Feb. 12, 1935. L. A. RAMSDEN 1,990,566

AUTOMATIC INTERMITTENT SWITCH

Filed May 10, 1933 3 Sheets-Sheet 1

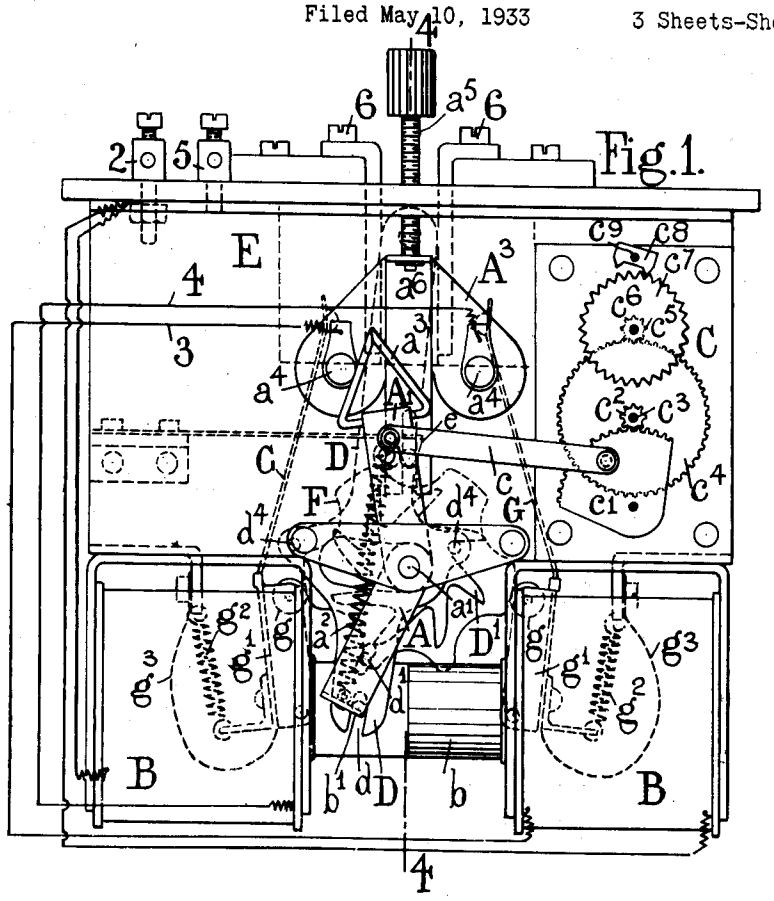

Fig.1.

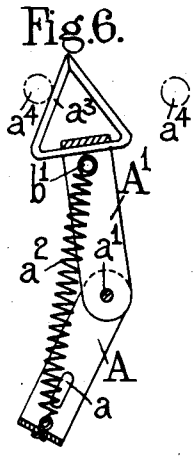

Fig.6.

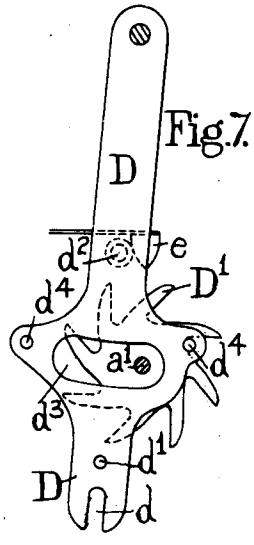

Fig.7.

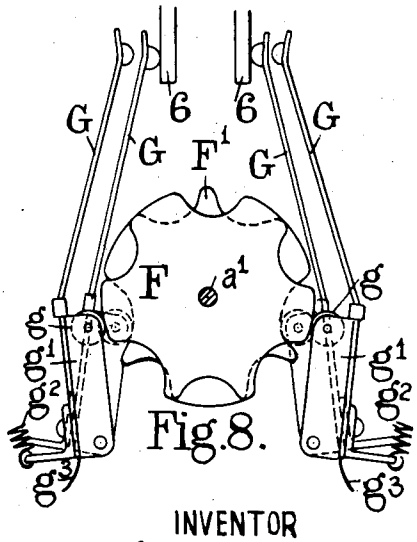

Fig.8.

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AUTOMATIC INTERMITTENT SWITCH

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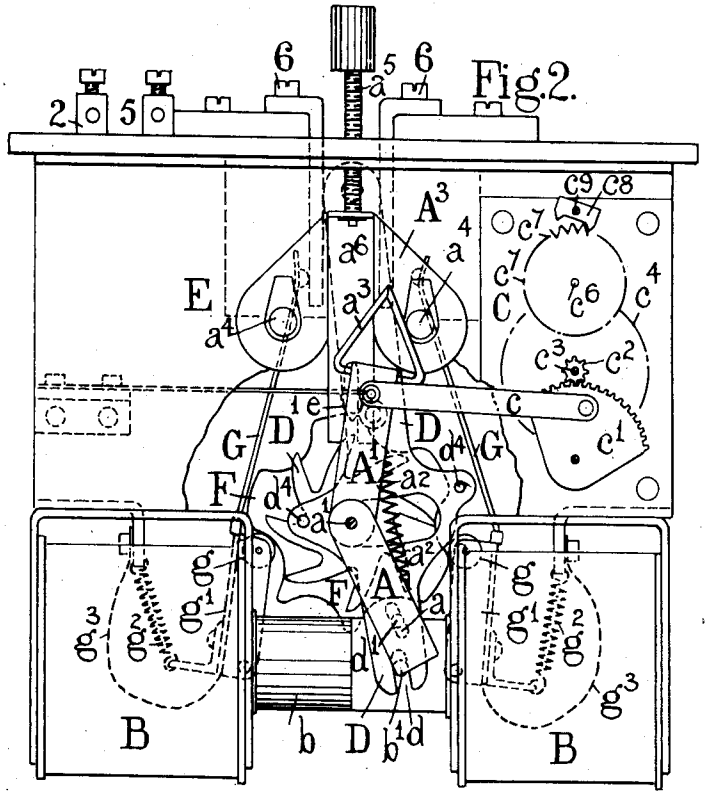

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Feb. 12, 1935. L. A. RAMSDEN 1,990,566

AUTOMATIC INTERMITTENT SWITCH

Filed May 10, 1933 3 Sheets-Sheet 3

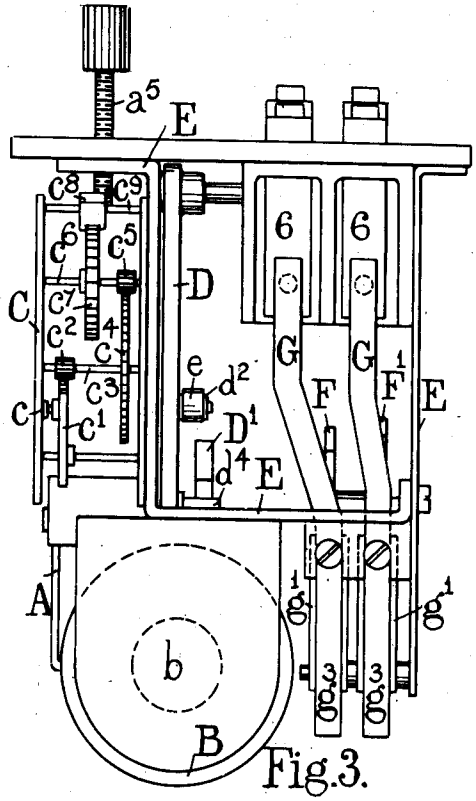

Fig.3.

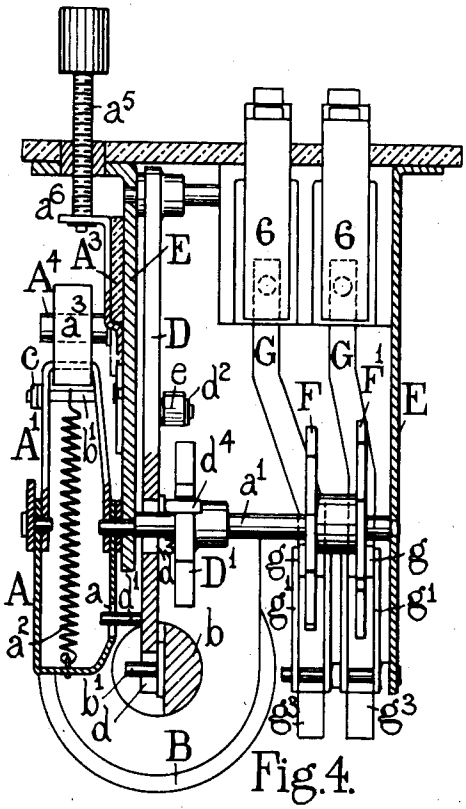

Fig.4.

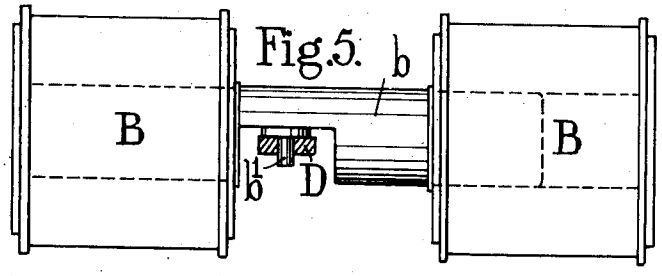

Fig.5.

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UNITED STATES PATENT OFFICE

1,990,566

AUTOMATIC INTERMITTENT SWITCH

Louis Alfred Ramsden, Failsworth, England

Application May 10, 1933, Serial No. 670,318
In Great Britain June 2, 1932

4 Claims. (Cl. 172—126)

This invention relates to improvements in automatic intermittent electric switches of the type in which the switch arm is formed in two parts pivoted together and connected by a spring and moved from one extreme position to the other by the common armature of two solenoids energized alternately.

The invention comprises two electromagnets or solenoids, energized alternately by a spring operated contact member controlled by the armature of the solenoids the speed of movement of this contact member from one extreme position to the other being retarded by gearing to provide a time lag for the operation of the switch.

The invention further comprises the provision of a plurality of cam discs given a rotary movement by the switch to control external electric circuits.

The invention will be described with reference to the accompanying drawings:—

Fig. 1 is a front elevation showing the contact maker in one extreme position.

Fig. 2 is a similar elevation showing the contact maker in the other extreme position.

Fig. 3 is a side elevation.

Fig. 4 is a section on line 4—4 Fig. 1.

Fig. 5 is a plan of the magnets.

Fig. 6 is a detail view of the contact maker.

Fig. 7 is a detail view of the lever D and star wheel.

Fig. 8 is a detail view of the cam discs and contacts for exterior circuits.

The switch is operated by a contact maker a^3 controlled by two solenoids B through gearing C which provides a time lag for the movement of the contact maker a^3.

The solenoids B are arranged to be energized alternately and are constructed with common armature b adapted to be drawn first in one direction and then in reverse by first one and then the other of the solenoids. The centre portion of the armature b is recessed and provided with a pin b^1 which engages a slot d in the lower end of a lever D pivoted about its upper end on the casing E. The lever D is thus given a movement through an arc of a circle as the armature b reciprocates. The lever D adjacent its lower end, carries a pin d^1 projecting through a slot a in one of a pair of diametrically opposed levers A A^1 pivoted on a common spindle a^1 to the casing and forming the contact maker. The free ends of the levers A A^1 are connected together by a spring a^2 which as the free end of the lever A swings over its dead centre with the pin b^1 causes the other lever A^1 to move in the same direction.

The amount of movement allowed to the lever A is constant and corresponds with the distance of travel of the pin b^1. The lever A^1 is provided with a triangular shaped contact a^3 which at the end of each movement of the lever A^1 comes in contact with one of two stops a^4 mounted on but insulated from the casing. These stops a^4 form the terminals for leads from the solenoid coils and as the contact a^3 enages one or other of these stops a^4 the circuit to one or other of the solenoids B is completed and the armature b is moved in a direction to break the circuit so made. The stops a^4 are carried on a plate A^3 of insulating material adjustably mounted on the casing by a spindle a^5 screwing therethrough to propel a bracket a^6 affixed to the plate A^3. To ensure that the armature b shall remain in one or other of its extreme positions when neither of the solenoids B is energized during the travel of the contact a^3 a spring pawl e mounted on the casing E travels over a roller d^2 carried by the lever D.

The rate at which the spring a^2 causes the lever A^1 to travel between the two stops a^4 is controlled by gearing C through a connecting rod c pivoted to the lever A^1 and to a toothed quadrant c^1. The quadrant c^1 gears with a pinion c^2 on a spindle c^3 also carrying a further pinion c^4 which engages a pinion c^5 on a spindle c^6 carrying a wheel c^7 engaged by an escapement c^8 pivoted on the casing on a spindle c^9. The gearing retards the rate of movement of the contact a^3 and the position of the stops a^4 determines the distance which the contact a^3 has to travel between them.

Current is fed to the solenoids by a lead from an insulated terminal 2 on the casing, the return lead 3 from one solenoid being connected to one stop a^4 and the return lead 4 from the other solenoid to the second stop a^4. The contact a^3 completes the circuit to the casing into which is screwed a return terminal 5. By varying the position of the plate A^3 carrying the stops a^4 any desired period of time for the travel of the contact a^3 may be obtained.

The switch may be employed to operate any external circuit and will now be described controlling four such external circuits.

The spindle a^1 upon which the levers A A^1 are pivoted extends rearwardly through the front of the casing E and through a slot d^3 in the lever D. A star wheel D^1 is mounted on the spindle a^1, the teeth of which are engaged by

pins d^4 on the lever D by which the star wheel is rotated on each oscillation of the lever.

Two discs F F^1 having a series of cam faces are also mounted on the spindle a^1 each disc being engaged by one or more rollers g (two are shown in the drawings). Each roller g is mounted on a lever g^1 and held in contact with the cam surface by a spring g^2. A contact arm G is mounted on each lever g^1 and as the cam disc rotates is intermittently brought into and out of contact with an insulated terminal 6 on the casing E thus intermittently making and breaking an electric circuit completed through the casing by the return terminal 5. To provide a good contact between the arms G and the casing E flexible strips g^3 are screwed into the arms and the casing.

In the drawings four such external circuits are shown operated by the two cam discs F, F^1 but by employing a greater number of rollers g on each disc or by increasing the number of discs F F^1 on the spindle a^1 a larger number of external circuits may be controlled.

What I claim as my invention and desire to protect by Letters Patent is:—

1. An intermittent electric switch comprising a casing, a spring operated switch arm, two solenoids energized alternately by the switch arm, a common armature for the solenoids, a depending lever pivoted on the casing, a pin on the armature engaged by the lever, a pin on the lever to transmit the movement to the contact maker, gearing to retard the operation of the contact maker, further pins on the depending lever, and a star wheel intermittently rotated in one direction by the pins.

2. An intermittent automatic switch comprising a casing, a spring operated switch arm, two solenoids energized alternately by the switch arm, a common armature for the solenoids, a lever pivoted to the casing and oscillated by the armature, a pin on the lever to engage a slot in the switch arm, a lever pivoted to the switch arm, a quadrant pivoted to the casing and partially rotated by the lever and escapement gearing operated by the quadrant to retard the rate of movement of the lever and switch arm.

3. An intermittent automatic switch comprising a casing, a spring operated switch arm, two solenoids energized alternately by the switch arm, a common armature for the solenoids, a lever pivoted to the casing and oscillated by the armature, a pin on the lever to engage a slot in the lower portion of the switch arm, a lever pivoted to the upper portion of the switch arm, a triangular contact member on the upper portion of the switch arm adjustable contacts on the casing engaged by the triangular contact member, a quadrant pivoted to the casing and partially rotated by the lever and escapement gearing operated by the quadrant to retard the rate of movement of the lever and switch arm.

4. In an intermittent electric switch as in claim 2 pins on the oscillating lever, and a star wheel engaged alternately by each pin by which it is rotated.

LOUIS ALFRED RAMSDEN.