Jan. 24, 1939. J. H. GRAYSON 2,145,082

TIME CLOCK MECHANISM

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Fig. 1

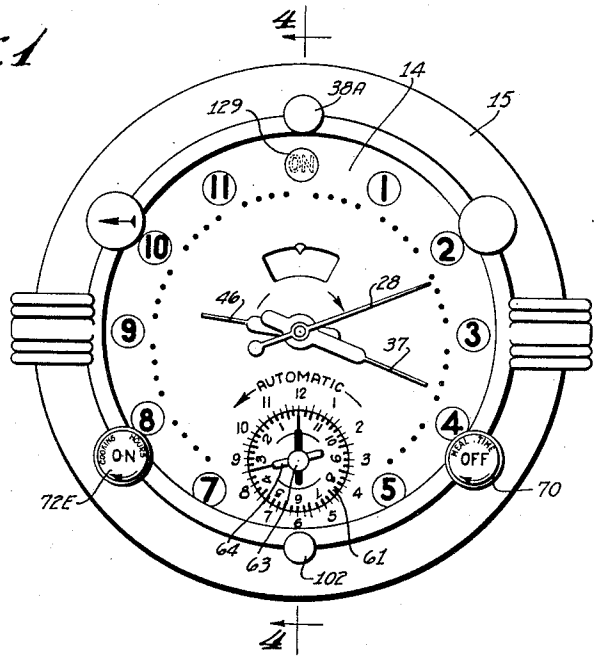



Fig. 3

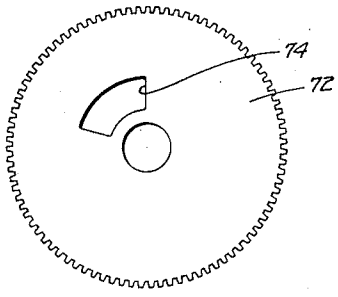
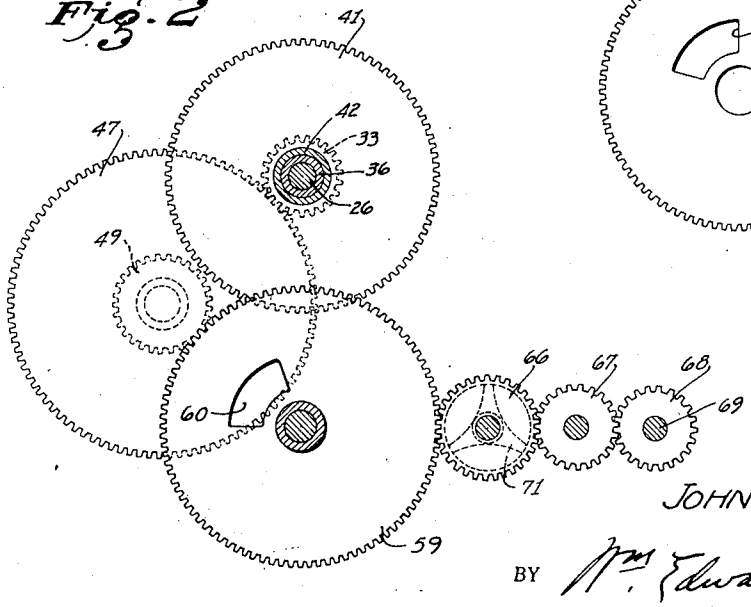



Fig. 2




JOHN H. GRAYSON,
INVENTOR.

BY Wm. Edward Hann

ATTORNEY.

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Fig. 4

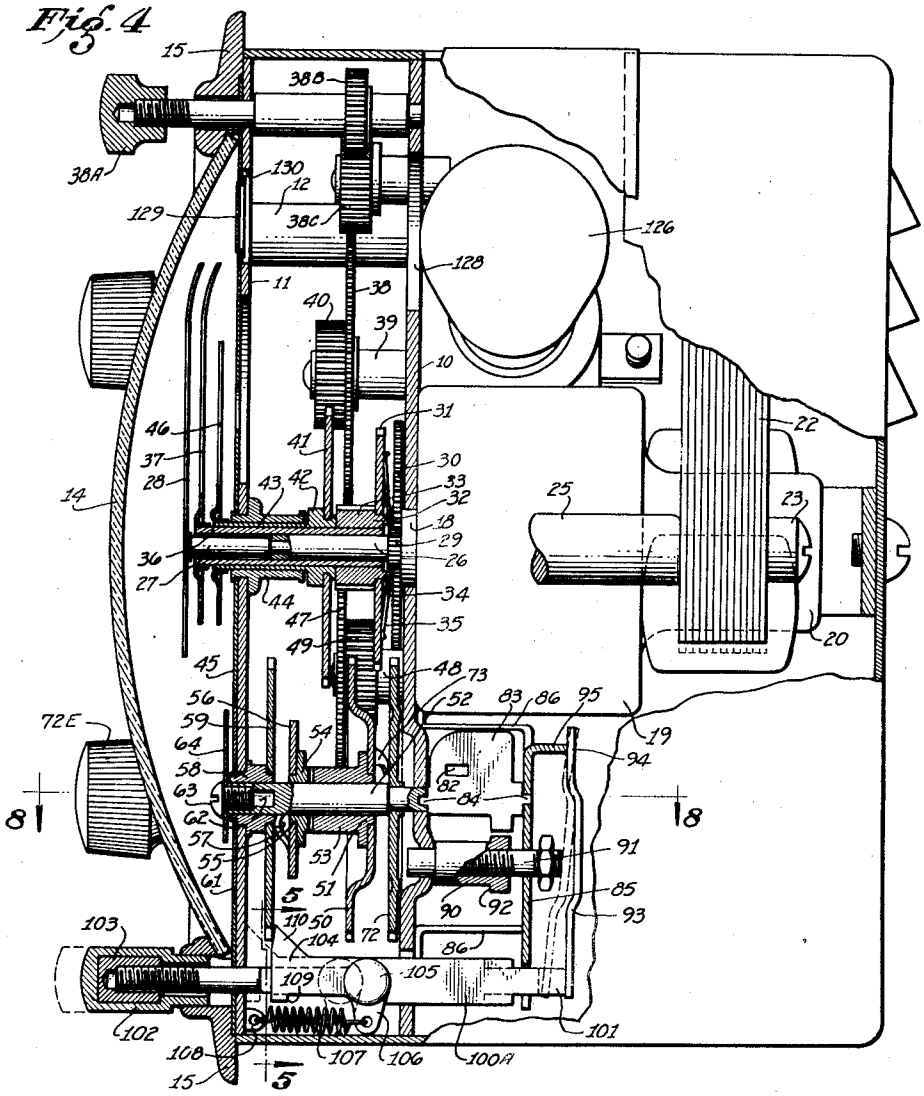
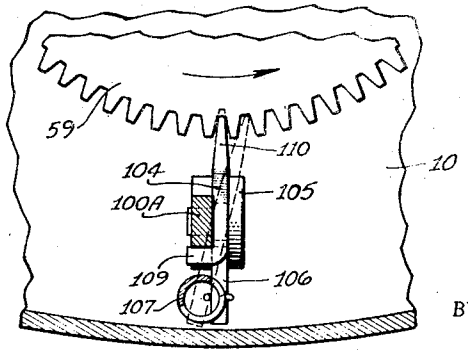



Fig. 5




JOHN H. GRAYSON,
INVENTOR.

BY Wm. Edward Hann

ATTORNEY.

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TIME CLOCK MECHANISM

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Fig. 6

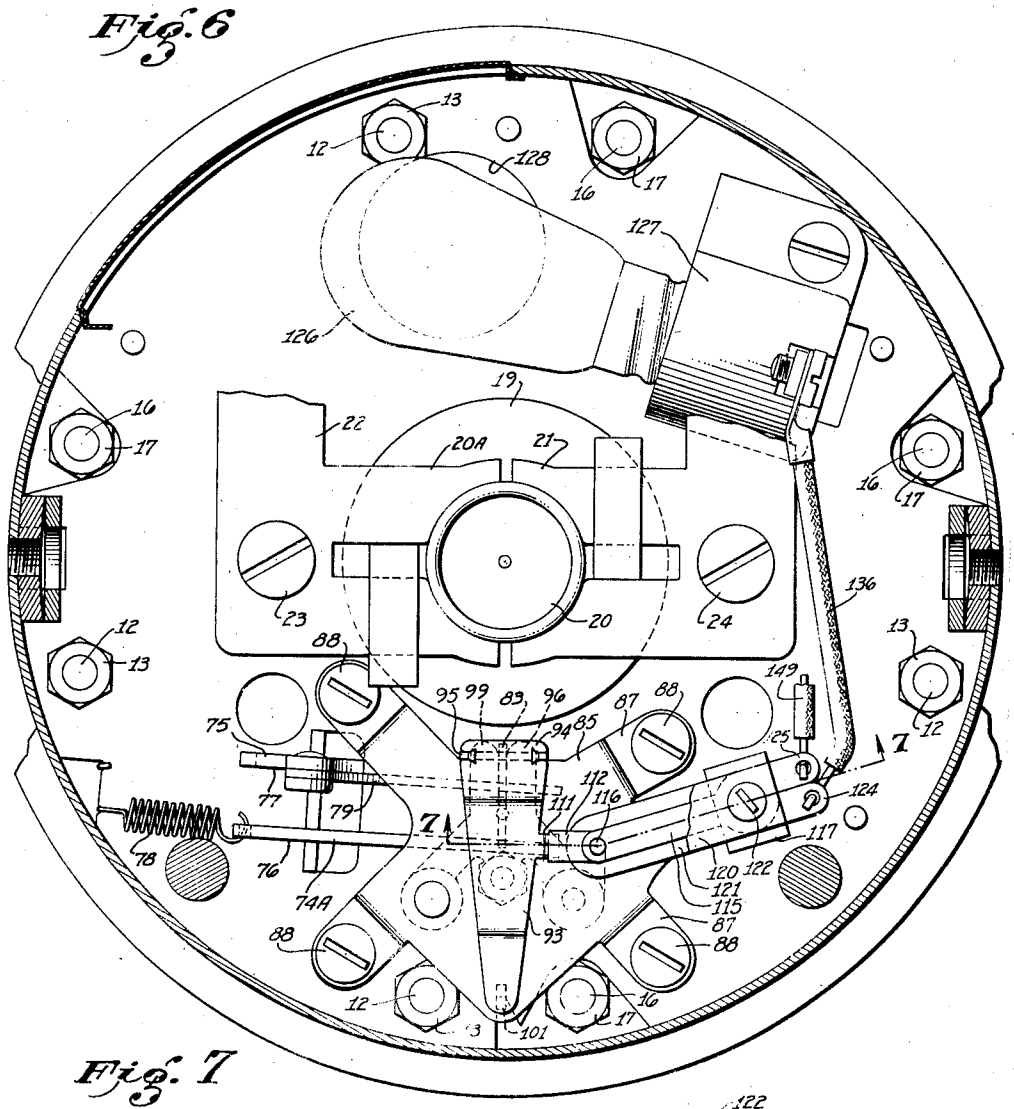
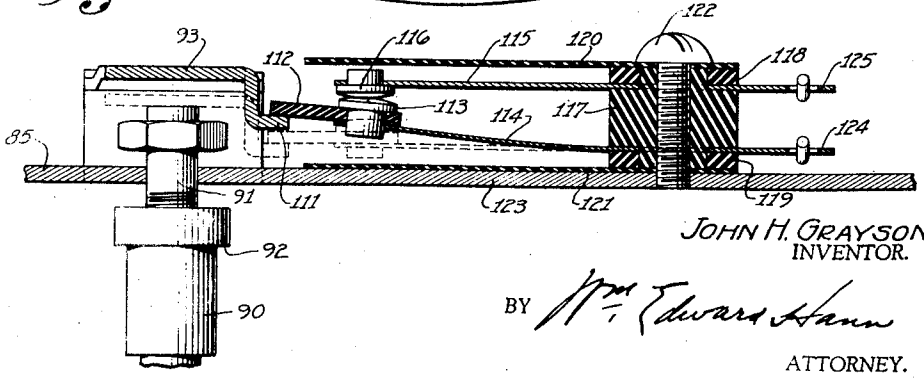



Fig. 7




JOHN H. GRAYSON,
INVENTOR.

BY Wm. Edwards Hann

ATTORNEY.

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Fig. 8

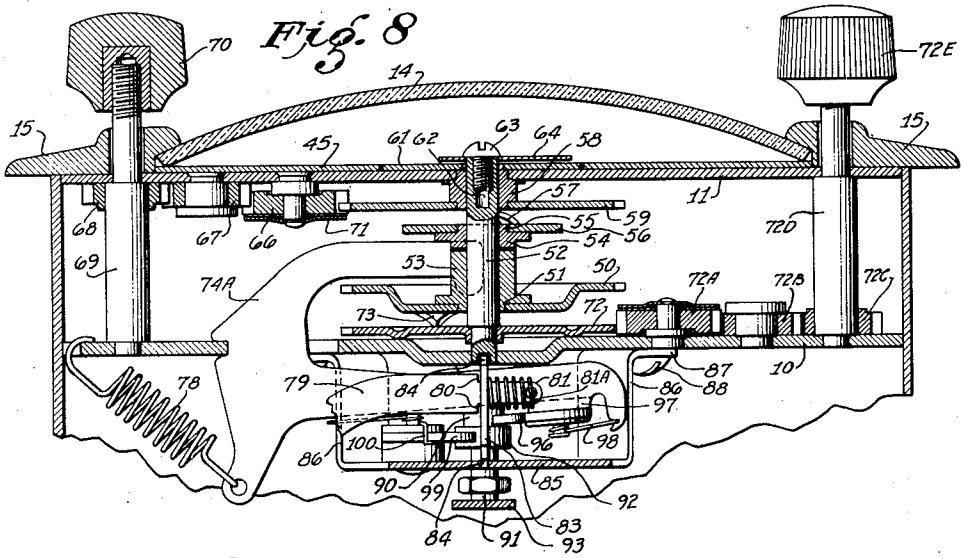



Fig. 9

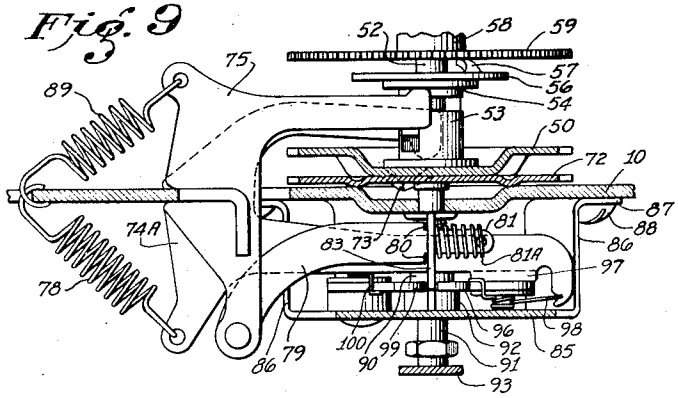
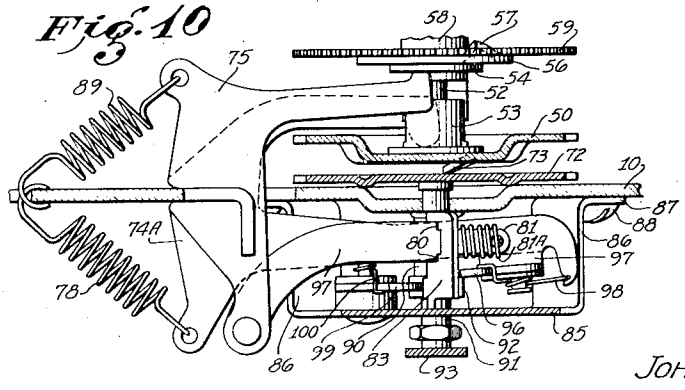



Fig. 10




JOHN H. GRAYSON,
INVENTOR.

BY Wm. Edward Hann

ATTORNEY.

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Fig. 11

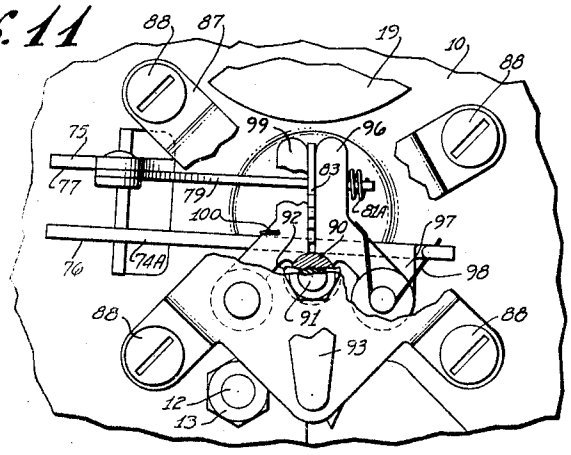



Fig. 12

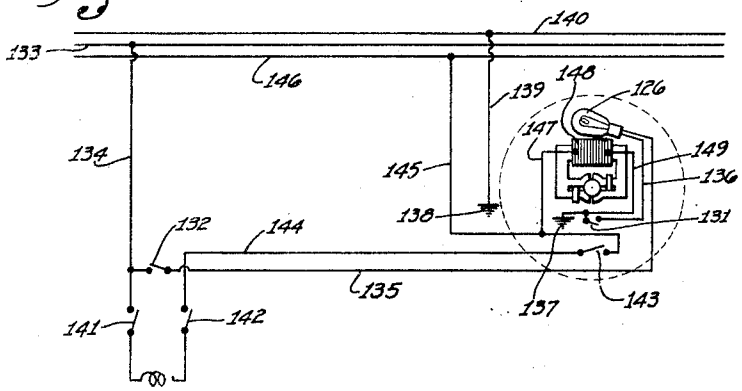
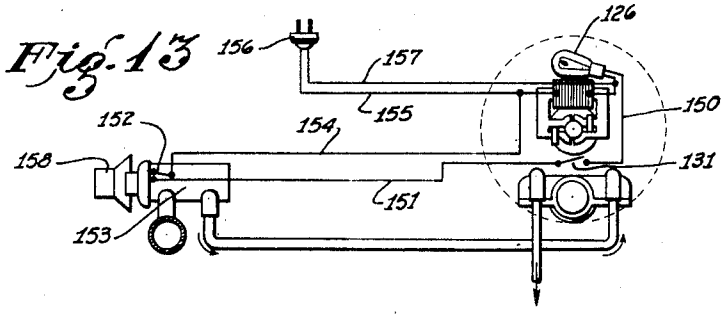



Fig. 13




JOHN H. GRAYSON,
INVENTOR.

BY Wm. Edward Hann

ATTORNEY.

Patented Jan. 24, 1939

2,145,082

# UNITED STATES PATENT OFFICE

2,145,082

## TIME CLOCK MECHANISM

John H. Grayson, Lynwood, Calif.

Application June 7, 1937, Serial No. 146,706

7 Claims. (Cl. 161—1)

This invention relates to time clock mechanisms, particularly useful for initiating and discontinuing certain desired functions and to visual signals for the same.

Heretofore in the use of many time clock mechanisms as applied to control the supply of gas or current to domestic cooking ranges, it has been necessary for the one using the range to manually operate a control for putting the mechanism in position to be responsive to the automatic operation. For instance, if the time clock control mechanism has been set for "manual" operation of the range, and it is desired to set it for "automatic" operation, the times at which it is desired to have the fuel come "on" and turn "off" are set off on the time clock mechanism but if another, separate control is not operated, then the mechanism will remain on "manual" operation and not turn "on" automatically at the desired selected time.

The main objects of this invention are to provide an improved mechanism whereby the manual setting off of the predetermined times on the automatic mechanism, will automatically change the controls from "manual" to "automatic" so that the operation of the device is positively assured at the desired time; to provide a mechanism of this character which will, at the slightest manual movement of the automatic controls, respond immediately to change the operation from "manual" to "automatic"; to provide a mechanism of this character which is simple in design and certain in operation; and to provide a visual signal which will indicate to the user, whether or not the fuel or power is being or can be supplied in accordance with the wishes of the user.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:

Fig. 1 is a face view of the improved time clock in full size.

Fig. 2 is a plan view of the train of gears by which the predetermined time is set off at which automatic functioning of the mechanism occurs.

Fig. 3 is a plan view of the "on" set gear showing the cam finger opening therethrough.

Fig. 4 is an enlarged vertical view, partly in section and partly in elevation, taken substantially along the line 4—4 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 5 is an enlarged fragmentary sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged view, partly in elevation and partly in section, showing the back plate of the clock with part of the operating mechanism in place and part removed for purposes of clarity.

Fig. 7 is an enlarged sectional view taken on the line 7—7 of Fig. 6, looking in the direction indicated by the arrows.

Fig. 8 is a fragmentary sectional view taken on the line 8—8 of Fig. 4, looking in the direction indicated by the arrows.

Fig. 9 is a fragmentary view similar to Fig. 8, but with the function controller moved to the "on" position.

Fig. 10 is a view similar to Fig. 9, but with the pawl spreader actuated to release the function controller.

Fig. 11 is a fragmentary plan view, with parts broken away, of the mechanism shown in Fig. 9.

Fig. 12 is a view showing the wiring diagram for the time clock and oven regulator as applied to an electric cooking range.

Fig. 13 is a view showing the wiring diagram for the time clock and oven regulator as applied to a gas burning cooking range.

The time clock upon which the present invention is adapted is shown and described in detail in applicant's co-pending application for patent, Serial No. 146,705, filed of even date herewith and reference is made thereto for a detailed description of all of the parts constituting the mechanism.

It will be understood, however, that the present invention is not limited in application to the particular type of time clock mechanism illustrated and described in the instant case or the application herein referred to but is equally well adapted to be used in conjunction with many other types of time clock instrumentalities wherein a certain desired function is performed both by automatic time control mechanism and manually operable mechanism.

In the construction illustrated the time clock comprises generally a pair of frame plates 10 and 11 which are held in spaced parallel relation by a plurality of posts or studs 12 spaced about the periphery of the frame plates.

One end of each of the posts 12 is riveted to the frame plate 11 and the other end thereof is of reduced diameter to form a shoulder and such reduced end is threaded and passes through a registering aperture in the frame plate 10. Nuts 13 are threaded on the protruding ends of the posts 12 for clamping the frame plate 10 securely against the shoulders formed by the reduction in diameters of the posts.

The front of the time clock is covered by a convexly curved glass 14 which is embraced around its peripheral or marginal edge by a ring or bezel 15. The bezel 15 is provided with a plurality of threaded studs 16 which pass through registering apertures in the frame plate 11 and upon which are threaded nuts 17 for securely clamping the bezel and glass in place against the face of the clock.

The frame plate 10 at the center thereof is provided with a circular opening for snugly receiving an annular boss 18 integrally formed on one end of a sealed sheet metal cylindrical casing or housing 19, within which is contained the customary reduction gears of a synchronous electric motor drive for time clocks. The other end of the cylindrical casing 19 is provided with an outwardly extending neck 20 within which is housed the armature of the electric motor. Such reduced neck is embraced between the opposed ends 20A and 21 of a laminated field 22 which is secured by screws 23 and 24 to the outer ends of posts or studs 25. The base ends of the studs 25 are securely riveted to the frame plate 10 at diametrically opposite sides of the housing 19.

Concentrically of the housing 19 and boss 18, the electric motor-driven unit is provided with a protruding drive shaft 26, in the outer end of which is formed an axially extending socket to snugly receive the reduced end of a second hand shaft 27 and frictionally drive such shaft together with a second hand 28 carried thereon, at a speed of one R. P. M.

The shaft 26, closely adjacent to the boss 18, is provided with a pinion gear 29 which meshes with and drives a gear 30. The gear 30 is rotatably mounted on the frame plate 10 and carries a pinion concentrically therewith (not shown) which meshes with and drives a gear 31 which is rotatably mounted on a hub 32 of a gear 33 which is journaled concentrically of the shaft 26. The hub 32 extends beyond the gear 31 and carries the base of a starspring 34, the spring fingers 35 of which bear against the adjacent side of the gear 31 so as to transmit rotary motion of the gear 31 to the hub 32 and gear 33. For convenience of manufacture, the gear 33 is made separately from and pressed on to a sleeve 36 which is journaled on the shaft 26. The sleeve 36 concentrically surrounds the second hand shaft 27 and terminates in slightly spaced relation to the second hand 28. The outer end of the sleeve 36 is provided with a minute hand 37 pressed thereon which travels over the face of the clock in spaced parallel relation thereto and in spaced parallel relation to the plane of rotation of the second hand 28. The gear reduction between the motor pinion 29, gear 30, pinion carried by the gear 30 (not shown) and gear 31, is 60 to 1 so that the minute hand 37 will travel once about the clock face for every 60 revolutions of the second hand 28.

The gear 33 meshes with and drives a gear 38 which is journaled on the outer end of a stub shaft 39, the base end of which is riveted to the frame plate 10. The gear 38 is provided with a concentrically positioned rigidly secured pinion gear 40 which meshes with and drives a gear 41 at one-twelfth of the speed of rotation of the pinion gear 33. The gear 41 is rigidly mounted to one end of a hub 42 which is concentrically journaled on the sleeve 36. The other end of the hub 42 is provided with an axially extending sleeve 43 which is exteriorly journaled in a bushing 44, said bushing being secured in the frame plate 11 by an interior shoulder which abuts the frame plate and an outer flanged shoulder which embraces the frame plate 11 and a relatively thin face plate 45, thus serving as a retaining means for the clock face plate. The sleeve 43 extends beyond the bushing 44 but terminates in spaced relation to the end of the sleeve 36 and its outer end has an hour hand 46 frictionally pressed thereon. The hour hand 46 travels over the face of the clock in spaced parallel relation thereto and in spaced parallel relation to the plane of rotation of the minute hand 37 in the usual manner.

The driving pinion 33 also meshes with and rotates a gear 47, which is journaled upon the outer end of a stub shaft 48, the base end of which is riveted to the frame plate 10. The gear 47 has a concentrically mounted pinion 49 rigidly secured thereto which meshes with and drives a gear 50, the hub 51 of which is journaled and axially slidable on a shaft 52.

The hub 51 is provided with an axially extending split sleeve or dental clutch 53 which constantly meshes with and drives a similar complementary split sleeve or clutch 54 formed on a hub 55 which is also journaled on the shaft 52 and axially slidable thereon independently of the hub 51. The hub 55 carries rigid therewith a disk 56 from the stock of which is struck out axially a cam finger 57.

The outer end of the shaft 52 is journaled in a bushing 58 which in turn is journaled in a circular aperture formed in the frame plate 11. One end of the bushing 58 carries a set gear 59 rigidly secured thereon and which is provided with a segmental opening 60 cut therethrough in position to register with and receive therethrough the cam finger 57 when in certain angular positions with respect to each other. At other angular positions the cam finger 57 rides upon or against the adjacent side of the gear 59 and thereby holds the gear 59 and cam disk 56 in axially spaced relationship. The other end of the bushing 58 which extends through the frame plate 11, has a circular disk or dial 61 rigidly secured thereon which rotates upon the face of the clock in a circular cut-out provided in the face plate 45.

The outer end of the shaft 52 protrudes slightly beyond the outer end of the bushing 58 and is provided with a socket 62 which is interiorly threaded to receive a screw 63 beneath the head of which is clamped a pointer finger 64. The finger 64 is adapted to rotate over the face of the dial 61 in spaced parallel relation thereto.

Manually operable means are provided for selectively positioning the set gear 59 and comprise a train of interengaging pinions 66, 67 and 68, the latter of which is rigidly secured to a post 69. One end of the post 69 extends through an aperture in the bezel 15 and is provided with a knurled knob 70 which may be grasped by the user for setting the mechanism in predetermined position. The pinion 66, as shown most clearly in Fig. 2, is provided with a friction drag or brake in the form of a star-spring 71 which frictionally retards rotation of the set gear 59 when the cam finger 57 bears thereagainst and is rotated by the time clock mechanism.

The inner end of the shaft 52 is reduced in diameter and has a manually adjustable set gear 72 rigidly mounted thereon.

The cam gear 50 is provided with a cam finger 73 struck out from the stock thereof in position to bear against the adjacent face of the set gear

72 and hold said gears 50 and 72 in axially spaced relation when so doing. The set gear 72 is also provided with a segmental opening 74 in position to register with, receive and permit passage therethrough of the cam finger 73 when the gears 50 and 72 are in certain angular relationship.

Means are provided for normally urging the cam gear 50 and cam disk 56 in opposite axial directions so as to cause their respective cam fingers to enter in and pass through the openings in the set gears adjacent thereto when in registry therewith and comprise a pair of cam arms, 74A and 75, which are fulcrumed by notches formed therein, in spaced parallel slots 76 and 77 respectively, formed in the frame plate 10.

One end of the cam arm 74A extends into the space between the hubs 51 and 55 and is yieldingly urged to bear against a radially extending flange of the hub 51 by a helical tension spring 78, one end of which is attached to said arm and the other end of which is hooked around the edge of the frame plate 10 in a notch provided therein.

The cam arm 75 has one end thereof also extending into the space between the hubs 51 and 55 but at the side of the shaft 52, opposite to that occupied by the arm 74A, and bears against a radially extending flange on the hub 54. The opposite end of the arm 75 has one end of a link 79 pivoted thereto and the other end of said link is reduced in width at 81 to form shoulders 80. Such reduced end 81 passes loosely through a rectangular opening 82 formed in a blade-like pawl spreader 83, in spaced relation to the axis of diametrically opposed, integrally formed trunnions 84.

A helical compression spring 81A surrounds the reduced end 81, one end of which bears against the pawl spreader 83 and the other end of which is anchored to the tip end of the link by having the last coil of the spring pass through an aperture in such tip end.

One of the trunnions 84 is journaled in an axially extending socket formed in the reduced end of shaft 52 and the other trunnion is journaled in an aperture formed through a bridge 85 which is rigidly secured in spaced parallel relation to the frame plate 10 by legs 86. The ends of the legs 86 terminate in transversely extending feet 87 through which pass screws 88 for holding the bridge plate 85 rigidly to the frame plate 10.

Means are provided for normally urging the cam arm 75 to rotate about its fulcrum point and thus urge the cam disk 56 toward its adjacent set gear 59 and comprises a helical tension spring 89, one end of which is hooked through an aperture formed in the arm 75 in spaced relation to its fulcrum point and the other end thereof is hooked around the edge of the frame plate 10 in a notch provided therefor.

The bridge plate 85 and frame plate 10 are provided with aligned apertures for receiving an axially slidable and rotatable function controller 90. The controller 90 comprises a body member with an interiorly threaded axial bore for receiving the threaded end of a shaft 91 which extends through the aligned aperture in the bridge plate 85. The function controller 90 is provided with a radially extending annular shoulder 92 closely adjacent one end thereof and the other end thereof is reduced in diameter and slidably passes through an aperture in the frame plate 10.

The end of the function controller 90 which passes through the bridge plate 85 is adapted to bear against and swing to the right, as viewed in Fig. 4, a lever arm 93, the base end 94 of which, is loosely pivoted on an outstanding rigid arm 95 of the bridge plate 85.

Means are provided for axially sliding the function controller 90 to the right, as viewed in Fig. 4, and comprise a pawl 96 which is pivoted on a transversely extending lug 97, integrally formed on the end of the arm 74A which extends beneath the bridge plate 85. A spring 98 normally urges the pawl toward the function controller 90 and an arcuate shoulder is formed on the pawl 96 for engaging under the annular shoulder 92 when moved axially back of said shoulder.

Means are provided for releasably locking the function controller 90 in its outwardly shifted position and comprise a locking pawl 99 which is mounted on a fixed pivot secured to the under side of the bridge plate 85, the pawl 99 being a duplicate of the pawl 96 but mounted in reverse position with respect thereto. A spring 100 is provided for normally yieldingly urging the pawl toward the function controller 90 so that the arcuate shoulder thereof will engage behind the annular shoulder 92 and retain the function controller 90 in shifted position.

As shown in detail in applicant's co-pending application hereinabove referred to, the swinging out of the lever arm 93 to the position shown in full lines in Fig. 4 of the drawings, performs certain desired functions and is particularly well adapted for closing the contacts of an electric switch or for opening a valve which controls the flow of a fluid such as gas.

In addition to the automatic mechanism for actuating the lever arm 93, manual means are also provided for performing the same function. Such manual means comprise an axially slidable shaft 100A of rectangular cross-section, one end of which is slidably mounted in an aperture formed through the frame plate 11 and the other end of which is slidable in an aperture formed in the bridge plate 85. This latter end 101 protrudes through the bridge plate 85 and is in position to contact and actuate the lever arm 93 so as to move it from the position shown in dotted lines in Fig. 4 to the position shown in full lines therein. The end of the shaft 100A which extends through the frame plate 11 protrudes a substantial distance therebeyond, through an opening in the bezel 15 and is threaded to receive a knob 102 of molded plastic material which has an interiorly threaded metal socket 103 molded therein.

A detent 104 is pivoted to one side of the shaft 100A by a rivet 105. The detent 104 is in the form of a bell-crank and the arm 106 thereof has its outer end apertured to receive one end of a helical tension spring 107, the other end of which passes through an aperture formed in a lug 108 integrally formed from the frame plate 11. The spring 107 is under tension at all times but rotation of the detent 104 about its pivot 105 is limited by a transversely disposed finger or lug 109, which is formed by bending at right angles a portion of the stock from which the detent is made and is positioned so as to engage one edge of the rectangular shaft 100A, as shown most clearly in Fig. 5. The other arm of the detent 104 terminates in a tapered finger 110 which extends toward the axis of rotation of the set gear 59 and is of such length as to engage the marginal edge of

the gear 59 at the base of the teeth formed thereon, as shown most clearly in Fig. 5.

The shaft 100A is not only axially slidable against the tension of spring 107 but is also arranged to have limited rotation or oscillation about its longitudinal axis.

As shown most clearly in Figs. 6 and 7 of the drawings, the lever arm 93 is provided with an integrally formed toe 111, substantially midway along one side thereof, which is adapted to engage under and actuate an arm 112 of insulating material which is secured underneath the contact head 113 of a spring switch arm 114. A complementary spring switch arm 115 is provided with a contact head 116 for completing an electric circuit through the switch when the arm 114 is moved, as shown in full lines in Fig. 7 of the drawings. The spring switch arms 114 and 115 are normally held in spaced parallel relation by a block of insulating material 117 which also carries insulating washers 118, 119 and strips of insulating material 120 and 121, the entire assembly being held together by a screw 122 which passes therethrough and is threaded into an arm 123 integrally formed on the bridge plate 85. The spring switch arms 114 and 115 extend in the opposite direction beyond the base block 117 of insulating material to provide terminals 124 and 125, to which electric conductor wires may be conveniently soldered.

A visual signal is provided for indicating the status of the time clock mechanism and comprises an electric light bulb 126, screwed in a socket 127 in such position that light therefrom will pass through a relatively large aperture 128 formed in the frame plate 10 and through a disk of translucent material 129 which is secured in a cut-out in the face plate 45, at the 12:00 o'clock position, the frame plate 11 having a registering aperture 130 formed therein through which the light passes to the disk.

As shown in Fig. 12, the electric circuit for the signal lamp 126 not only passes through the switch comprising the spring arms 114 and 115, which is generally designated in Fig. 12 as 131, but also passes through and is controlled by an oven regulator switch generally designated as 132. As shown in this figure, current from a lead 133 passes through conductor 134, switch 132, a conductor 135 which connects one side of said switch to the lamp 126, thence through a conductor 136 to the switch 131 and then to a ground 137. This ground 137 is the frame of the time clock mechanism and a similar ground 138 is connected by a conductor 139 to a neutral lead 140.

The oven regulator switch 132 is connected in such manner that said switch is closed at all times when the oven regulator manual control is moved away from its zero or "off" position. It will be understood, of course, that in the usual thermostatically controlled oven regulators, the fuel or current is passed to the oven which causes it to heat up until the temperature has risen to the selected predetermined temperature set off on the control knob by the user. When the temperature of the oven reaches such selected temperature, the supply of power is automatically discontinued and in electric ovens this is done by opening of both sides of the power line by the switches generally designated 141 and 142. The opening of these switches, however, does not open the switch 132 which remains closed until the manual control for the oven regulator is turned back to zero or "off" position.

In the usual electric oven, the circuit of which is illustrated in Fig. 12, one side of the power line also passes through an electric switch generally designated 143, which is within the time clock mechanism, such switch being automatically or manually controlled by the time clock mechanism or by the user. A conductor 144 connects the switch 142 to one side of the switch 143 and a conductor 145 connects the other side of the switch 143 to a lead wire 146. The circuit between the leads 133 and 146 is usually 220 volts and a circuit from either of these leads to the neutral lead 140 will give 110 volt current.

Current at 110 volts is supplied constantly to the synchronous electric motor of the time clock mechanism through the conductor 145, a conductor 147 to the field winding 148 of the synchronous electric motor and thence through a conductor 149 to the ground 137. From here the current passes through the frame of the clock and thence through the conductor 139 to the neutral line 140. Due to the fact that sometimes electric current will leak through faulty or damaged insulation into the domestic range or stove upon which it is mounted, users who might touch the clock or range are sometimes subjected to electric shock but in the present construction, by having the neutral lead 140 grounded at 138 to the clock frame, all danger of injury due to such leakage is eliminated.

As shown in Fig. 13 of the drawings, the circuit of the signal lamp 126 passes through a conductor 150 to one side of the time clock switch generally designated 131, the other side of which is connected by a conductor 151 to one side of an electric switch generally designated 152, which is located in a gas oven thermostatically controlled regulator generally designated 153. The other side of the switch 152 is connected through conductors 154 and 155 to one of the terminals of a two terminal wall plug 156 which may be plugged into any convenient electric outlet. The circuit through the lamp is completed through a conductor 157 which connects the other terminal of the plug 156 to the lamp 126. The switch 152, in the same manner as the switch 132 of the electric oven, is arranged so as to be closed at all times when a regulator control knob 158 is turned on from the zero or "off" position and remains closed until the centrol knob 158 is returned to the zero or "off" position.

In the operation of this improved time clock mechanism and signal system, the synchronous electric motor 19 is connected to a suitable source of current, as shown by the circuit diagrams in Figs. 12 and 13, so as to have a continuous supply of current. Rotation of the armature therein through the reduction gearing which is sealed within the casing, rotates shaft 26 at 1 R. P. M. The second hand 28 which is mounted on the shaft 27, is directly driven at the rate of 1 R. P. M. by having the reduced end of the shaft 27 frictionally engaged in the axially extending socket formed in the outer end of the shaft 26.

Shaft 26 carries rigid therewith the drive pinion 29 which meshes with and drives the gear 30. The concentrically mounted, rigidly secured pinion on the gear 30 meshes with and drives the gear 31, the gear ratios being such that the gear 31 is rotated at a 60 to 1 reduction. The gear 31 frictionally drives the spring fingers 35 which yieldingly bear against the side thereof and the base or center of which is rigidly secured to the hub 32 of gear 33. The pinion gear 33, being rigid on the sleeve 36, will rotate said sleeve and thus rotate the minute hand 37 which is pressed

on the outer end thereof at 1/60 of the speed of the second hand 28.

The pinion gear 33 meshes with and drives the gear 38, pinion gear 40 integral therewith, which in turn meshes with and drives the gear 41. The gear 41 is rigidly secured to the hub 42 which has the extended sleeve 43, to the outer end of which is frictionally secured the hour hand 46. The gear ratio between the driving pinion 33 and the gear 41 is 12 to 1, so that the hour hand 46 is rotated at 1/12 of the speed of rotation of the minute hand 37.

The sleeve 43 is concentrically journaled on the sleeve 36 and is exteriorly journaled in the bushing 44, which is rigidly mounted in the frame plate 11.

Manual setting of the clock hands is effected through the rotation of the gear 38 by means of a setting knob 38A, rotation of which in a left hand direction, will drive the intermediate pinions 38B and 38C.

The set gear 72 is manually rotated to a predetermined selected position by intermeshing pinion gears 72A, 72B and 72C, the latter of which is rigidly fixed to a shaft 72D, which is journaled in the frame plates 10 and 11. One end of the shaft 72D protrudes through an aperture in the bezel 15 and is provided with a knurled knob 72E, which may be readily grasped by the user and rotated to actuate the gear train.

Automatic actuation of the function controller for initiating the desired function to be performed is secured by manual setting of the gear 72 to a predetermined position so that when the clock mechanism through the gears 47 and 49 rotates the gear 50 to such predetermined position, the spring 78, acting through the U-shaped lever 74A will cause the cam finger 73 of gear 50 to enter into and pass through the registering aperture 74, formed in gear 72. Such movement will cause the actuating pawl 96, which is engaged back of the annular shoulder 92 to move the function controller 90 axially outwardly and thus swing the lever arm 93 to the position shown in full lines in Figs. 4 and 9 of the drawings. When moved to this position, the locking pawl 99 is swung into engagement behind the annular shoulder 92 by the spring 100, thus holding the function controller in such position during the predetermined selected period of time.

Likewise, manual set gear 59 is rotated to a predetermined selected position manually through the medium of pinion gears 66, 67, 68 and knob 70. When the time clock driving cam disk 56 is rotated to such selected time position through the constantly engaged dental clutch 53 and 54, the spring 89 will rotate the lever 75 on its fulcrum so as to cause the cam finger 57 to enter into and pass through the registering aperture 60 of gear 59. Such movement will carry the link 79, which is pivoted to the lever 75, to the right, as viewed in Fig. 10 of the drawings and thus cause the shoulders 80 thereon to engage and swing the pawl spreader 83 to the position shown in Fig. 10. Such movement will spread the pawls 96 and 99 sufficiently to permit the annular shoulder 92 to pass freely therebetween, and thus permit the lever arm 93 to assume the position shown in dotted lines in Fig. 4.

The spring 81A which surrounds the reduced end 81 of the link 79 yieldingly urges the pawl spreader 83 against the shoulders 80 so as to snugly abut thereagainst and at the same time permit angular movement between the pawl spreader and its actuating link 79. Such limited angular movement is permitted by reason of the loose fit of the reduced end 81 in the rectangular aperture 82 of the pawl spreader 83.

Movement of the lever arm 93 to the position shown in full lines in Fig. 4 may be accomplished manually by grasping the knob 102 and pushing inwardly so as to slide it from the position shown in dotted outline to the position shown in full lines in Fig. 4. When pushed in to this position, the tapered finger 110 of the detent 104 is first cammed away from the gear 59 against the action of the tension spring 107 as the detent passes thereby and then the spring 107 causes the tip end of the tapered finger 110 to engage under the marginal or peripheral edge of the gear 59 at the base of the teeth thereon, as shown in full lines in Figs. 4 and 5. In this position, the detent 104 including the tapered finger 110 thereof, is in substantially radial alignment with the axis of rotation of the gear 59.

Movement of the shaft 110 to this position will cause the reduced end 101 thereof to swing the lever arm 93 outwardly to the position shown in full lines in Fig. 4 and retain it in that position.

The shaft 100A may be returned to its non-operative position in either one of two ways. The shaft is slightly rotatable or oscillable and will normally be held in radial alignment with the axis of rotation of the set gear 59. However, it may be slightly rotated, against the action of the spring 107, by grasping the knob 102 with the fingers and rotating the assembly to the right.

Most important, however, is the automatic release of this manual control. As heretofore pointed out, the tension spring 107 yieldingly urges the shaft 100A outwardly or to the left as viewed in Fig. 4 while at the same time maintaining the tip end of the tapered finger 110 engaged under the marginal edge of the set gear 59. Immediately upon rotation of the set gear 59 in the direction indicated by the arrow in Fig. 5, the detent 104 and its supporting shaft 100A are oscillated or rotated to the positions shown in dotted lines in Fig. 5. In such position, the tip of the tapered finger 107 is withdrawn from the marginal edge of the set gear 59 and passes between the teeth on said gear, due to the tension of spring 107. The length of the detent is so proportioned that when it is in radial alignment with the axis of rotation of the gear 59 it will slightly overlap the marginal edge of said gear, but when rotated slightly on its axis, the tip end thereof will withdraw from such marginal edge engagement.

It will thus be seen that the tension spring 107 performs a triple function. First, in normally urging the shaft 100A to the left, as viewed in Fig. 4, so as to cause it to assume the position shown in dotted outline thereon; second, it will tend to rotate the detent about its pivot 105 until rotation is restrained by the shoulder 109 and third, the spring will at all times tend yieldingly to hold the detent 104 in radial alignment with the axis of the set gear 59.

When the cam lever 93 is moved outwardly to the position shown in full lines in Fig. 4 either manually by the shaft 100A, or automatically by the controller 90—91, the toe 111 of the cam lever 93 engages the arm 112 of insulating material which is secured to the spring contact arm 114 and moves it to the position shown in full lines in Fig. 7. When moved to such position, the contact point 113 bears against contact point 116 and thereby closes the circuit between the terminals

124 and 125 of the switch, which is generally designated 131 in Figs. 12 and 13.

As shown in Figs. 12 and 13, a circuit through the visual signal, comprising the electric light bulb 126, passes through the switch 131 and also through the switch 132 in the oven regulator shown in Fig. 12, which illustrates an electric oven, and indicated at 152 in Fig. 13, which illustrates a gas oven. The oven regulator switches 132 and 152 are arranged so as to be open when the manual control of the oven regulator is at zero or off, and are closed when the oven regulator control is turned on to any point away from zero or "off" position.

With this arrangement, the signal lamp will indicate when fuel or power is being supplied to the oven or when the controls are in position so that it will be supplied in the event the temperature of the oven should fall below the setting of the thermostatically controlled oven regulator. It will be understood, of course, that in thermostatically controlled oven regulators, the fuel or power is supplied and consumed until the heat of the oven reaches the temperature selected by the user, at which time it automatically turns off. If the oven cools below that temperature, however, the automatic control operates to supply fuel or power to again raise the temperature to the selected temperature.

Although but one specific embodiment and two applications of use of this invention have been herein shown and described, it will be understood that numerous details of the constructions shown may be altered or omitted without departing from the spirit of this invention, as defined by the following claims.

I claim:

1. In a time clock mechanism, manual means for performing a desired function, releasable means for holding said manual means in position to perform such function, automatic means controlled by the timing mechanism for performing the same function, means for setting said automatic means at a selected time position, and means actuated by such setting for releasing said manual function performing means.

2. In a time clock mechanism, a manually operable member movable to two positions, one of said positions being function performing, automatic means for releasably holding said member in function performing position, automatic means rendered effective by the timing mechanism for performing the same function, manual means for setting said automatic means at a selected time position, and means actuated by such setting for releasing said automatic holding means.

3. In a time clock mechanism, time controlled automatic mechanism for performing a desired function, said mechanism including a rotatable set gear, a manually operable shaft for performing the same function, said shaft being slidable to two positions on an axis substantially parallel to the axis of rotation of said set gear, said shaft being oscillatory on its axis and located adjacent the periphery of said gear, a detent pivoted on said shaft and yielding means normally urging said detent to a position to engage the marginal edge of said gear, said shaft being rotatable against the action of said yielding means whereby rotation of said set gear will rotate said detent and shaft and thereby release said detent from engagement with said set gear.

4. In a time clock mechanism, time controlled automatic mechanism for performing a desired function, said mechanism including a rotatable set gear, a manually operable shaft for performing the same function, said shaft being slidable to two positions on an axis substantially parallel to the axis of rotation of said set gear, said shaft being oscillatory on its axis and located adjacent the periphery of said gear, a detent pivoted on said shaft, a spring acting on said detent for normally urging said detent to engage the marginal edge of said gear when said shaft is slid to one of its positions, said spring normally urging said shaft to the other of its positions and yieldingly resisting oscillation thereof, and manual means for rotating said set gear whereby said detent, if engaged therewith and said shaft will be oscillated and thereby withdraw said detent from engagement with said set gear.

5. A structure as defined in claim 4, in which the detent is yieldingly held by said spring in radial alinement with respect to the axis of rotation of said set gear, the tip end of said detent overlapping and being engageable behind the marginal edge of said set gear at the base of the teeth thereon, and slidable between the teeth thereof when oscillated slightly out of the aforesaid radial alinement.

6. In a time clock mechanism, automatic means controlled by said clock mechanism for performing a desired function, an axially slidable shaft for performing the same function, a detent pivoted on said shaft for releasably engaging said automatic means, a spring acting on said detent for normally urging said detent toward engaging position and sliding said shaft in one direction, said shaft being manually slidable in the other direction against the action of said spring for performing the desired function and manual means for adjusting said automatic means, said shaft, detent and automatic means being so constructed and arranged that manual adjustment of the automatic means will release said detent from engagement therewith.

7. In a time clock mechanism, automatic means controlled by said clock mechanism for performing a desired function, a shaft for performing the same function, said shaft being axially slidable and oscillatable, a detent on said shaft for releasably engaging said automatic means, a spring acting on said detent for normally urging said detent toward engaging position, for sliding said shaft in one direction and for yieldingly restraining said shaft from oscillating, said shaft being manually slidable in the other direction against the action of said spring for performing the desired function and for engaging said detent with said automatic means, and manual means for adjusting said automatic means, said shaft, detent and automatic means being so constructed and arranged that manual adjustment of the automatic means will release said detent from engagement therewith.

JOHN H. GRAYSON.