

United States Patent

[11] 3,552,350

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1,949,856	3/1934	Blakeslee	116/106
2,085,860	7/1937	Lambert.....	116/106
2,563,877	8/1951	Sfrello	185/44X
2,632,887	3/1953	Rusmak.....	58/85X
2,999,477	9/1961	Pratt et al.	116/106

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[54] **VISUAL SIGNAL MEANS FOR A FIRE DETECTION ALARM**
10 Claims, 4 Drawing Figs.

[52] U.S. Cl. **116/106,**
58/85; 116/132; 185/44
[51] Int. Cl. **G08b 17/00**
[50] Field of Search 116/4, 5,
91, 92, 94, 102, 106, 162; 58/85; 185/6, 14, 44;
340/(Inquired)

[56] **References Cited**
UNITED STATES PATENTS
1,189,915 7/1916 Clive 116/106

ABSTRACT: A visual signal means for a fire detection alarm device in which a flag-type signal means is normally biased into exposed, readily visible position to indicate that the driving or spring motor is not fully wound or energized. A latch member, responsive to the spring motor during its final winding into fully energized condition, positions the latch member at that time for latchable engagement with the flag means when manually positioned in nonexposed relation with respect to the alarm; the flag means being virtually immediately exposable upon initial unwinding action of the spring motor by release of the latch member which immediately responds to such initial unwinding action.

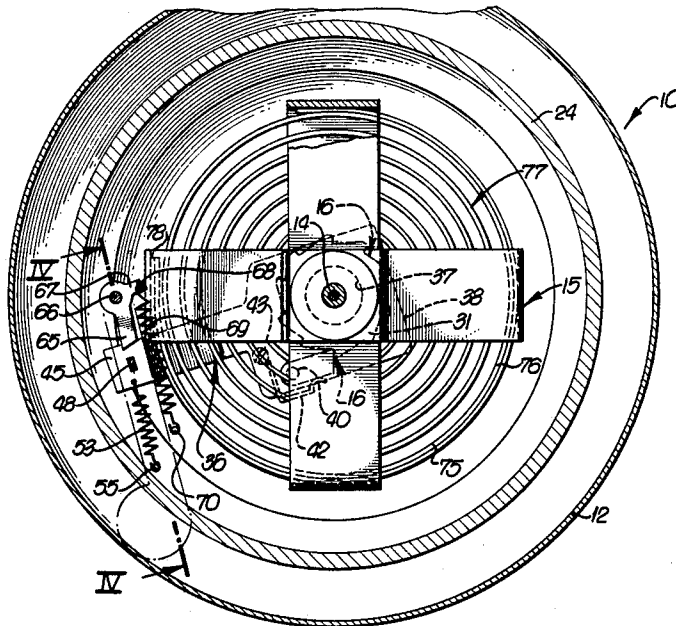


FIG. 2.

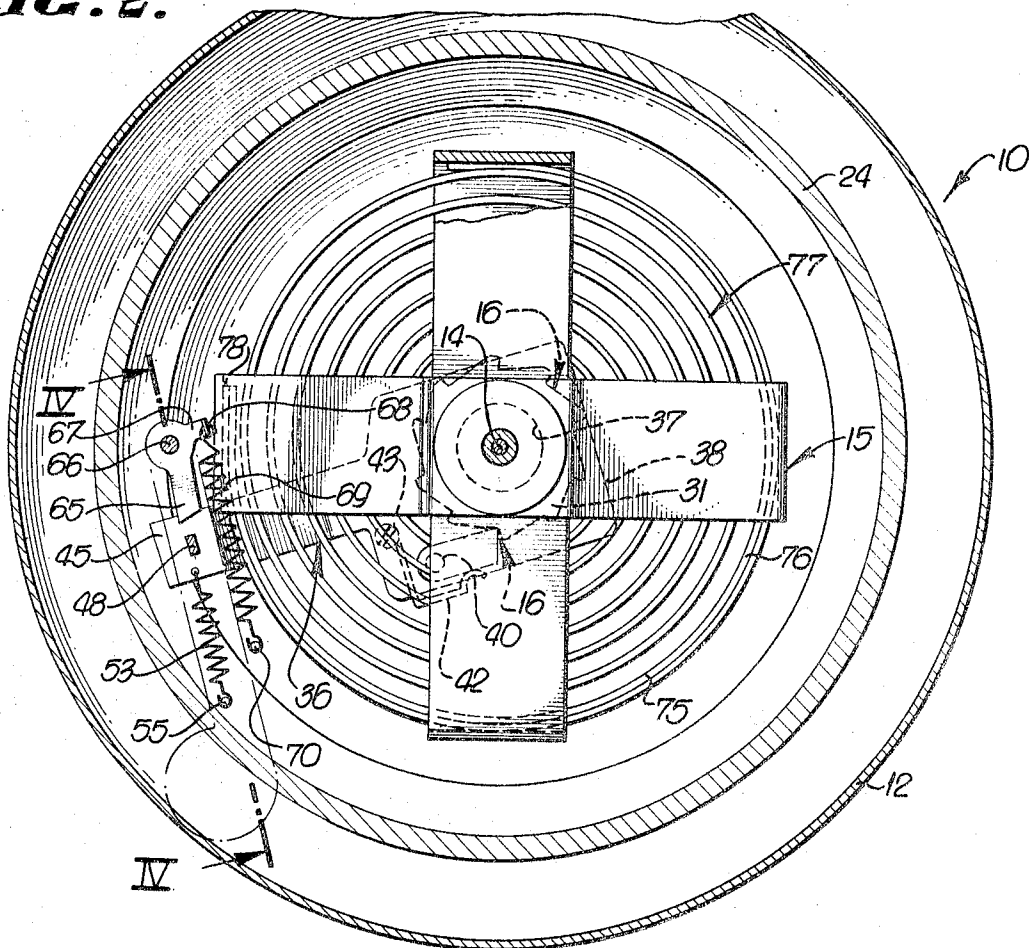
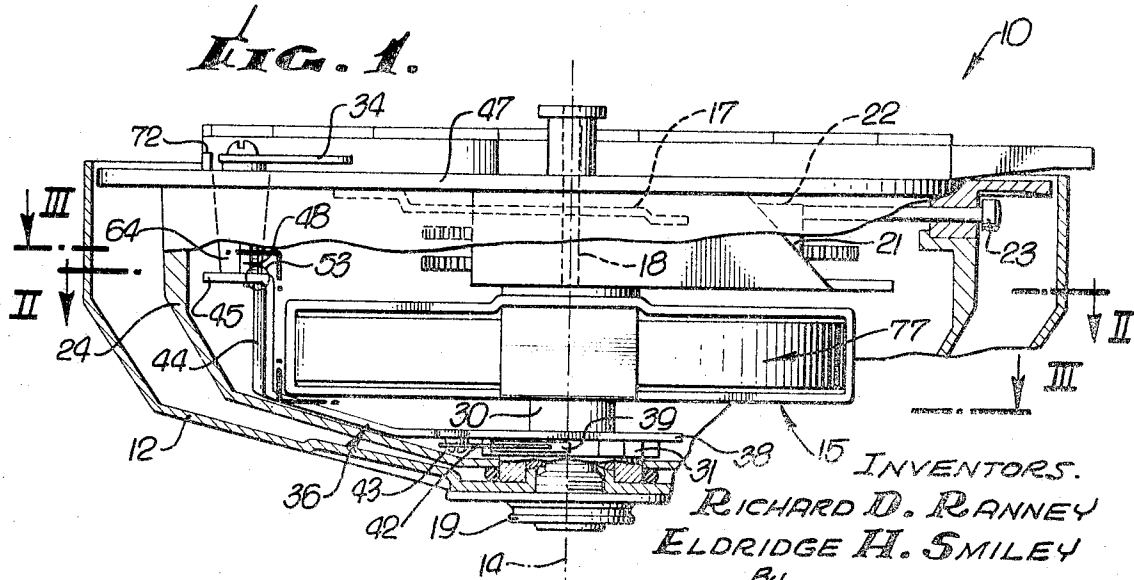


FIG. 1.



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FIG. 3.

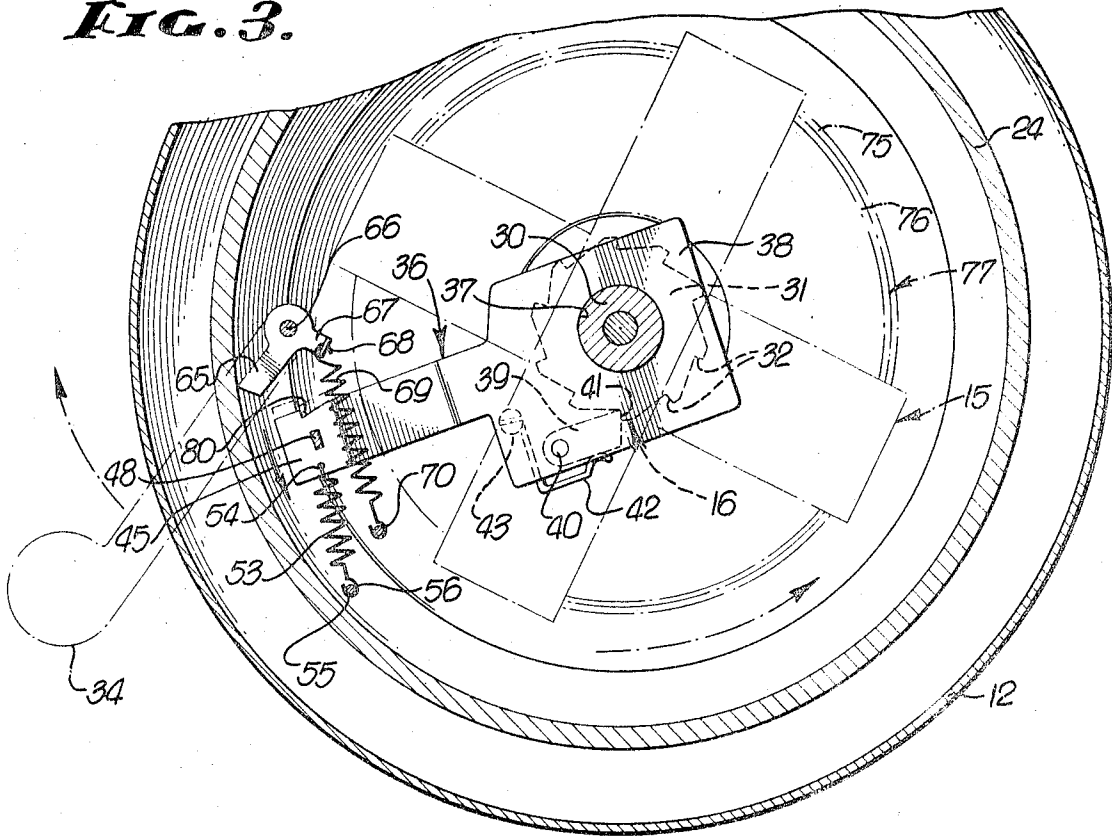
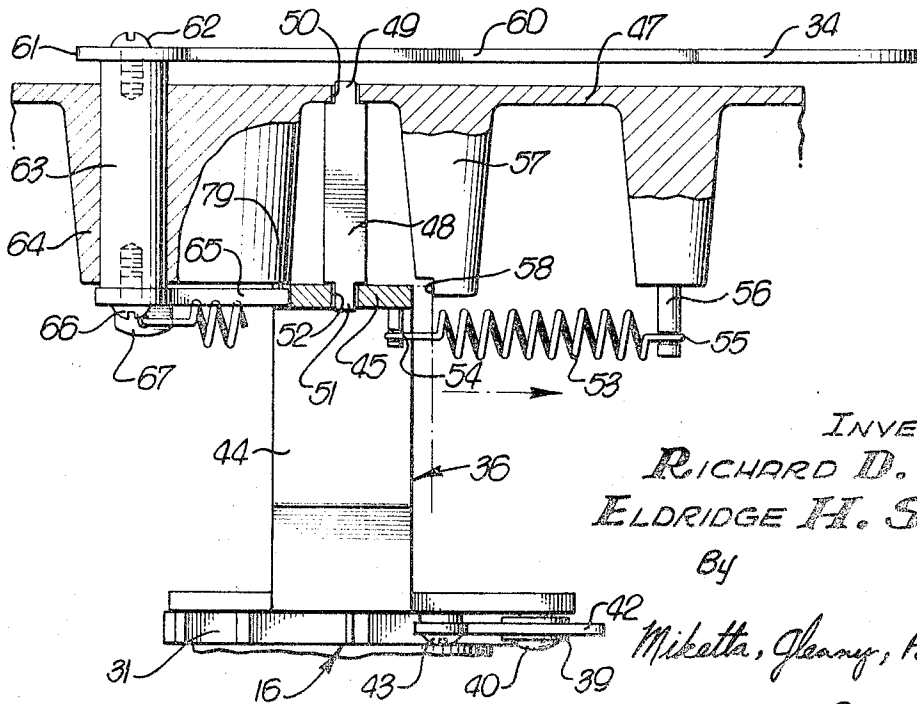


FIG. 4.



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VISUAL SIGNAL MEANS FOR A FIRE DETECTION ALARM

BACKGROUND OF THE INVENTION

Prior proposed fire detection alarm devices have included mechanically wound spring motors or drive means in which various arrangements have been proposed for indicating the wound or unwound condition of the spring motor. Such mechanical spring motors may be energized or wound to varying degrees. In some prior proposed devices, a signal element for indicating the wound condition of the spring motor was often not immediately responsive to unwinding of the motor. In U.S. Pat. No. 2,999,477, a flag indicator includes a sensing arm bearing continuously against the outer turn of a spiral spring motor and as the diameter of the turn of the spiral spring changes during actuation of the alarm the flag is urged outwardly into view in a gradual manner. Initial movement of the flag is relatively small and the entire flag is not immediately exposed. In copending application Ser. No. 761,433, filed Sept. 23, 1968, now patented owned by a common assignee of the present application, a flag includes an arm which may not contact the outer turn of a spiral spring but which is urged into exposed position by contact with a portion of a rotatable spring housing.

It is very important that such alarm devices clearly and positively show whether the alarm is fully wound or in fully energized condition or in less than a fully energized condition. Where such information as to the condition of the alarm is not readily immediately indicated by a flag device, the existence of a partially unwound spring motor reduces the effectiveness of the alarm system and reflects upon the capability of the alarm device to ring its alarm for a preselected warning period of time. To provide adequate warning by an audible signal, arbitrary standards require a minimum of 4 minutes of ringing at a decibel range of between 85 to 95. It is therefore highly desirable that the flag indicate that the spring motor is not fully wound upon the slightest unwinding of the spring motor so that the maximum alarm ringing period will always be available in the event of a fire. Prompt rewinding and maintenance of the alarm in fully wound condition is necessary when indicated by the flag signal. Prior proposed visual flag-type alarm signals for mechanically wound spring-type alarms have included various devices responsive to the condition of the spring motor but have not been constructed and arranged so that slightest dissipation of the energized condition of the spring motor will be visually indicated by movement of the flag or signal into visible exposed position.

The present invention contemplates a novel, quick acting visual signal means for a mechanical alarm having a spring motor whereby fully wound condition is indicated by nonexposure or concealment of a flag signal means and whereby an initial slight change out of fully wound condition immediately releases the flag signal means into exposed visible position indicating that rewinding is necessary. The invention contemplates such a visual signal indicating means which may be employed with various types of mechanical alarm signal means in which a spring motor of spiral spring type is employed. The invention contemplates a novel arrangement whereby the visual indicating means cannot be moved into unexposed concealed position and retained in such position until and unless the spring motor is in its virtually fully wound and energized condition.

The primary object of the present invention is to disclose and provide a novel visual signal means for indicating the condition of an alarm device.

An object of the present invention is to disclose and provide a novel construction and arrangement for a visual signal indicating means for a mechanical alarm device wherein the visual signal indicating means is not held in nonexposed position until a preselected wound condition of the spring motor exists.

Another object of the present invention is to disclose and provide a visual signal indicating means for a mechanical alarm device which is immediately released and exposed upon the commencement of the unwinding or deenergization of the spring motor.

A further object of the present invention is to disclose and provide a visual signal indicating means for a mechanical alarm device wherein means responsive to the change in condition of the spring motor is immediately operable to release the concealed flag means for movement into an exposed position indicating unwound condition of the spring motor.

A still further object of the present invention is to disclose and provide a novel flag signal means for an alarm device wherein the flag signal is pivotally mounted and a latch member extends from the spring motor to the flag signal means and is normally biased into nonengageable position with the flag signal, and is urged into engageable position with the flag signal by final energization of the spring motor into fully wound condition.

Other advantages and objects of the present invention will be readily apparent from the following description of the drawings in which an exemplary embodiment of the present invention is shown.

In the drawings:

FIG. 1 is a fragmentary side view of an alarm device embodying this invention, the view being partially in section which is taken in a longitudinal plane passing through the axis of the device;

FIG. 2 is a transverse sectional view taken in the plane indicated by line II-II of FIG. 1;

FIG. 3 is a fragmentary transverse sectional view taken in the plane indicated by line III-III of FIG. 1; and

FIG. 4 is a fragmentary sectional view taken in the plane indicated by line IV-IV of FIG. 2.

In the drawings a mechanical alarm device embodying the present invention is shown associated with the alarm construction of copending patent application Ser. No. 761,433 owned by a common assignee of both applications. The mechanical alarm device shown is exemplary only and it is understood that other types of mechanical alarms embodying spring motors or their equivalent may be readily adapted to employ the visual signal means of the present invention.

The alarm device indicated at 10 is partially shown and generally comprises an outer rotatable housing or cover 12 rotatable about an axis at 14 which coincides with the axis of a rotatable spring motor or drive means 15. Drive means 15 may be held against rotation in one direction by a ratchet and pawl means generally indicated at 16 and against rotation in the opposite direction by a trigger member 17 which may be moved to release position by a pin 18, one end of which is cooperably associated with a thermostat bimetalllic disc 19 carried at the front face of cover 12. In general, release of trigger 17 permits the spring motor 15 to unwind and to transmit its driving force through a gear train into rotation of a hammer actuating member 21 upon which a pair of swingable hammers 22 are mounted which strike one end of a pin 23, the other end of which forcibly strikes against the inner surface of the cover 12 for sounding the alarm. The ratchet and pawl means 16, trigger member 17, spring motor 15, and hammer actuating means 21, 22 and pin 23 are normally disposed within a sealed inner casing 24. The construction generally mentioned above, except for the location of the pawl means, is similar to the construction of a mechanical alarm shown and claimed in the aforesaid application Ser. No. 761,433, and for brevity is not further described in detail herein.

The visual signal indicating means of the present invention will now be described and may comprise a hub 30 coaxial with the axis 14 of the cover 12 and spring motor 15 and having mounted thereon for rotation with the hub a ratchet 31 provided with ratchet teeth 32.

Means for cooperably interconnecting the drive means 15 with a visual signal indicating means or flag means 34 may comprise a drive means responsive or latch member 36 having

an opening 37 for coaxially mounting one end portion 38 of the member 36 on hub 30 for nonrotation therewith.

The member therewith. The member 36 carries pawl 39 pivotally mounted thereon as at 40 and having its end face 41 engageable with a tooth 32 for restraining the ratchet against rotation in one direction and thereby restraining the spring motor against rotation in that direction. The pawl 39 is biased against ratchet 32 by a spring 42 fixed to member 36 by a suitable screw at 43. Pressure forces of spring motor 15 are transmitter through hub 30 and ratchet 32 to pawl 39.

Latch member 36 extends radially outwardly from the axis 14 and may in general follow the contour of the inner housing 24 so as to pass between spring motor 15 and the inner surface of housing 24 to a circumferential portion of base member 47 upon which flag member 34 is mounted. Member 36 includes an offset portion 44 which terminates in a radially outwardly extending latch end portion 45 which may be antifrictionally limitedly movably mounted from base member 47 of the inner housing by a rockable pin 48. Pin 48 may be rockably mounted on base 47 by a reduced end section 49 which is loosely receivable within a port 50 in base member 47. A similar rockable arrangement is provided at the opposite end of pin 48 wherein a reduced end section 51 extends loosely within a port 52 provided in latch end portion 45. Thus limited movement of latch end portion 45 of the member 36 is provided without substantial frictional resistance thereto.

Means for biasing latch member 36 into a normally nonengageable position with flag means 34 may comprise a spring means 53 connected at one end at 54 to latch member 36 and connected at its other end at 55 to a suitable post 56 provided on base member 47. Adjacent the pin 48, base member 47 may be provided with a stub member 57 provided with a stop face 58 for limiting movement of member 36 in one direction, member 36 being normally biased by spring 53 thereagainst.

Flag means 34 may comprise an arm 60 (FIG. 4) having one end 61 secured by a screw 62 to a pivot pin 63 pivotally mounted in a boss 64 provided on base member 47. The opposite end of pivot pin 63 carries a latch element 65 secured to pin 63 by a suitable screw 66. Latch element 65 and arm 60 are secured in fixed relation to pivot pin 63. Latch element 65 includes an angularly disposed extension 67 providing a connection at 68 for one end of a flag biasing spring 69 which may be secured as at 70 to the base member 47. Spring 69 normally biases flag 34 into exposed, readily visible position beyond the circumference of the cover 12 of the alarm. Such outward exposure of flag 34 may be limited by a stop element 72 (FIG. 1) projecting from base member 47 for contact with flag 34.

Before describing operation of the visual signal means of the present invention it should be noted that the spring motor or drive means 15 is provided with an additional spring member 75 positioned within the outer turn 76 of the spiral spring 77 comprising the spring motor 15. One end of the additional spring member 75 may be secured at 78 to the spring housing and may extend for a selected length along outer turn 76, in this example, the length being approximately three-fourths of a turn. Spring member 75 serves to increase the tension or spring force just prior to the fully wound condition of the spring motor 15. An exam exemplary spring force at the final stage of the spring windup may be doubled. Spring 77 preferably is provided with a substantially uniform spring tension or spring unwinding rate throughout its unwinding action such as approximately 10 pounds. The installation of a spring member 75 at the outermost turn of spring 77 serves to provide a preselected spring force such as approximately 20 pounds at or during the last stages of the last turn of the spring motor when it is wound to fully energized condition. Such increase in spring force is important with respect to operation of this device as now described.

In operation, the spring motor 15 may be wound to fully energized condition by rotating outer cover 12 which causes spiral spring 77 to be wound more tightly about hub 30 and which rotates ratchet 32. During winding pawl 39 slips over the teeth 32. The latch member 36 maintains its normal non-

latching position because of its biasing spring 53 which during a substantial part of the winding operation exerts a spring force on the latch member 36 greater than that exerted by the spring 77 through engagement of teeth 32 with latch element 39 in the event rotation of cover 12 is momentarily stopped. When the cover is rotated into the final stage of its last turn, spring member 75 becomes effective to increase the spring force of spring 77 so as to overcome the spring force of biasing spring 53 so that latch member 36 will be moved in a clockwise direction as viewed in FIG. 3 into a latchable position as indicated in FIG. 3 by phantom lines. As the cover is turned into final wound position, the flag 34 may be manually rotated toward and into the alarm device against its biasing spring 69. As latch element 65 passes over the opposed edge face of latch end portion 45 the latch member 36 will latchably engage as at 79 the shoulder formed by latch recess 80 in latch end portion 45. Flag 34 will thus be retained within the circumference of the alarm device and will be concealed. It will be noted that flag 34 is incapable of being latched to latch member 36 until latch member 36 has been moved by action of the spring member 75 which at the last stage of spring wind up overcomes the biasing spring 53. Non visibility of flag 34 thus indicates positively that the spring motor is in fully wound or energized condition.

When the thermostat disc 19 is actuated by response to a selected temperature such as 135° F., the disc 19 moves pin 18 to displace trigger 17 to release the hammer actuating means 21, 22 and to thereby permit the spring motor to commence unwinding. Just as soon as the spring force of spring motor 15 begins to be diminished by such unwinding, the spring force maintaining latch member 36 in latched engagement with latch element 65 is reduced so that biasing spring 53 overcomes the spring force of the spring motor and causes flag 34 to be biased immediately into viewable exposed position. It should be noted that dissipation of the spring force of spring motor 15 as it commences to unwind permits the latch arm 36 which is responsive to such force to move in a counterclockwise direction and the latchable interengagement of element 65 with portion 45 is quickly disengaged.

It will be apparent to those skilled in the art that the offsetting of the spring forces of spring motor 15 and flag biasing spring 53 together with an arrangement of latchable elements a may be employed with other types of mechanical spring controlled alarm devices. Thus, the visual signal indicating means of the present invention may be employed on other alarm devices.

It should be noted that the pawl 39 serves to transmit the spring force of spring 77 to the latch arm 36 and that movement of the latch end portion 45 of arm 36 is facilitated by the rockable mounting of its end portion on mounting element 48. Tolerance between ends of pin 48 and base member 47 and latch end portion 45 may be sufficiently sloppy so that the latch end portion 45 is readily limitedly movable without frictional restraint.

Modifications and changes coming within the scope of the appended claims are embraced thereby.

We claim:

1. In combination with a mechanical alarm device including a spring motor provided with means to restrain rotation in one direction; the provision of:

flag means normally biased into exposed position for indicating at least partially unwound condition of said condition of said spring motor and including a latch element; a latch member having one end portion thereof cooperably associated with said restraint means and the other end portion thereof limitedly movable;

spring means biasing said latch member into a position normally nonengageable with said flag means; and

means cooperable with said spring motor to move said latch member against its biasing spring means into latchable position for engagement with said latch element on said flag means, and upon initial change of said spring motor from fully wound condition to partial wound condition to

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immediately release said latch member from said latch element to cause said flag means to be exposed.

2. An alarm device as stated in claim 1 wherein said means cooperable with said spring motor includes means for increasing tension of said spring motor just prior to fully energized condition of the spring motor.

3. An alarm device as stated in claim 1 including means for antifrictionally mounting said other end portion of said latch member.

4. A device as stated in claim 1 including stop means for limiting movement of said other end portion of said latch member.

5. A device as stated in claim 1 wherein said restraint means includes a ratchet and a pawl, said pawl being carried on said one end portion of said latch member.

6. An immediately responsive visual indicating means for a fire detection alarm device or the like to visually indicate the energized condition of said alarm, the combination of:

drive means for said alarm;

a visual indicating member for said alarm;

means for cooperably interconnecting said drive means and said visual indicating member including a drive means responsive member; and

means connected with said responsive member normally holding the latter in nonengageable position with respect

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to said visual indicating member until said drive means is fully energized.

7. A device as stated in claim 6 including a ratchet connected with said drive means and a pawl carried by said responsive member for transmitting the condition of said drive means to said indicating member.

8. A device as stated in claim 6 including a spring means connected to said responsive member normally biasing said responsive member against said drive means.

9. A device as stated in claim 6 including means for limitedly movably mounting one end of said responsive member between engaged and nonengaged relationship with said visual indicating member.

10. In combination with an alarm device; the provision of:

drive means having a fully energized condition for said alarm device;

visual signal means having an exposed and unexposed position mounted on said alarm device; and

means interconnecting said drive means and said visual signal means and responsive to the condition of the drive means to hold the visual signal means in unexposed position only when said drive means is in fully energized condition.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,552,350

Dated January 5, 1971

Inventor Richard D. Ranney and
Eldridge H. Smiley

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, line 2, after "mechanically" delete [s].

Column 2, line 14, after "flag", delete [d].

Column 3, line 3, delete [The member therewith.]; same column 3, line 59, delete [exam].

Column 4, line 21, delete [bee] and insert --been--; same column 4, line 44, delete [a]; same column 4, lines 64 and 65, delete [of said condition].

Signed and sealed this 29th day of February 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents