafts 40 and 43 in opposite directions, which is proper in view of the application of driving torque by drivers 37 and 38 to the wheel flange.

The operation of the apparatus is as follows. Assume a flatwork article to be moving from right to left on the top flight of conveyor 10. Its leading edge depresses switch armature 12 and energizes solenoid 15 as previously described. Solenoid armature 34 lifts link 33 and arm 30 so as to establish driving contact between driving wheel 19 and driver 38 so that the wheel begins to rotate clockwise at one half speed. As long as the article is passing switch 12 the switch remains closed and solenoid 15 remains energized, thereby effectively constituting a measuring of article length. When the trailing edge of the article breaks contact with switch 12, solenoid 15 is de-energized, arm 30 falls by gravity to its low position, and driver 37 takes over the drive of timing wheel 19, which now rotates at full speed.

When finger 22 is advanced to contact with switch 21, solenoid 23 is energized, as previously described, and folding blade 20 is operated to effect the folding operation. Spacing of the finger on the wheel is pre-arranged so that the folding operation takes place when the fold line of the article comes to registry with blade 20.

Rotation of timing wheel 19 continues until finger 22 passes the stop shoulder of a latch finger 48 which is biased upwardly in any suitable way, such as by counterweight 49, which stops against pin 50 in the position shown. It will be observed that wheel 19 has a solid portion 19*d* which tends to bias the wheel and pin 22 to the position shown. In such position pin 22 abuts the stop 51, and prevents further advance rotation of timer wheel 19 until solenoid 15 is again energized by the next succeeding article. Latch 48 is not essential, but it insures a correctly maintained zero position.

The apparatus just described avoids the necessity of a continuous slip clutch drive, or an alternating positive clutch and a slip clutch drive, or two positive clutch drives. The timer merely rotates to a position in which it automatically breaks contact with the half speed drive.

For a proportional fold at another point, such as the one-third point, the speed of driver 38 will be varied proportionally, by a change of gearing or otherwise.

Fig. 3 illustrates a modified peripheral drive wherein either of the drivers 53 and 54 engage the outer periphery of the timer wheel 55 depending on the respective position of the arm 56. The lower end of the arm is biased to the right by spring 57 but it may be drawn to the left by energization of solenoid 58. In this embodiment there should be an axial displacement of one of the drivers so that it will come to registry with the cut-out part 55*a* of the wheel, whereas the wheel's outer surface is continuous with respect to the peripheral track in registry with the other driver. As shown in Fig. 3 the timer has arrived at idle position with the finger 29 in contact with stop 60.

Figure 4 is included to show that the broken-periphery drive may be employed in the full speed position in conjunction with an axially aligned positive clutching proportional driver 63. As shown, the timer wheel 64 is movable axially by the yoke 65 pivoted at 66 and responsive to solenoid 67. The discoidal driver 68 drives by contact with the right side face of the driven wheel 64. The cut-away depression 64*a* in this embodiment is in the said right side face, the position shown being the idle one. Energization of the solenoid 67 moves the timing wheel 64 to the left until the clutch teeth engage to achieve the first or fractional speed increment of the drive. De-energization of solenoid 67 permits spring 69 to establish driving engagement between driver 68 and wheel 64 to achieve the full speed increment of the drive.

While I have shown a single timing unit to control a single operation, two operations would obviously require two timing wheels independently mounted and having suitable proportional speed drivers. Sequential operation of a plurality of timing units can be had by any of the well known sequence controls.

What I claim is:

1. In apparatus of the type wherein operating means performs an operation proportionate to article length on each of a series of articles moving in succession on a conveyor towards and past said operating means, trip means adjacent said conveyor and adapted to be actuated by passage of each said article thereby, timing control means including a rotatable driven member, said driven member having a first and a second concentric peripheral driven surface, a first driving member, means for rotating said first driving member continuously at a speed in ratio to the speed of said conveyor, a second driving member, means for rotating said second driving member continuously at a speed differing from that of the first driving member, said driving members being rotatable on fixed axes, means responsive to passage of the leading edge of an article past said trip means for moving said driven member to produce a first driving engagement between said first driving member and the first driven surface of said driven member whereby to start said driven member from a rest position, means responsive to travel of the trailing edge of an article past said trip means for terminating said first driving engagement and for moving said driven member to institute a second driving engagement between said second driving member and said second driven surface of said driven member, actuating means carried by said driven member, means effective on said operating means and operatively responsive to said actuating means for causing operation of said operating means, said second peripheral driven surface having a cut away discontinuity therein at idle position whereby, when said discontinuity comes to registry with said second driving means, said second driving engagement is terminated.

2. Apparatus as defined in claim 1 wherein positive stop means is provided for holding said driven member in rest position, and means for disengaging said positive stop means at the beginning of said first driving engagement.

3. In apparatus of the type wherein operating means performs an operation proportionate to article length on each of a series of articles moving in succession on a conveyor towards and past said operating means, trip means adjacent said conveyor and adapted to be actuated by passage of each said article thereby, timing control means including a rotatable driven member having a circumferential flange with an outer peripheral surface and an inner peripheral surface, a first driving member mounted adjacent said outer surface for rotating said first driving member continuously at a speed in ratio to the speed of said conveyor, a second driving member mounted adjacent said inner surface, means for rotating said second driving member continuously at a speed differing from that of the first driving member, means responsive to passage of the leading edge of an article past said trip means for producing first driving engagement between said first driving member and said driven member whereby to start said driven member from a rest position at a first speed, means responsive to travel of the trailing edge of an article past said trip means for terminating said first driving engagement and for instituting a second driving engagement at a second speed between said driven member and said second driving member, said second

driving engagement being along a peripheral path around the axis of rotation of said driven member, actuating means carried by said driven member, means effective on said operating means and operatively responsive to said actuating means for causing operation of said operating means, said peripheral path along said inner surface having a cut away discontinuity therein at idle position whereby, when said discontinuity comes to registry with said second driving means, said second driving engagement is terminated.

4. Apparatus as defined in claim 3 wherein positive stop means is provided, engageable with said driven member in said rest position, and means for disengaging said positive stop means at the beginning of said first driving engagement.

5. In apparatus of the type wherein operating means performs an operation proportionate to article length on each of a series of articles moving in succession on a conveyor towards and past said operating means, trip means adjacent said conveyor and adapted to be actuated by passage of each said article thereby, timing control means including a rotatable driven member having a circumferential flange with first and second peripheral driven surfaces thereon, a first driving member mounted adjacent said first driven surface, means for rotating said first driving member continuously at a speed in ratio to the speed of said conveyor, a second driving member mounted adjacent said second driven surface, means for rotating said second driving member continuously at a speed differing from that of the first driving member, means responsive to passage of the leading edge of an article past said trip means for producing first driving engagement between said first driving member and said first driven surface whereby to start said driven member from a rest position at a first speed, means responsive to travel of the trailing edge of an article past said trip means for terminating said first driving engagement and for instituting a second driving engagement at a second speed between said second driving member and said second driven surface, said second driving engagement being along a peripheral path around the axis of rotation of said driven member, actuating means carried by said driven member, means effective on said operating means and operatively responsive to said actuating means for causing operation of said operating means, said peripheral path having a cut away discontinuity therein at idle position whereby, when said discontinuity comes to registry with said second driving means, said second driving engagement is terminated.

6. Apparatus as defined in claim 5 wherein positive stop means is provided, engageable with said driven member in said rest position, and means for disengaging said positive stop means at the beginning of said first driving engagement.

7. In apparatus of the type wherein operating means performs an operation proportionate to article length on each of a series of articles moving in succession on a conveyor towards and past said operating means, trip means adjacent said conveyor and adapted to be actuated by passage of each said article thereby, timing control means including a rotatable driven member having upon its circumferential periphery first and second peripheral driven surfaces, a first driving member rotating continuously adjacent said first driven surface, means for rotating said first driving member at a speed in ratio to the speed of said conveyor, a second driving member rotating continuously adjacent said second driven surface, means for rotating said second driving member at a speed differing from that of the first driving member, means responsive to passage of the leading edge of an article past said trip means for producing first driving engagement between said first driving member and said first driven surface whereby to start said driven member from a rest position, means responsive to travel of the trailing edge of an article past said trip means for terminating said first driving engagement and for instituting a second driving engagement between said second driving member and said second driven surface, said second driven surface being along a peripheral path around the axis of rotation of said driven member, actuating means carried by said driven member, means effective on said operating means and operatively responsive to said actuating means for causing operation of said operating means, said peripheral path having a cut away discontinuity therein at idle position, whereby when said discontinuity comes to registry with said second driving means, said second driving engagement is terminated.

8. Apparatus as defined in claim 7 wherein positive stop means is provided, engageable with said driven member in said idle position, and means for disengaging said positive stop means at the beginning of said first driving engagement.

9. In apparatus of the type wherein operating means performs an operation proportionate to article length on each of a series of articles moving in succession on a conveyor towards and past said operating means, trip means adjacent said conveyor and adapted to be actuated by passage of each said article thereby, timing control means including a rotatable driven member having first and second driven surfaces, said first driven surface consisting of a clutch face and said second driven surfaces consisting of a peripheral track, a first driving member, means for rotating said first driving member continuously at a speed in ratio to the speed of said conveyor, a second driving member, means for rotating said second driving member continuously at a speed differing from that of the first driving member, means responsive to passage of the leading edge of an article past said trip means for producing first driving engagement between said first driving member and said first driven surface whereby to start said driven member from a rest position, means responsive to travel of the trailing edge of an article past said trip means for terminating said first driving engagement and for instituting a second driving engagement between said second driving member and said second driven surface, said second driven surface being along said peripheral path around the axis of rotation of said driven member, actuating means carried by said driven member, means effective on said operating means and operatively responsive to said actuating means for causing operation of said operating means, said peripheral path having a cut away discontinuity therein at idle position whereby, when said discontinuity comes to registry with said second driving means, said second driving engagement is terminated.

10. Apparatus as defined in claim 9 wherein positive stop means is provided, engageable with said driven member in said idle position, and means for disengaging said positive stop means at the beginning of said first driving engagement.

11. In apparatus of the type wherein operating means performs an operation proportionate to article length on each of a series of articles moving in succession on a conveyor towards and past said operating means, trip means adjacent said conveyor and adapted to be actuated by passage of each article thereby, timing means including a rotatable driven member having a first and a second concentric driven surface, a first driving member, means for rotating said first driving member continuously at a speed in ratio to the speed of said conveyor, a second driving member, means for rotating said second driving member continuously at a speed differing from that of the first driving member, means responsive to passage of the leading edge of an article past said trip means for moving said driven member to produce a first driving engagement between said first driving member and the first driven surface of said driven member whereby to start said driven member from a rest position, means responsive to passage of the trailing edge of an article past said trip means for terminating said first driving engagement and for moving said driven member to institute a second

driving engagement between said second driving member and said second driven surface of said driven member, actuating means carried by said driven member, means effective on said operating means and operatively responsive to said actuating means for causing operation of said operating means, said second driven surface having a cut-away discontinuity therein at idle position whereby, when said discontinuity comes to registry with said second driving means, said second driving engagement is terminated.

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