Feb. 2, 1960 W. A. PATZER 2,923,165

COIN CONTROL DEVICE

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FIG. 1

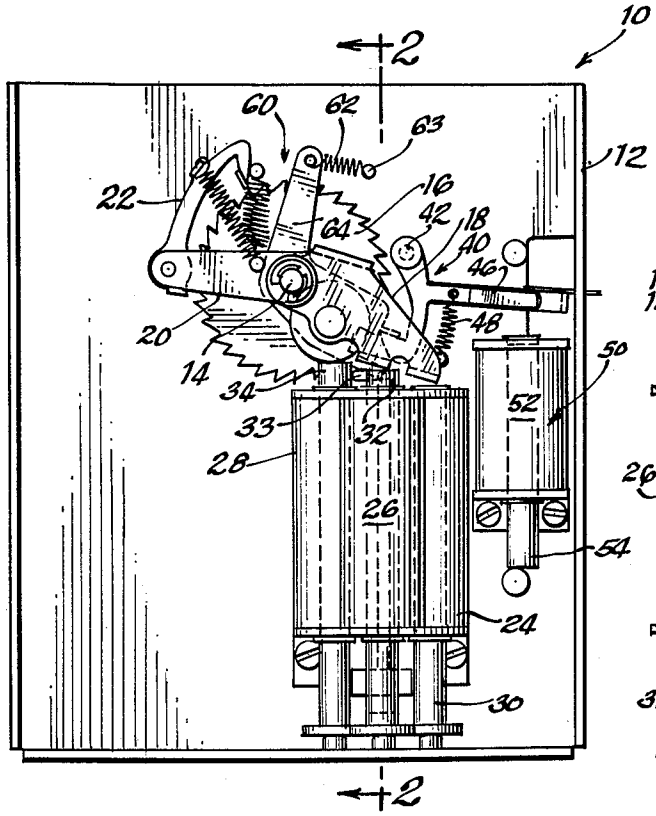


FIG. 2

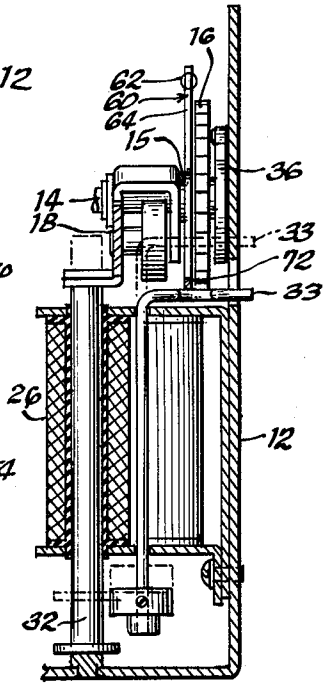
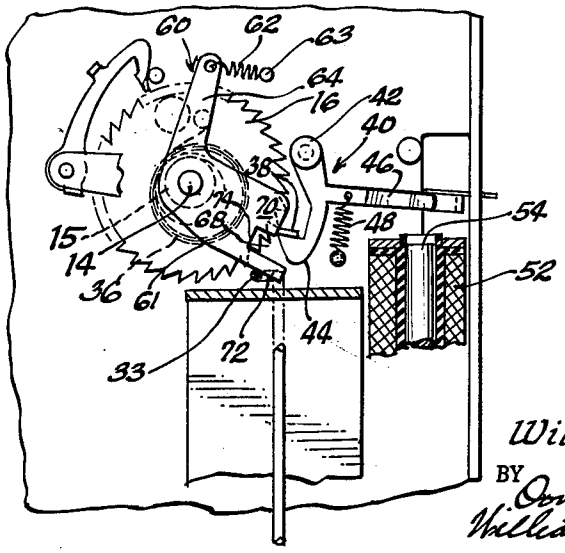


FIG. 3



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FIG. 4

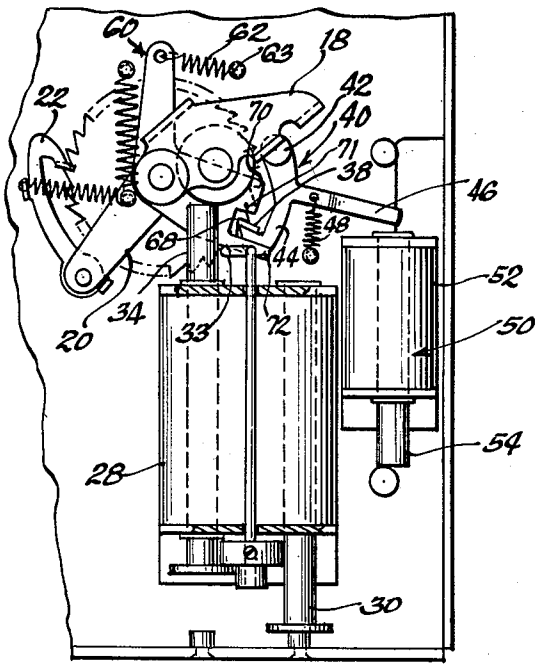


FIG. 5

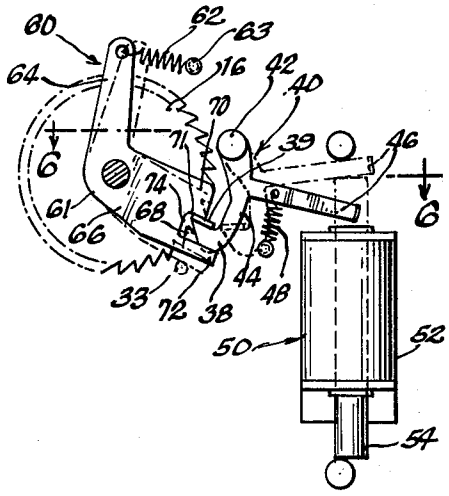
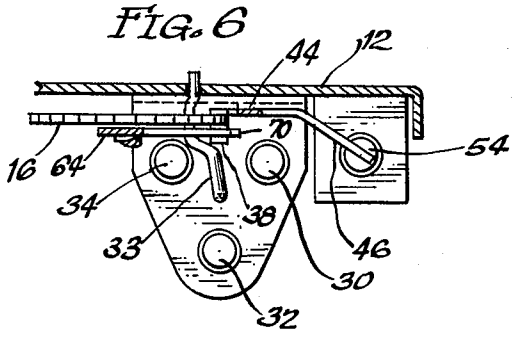


FIG. 6



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United States Patent Office 2,923,165 Patented Feb. 2, 1960

2,923,165

COIN CONTROL DEVICE

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Application November 8, 1957, Serial No. 695,445

11 Claims. (Cl. 74—126)

This invention relates to a ratchet driven accumulator, and more particularly to a device for positively restoring an accumulator to its zero position whenever the accumulator reset mechanism is actuated.

Accumulators as used in vending machines are essentially rotary switches wherein the angular position of the rotatably mounted switch blade depends upon the amount of money inserted in the machine. A plurality of hot contact points are angularly spaced around the axis of the switch blade and each of these hot contact points may be connected to one or more vending machines so that when the required sum of money is inserted, the rotatably mounted switch blade in the accumulator will rotate into engagement with the proper hot contact point, and this engagement will close a circuit which will permit the vending machine to dispense or sell its products.

Typically, the accumulator comprises a ratchet wheel which is rigidly mounted on the same shaft as the rotatably mounted switch blade or else is otherwise connected when used as a coin changer and/or dispenser or for other purposes. This ratchet wheel is adapted to be rotated by a plurality of coin-actuated and solenoid-driven push rods. Each solenoid is associated with a coin of a particular denomination and is energized only when that coin is inserted in the vending machine. When this happens, the push rods in the energized solenoid move into pushing engagement with the ratchet wheel. Lever means are provided so that this engagement displaces the ratchet wheel in proportion to the monetary values of the coins inserted in the vending machine.

A reset mechanism is provided to enable return of the ratchet wheel to its zero or rest position, after the vending operation or change operation has been completed. This reset mechanism includes both a spiral spring which is connected to the ratchet wheel to exert the required restoring force, and an escapement pawl which is spring biased into engagement with the teeth of the ratchet wheel and prevents it from rotating back to its zero position after each coin is inserted in the machine. The biasing force exerted on the escapement pawl may be overcome by a reset solenoid, which, when actuated, drives a push rod into engagement with a part of the escapement pawl and forces it out of engagement with the ratchet wheel so that the ratchet wheel and its associated coaxially mounted switch blade can rotate back to its zero position under the restoring force exerted by the spiral spring.

This mechanism is satisfactory if the escapement pawl is held out of engagement with the ratchet wheel long enough for it to return to zero. The difficulty arises when the reset mechanism, either by accident or design, is given a very short impulse so that the escapement pawl is permitted to move back into engagement with and stop the ratchet wheel before it rotates back to its zero position. In such an event, on the next sale, the rotary switch blade of the accumulator would rotate to one of the hot contact points, permitting the vending machine to function when less than the required amount of money

is inserted in the machine. What is needed, therefore, and comprises the principal object of this invention, is a device for positively restoring the ratchet wheel in an accumulator to its zero position each time the reset mechanism is actuated.

A further object of this invention is to provide a simple mechanical device for positively restoring the ratchet wheel of an accumulator to its zero position each time the reset mechanism is actuated, which is simple to make and easy to install.

These and other objects of this invention will become more apparent when read in the light of the accompanying drawings and specifications wherein—

Figure 1 is a front elevational view of the accumulator in zero or rest position;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1 and looking in the direction indicated;

Figure 3 is a portion of a front elevational view of the accumulator with parts broken away to show the arrangement of the internal parts;

Figure 4 shows a portion of the front view of the accumulator with a push rod actuated by the insertion of a quarter in the vending machine, rotating the ratchet wheel;

Figure 5 shows the position of the various parts of the accumulator with the movement of the push rod of the reset solenoid indicated in dotted lines; and

Figure 6 shows a sectional view taken on the line 6—6 of Figure 5 and looking in the direction indicated.

Referring now to Figure 1 of the drawing, the accumulator mechanism for a coin-operated vending machine, indicated generally by the reference numeral **10**, comprises an L-shaped support **12**, see Figure 2. A shaft **14** is rotatably mounted on the support by any conventional means (not shown), and rigidly mounted on this shaft and rotatable therewith is a ratchet wheel **16**. A ratchet wheel rotating mechanism is provided for rotating this ratchet wheel. This rotating mechanism includes a tubular shaft **15** which is rotatably mounted on shaft **14**. A push rod-driven arm **18** and a pawl-carrying arm **20**, to which are pivotally secured the spring-biased pawl **22**, are rigidly mounted on the tubular shaft **15** and are rotatable therewith, see Figure 1. Actuating means for the rotating mechanism are provided. These include solenoids, **24**, **26**, and **28** which are mounted on the support **12** below arm **18**. A conventional circuit (not shown) is connected to these solenoids to energize them by the insertion of a nickel, dime, or quarter in the coin vending machine. Push rods **30**, **32**, and **34** are mounted inside these solenoids, see Figure 1, and each of them is adapted to move into engagement with arm **18** when its solenoid is energized. This movement is illustrated in Figure 4, which shows push rod **34** in raised position engaging arm **18** after the solenoid **28** is energized by the insertion of a quarter in the vending machine. This engagement causes arm **18** to rotate and this in turn rotates the ratchet wheel **16** by means of the engagement of pawl **22** with the ratchet wheel. The push rods engage the arm **18** at different distances from the rotational axis of the arm so the degree of rotation of the ratchet wheel depends upon the solenoid which is energized. These points of contact between the push rods and arm **18** are adjusted so that energizing solenoid **24** by the insertion of a nickel in the vending machine rotates the ratchet wheel a distance equivalent to one tooth, energizing solenoid **26** by the insertion of a dime rotates the ratchet wheel through two teeth, and energizing solenoid **28** by the insertion of a quarter rotates the ratchet wheel through five teeth. With this arrangement it is seen that the degree of rotation of the ratchet wheel is proportional to the monetary value of coins inserted in the vending machine. The operation of the mechanism to this point is explained in greater detail in the patent to Tratsch, No.

2,459,008, to which reference is now made. With this mechanism, the accumulator would be complete by mounting a conductive switch blade on shaft **14** to be rotatable therewith, and providing a plurality of hot contact points leading to vending machines around the axis of shaft **14** for engagement by the switch blade when the required sum of money is inserted in the vending machine.

As seen in Figure 3, a flat spiral restoring spring **36** is connected by any conventional means (not shown) between the support **12** and the ratchet wheel **16** constantly to urge the ratchet wheel to rotate back toward zero position. In order for the accumulator to sum or totalize the money inserted in the vending machine, the ratchet wheel **16** must operate in a step-by-step manner as each coin is inserted in the machine. This requires that an escapement pawl **38** be provided which will engage the ratchet wheel **16** to prevent it from rotating back to zero after each coin is inserted in the machine. This escapement pawl, as seen in Figures 4 and 5, includes a lever **40** which is pivotally secured to the support **12** at pivot **42**. The escapement pawl is integral with arm **44** of the lever, and a coil spring **48** is connected to the other arm **46**. This coil spring biases the lever **40** in a clockwise direction to urge the escapement pawl **38** into engagement with the teeth on the ratchet wheel.

After enough coins have been inserted in the vending machine to cause the ratchet wheel to rotate to its predetermined angular position in which the switch blade (not shown) engages one of the hot contact points positioned around its axis, the vending machine can then be operated. After this, the ratchet wheel **16** must be returned to its zero or rest position for the next sale by the vending machine. This requires that a reset mechanism be provided. In the form shown in the drawings, the reset mechanism indicated generally by the reference numeral **50**, includes a solenoid **52** having a reciprocably movable solenoid actuated push rod **54** mounted inside. The top of this push rod **54** is positioned beneath the end portion of arm **46** on lever **40**, see Figure 6, so that when the solenoid **52** is energized, the push rod **54** is forced upwards against the lever **40**. This engagement pivots lever **40** in a counterclockwise direction against the action of the biasing spring **48** and forces the escapement pawl **38** out of engagement with the ratchet wheel **16**, see Figures 3 and 5. This movement frees the ratchet wheel and lets it rotate back to its zero or rest position under the biasing force exerted by the spiral spring **36**. When the solenoid **52** is de-energized, the push rod **54** falls back to its rest position and the biasing force exerted by spring **48** on lever **40** again forces the escapement pawl back in the direction of the ratchet wheel. Since the effect of the solenoid **52** and push rod **54** is only to move the escapement pawl out of engagement with the ratchet wheel, it is apparent that other reset mechanisms could be provided.

It is noted that if the duration of the actuation or energization of the solenoid **52** is too short, the escapement pawl **38** may be permitted to move back into engagement with the ratchet wheel **16** and stop it before it has completely returned to zero. If that happens, less money would have to be inserted in the machine to rotate the ratchet wheel **16** and its switch blade to the required angular position, or in effect the machine would sell its product at a loss. To prevent this from happening, an escapement pawl blocking mechanism, indicated generally by the reference numeral **60**, is provided, see Figure 1. This blocking mechanism, in the particular embodiment shown, comprises a lever **61** which is rotatably mounted on shaft **14**. A coil spring **62** is connected at one end to a lug **63** secured to support **12**, and at the other end to an arm **64** on the lever **61**, thereby exerting a clockwise rotational force on the lever.

Another arm **66** of lever **61** is provided with a recess **68** defining an upper blocking abutment member **70** and

a lower actuating arm **72**, see Figure 5. The inner edge **74** of the recess **68** does not extend to the periphery of the ratchet wheel, so when the escapement pawl **38** enters the recess **68**, it can engage the teeth on the ratchet wheel and prevent it from rotating back to its zero or rest position. When this happens the effect of spring **62** is to bias lever **61** into engagement with the escapement pawl **38** so that the lower edge **71** of the abutment **70** rests on the top edge **39** of the escapement pawl **38**, see Figure 5. In this position, the blocking mechanism does not affect the operation of the accumulator in any way, but when the reset mechanism is actuated forcing the escapement pawl **38** out of engagement with the teeth of the ratchet wheel, and out of recess **68**, the lever **61** is freed to rotate. When this happens, the biasing force exerted by the spring **62** forces lever **61** to pivot further in the clockwise direction until the actuating arm **72** engages and is stopped by the latch bar **33**, see Figure 3. This bar, as described in the abovementioned patent to Tratsch, has the added function of preventing backlashing of the ratchet wheel. In this position, the blocking abutment **70** has moved into the path of the escapement pawl **38** to prevent it from moving back into engagement with the ratchet wheel **16** after the reset solenoid is de-energized, see Figure 3. This permits the ratchet wheel **16** to rotate back to its zero position regardless of the period of the actuation of the reset solenoid **50**.

After the accumulator ratchet wheel **16** has returned to its zero position, it is necessary to move the blocking lever **61** back to the position shown in Figure 5, so that the escapement pawl **38** can move back into engagement with the ratchet wheel for the next sale. This can be done by giving the latch bar **33** an added function. As described in the abovementioned patent to Tratsch, the latch bar **33** is raised into engagement with the ratchet wheel **16** each time one of the coin-operated solenoids is energized, see Figure 4. Since the actuating arm **72** abuts against the top portion of the latch bar, when the first coin is inserted in the vending machine, the latch bar will rise and force lever **61** in the counterclockwise direction so the abutment member **70** moves from the blocking position shown in Figure 3 to the position shown in Figure 5 in which the escapement pawl **38** again enters recess **68** and moves into engagement with the ratchet wheel.

The invention may be embodied in other forms without departing from the spirit or essential characteristics thereof as set forth in the claims, and the present embodiment is therefore to be considered as illustrative and not restrictive, and it is intended to include all changes which come within the scope and range of the claims.

I claim:

1. An apparatus of the class described, comprising in combination a support, a ratchet wheel rotatably mounted on said support, rotating means connected to said ratchet wheel, restoring means connected to said ratchet wheel to restore it to a rest position after it has been rotated away therefrom, a pawl movably mounted on said support, means connected to said pawl to move it into engagement with said ratchet wheel to prevent the restoring means from rotating the ratchet wheel back to its rest position, reset means associated with said support, said reset means operating to move and hold said pawl out of engagement with said ratchet wheel for the period of its operation whereby the ratchet wheel can start rotating back to its rest position, and blocking means, said blocking means in operative association with said reset means and said pawl so that when said reset means is operated said blocking means holds the pawl out of engagement with the ratchet wheel permitting the ratchet wheel to rotate completely back to its rest position regardless of the period of operation of the reset means.

2. The apparatus described in claim 1 wherein said blocking means is mounted on said support.

3. An apparatus of the class described comprising in

combination a support, a ratchet wheel rotatably mounted on said support, rotating means connected to said ratchet wheel, restoring means connected to said ratchet wheel to rotate it back to a rest position after it has been rotated away therefrom, a pawl movably mounted on said support, means connected to said pawl to move it into engagement with said ratchet wheel to prevent the restoring means from rotating the ratchet wheel back to its rest position, reset means associated with said support, said reset means operating to move and hold said pawl out of engagement with said ratchet wheel for the period of its operation whereby the ratchet wheel can start rotating back to its rest position, and blocking means mounted on said support, said blocking means movable between a blocking and a non-blocking position and normally in a non-blocking position, means connected to said blocking means and triggered by the operation of the reset means to move the blocking means to said blocking position between said pawl and said ratchet wheel and thereby prevent said pawl from moving back into engagement with said ratchet wheel so that the ratchet wheel will always rotate completely back to its rest position regardless of the period of operation of the reset means.

4. An accumulator for a coin-operated vending machine, comprising in combination a support, a shaft rotatably mounted on said support, a ratchet wheel mounted on said shaft and rotatable therewith, rotating means connected to said ratchet wheel, restoring means connected to said ratchet wheel to rotate it back to a rest position after it has been rotated away therefrom, a pawl movably mounted on said support, means connected to said pawl to move it into engagement with said ratchet wheel to prevent the restoring means from rotating the ratchet wheel back to its rest position, reset means associated with said support, said reset means operating to move and hold said pawl out of engagement with said ratchet wheel for the period of its operation whereby the ratchet wheel can start rotating back to its rest position, and blocking means mounted on said support, said blocking means movable between a blocking and a non-blocking position and normally in a non-blocking position biasing means connected to said blocking means and triggered by the operation of the reset means to move the blocking means to said blocking position between said pawl and said ratchet wheel and thereby prevent said pawl from moving back into engagement with said ratchet wheel so that the ratchet wheel will always rotate completely back to its rest position regardless of the period of operation of the reset means.

5. The apparatus set forth in claim 4 including means connected to said blocking means for moving it out of said blocking position when said rotating means is actuated.

6. An accumulator for a coin-operated vending machine, comprising in combination a support, a shaft rotatably mounted on said support, a ratchet wheel mounted on said shaft and rotatable therewith, rotating means connected to said ratchet wheel, restoring means connected to said ratchet wheel to rotate it back to a rest position after it has been rotated away therefrom, a pawl movably mounted on said support, means connected to said pawl to move it into engagement with said ratchet wheel to prevent the restoring means from rotating the ratchet wheel back to its rest position after it has been rotated away therefrom, reset means associated with said support, said reset means operating to move and hold said pawl out of engagement with said ratchet wheel for the period of its operation whereby the ratchet wheel can start rotating back to its rest position, and blocking means pivotally mounted on said support, the pivotal axis of said blocking means coinciding with the rotational axis of said shaft, said blocking means pivotal between a blocking position and a non-blocking position and normally in a non-blocking position, biasing means connected to said blocking means and triggered by the operation of the reset means to pivot the blocking means to the said blocking position between said pawl and said ratchet wheel so that the ratchet wheel will always rotate completely back to its rest position regardless of the period of operation of the reset means.

7. The apparatus set forth in claim 6 including means connected to said blocking means for moving it out of said blocking position when said rotating means are actuated.

8. The apparatus set forth in claim 7 wherein said means connected to said blocking means includes an actuating arm, said actuating arm adapted to be engaged by a portion of said rotating means when it is actuated whereby said blocking means is rotated out of said blocking position thereby permitting said pawl to move back into engagement with said ratchet wheel.

9. An accumulator for a coin-operated vending machine, comprising in combination a support, a shaft rotatably mounted on said support, a ratchet wheel mounted on said shaft and rotatable therewith, rotating means connected to said ratchet wheel, restoring means connected to said ratchet wheel to rotate it back to a rest position after it has been rotated away therefrom, a lever pivotally mounted on said support, said lever having first and second arms, a pawl connected to one arm, spring means connected to said other arm to pivot said lever and bias said pawl into engagement with said ratchet wheel to prevent it from rotating back to its rest position after it has been rotated away therefrom, reset means associated with said support, said reset means operating to exert a rotational force on said lever for the period of its actuation which overcomes the biasing force exerted by the spring means and causes said pawl to move out of engagement with said ratchet wheel to permit the restoring means to start rotating the ratchet wheel back to its rest position, and blocking means pivotally mounted on said support, the pivotal axis of said blocking means coinciding with the rotational axis of said shaft, said blocking means pivotal between a blocking position and a non-blocking position and normally in a non-blocking position biasing means connected to said blocking means and triggered by the operation of the reset means to pivot the blocking means to the said blocking position between the pawl and said ratchet wheel so that the ratchet wheel will completely rotate back to its rest position regardless of the period of the operation of the reset means, and means connected to said blocking means for pivoting it out of said blocking position when said rotating means are actuated.

10. The apparatus set forth in claim 9 wherein said means connected to said blocking means includes an actuating arm, said actuating arm positioned to be engaged by a portion of said rotating means when it is actuated, whereby said blocking means may be rotated out of said blocking position thereby permitting said pawl to move into engagement with said ratchet wheel.

11. An accumulator for a coin-operated vending machine comprising in combination a support, a shaft rotatably mounted on said support, a ratchet wheel mounted on said shaft and rotatable therewith, rotating means connected to said ratchet wheel, a restoring spring connected between said support and said ratchet wheel for rotating it back to its rest position after it has been rotated away therefrom, a lever pivotally mounted on said support, said lever having first and second arms, a pawl connected to one arm, spring means connected to said other arm to pivot said lever and bias said pawl into engagement with said ratchet wheel to prevent the restoring spring from rotating it back to its rest position after it has been rotated away therefrom, reset means mounted on said support, a push rod driven by said reset means and adapted to move into engagement with said lever when said reset means is operated, said engagement exerting a rotational force on said lever which overcomes the biasing force exerted by said spring means causing said

pawl to move out of engagement with said ratchet wheel and permitting the restoring spring to start rotating the ratchet wheel back to its rest position, and a blocking lever pivotally mounted on said support, the pivotal axis of said blocking lever coinciding with the rotational axis of said shaft, said blocking lever pivotal between a blocking position and a non-blocking position and normally in a non-blocking position biasing means connected to one arm of said blocking lever to pivot the blocking lever in a predetermined direction, the outer edge of another arm of the blocking lever provided with a recess, said recess defining an upper blocking abutment member and a lower actuating arm, the inner edge of said recess at a distance from the axis of said shaft which is less than the radius of said ratchet wheel so that the pawl may enter said recess to engage the teeth on said ratchet wheel and to engage a portion of the arm of the blocking lever in the recess and thereby prevent the blocking lever from pivoting to its blocking position, said biasing means causing said blocking abutment member to pivot to a blocking position between the pawl and the ratchet wheel when the reset means is operated to force said pawl out of engagement with said ratchet wheel and out of said recess, said actuating arm engaging a portion of said rotating means when said blocking abutment member is in blocking position so that when said rotating means is actuated it pivots said blocking abutment member out of its blocking position thereby permitting said pawl to move back into the recess and into engagement with said ratchet wheel.

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