Oct. 6, 1964 T. BOWEN 3,151,489

ADJUSTABLE CLOCK CONTROLLED SWITCH MECHANISM

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Fig. 1.

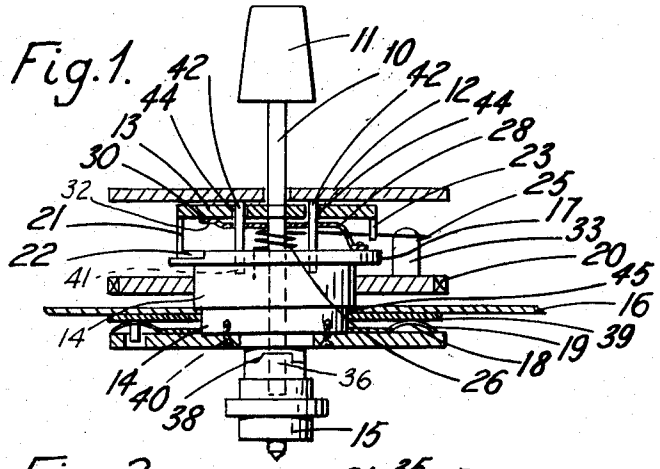

Fig. 2.

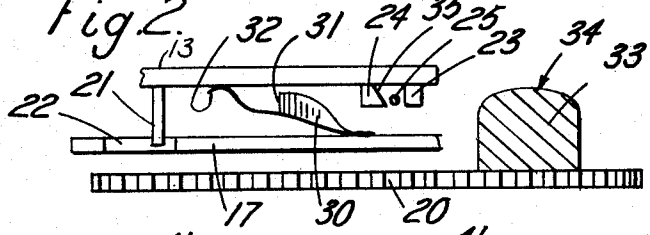

Fig. 10.

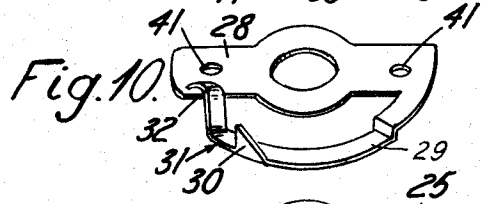

Fig. 9.

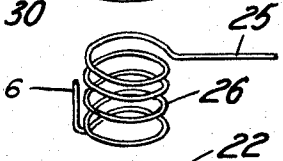

Fig. 8.

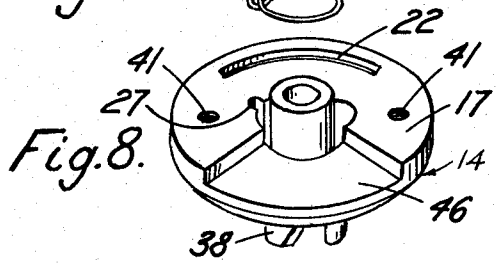

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Fig. 3.

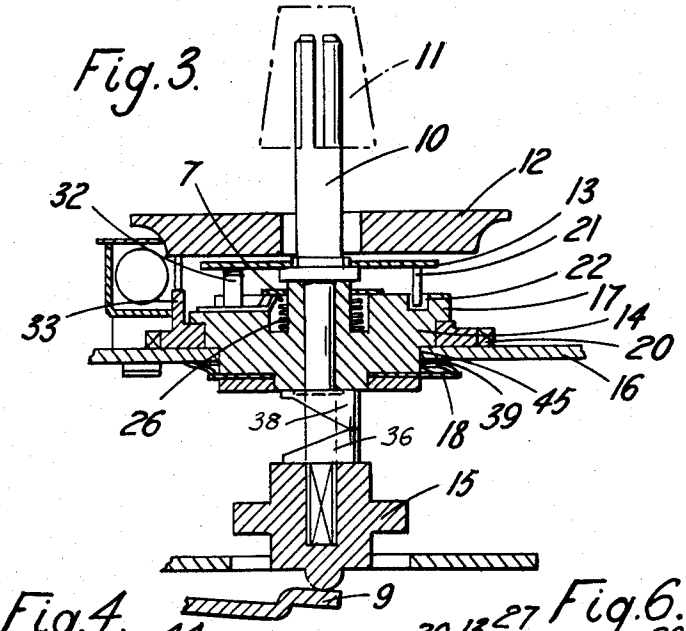


Fig. 4.

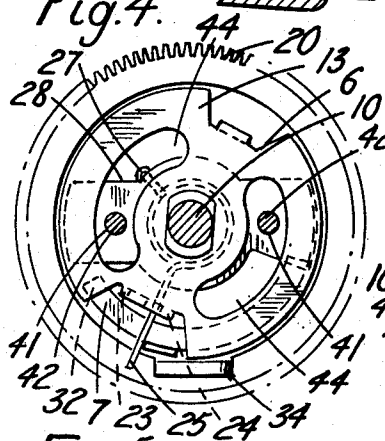


Fig. 6.

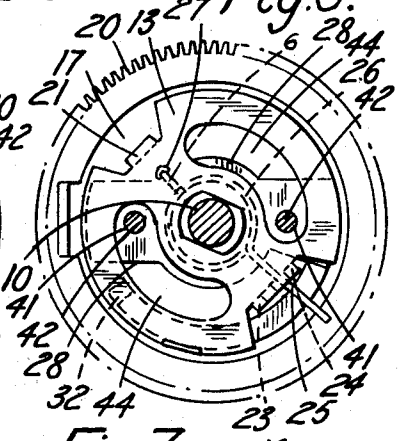


Fig. 5.

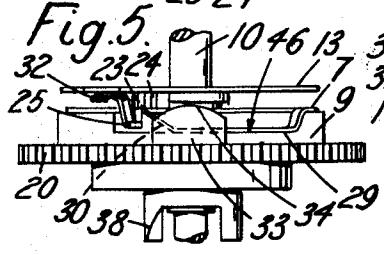
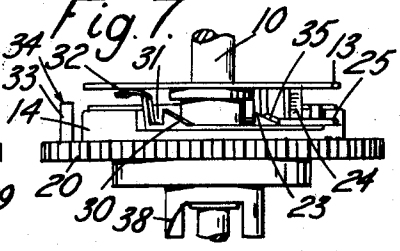


Fig. 7.



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3,151,489

ADJUSTABLE CLOCK CONTROLLED SWITCH MECHANISM

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Claims priority, application Great Britain, Oct. 22, 1959, 35,873/59
7 Claims. (Cl. 74—3.5)

This invention relates to adjustable clock controlled switch mechanism. The term switch mechanism is intended to cover any mechanism controlling an electrical, mechanical or fluid source.

According to this invention an adjustable clock controlled switch mechanism is characterized in that a part of the mechanism is disposed in and is adjustable along the path of movement of an element driven by the clock, and in that means are provided for pre-setting said part at a pre-selected locality in said path away from said element and in so doing imparting movement to a switch controlling member in one sense, and which part when engaged by the clock driven element causes the switch controlling member to move in the opposite sense and in that the means for pre-setting said part of the mechanism to a pre-selected locality in the path of movement of the element driven by the clock, imparts movement to the switch controlling member in one sense against the action of a spring and which part has associated therewith a detent which automatically engages it during the pre-setting operation so as to hold the spring in a loaded condition and in that the detent is arranged to be tripped by the clock driven element whereupon the spring can impart movement to said part and to the switch controlling member in the opposite sense.

One end of said spring may be attached to or form said part which is adjustable along the path of movement of the clock driven element and the other end of the spring is connected to an element rotatable through a lost motion device by the means for pre-setting said part so that when the switch controlling member has been actuated by the initial part of the setting movement continued setting movement results in said spring and said part rotating solidly together whereby the spring cannot be overstressed.

Preferably the means for pre-setting said part in the path of movement of the clock driven element is rotatable and the switch controlling member rotates therewith but is axially movable relatively thereto which axial movement actuates said switch and a rotatable frictionally restrained member is arranged co-axially with said switch controlling member and is rotated through a lost motion device by said setting means and cam means are arranged between the switch controlling member and the frictionally restrained member so that while lost motion takes place between the setting means and frictionally restrained member axial movement is imparted to said switch controlling member and when the lost motion is taken up, the setting means, the frictionally restrained member, and switch controlling means rotate together.

The same lost motion device may be asosciated with said frictionally restrained member as with said spring and the part which spring is adjustable along the path of movement of the clock driven element.

The part adjustable along the path of the switch controlling member is so connected to the pre-setting means that it may be moved out of engagement with the detent by reversal of the movement of the pre-setting means whereby correction may be made should said parts be overset.

The part which is attached to or forms a part of said spring and is adjustable along the path of movement of

the clock driven element may be disposed between two faces axially extending away from the setting means, one of which is inclined to an axial line, so that when the setting means is turned towards the datum position the inclined face moves said part clear of the detent, which movement is permitted by reason of the resilience of the spring.

A rotatable indicating member may be connected to the frictionally restrained member or part moving therewith so that no indicating movement takes place while the lost motion is being taken up. Such an arrangement is particularly applicable to controlling the cooking period of an electric cooker in which case two such mechanisms may be provided one for determining the time when the cooker is to be turned on and the other for determining when the cooker is to be turned off.

The following is a more detailed description of one such clock actuated mechanism reference being made to the accompanying drawings in which:

FIGURE 1 is a diagrammatic section through the mechanism;

FIGURE 2 is an enlarged diagrammatic view of the detent mechanism;

FIGURE 3 is a more detailed section through the mechanism showing the parts when the coiled spring is loaded;

FIGURE 4 is a plan view of the arrangement shown in FIGURE 3 with the indicating disc removed;

FIGURE 5 is a side elevation of the arrangement in FIGURE 4;

FIGURE 6 is a plan view similar to that of FIGURE 4 but showing the parts in the position they assume after the release of the spring;

FIGURE 7 is a side view of the arrangement of FIGURE 4;

FIGURE 8 is a perspective view of the member 14;

FIGURE 9 is a perspective view of the operating spring; and

FIGURE 10 is a perspective view of the detent.

A setting spindle **10** has secured to it a manipulating knob **11**, and the spindle **10** extends loosely through an indicating disc **12**. The spindle has attached to it a setting disc **13** and projects beyond that disc through a member **14** into a bore of a switch operating member **15** which is shown engaging a part **9** of a switch mechanism. The end of the spindle is flattened so as to engage flats in said bore so that relative axial movement may take place between these two parts but not rotary movement. The member **14** is rotatably supported by a fixed frame member **16**, passing through a hole **45** therein. The member **14** has fixed to or formed on it, on the same side of the frame member **16** as the setting disc **13**, a further disc or flange **17**. The member **14** on the other side of the frame member **16** has fixed to it a resilient washer **18** which frictionally engages a face of the frame member **16** or an interposed washer **39**. A wheel **20** driven by the clock train is disposed between the frame member **16** and the disc or flange **17** on the body **14**. An axially extending lug **21** on the setting disc **13** projects into an arcuate slot **22** in the flange **17** so as to have lost motion therein. The setting disc **13** is provided with two axially extending lugs **23**, **24** between which is located a radial extension **25** of an upper convolution of a helically coiled spring **26**. The convolutions of the spring are circular in cross-section. The lower convolution has an upturned portion **6** which engages a slot **27** formed in the member **14**.

A detent **28** rotates with the part **14** by reason of pins **42** which engage holes **41** in part **14**, extend through holes **41** in the detent **28** and through slots **44** in setting disc **13** and are fixed in the indicating disc **12** and is formed from sheet metal which has a portion **29** bent out of it, a

part of which is shaped to provide a cam surface 30 and a nitch 31 beyond the cam. The bent out part 29 is located in a sector shaped recess 46 (see FIGURE 8) formed in a face of the flange 17. The extremity 32 of the strip bears against a face of the setting disc 13. An axially extending projection 33 is provided on a face of the clock driven wheel 20 having a curved face 34 and the radial extension 25 of the spring is arranged in the path of movement of this curved face. The inner face (FIGURE 2) of the lug 24 on the setting disc is inclined at 35. The curved face 34 ensures that the spring extension 25 can pass over the projection 33 for either direction of relative rotation between the time wheel 20 and setting spindle 10 thus preventing damage to the spring.

The upper face of the switch operating member 15 which is directed towards the resilient plate 18 is provided with a cam profile 36. A part of the body 14 projecting downwardly through the resilient plate 18 is provided with a similarly shaped cam profile 38. The switch operating member 15 is spring urged towards the body 14 and the resilient plate 18.

The indicating disc 12 is fixed to the part 14 by pegs 42 secured to the disc 12 which pegs extend through slots 44 in the setting disc 13, through holes 41 in the detent 28 and in the part 14.

The operation of the mechanism is as follows:

Assuming the switch operating member controls a switch for connecting a cooker oven to a source of supply and the various parts are in the positions which they take up after the operating member 15 has returned to its initial position, the radial extension 25 of the spring 26 will then be away from the cam-face 30 on the detent 28. Extension 25 always lies between the lugs 23, 24. Extension 25 will normally, but not necessarily be disposed away from the projection 33 on the time wheel 20. The lug 21 on the setting disc 13 will be at one end the left end as seen in FIGURE 8 of the slot 22. When it is required to set the cooking starting time the setting spindle 10 is then rotated clockwise as viewed in plan, so as to move the lug 21 towards the other end of the slot and during this time the operating member 15 will be rotated relatively to the frictionally restrained member 14, and the relative movement between these parts will cause the cam mechanism 36, 38 to shift the member 15 axially and open the switch associated with it and while the lug 21 is moving between one end of the slot 22 to the other, the extension of the spring 25 will be drawn by lug 24 up the cam face 30 away from projection 33 and snap over the end so that it then lies in the nitch 31, and during this time the spring 26 will be loaded since its other end is fixed relatively to member 14.

Continued rotation of the spindle 10 will cause the disc 13, member 14, resilient plate 18 and the switch actuating member 15 to move solidly together by reason of the fact that the lug 21 will be abutting the end of the slot 22 in disc 17 and the extension 25 of the spring will move away from the projection 33 on the time wheel 20 in the direction of its rotation. After the lost motion has been taken up by the lug 21 coming to the end of the slot 22 the indicating disc 12 will also move with the flange 17 to which it is attached by pins 42. After the parts have been appropriately set the projection 33 on the time wheel will, after a predetermined time, come into contact with the extension 25 moving it upwardly out of the nitch 31 of the detent and the spring 26 will then rotate the setting disc 13 and switch operating member 15 so as to close its switch. The frictional restraint provided by the resilient washer 18 is sufficient to prevent rotation of the part 38.

Under certain circumstances after setting the setting mechanism it may be required to release the detent for example in the case where the switch controlled by the operating member 15 connects an electric source of supply to a cooking oven, should the operator after setting

the mechanism so that the switch will be automatically closed at some future time and then has a change of mind and wishes to use the cooker immediately it is necessary to retract the member 15 and close the switch. This may be effected by reversing the rotation of the setting spindle which causes the inclined face 35 on the lug 24 to lift the radial extension 25 of the spring out of engagement with the nitch 31 on the detent 28 and continued movement of the spindle 10 will cause the switch actuating member to be brought back to its initial position. This reverse rotation of the spindle 10 must be sufficient to bring the member 14 back to its initial position.

The operator will then require to rotate the spindle in the setting direction so as to take up the lost motion and to rotate the switch operaing member 15 and to ensure that this action is taken a warning light may be associated with the switch mechanism.

While there have been described above what are presently believed to be the preferred forms of the invention, variations thereof will be obvious to those skilled in the art and all such changes and variations which fall within the spirit of the invention are intended to be covered by the generic terms in the appended claims, which are variably worded to that end.

I claim:

1. An adjustable clock controlled mechanism comprising a clock driven element, a rotatable setting spindle, a switch operating member connected to said spindle, an intermediate element rotatable on said spindle, a lost motion connection between the setting spindle and the intermediate element, spring means connected between the setting spindle and the intermediate element, friction means restraining rotation of the intermeditae element as the lost motion is taken up and the spring means are loaded by rotation of the spindle, detent means acting to hold said spring means in a loaded condition, said spring means having a part disposed in the path of movement of the clock driven element, said rotatable setting spindle having means acting to take up the lost motion during the first portion of its motion in a setting sense and simultaneously acting to load said spring means until said spring means is held by said detent means, the movement of said spindle during the taking up of said lost motion acting to move said switch operating member from a first position to a second position, said rotatable setting spindle after the lost motion is taken up having a further and variable portion of its motion of rotation in said setting sense during which it acts to rotate said intermediate element and to locate said part of said spring means at a desired position along the path of movement of said clock driven element so that subsequent engagement of said part by said clock driven element releases said spring means and causes said setting spindle to rotate in a sense opposite to said setting sense under the action of said spring means and returns said switch operating member from said second position to said first position.

2. An adjustable clock controlled switch mechanism according to claim 1 wherein said spring means comprise a helical spring one end of which forms said part of said spring means and is adjustable along the path of movement of the clock driven element and the other end of said spring is connected to the intermediate element.

3. An adjustable clock controlled mechanism according to claim 1 wherein said switch operating member which rotates with the setting spindle is axially movable relatively thereto to actuate said switch, said friction means acting between said intermediate element and a fixed part of the mechanism, a cam arranged between the switch operating member and the frictionally restrained intermediate element which imparts axial movement to the switch operating member while lost motion takes place between the setting spindle and frictionally restrained intermediate element, the setting spindle being

constructed to impart rotational movement to the frictionally restrained intermediate element and switch operating member when the lost motion is taken up.

4. An adjustable clock controlled mechanism according to claim 1 wherein said part of said spring means engageable by the clock driven element is movable into and out of the path thereof, and means actuated by the movement of setting spindle in the opposite sense to said setting sense and engageable with said part for moving it out of said path.

5. An adjustable clock controlled mechanism according to claim 4 wherein said part of said spring means is disposed between two faces axially extending away from a part fixed to the setting spindle, one of said faces being inclined to an axial line, so that when the setting spindle is rotated in said opposite sense the inclined face engages said part and moves it clear of said detent means.

6. An adjustable clock controlled mechanism according to claim 1, wherein a rotatable indicating member is connected to said intermediate element.

7. An adjustable clock controlled mechanism comprising a clock driven element, a rotatable setting spindle, a switch operating member connected to said spindle, an intermediate element rotatable on said spindle, a lost motion connection between the setting spindle and the intermediate element, spring means connected between the setting spindle and the intermediate element, friction means restraining rotation of the intermediate element as the lost motion is taken up and the spring means are loaded by rotation of the spindle, detent means on said intermediate element, a part rotating with the spindle and movable into engagement with the detent means when the lost motion is taken up so that when said part

is in engagement with the detent means to spring means are held in a loaded condition, said part being disposed in the path of movement of the clock driven element, said rotatable setting spindle having means acting to take up the lost motion during the first portion of its motion in a setting sense and simultaneously acting to load said spring means until said part rotating with the spindle is held by said detent means, the movement of said spindle as the lost motion is taken up acting to move said switch operating member from a first position to a second position, said rotatable setting spindle having a further and variable portion of its motion of rotation in said setting sense during which it acts to rotate said intermediate element and to locate sad part rotating with the spindle at a desired position along the path of movement of said clock driven element so that subsequent engagement of said part by said clock driven element releases said part from said detent means and causes said setting spindle to rotate in a sense opposite to said setting sense under the action of said spring means and returns said switch operating member from said second position to said first position.

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