April 22, 1941. S. MILONE 2,239,334

VACUUM-ACTUATED SPRING-WINDING DEVICE

Filed Feb. 3, 1939 2 Sheets-Sheet 1

Fig. 1.

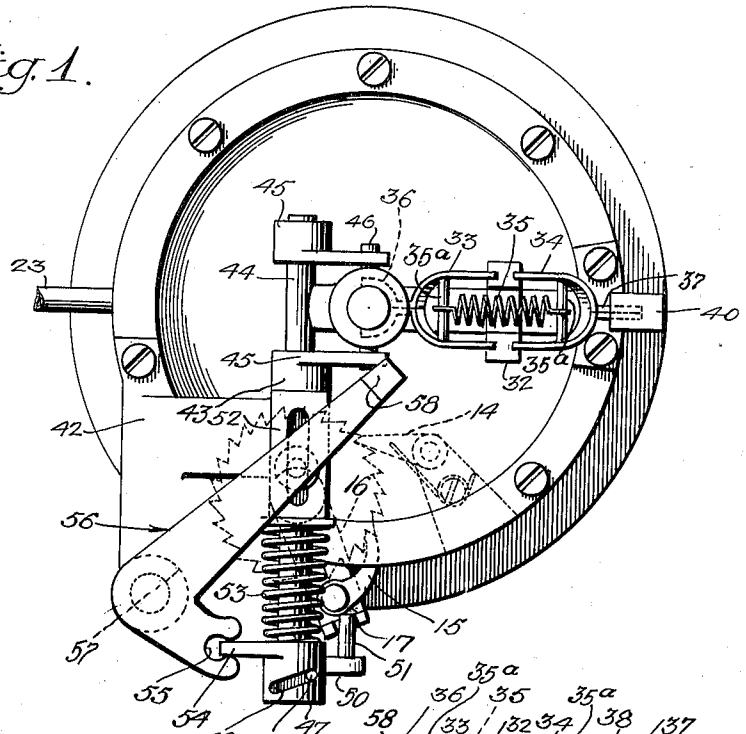
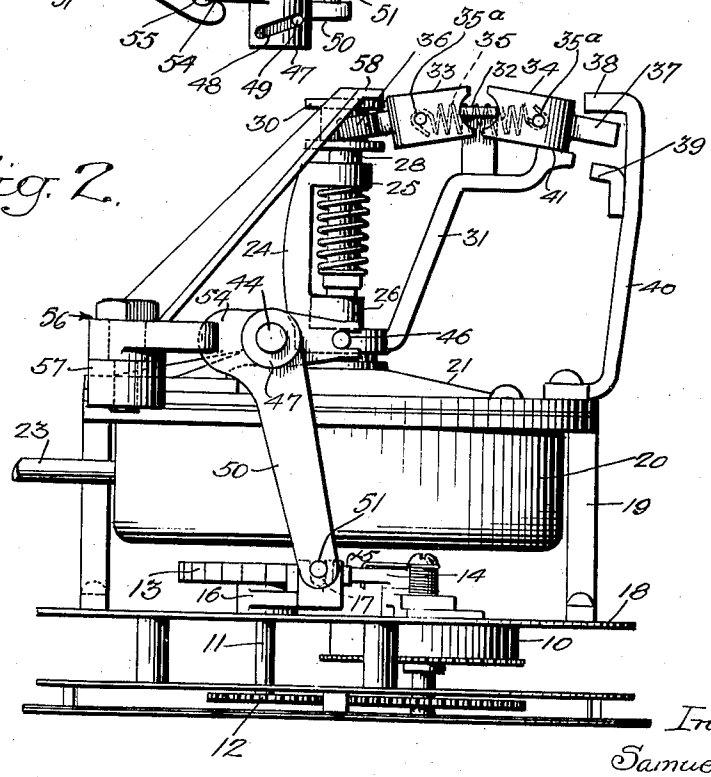


Fig. 2.



Inventor
Samuel Milone
by his Attorneys
Howson & Howson

April 22, 1941. S. MILONE 2,239,334

VACUUM-ACTUATED SPRING-WINDING DEVICE

Filed Feb. 3, 1939 2 Sheets-Sheet 2

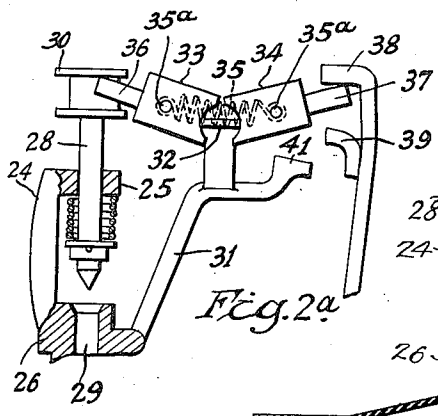


Fig. 2a

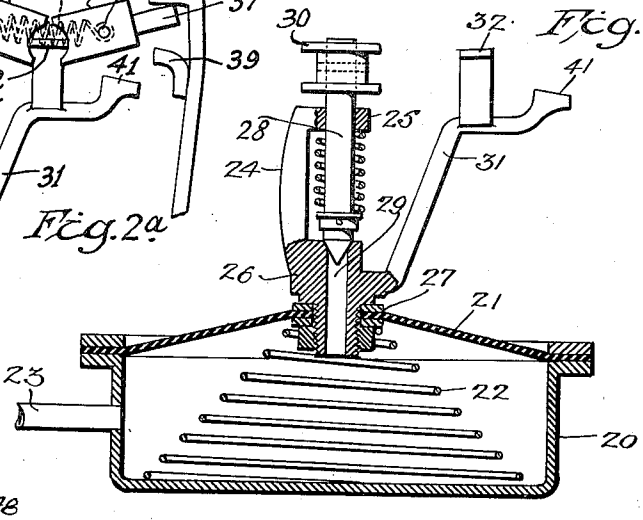


Fig. 3.

Fig. 4.

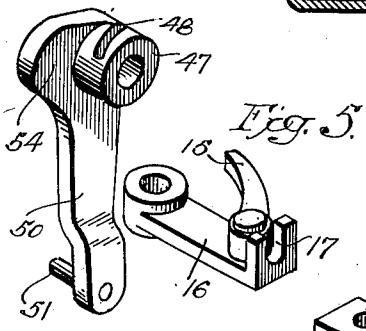


Fig. 5.

Fig. 8.

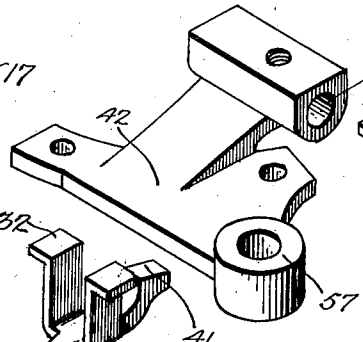


Fig. 9.

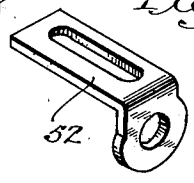
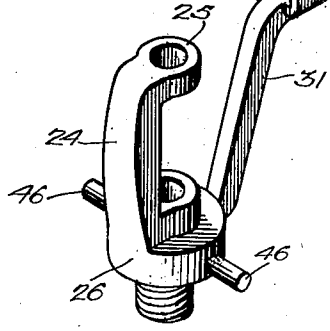


Fig. 7.



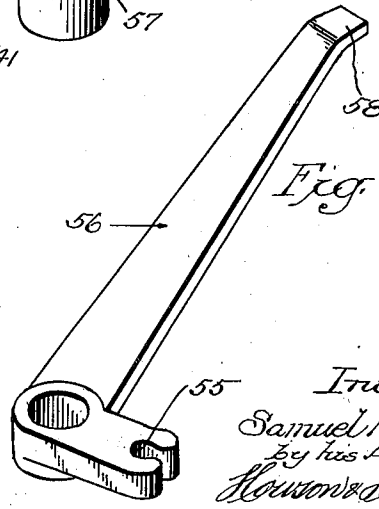


Fig. 6.

Inventor
Samuel Milone
by his Attorneys
Howson & Howson

Patented Apr. 22, 1941 2,239,334

UNITED STATES PATENT OFFICE

2,239,334

VACUUM-ACTUATED SPRING-WINDING DEVICE

Samuel Milone, Camden, N. J.

Application February 3, 1939, Serial No. 254,503

12 Claims. (Cl. 185—13)

This invention relates to spring-winding devices and, more particularly, to a device of this character which may be made extremely small, compact and suitable for use in winding the clocks of automobiles.

An important object of the invention is the production of an apparatus of this character which may be operated by suction from the intake manifold of the engine after the manner of operation of wind-shield wipers, and which may be readily adapted to the ordinary dash clock without material change in the structure thereof.

Another and important object of the invention is the provision of a winding mechanism which, when the spring of the clock or other mechanism which is being wound has attained a predetermined tension, will be rendered inoperative but which will immediately resume its operation when the spring tension has been slightly relieved, thereby insuring the maintenance of the spring at the tension at which it has maximum efficiency.

Other objects of the invention are to provide a device of this character which may be very cheaply manufactured, and which will be durable and efficient in operation.

These and other objects I attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a plan view of a spring-winding mechanism constructed in accordance with my invention;

Fig. 2 is a side elevation thereof;

Fig. 2*a* is a fragmentary sectional view similar to that of Fig. 2 and showing a second position of the control mechanism;

Fig. 3 is a vertical sectional view through the diaphragm chamber;

Fig. 4 is a perspective of the winding and stop control arm;

Fig. 5 is a perspective view of the winding ratchet;

Fig. 6 is a perspective view of the motor control arm;

Fig. 7 is a perspective view of the valve bracket;

Fig. 8 is a perspective view of the mounting bracket; and

Fig. 9 is a perspective view of the tension control device.

Referring now more particularly to the drawings, the numeral 10 indicates a spring to be wound, and 11 a shaft, rotation of which winds the spring through gearing generally designated at 12. The upper end of shaft 11 is equipped with a ratchet disc 13 having associated therewith a holding pawl 14 and an operating pawl 15 mounted upon an arm 16 oscillating about the shaft 11 as a center. The outer end of this arm is provided with a fork 17 the purpose of which will presently appear.

Mounted upon the frame 18 supporting the mechanism just described, as by means of standards 19, is a diaphragm chamber 20 the diaphragm 21 of which is normally maintained in the position illustrated in Figs. 2 and 3 through medium of a spring 22. The diaphragm chamber is illustrated as provided with a tube 23 which may be connected to a source of suction as, for example, the intake manifold of an internal combustion engine (not herein illustrated).

Mounted centrally upon the diaphragm is a valve yoke 24 having upper and lower arms 25 and 26, said lower arm being tubular and being extended through and sealed to the diaphragm as at 27. The upper arm 25 guides the stem of a valve 28 which normally is spring-seated at the upper end of the bore 29 of the lower arm. The upper end of this valve stem is provided with a grooved collar 30, the purpose of which will presently appear. The lower arm 26 has the extension 31 provided near its end with brackets 32 the edges of which are engaged in notches formed in the elements 33 and 34 of a spring-actuated jack-knife toggle, the spring 35 of which serves to hold the elements in assembled relation. The ends of spring 35 are, as shown, engaged with pins 35*a* carried by elements 33 and 34. The element 33 has a fork 36 engaged in the groove of collar 30, while the element 34 has an extension 37 projecting between stops 38 and 39 upon a standard 40 secured to the diaphragm casing. The extension 37 engages the upper stop 38 as the diaphragm is elevated under the influence of spring 22 and is depressed to a point where the spring 35 becomes effective to move the elements 33 and 34 to the position shown in Fig. 2. This action seats valve 28 so that suction exerted through tube 23 becomes effective and acting upon the diaphragm draws the diaphragm downwardly moving the valve-holding element 24, more clearly shown in Fig. 7, with it. This brings the extension 37 into engagement with the lower stop, with the result that the position of the toggle is reversed and the valve disengaged from its seat, admitting air to the diaphragm chamber so that the spring 22 may again act to elevate the diaphragm as shown in Fig. 2*a*. Move-

ment of the toggle to its position illustrated in Fig. 2 is limited by engagement of element 34 with the extreme end 41 of the extension 31 and the seating of valve 28 which will, of course, limit downward movement of the element 33.

Secured to the diaphragm chamber is a bracket 42 including a bearing 43 for a shaft 44. The shaft has secured thereon a pair of forked arms 45 one of which abuts the inner end of bearing 43. The forks of these arms receive pins 46 carried by the member 24. When the diaphragm reciprocates the shaft 44 is oscillated. Mounted upon the outer end of the shaft is a collar 47 having an angular groove 48 through which extends a pin 49 secured to the shaft. This collar has a depending arm 50 the end of which has a pin 51 for engagement with the fork 17 of the actuating arm 16 bearing operating pawl 15. Between the collar 47 and a tension regulating member 52 adjustably mounted upon the upper surface of bearing 43 and surrounding the shaft 44 is a spring 53 which serves normally to maintain the slidable collar with the pin 49 at the inner end of the groove.

This collar likewise includes an arm 54 engaging in a notch 55 in the end of one arm of a bell crank lever 56 pivoted in a vertical bearing 57 on bracket 42. The other arm 58 of this bell crank lever has its terminal disposed in the normal position of collar 47 in close proximity to the collar 30 of valve 28. When, as a result of operation of the motor, the spring 10 has been wound to a predetermined tension, the resistance to movement of arm 50 will cause this arm to remain stationary, whereupon the oscillation of the shaft 44 through the pin 49 operating in groove 48 will cause collar 47 to move inwardly thereby oscillating bell crank lever 56 and swinging the end of the second arm 58 thereof into the groove of collar 30 of the valve which, at this time, will be elevated. The valve is thus held in opened position and the motor rendered inoperative and it will remain inoperative until the tension of spring 10 is sufficiently relieved to permit spring 53 to return the arm to its normal position. Since the motor is thus periodically rendered inoperative and will, during periods of operation, be operated only a time just sufficient to complete the winding, it will be obvious that the apparatus will be relatively long lived as compared to an apparatus in which the motor is in continuous operation.

Since the construction illustrated is, obviously, capable of considerable modification without in any manner departing from the spirit of my invention, I do not wish to be understood as limiting myself to such specific structure except as hereinafter claimed.

I claim:

1. In a spring-winding device, a spring to be wound, a fluid pressure motor to wind the spring, a movable valve controlling operation of the motor, and means operative when the spring attains a predetermined tension to render the valve immovable.

2. In a spring-winding device, a spring to be wound, a motor to wind the spring, a valve movable to open and closed positions to control operation of the motor, a normally inoperative member to hold said valve in one of said positions, and means operative when the spring attains a predetermined tension to render the first-named means inoperative.

3. In a spring-winding device, a spring to be wound, a motor to wind the spring including a reciprocating member, a valve to control operation of the member, a seat with which the valve coacts reciprocating with the member, means rendered operative by reciprocation of the member to seat and unseat said valve, and means operative when the spring has attained a predetermined tension for rendering the first-named means inoperative.

4. In a spring-winding device, a spring to be wound, a fluid pressure motor to wind the spring, a movable valve controlling operation of the motor, and cam-operated means operative when the spring attains a predetermined tension to render the valve immovable.

5. In a spring-winding device, a spring to be wound, a motor to wind the spring, a valve movable to open and closed positions to control operation of the motor, a normally inoperative member to hold said valve in one of said positions, and cam-operated means operative when the spring attains a predetermined tension to render said member operative.

6. In a spring-winding device, a spring to be wound, a motor to wind the spring including a reciprocating member, a valve to control operation of the member, a seat with which the valve coacts reciprocating with the member, means rendered operative by reciprocation of the member to seat and unseat said valve, and cam-operated means operative when the spring has attained a predetermined tension for rendering the first-named means inoperative.

7. In a spring-winding device, a spring to be wound, a motor to wind the spring, a movable valve controlling operation of the motor, cam-operated means operative when the spring attains a predetermined tension to render the valve immovable, and adjustable spring means resisting operation of said cam.

8. In a spring-winding device, a spring to be wound, a motor to wind the spring, a valve movable to open and closed positions to control operation of the motor, a normally inoperative member to hold said valve in one of said positions, cam-operated means operative when the spring attains a predetermined tension to render said member operative, and adjustable spring means resisting operation of said cam.

9. In a spring-winding device, a spring to be wound, a motor to wind the spring including a reciprocating member, a valve to control operation of the member, a seat with which the valve coacts reciprocating with the member, means rendered operative by reciprocation of the member to seat and unseat said valve, cam-operated means operative when the spring has attained a predetermined tension for rendering the first-named means inoperative, and adjustable spring means resisting operation of said cam.

10. In a spring-winding device, a spring to be wound, a motor to wind the spring, a movable valve controlling operation of the motor, means operative when the spring attains a predetermined tension to render the valve immovable comprising a shaft oscillated by operation of the motor, an arm on said shaft capable of axial movement thereon, and a spring effective to prevent movement of the arm axially of the shaft until the spring to be wound attains a predetermined tension.

11. In a spring-winding device, a spring to be wound, a motor to wind the spring, a valve movable to open and closed positions to control operation of the motor, a normally inoperative member to hold said valve in one of said positions,

means operative when the spring attains a predetermined tension to render said member operative comprising a shaft oscillated by operation of the motor, an arm on said shaft capable of axial movement thereon, and a spring effective to prevent movement of the arm axially of the shaft until the spring to be wound attains a predetermined tension.

12. In a spring-winding device, a spring to be wound, a motor to wind the spring including a reciprocating member, a valve to control operation of the member, a seat with which the valve coacts reciprocating with the member, means rendered operative by reciprocation of the member to seat and unseat said valve, means operative when the spring has attained a predetermined tension for rendering the first-named means inoperative, a shaft oscillated by reciprocation of the member, an arm on said shaft capable of axial movement thereon and a spring effective to prevent movement of the arm in a direction axial to the shaft until the spring to be wound attains a predetermined tension.

SAMUEL MILONE.