Sept. 22, 1953 F. J. QUINN 2,652,745

DIRECT READING PROJECTION CLOCK APPARATUS

Filed Nov. 7, 1950 2 Sheets-Sheet 1

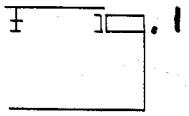
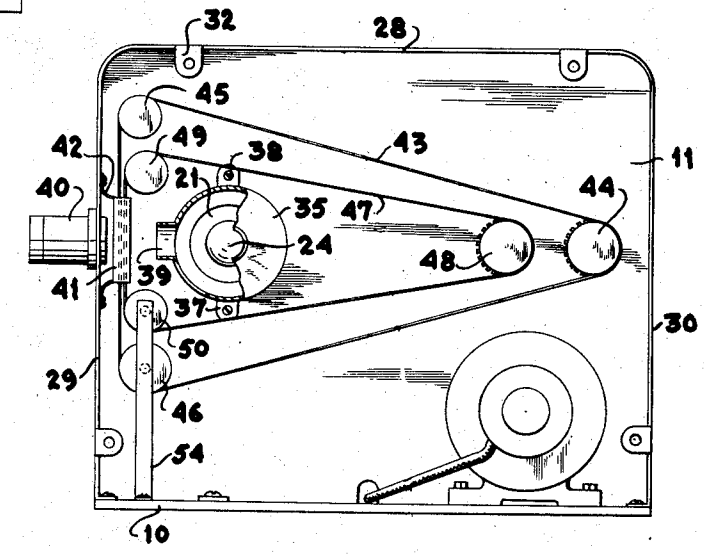


FIG. 1



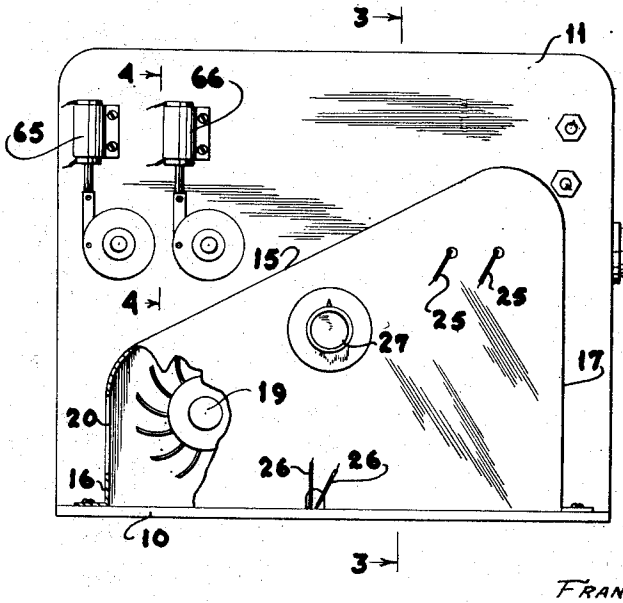


FIG. 2

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DIRECT READING PROJECTION CLOCK APPARATUS

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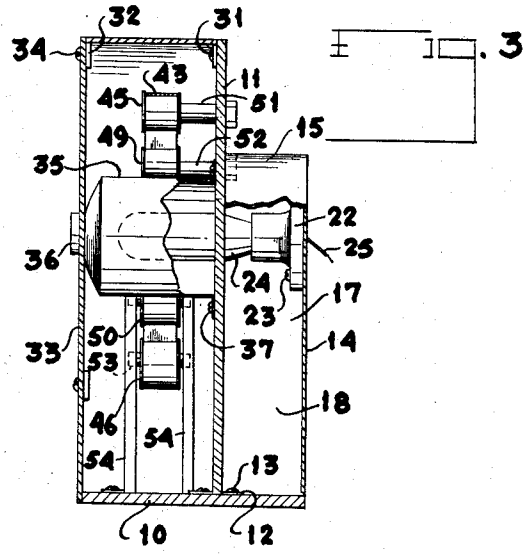


FIG. 3

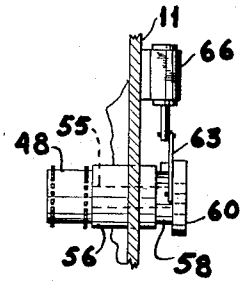


FIG. 4

FIG. 5

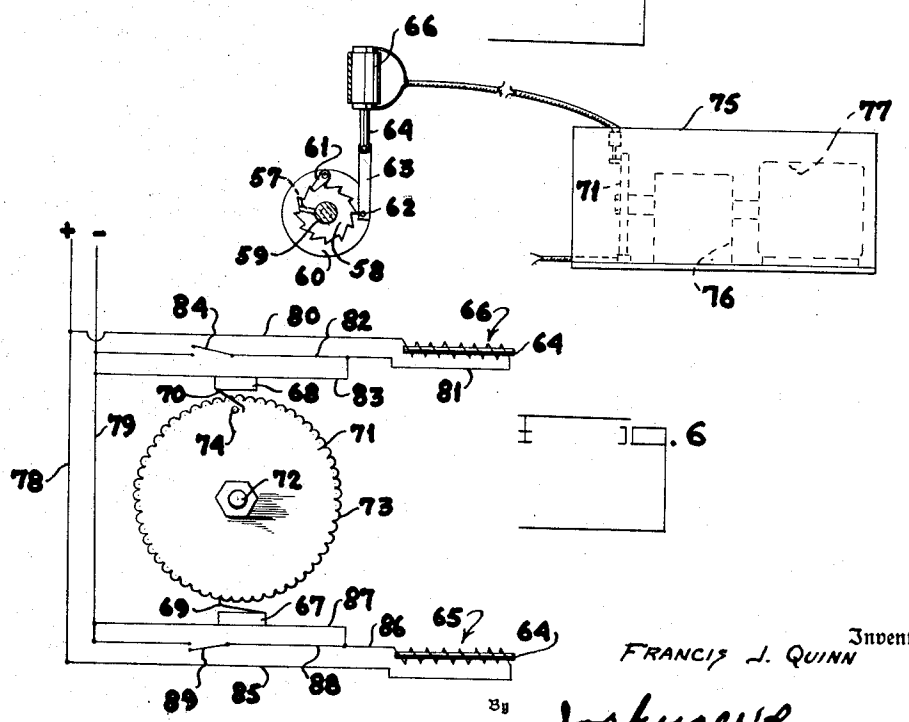


FIG. 6

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DIRECT READING PROJECTION CLOCK APPARATUS

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9 Claims. (Cl. 88—24)

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The present invention relates to a projection clock and is concerned primarily with a clock of this type which is peculiarly adapted to convey an advertising message along with the indication of time.

At the present time proprietors of certain mercantile establishments utilize clocks which convey to the public an indication of the correct time. The advertising effect of such practice is somewhat indirect, and this invention has in view as an important objective the provision of a projection clock which is peculiarly adapted to convey an advertising message with each indication of time.

Another highly important object of the invention is the provision of a projection clock of a new and improved type. More in detail, the invention has in mind the provision of a projection clock which includes as a characteristic feature two endless strips of film, together with appropriate actuating mechanism therefor. One of these film strips carries the hourly designations, while the other is marked off to give the minute designations. The two strips pass through a single picture framing device and the image which is projected therefrom is a composite result of the two films. Thus, the mechanism of the clock itself is highly simplified and its operation rendered sure and certain. In accordance with this invention either one or both of these film strips may carry an advertising message along with each time indication.

Another highly important object of the invention is to provide, in a projection clock of the type indicated, new and improved actuating mechanism for the film strips. Such mechanism consists essentially of a driving sprocket for each film strip. Drivably connected to each sprocket is a ratchet, and associated with each ratchet is a drive wheel having a pawl cooperating with the ratchet teeth. A solenoid is provided for each drive wheel and the solenoids are mounted with their plungers in vertical position. Each plunger is connected to its respective drive wheel by a link. When the plunger is energized the drive wheel is moved a predetermined angular distance to drive the ratchet and sprocket associated therewith, thus moving the respective film strips. When the solenoid is deenergized the plungers fall under gravity action and return the drive wheels to their initial position, during which movement the pawls freely ride over the ratchet teeth.

Another important object is to provide, in a projection clock of the type indicated, a cam device for energizing the respective solenoids at appropriate intervals. The cam device consists essentially of a cam having cam elements on its periphery for the minute film strip and another cam element on its face for the hour strip. This cam is driven from a self-starting synchronous motor of a type well known in the clock art, through a gear reduction unit.

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An important feature of the invention resides in the fact that the cam, gear reduction unit and synchronous motor may be assembled as an individual unit which may be either included as a part of the projection unit or removed therefrom. With the latter arrangement the cam unit may be located at a place where it is conveniently accessible, with the projection unit itself located in a more remote position.

Still another object of the invention is to provide, in a projection clock of the type indicated, a cam assembly for energizing the solenoid which includes individual manually operable switches which may be operated to close the circuit to either of the solenoids at the will of the operator and entirely independent of the operation of the timing motor. With this arrangement, the clock may be accurately set as to time, and on those occasions when the film strips are employed to carry advertising messages alone without the time readings, the switches may be operated to change the advertising message that is projected, at the will of the operator.

Still another somewhat more detailed object of the invention is to provide, in a projection clock of the character indicated, simplified means for maintaining the film strips under the required degree of tension. In carrying out this idea, the film strips are mounted in a vertical position, one within the other. Each film strip passes over a driving sprocket, a fixed pulley that is positioned above the picture frame, and a movable pulley below the picture frame. Each movable pulley is appropriately guided and is either suitably weighted or spring-biased to take up tension in the respective film strip.

Various other more detailed objects and advantages of the invention, such as arise in connection with carrying out the above noted ideas in a practical embodiment, will in part become apparent and in part be hereinafter stated as the description of the invention proceeds.

The invention therefore comprises a direct reading projection clock which consists essentially of conventional projection apparatus, together with two vertically positioned film strips which pass through a common picture frame be-

tween the lens and lamp of the projection apparatus. One of these film strips carries hourly designations, while the other carries minute designations. Either or both of the film strips carry an advertising message. Movable rollers are suitably biased to take up tension in the film strips, and the latter are driven by sprocket wheels which are in turn actuated by the plungers of vertically positioned solenoids. The solenoids are energized through the medium of microswitches which are closed by a cam that is driven from a synchronous timing motor or by manually operable switches at the will of an operator.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawings, wherein:

Figure 1 is a view in side elevation of a direct reading projection clock which is designed in accordance with the precepts of this invention with a side panel removed and with certain parts broken away and shown in section;

Figure 2 is a view in side elevation looking in the direction opposite from that from which Figure 1 is taken;

Figure 3 is a longitudinal vertical section taken about on the plane represented by the line 3—3 of Figure 2;

Figure 4 is a detailed showing, partly in section and partly in elevation, taken about on the plane represented by the line 4—4 of Figure 2;

Figure 5 is a view in side elevation of one of the solenoids, drive wheel and ratchet associated therewith, and represents the cam and associated instrumentalities diagrammatically; and

Figure 6 is a diagrammatic representation of the circuits to the solenoids and cam associated therewith.

Referring now to the drawings wherein like characters of reference indicate corresponding parts, and first more particularly to Figure 3, the clock of this invention is shown as comprising certain projection apparatus, film strips and actuating mechanism therefor which are mounted on a base plate **10**. Upstanding from the base plate **10** is a central casing panel **11** which may be secured to the base plate in any preferred manner, such as by feet **12** which are secured to the base plate by screws **13**.

Also carried by the base plate **10** is a casing made up of a side wall **14**, an inclined top wall **15**, a short end wall **16**, and a long end wall **17**. This casing, together with the panel **11**, defines a chamber **18** which receives a fan such as represented at **19** in Figure 2, for air circulation purposes. The end wall **16** is formed with an air intake opening **20**, while the panel **11** is formed with an opening at **21** through which air is exhausted from the chamber **18**. A detailed construction of the fan **19** is not herein described nor illustrated in detail. Fans of this type are well known as such and ordinarily include an electric motor for driving purposes.

Carried by the side wall **14** is a lamp base **22** which may be secured thereto in any preferred manner such as by the screws indicated at **23**. This lamp base **22** carries a lamp **24** which extends through the opening **21** to the other side of the panel **11**. The lamp **24** is an electric lamp as is well known in this art and is energized by wires shown at **25**. The motor for the fan **19** receives current from wires shown at **26** in Figure 2 and both of these circuits are controlled by a common switch represented at **27**. When this switch **27** is moved to circuit closing position the lamp **24** is illuminated and the fan **19** started into operation.

A main casing made up of a top wall **28**, a front end wall **29**, and a rear end wall **30**, is anchored to the face of the panel **11** opposite to the chamber **18**. This anchorage may be achieved in any preferred manner, such as by the flanges and screw fastening elements indicated at **31**. This casing **28, 29, 30** carries on its outer free edge a plurality of inwardly turned tabs **32**. A side casing wall **33** is removably secured to the casing by screw fastenings **34** and the tabs **32**.

A lamp housing **35** has a reduced end **36** which is received in an opening in the casing wall **33**. This lamp housing **35** encompasses the lamp **24** with the cylindrical wall of the lamp housing in spaced relation to the lamp. It carries outwardly extending tabs **37** which are secured to the panel **11** with screws **38** and which serve to secure the lamp housing in position. The lamp housing **35** is formed with a light passage at **39** which confronts the front wall **29**.

The front wall **29** carries an appropriate optical device or lens represented at **40**. Optical devices of this type are well known in the light projection art and need not be described in detail. The optical device **40** is in alignment with the light passage **39**. A picture frame **41**, such as is well known in the projection art, is supported by a bracket **42** from the inner face of the front wall **29** and is interposed between the light passage **39** and lens **40**. The film strips, about to be described, pass through this picture frame **41**. The image which is projected from the lens **40** is the composite result of what appears on these film strips in the frame **41**.

The minute film strip is designated **43**. It is an endless strip of film which passes over a driving sprocket **44**, a fixed outer idler pulley **45**, and a movable idler pulley **46**. An hourly film strip **47** passes over a driving sprocket **48**, a fixed idler pulley **49** and a movable idler pulley **50**. The portions of the film strips **43** and **47** passing between the lens **40** and the lamp **24** and passing through the picture frame **41** are arranged in aligned parallel spaced relation with respect to each other and the said portion of the film strip **47** being directly in back of the said portion of the film strip **43**.

The idler pulleys **45** and **49** are freely journaled on shafts **51** and **52** which are carried by the panel **11**. The movable pulleys **46** and **50** carry reduced ends **53** which are received in tracks defined by channel members **54** which upstand from the base plate **10**. These pulleys **46** and **50** are appropriately weighted so that their movement in the tracks of the channel members provides tension in the film strips **43** and **47** and serves to take up slack therein. Obviously, these pulleys might just as well be spring biased instead of functioning under gravity action.

The mounting of the driving sprockets **44** and **48** is substantially alike and one of these mountings is shown in detail in Figure 4. Thus, the sprocket **48** is shown as drivably carried by a shaft **55**. This shaft **55** is journaled in a bearing **56** that is carried by the panel **11** and projects from the opposite sides thereof. The shaft **55** projects beyond the bearing **56**, and drivably connected to this projecting portion in any preferred manner, such as by being keyed thereto or through the medium of a set screw which is received in a passage **57**, is a ratchet wheel **58**. The shaft **55** terminates in a reduced end portion **59** which rotatably carries a drive wheel **60**.

Pivotally mounted on the inner face of this drive wheel 60 is a pawl 61, the point of which cooperates with the teeth of the ratchet wheel 58. Also pivotally connected to the inner face of the drive wheel 60, as indicated at 62, is a link 63, the other end of the link 63 being connected to the plunger 64 of a solenoid 66.

As illustrated, a solenoid 65 is provided for actuation of the sprocket 44. The solenoid 66 is provided for actuation of the sprocket 48. It is evident that upon energization of either of these solenoids the plunger 64 is drawn upwardly, exerting a pull on the link 63. This imparts a counter-clockwise rotation to the drive wheel 60 (speaking with reference to the showing of Figure 5) which, through the pawl 61, is transmitted to the ratchet wheel 58 and from the latter to the shaft 55 to drive the sprocket 44 (or 48, as the case may be) a predetermined distance. When the solenoid is deenergized the plunger 64 falls under gravity action to retract the drive wheel 60 by rotating it in a clockwise direction the same distance it had been moved in the counterclockwise direction.

A microswitch for the solenoid 65 is represented diagrammatically at 67 in Figure 6, while another microswitch for the solenoid 66 is represented diagrammatically at 68. The microswitch 67 includes an actuating arm 69, while the microswitch 68 includes a similar actuating arm 70. A circular cam 71 is rotatably mounted on its axis 72 and is formed with a plurality of cam elements 73 on its periphery, each of which is adapted for cooperation with the arm 69 to close the microswitch 67. Another cam element 74 projects from one face of the cam 71 and is adapted to cooperate with the arm 70 to close the circuit to the switch 68.

As represented diagrammatically in Figure 5, the cam 71 is rotatably mounted in a casing 75. This casing also includes a gear reduction unit 76 which is drivably connected to the cam 71 and a self-starting synchronous motor 77, which is drivably connected to the gear reduction unit 76. This motor 77 is one commonly employed in electric clocks and is well known as such. It is intended to be running all the time that the clock is in use.

The power lines for the solenoids 65 and 66 are represented diagrammatically in Figure 6 and designated 78 and 79. The line 78 is connected by a line 80 to the coil of the solenoid 66. Another line 81 leads from the other end of the coil back to two parallel branches 82 and 83. Both of these branches 82 and 83 connect to the power line 79. A microswitch 68 is included in the branch 83 while a manually operable switch 84 is included in the branch 82. This switch 84 is preferably of the push button type.

Similarly, a line 85 extends from the power line 78 to one end of the coil of the solenoid 65, while the other line 86 extends from the other end of the coil to the two branches 87 and 88. The microswitch 67 is included in the line 87, while the manually operable switch 89 is included in the line 88.

Operation

While the operation of the direct reading clock above described is believed to be obvious from the description of the parts given, it may be briefly outlined as follows:

It will be assumed that the film strip 43 carries the minute designations of time, together with any advertising messages which are appropriate for the business of the particular user of the clock. Likewise, the film strip 47 carries the hourly designations, together with any appropriate advertisement. Both of these film strips pass through the picture frame 41 so that light from the lamp 24 passes through the picture frame and film therein to project a composite image onto an appropriate screen through the medium of the lens 40. The lamp 24 is continuously illuminated and the fan 19 is continuously driven. The synchronous motor 77 is also in continuous operation. Upon the elapse of a minute one of the cam elements 73 affects the arm 69 to close the microswtich 67. This completes the circuit to the solenoid 65 and energizes the solenoid to draw the plunger 64 upwardly and, through the driving connections of link 63, drive wheel 60, pawl 61, ratchet wheel 58, and drive shaft 55, the sprocket 44 is driven a required distance to move the film strip 43 the distance of one frame or section thereon. Immediately the solenoid is deenergized the plunger 64 falls downwardly and the drive wheel 60 is retracted under gravity action the angular distance it has just been moved. During this movement the pawl 61 rides freely over the teeth of the ratchet wheel 58. This operation is repeated for each minute interval. After the elapse of an hour the cam element 74 engages the arm 70 to close the microswitch 68 and energize the solenoid 66 in exactly the same manner to move the film strip 47 a distance of one frame thereon.

On such occasions as power failure, the synchronous motor 77 will of course stop. This means that there will be times when it is necessary to set the clock. This may be accomplished through the actuation of the manually operable switches 84 and 89.

Should it be desired to use the mechanism above described for purposes other than time projection purposes, all that is required is to replace the film strips 43 and 47 with other strips carrying messages or data or other intelligible matter which it is desired to project as still pictures. For such use the synchronous motor 77 is not employed, and the operation uses the switches 84 and 89 to change the projected pictures at his volition.

It is important to note that the unit included in the casing 75 may be either mounted on an extension of the base plate 10 to assemble the entire apparatus as a single compact unit or it may be separated therefrom. Thus, the apparatus which is carried by the base plate 10 may be supported in a position where it is not immediately accessible while the casing 75 is located in a position where it may be conveniently reached by an operator for actuation of the switches 84 and 89.

While a preferred specific embodiment of the invention is hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact constructions, mechanisms and devices illustrated and described because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

What is claimed is:

1. In a direct reading projection clock, a supporting casing, a lens carried by said casing, a lamp within said casing, a picture frame between said lens and lamp, an endless film strip mounted in said casing for movement over a continuous path and carrying hourly designations, a second endless strip mounted for movement in said casing over a continuous path and

carrying minute designations, both of said film strips passing through said picture frame in overlapping relation, actuating mechanisms for each of said film strips for moving said film strips with a step by step motion, and timing means for causing said actuating mechanism to operate at appropriate intervals.

2. In a direct reading projection clock, a casing, a lens carried by said casing, a lamp within said casing, a picture frame between said lens and lamp, an endless film strip mounted on a fixed idler pulley and carrying minute designations, a movable idler pulley and a driving sprocket within said casing, a second endless film strip mounted in said casing within said first endless film strip on a fixed idler pulley and carrying hourly designations, a movable idler pulley and a driving sprocket, both of said film strips passing through said picture frame in overlapping relation, actuating means for each of said driving sprockets for moving said sprockets with a step by step motion, and a timing motor for causing operation of said actuating means at prescribed intervals.

3. In a direct reading projection clock, a casing, a lens carried by said casing, a lamp within said casing, a picture frame between said lens and lamp, an endless film strip mounted on a fixed idler pulley and carrying minute designations, a movable idler pulley and a driving sprocket within said casing, a second endless film strip mounted in said casing within said first endless film strip on a fixed idler pulley and carrying hourly designations, a movable idler pulley and a driving sprocket, both of said film strips passing through said picture frame, actuating means for each of said driving sprockets for moving said sprockets with a step by step motion, a timing motor for causing operation of said actuating means at prescribed intervals, and guides mounting said movable rollers whereby they move under their own weight to take up slack in said film strips.

4. In projection apparatus including a pair of endless film strips passing through a common picture frame, a driving sprocket for each film strip, a pair of solenoids, there being a solenoid for each driving sprocket with each solenoid having a plunger, operating connections between each plunger and the respective sprocket, a microswitch for each solenoid having an operating arm, a circular cam having cam elements on its periphery for engaging the arm of one switch and a cam element on one face for engaging the arm of the other switch, a timing motor for driving said cam, and manually operable means for closing the circuit to each of said solenoids independently of said microswitches.

5. In a direct reading projection clock including a pair of endless film strips adapted to pass through a common picture frame, each of said film strips being provided with a time designation and an advertising message to be projected, a driving sprocket for each film strip, a drive shaft carrying each sprocket, a ratchet wheel drivably connected to each drive shaft, a drive wheel rotatably mounted on each drive shaft, a pawl carried by each drive wheel in operative engagement with the teeth of the respective ratchet wheel, a pair of vertically arranged solenoids each having a plunger adapted to fall under gravity action, a link connecting each of said drive wheels to one of said plungers, and means for energizing each of said solenoids at prescribed intervals.

6. In a direct reading projection clock including a pair of endless film strips adapted to pass through a common picture frame, each of said film strips being provided with a time designation and an advertising message to be projected, a driving sprocket for each film strip, a drive shaft carrying each sprocket, a ratchet wheel drivably connected to each drive shaft, a drive wheel rotatably mounted on each drive shaft, a pawl carried by each drive wheel in operative engagement with the teeth of the respective ratchet wheel, a pair of vertically arranged solenoids each having a plunger adapted to fall under gravity action, a link connecting each of said drive wheels to one of said plungers, a microswitch included in the circuit for each solenoid, a circular cam having cam elements for closing said microswitches, and a timing motor for actuating said cam.

7. In a direct reading projection clock including a pair of endless film strips adapted to pass through a common picture frame, each of said film strips being provided with a time designation and an advertising message to be projected, a driving sprocket for each film strip, a drive shaft carrying each sprocket, a ratchet wheel drivably connected to each drive shaft, a drive wheel rotatably mounted on each drive shaft, a pawl carried by each drive wheel in operative engagement with the teeth of the respective ratchet wheel, a pair of vertically arranged solenoids each having a plunger adapted to fall under gravity action, a link connecting each of said drive wheels to one of said plungers, a microswitch included in the circuit for each solenoid, each of said microswitches having an operating arm, a circular cam having cam elements on its periphery adapted to engage the arm of one microswitch, and a cam element on one face adapted to engage the arm of the other microswitch, a timing motor for driving said cam, and a manually operable switch in the circuit of each solenoid.

8. Projection apparatus comprising a casing, a lens secured to said casing, a lamp positioned in said casing and supported by said casing, a first film strip movably positioned in said casing between said lens and said lamp, minute designations on said first film strip, a second film strip movably positioned in said casing between said lens and said lamp and arranged in spaced parallel relation with respect to and directly in back of said first film strip, hourly designations on said second film strip, and means for moving said first and second film strips, the portions of said first and second film strips between said lens and said lamp being in alignment and the light from said lamp projecting through both of said portions of said first and second film strips and adapted to project the time in hours and minutes on a screen.

9. Projection apparatus comprising a casing, a lens secured to said casing, a lamp positioned in said casing and supported by said casing, a first endless film strip movably positioned in said casing and adapted to pass between said lens and said lamp, minute designations on said first film strip, a second endless film strip movably positioned in said casing and adapted to pass between said lens and said lamp, hourly designations on said second film strip, and means for moving said first and second film strips, the portions of said first and second film strips passing between said lamp and said lens being in aligned parallel spaced relation and the said portion of said sec-

ond film strip being directly in back of the said portion of said first film strip and the light from said lamp projecting through both of said portions and adapted to project the time in hours and minutes on a screen.

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