

May 11, 1954

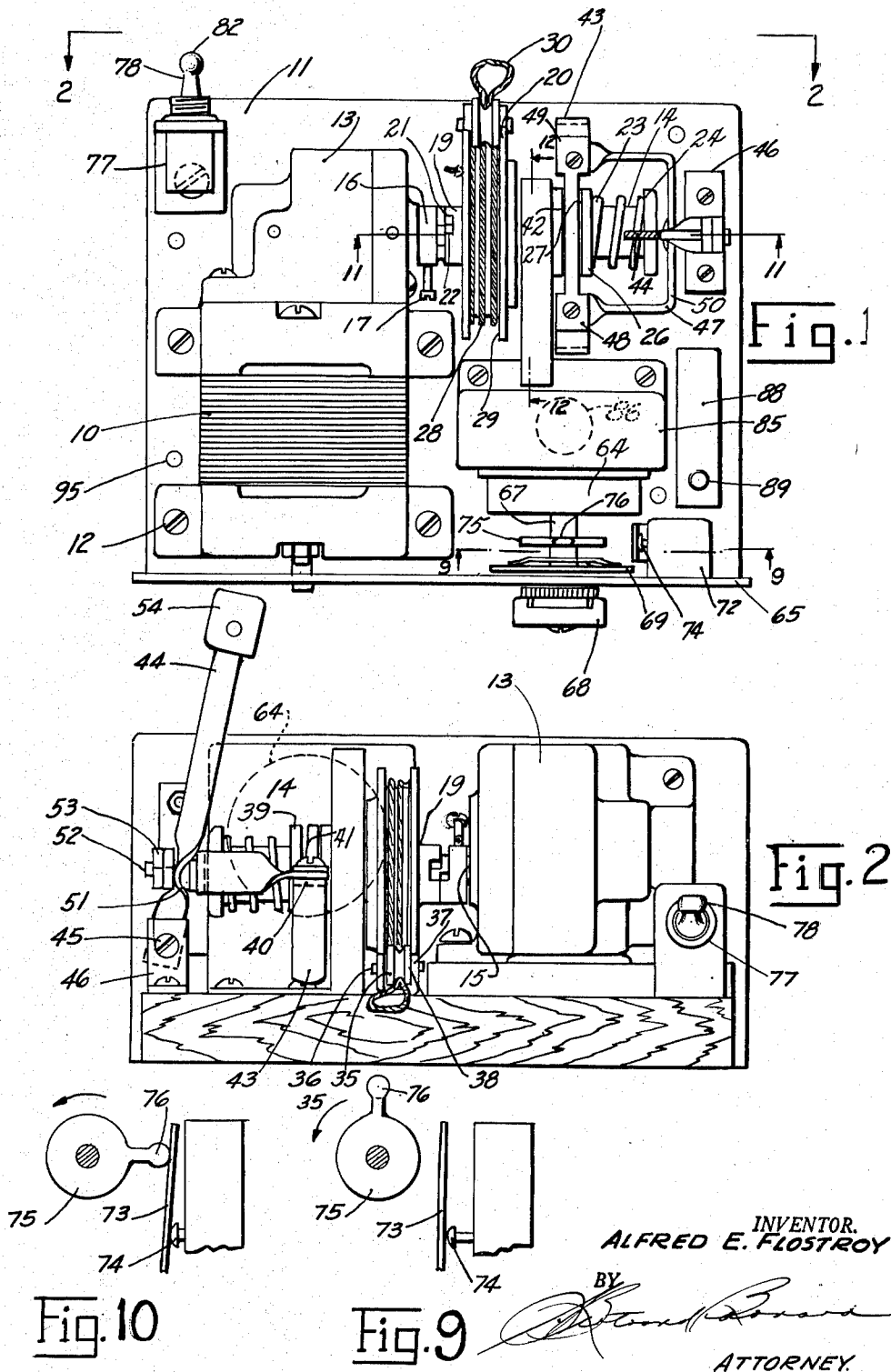
A. E. FLOSTROY

2,678,212

TIME-CONTROLLED AUTOMATIC WINDOW CLOSING DEVICE

Filed March 29, 1948

3 Sheets-Sheet 1



May 11, 1954

A. E. FLOSTROY

2,678,212

TIME-CONTROLLED AUTOMATIC WINDOW CLOSING DEVICE

Filed March 29, 1948

3 Sheets-Sheet 2

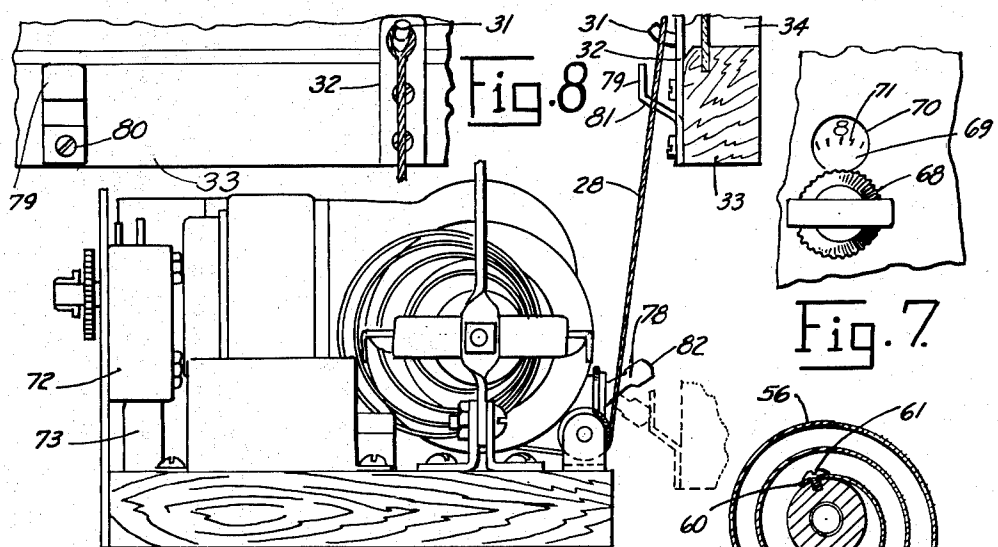


Fig. 3

Fig. 7

Fig. 12

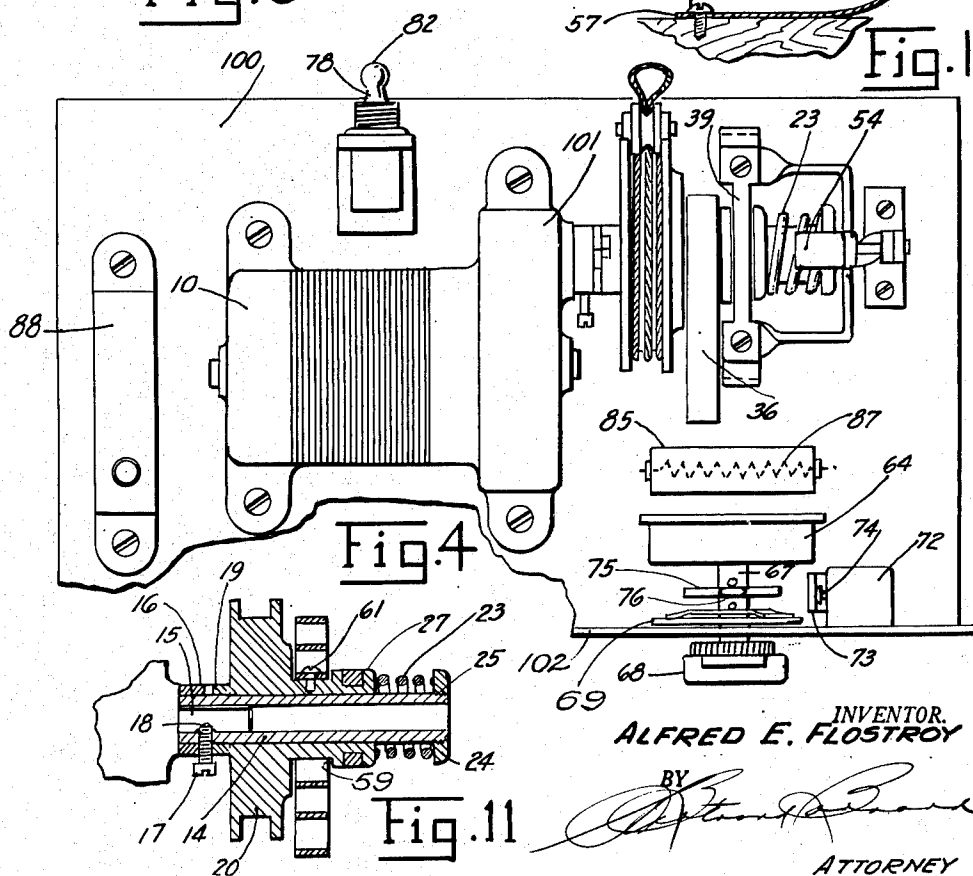


Fig. 4

Fig. 11

INVENTOR.
ALFRED E. FLOSTROY

BY

[Signature]

ATTORNEY

May 11, 1954

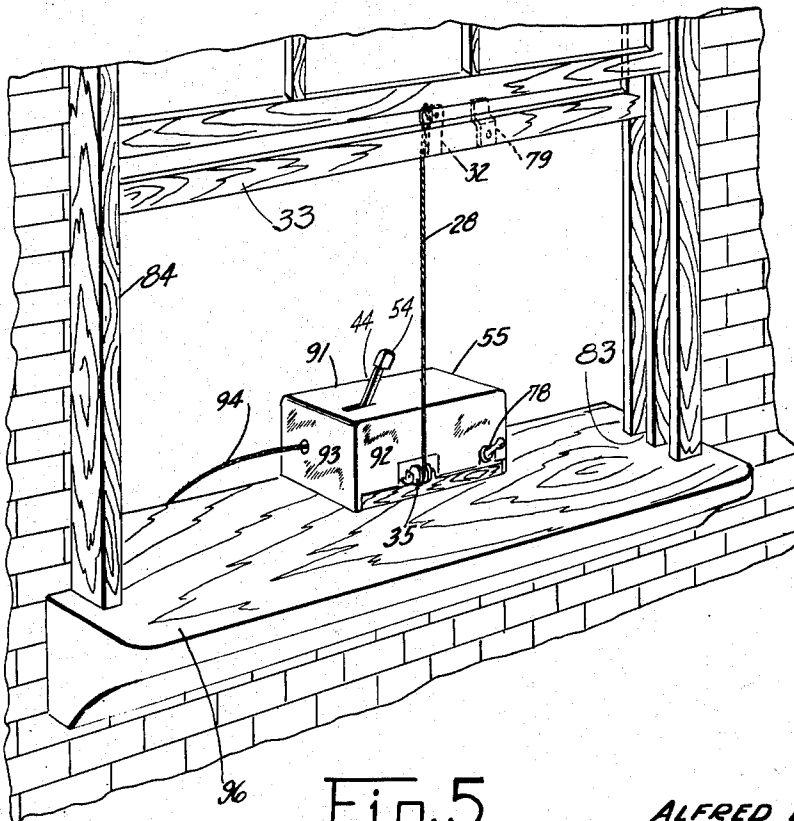
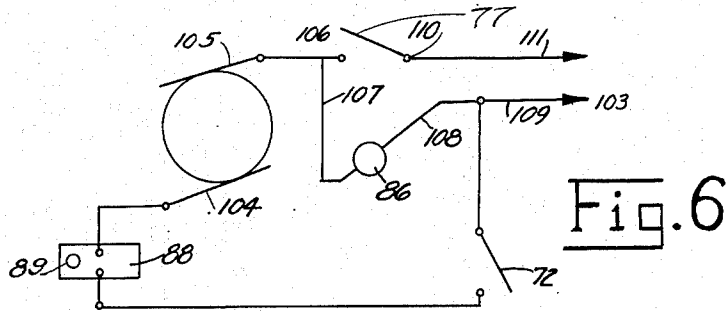
A. E. FLOSTROY

2,678,212

TIME-CONTROLLED AUTOMATIC WINDOW CLOSING DEVICE

Filed March 29, 1948

3 Sheets-Sheet 3



INVENTOR.
ALFRED E. FLOSTROY

BY

Alfred E. Flostroy
ATTORNEY

UNITED STATES PATENT OFFICE

2,678,212

TIME-CONTROLLED AUTOMATIC WINDOW
CLOSING DEVICE

Alfred E. Flostroy, Bayside, N. Y.

Application March 29, 1948, Serial No. 17,658

5 Claims. (Cl. 268—124)

1

The present invention relates to a device for automatically closing windows, which may be preset and preadjusted to operate at a specific time or after a specific time interval.

During cold weather, or when the occupants of a house leave it for a limited period, the closing of windows, left open during the night, or over a sustained period becomes a chore.

This invention is directed to an automatic mechanism for closing the conventional type of vertical sliding household windows, or other types of windows, at a predetermined time, or after a preselected time interval.

The apparatus in its present, or slightly modified form may also be used for opening and closing doors, cabinets, ovens, baking apparatus, and similar devices, in which a window or door is to be opened or closed at a specific time or after a predetermined time interval.

The primary object of my invention is to produce a compact mechanism, which can be preadjusted to close a window, or similar unit at a predetermined time.

A further object is to produce an apparatus which is comparatively simple, and can be adjusted by persons of little or no mechanical skill.

A further object is to produce a compact device, which can be mounted on the sill of a window, without disturbing the appearance of the room, or unduly obstructing the circulation of air into the room.

Another object is to so construct the unit that it can be mounted substantially flush with the window sill.

Another object is to produce an apparatus which will operate over a sustained period, covering a wide range of temperature and humidity conditions, with a minimum of attention, adjustment or service.

A further object is to produce an apparatus, so located on the sill of a window, that it will permit the window to be fully closed without interference or obstruction.

Another object of the invention is to so locate the device that it will draw the window straight down along the ways of the sash, without cocking or otherwise interfering with the movement of the window.

A primary object is to produce an apparatus for closing windows, which can be operated automatically, or converted to manual operation without difficulty.

A further object is to produce an apparatus which can be connected to a window, with a minimum of effort by a person with little me-

2

chanical skill, adjusted for operation in a minimum of time, and can be connected to and disconnected from the window without interfering with the normal manual operation of the window.

The accompanying drawings, illustrative of one major embodiment of my invention, and several modifications thereof, together with the description of the construction, method of installation, operation and adjustment thereof, will serve to clarify further objects, advantages and features of my invention.

In the drawings:

Fig. 1 represents a plan view of one type window of closing device assembly, mounted on a base, with the cover removed, showing the motor fitted with a right angle reduction gear.

Fig. 2 is a front view of the apparatus, taken at 2—2 Fig. 1, showing the motor, clutch, and the cable winding pulley.

Fig. 3 is a right hand end view of another modification of the window-closing device of Fig. 1, showing the motor, fitted with a parallel reduction gear, the timer control knob, with the free end of the cable attached to a bracket mounted on the lower member of the frame of an open window.

Fig. 4 represents a plan view of an apparatus, similar to that shown in Fig. 1, except that the reduction gear is shown parallel to the center line of the motor.

Fig. 5 shows a skeleton isometric view of the window closing device of Fig. 1, enclosed in a case, the case being mounted on a window sill, with the free end of the cable connected to a bracket attached to the lower member of the frame of an open window.

Fig. 6 is a schematic wiring diagram of the apparatus of Figs. 1 and 4.

Fig. 7 is a front view of the timer control knob and the dial viewing opening of the device shown in Figs. 1 and 4.

Figure 8 represents a front elevation of the bottom section of the window frame, showing the bracket for attaching the loop of the cable to the window, and a switch-actuating plate for moving the toggle lever on the cut out switch.

Figure 9 is a schematic diagram of the timer shaft and the micro-switch, showing the radial tip attached to a disc mounted on the timer shaft, the spring contact plate, and the switch contact button in the open position.

Figure 10 is a view of the mechanism of Figure 9, with the timer shaft rotated into its preadjusted operating position, the radial tip press-

ing against the contact plate, thus pressing the switch-actuating button inward to actuate the micro-switch.

Figure 11 represents a section taken at 11-11, Figure 1, showing the method of attaching the tubular shaft extension to the reduction gear shaft, the clutch, the torsion spring, and the compression spring for holding the clutch elements in engagement.

Figure 12 is a vertical section thru the torsion spring shown in Figure 3, showing the method of attaching the ends of the spring to the shaft collar and the base, respectively.

The window-closing device as shown in Figs. 1 and 2 comprises, essentially a small motor, direct connected to a reduction gear, which thru a clutch mounted on the reduction gear shaft, drives a pulley on which a cable is wound.

A reset timer of one of several types may be mounted at the forward end of the case, with an adjusting knob, mounted on the timer shaft, projecting out beyond the end of the apparatus case, to permit manual setting and adjustment of the timer.

A loop, connected to the free end of the cable, may be connected to a bracket mounted approximately at the center of the lower portion of a window frame, the cable being drawn upward when the window is opened.

When the timer reaches the preset time, it actuates a micro-switch which starts the motor, thus rotating the cable pulley, drawing the cable downward, and pulling the window down or up to the closed position, the direction depending upon the position of the window.

Before the window reaches the fully closed position, a switch actuating plate, attached to the bottom section of the frame engages the edge of a toggle lever projecting outward beyond the case from a throwout switch, mounted at the rear end of the case, the switch shutting off the flow of current to the motor, almost simultaneously with the time when the window reaches its fully closed position.

In order to prevent the freezing of the lubricant in the timer when the device is operated under extreme low temperature conditions, a small electric bulb, or a resistance heating unit may be mounted behind the timer, the current to the resistance heating unit, or bulb being kept on during the entire period while the device is set to operate.

The reduction gear reduces the final clutch shaft speed to approximately 6 to 10 revolutions per minute, thus providing a high torque and a window pulling power of approximately 36 pounds at the bottom of the window frame.

In order to avoid injury to the motor, when the window is jammed or otherwise prevented from sliding, a circuit-breaker is connected into the motor line, to shut off the motor when an excessive load is placed on the motor and the apparatus.

After the window is free, or the obstruction removed, a reset button may be provided on the circuit breaker to reset the circuit breaker, in its initial operating position.

In order to enable the window to be left open, and detach the cable from the bracket on the window frame, a clocktype torsion spring may be mounted on the pulley shaft. A manually operated clutch-release lever is also provided, the upper end of the lever projecting above the top of the case, to release the clutch and permit a length of cable to be withdrawn from

the pulley, to allow the free end of the cable to reach the bottom of the window frame, when the window is open.

While the above-described device is directed towards closing windows and the like, the same apparatus with a few minor modifications, may be utilized for performing other functions such as opening and closing furnace doors, ovens, cabinets, cellar doors or performing similar functions wherein a definite operation requiring pushing or pulling is to be performed at a predetermined time or after the lapse of a definite time interval.

It will be understood that the foregoing general description of the construction and operation of the time-controlled automatic window closing device, and its various modifications, as well as the following detailed description thereof, are intended as explanatory of the invention and not restrictive thereof.

In the drawings, the same reference numerals designate the same parts throughout the various views, except where otherwise indicated.

The window-closing device as indicated in Figs. 1 and 2 is driven by a motor 10 which is attached to a base 11, made of wood, plastic, or other suitable material, by means of screws 12, or by another suitable means of attachment. The motor is direct-connected to a right-angle reduction gear 13, attached to the forward end of the motor housing.

A tubular or other type of shaft extension 14, may be pressed on one end of the reduction gear shaft 15, Fig. 11. One section 16 of a square jaw clutch, or other type of clutch, or coupling, may be attached to the shaft extension, and the reduction gear shaft by means of a set screw 17, which projects thru the shaft extension, the point 18, of the screw, fitting into a counter-sink in the reduction gear shaft to lock the shaft extension on the reduction gear shaft, as indicated in detail in Fig. 11.

The opposite section 19, of the clutch may be attached to or formed integral with a cable pulley 20, which is slidably mounted on the shaft extension 14, the square teeth 21, in one section of the clutch, meshing with the slots 22, in the opposite section to drive the cable pulley.

A coiled compression spring 23, may be mounted between the inner face of a flange 24, attached to the rear end of the reduction gear shaft extension 14, by means of the threads 25, or formed integral with the tabular shaft extension, and the rear wall 26 of a grooved collar 27, attached to or formed integral with the rear wall of the cable pulley, to press the pulley toward the reduction gear, and force the clutch jaws into engagement with one another.

A cable 28, the rear end of which may be attached to the bottom of a substantially rectangular groove 29, formed in the outer circumference of the cable pulley 20, the cable fitting into the rectangular groove when it is wrapped around body of the pulley, as the pulley is rotated, may be demountably attached to the bottom of the window frame.

A loop or eye 30 may be attached to, or formed from the free end of the cable, the loop fitting over a hooked pin 31, or other suitable means of a connection, attached to a bracket 32, mounted on the lower section 33 of the window frame 34, as indicated in Fig. 3, the cable drawing the window downward, when the pulley is rotated by the motor, thus wrapping the cable around the root of the groove in the pulley.

5

The cable may be guided toward the cable pulley by a guide pulley 35, rotatably mounted on a shaft 36, which may be supported in a U-shaped bracket 37, attached to the base, or by other suitable means. The outer rims 38, of the guide pulley and the bracket also co-operate to arrest the rotation of the cable pulley by gripping the looped end 30 of the cable when the end of the cable reaches the guide pulley.

A sliding yoke consisting of an upper section 39 and a lower section 40, connected by means of screws 41, located at the ends of the yoke, may be fitted into the groove 42 in the collar 27 attached to or formed integral with the cable pulley, to slide the pulley clutch jaw out of engagement with the mating jaw 16, attached to the reduction gear shaft extension. Legs 43, attached to the extreme ends of the lower section of the yoke, limit the angular movement of the yoke, when the collar is rotated. A clutch throw-out lever 44 the bottom of which is pivotally supported by means of a pin or bolt 45, in the angle brackets 46, attached to the base is connected by means of a U-shaped yoke 47, to the extensions 48 and 49 of the sliding collar. The rear wall 50 of the yoke may be attached to the central hub 51 of the clutch throwout lever 44, by means of a screw 52 and nuts 53, or by other suitable means.

When the top of the lever 44 or a knob 54, mounted at the upper end of the lever, which projects outside the top of the housing 55 is moved rearward, the upper portion of the lever is moved toward the rear, thus drawing the sliding collar 27 rearward against the pressure of the compression spring 23, and permitting the cable pulley 20 to rotate freely about the reduction gear shaft extension 14.

A clock-type torsion spring 56, the outer end 57, of which is attached to the base by means of a screw 58, is mounted in the rectangular groove 59 formed in a flanged collar 29, attached to or formed integral with the rear flange of the cable pulley, the inner end 60 of the spring being attached to the hub of the collar 27, rotatably mounted on the reduction gear shaft extension, by means of a screw 61 or by other suitable means of attachment.

When the operator desires to disconnect the cable from the window, or close the window without disturbing the motor, the upper end of the clutch-throwout lever may be moved rearward, thus releasing the clutch jaws. The cable loop 30 may then be removed from the pin 31 on the bracket attached to the bottom of the window frame, the torsion spring causing the cable pulley to rotate, thus wrapping the cable around the pulley. After the clutch throwout lever is released, the clutch jaws are pressed back into engagement by the compression spring, and the apparatus is again ready for automatic operation.

A spring-actuated timer 64, or other suitable timing device may be attached to the forward wall 65, of the casing 55, the lower end of which is attached to the base. The timer shaft 67, which is rotatably supported by the timer mechanism, projects thru an opening in the forward wall, a control knob 68 being attached to the end of the shaft, to manually adjust the operating position of the timer shaft. A substantially circular dial 69 may be attached to the timer shaft, adjacent the inner side of the forward wall of the casing. A series of numerals, equally spaced around the dial and engraved or other-

6

wise imprinted on the forward face of the dial, may be viewed by the operator thru an opening 70, located in the forward wall of the housing, above the control knob, Fig. 7.

The scale 71 on the dial may be graduated in hours, or suitable fractions of an hour, depending upon the accuracy desired, the numerals indicating either the elapsed time in hours, from the time of setting the dial to the time it reaches its operating position, or the actual time of day at which the apparatus is set to operate, depending upon the type of timer used, and the scale of the graduations on the dial.

A micro-switch 72, or other compact type of switch, may be mounted on the forward wall 65 of the housing, and wired to the motor 10, a spring contact plate 73 being moved into engagement with a switch-actuating button 74, mounted on the micro-switch, when the upper end of the contact plate is moved toward the micro-switch, Figs. 9 and 10.

A small disc 75 attached to the timer shaft, and rotated therewith may be mounted behind the dial plate, a ball tip 76, projecting radially from the disc, pressing the contact plate against the actuating button 74 of the micro-switch when the predetermined operating time is reached, the micro-switch thus starting the motor 10.

In setting the timer, the adjusting knob 68 may be rotated clockwise until the desired elapsed time is indicated on the dial. The timer shaft, the disc and the tip, attached thereto, rotate slowly counter-clockwise, continuously, from the time the timer is set, until the tip 76 engages the contact plate, thus actuating the micro-switch which starts the motor.

When the motor starts, the clutch on the reduction gear shaft extension rotates the cable pulley, the cable being wrapped around the pulley, thus drawing the window to which the looped end of the cable is attached, downward, and closing the window.

A small toggle cut out switch 77 may be mounted at the rear end of the base as indicated in Figs. 1 and 2. When the apparatus is set for operation, or when the motor is running, the toggle lever 78 is in the upper position, Figs. 2 and 3. A switch actuating plate 79, made of spring strip material may be attached to the bottom section 33 of the window frame by means of screws 80, in vertical alignment with the switch toggle lever 78. The sloping portion 81 of the plate is so positioned, with relation to the bottom of the window frame, that it strikes the tip 82 of the toggle lever, when the bottom of the window approaches the bottom 83 of the sash 84. As the window continues its downward movement the sloping portion of the plate moves the toggle lever of the switch to the lower "off" position, the switch shutting off the flow of current to the motor, thus stopping the motor and arresting the further movement of the cable pulley, almost simultaneously with the time the bottom of the window frame strikes the bottom of the sash.

In order to avoid excessive shocks and jars to the glass in the window, the switch-actuating plate may be so located that it strikes the toggle lever, a short distance before the window reaches the bottom of its travel. The momentum of the window and the inertia of the motor and the various parts of the operating mechanism would cause the window to continue in motion until the window reaches the bottom of the sash.

By adjusting the time of shutting off the motor to synchronize with the point at which the window is fully closed, sudden jars to the glass and the various parts of the mechanism may be avoided, the final drop of the window to the fully closed position being cushioned to a large extent.

A heating unit 85 in the form of a small electric bulb 86, Fig. 1, or a resistance coil 87, Fig. 4, may be mounted behind the timer to heat the timer and prevent the lubricant in the timer from freezing during extreme low temperature operation. As indicated in the wiring diagram, Fig. 6, this heating unit may be so connected into the circuit as to remain in operation during the entire period when the apparatus is set to function, or it may be connected to a separate switch, and thus thrown in only during cold weather operation and shut off at all other times.

This type of heating unit would only be necessary with certain types of spring-actuated timers, the lubricant in which is sensitive to low-temperature operation.

In this type of timer or in other types which may be substituted for it, a special light lubricant which is designed for extremely low temperature operation may be utilized, thus eliminating the heating unit entirely, except for extreme applications.

A circuit breaker 88 may be mounted on the base and connected in series with the motor, as indicated in the wiring diagram, Fig. 6. When the window is cocked in the sash, or when foreign matter of any kind lodges in the sash ways, thus obstructing the movement of the window, the circuit breaker would shut off the current to the motor, when the load on the motor is excessive, to prevent burning out of the motor windings.

A reset button 89 may be mounted on the circuit breaker, to enable the operator to reset the circuit breaker into its normal position after the obstruction is removed, and the apparatus is again set for normal operation.

A casing 55 consisting of a top 91, a rear wall 92 and two side walls 93 may be attached to the base, these walls with the forward wall 65, completely housing the entire unit, as shown in Fig. 5.

The cord 94, which connects the unit to an ordinary outlet, by means of a plug (not shown) projects thru one end of the casing.

A plurality of holes 95, formed in the base, Fig. 2 may be utilized to receive screws or other means of attachment, to fasten the base to the top 96 of the window sill thus firmly supporting the unit while it pulls the window downward. Clamps or other means of attachment may, however, be utilized in place of screws to support the unit on the window sill.

The location of the unit with relation to the center of the window frame is also shown in Fig. 5, the position of the cable guide pulley 35 being so located that the cable 28 attached to a bracket mounted at the center of the lower section 33 of the window frame, assumes a substantially vertical position, the unit thus drawing the window straight downward, thereby eliminating any tendency toward cocking or otherwise causing the window to stick.

The snap-switch toggle lever 78 is also shown projecting thru the rear wall 92 of the casing, in vertical alignment with the switch actuating plate 79.

Figs. 3 and 4 show another modification of the device, in which the motor is mounted parallel

to the front of the base 100, the center line of the reduction gear 101 being parallel to the center line of the motor.

In all other respects the various units incorporated in the device are essentially the same as those shown in Figs. 1 and 2 and hereinbefore described.

The timer 64 is mounted in essentially the same position, with relation to the forward wall 102 of the casing, as that shown in Fig. 1.

The resistance type heating unit 87 is shown behind the timer to heat the timer lubricant in extreme cold weather, in place of the bulb shown in Fig. 2.

Fig. 6 shows a schematic wiring diagram of one form of the unit, in which the current flows from the source 103 to the timer micro-switch 72, thence to the circuit breaker. From the circuit breaker the current flows to the brushes 104 and 105 of the motor, thence to one pole 106, of the toggle cutout switch 77. From the pole 106 of the cutout toggle switch, a branch line 107 runs to a heating lamp 86, or resistance unit 87, a return line 108 connecting the lamp to the main line 109 of the current source 103, to enable the lamp to be continuously in operation, when the cutout switch is closed. From the opposite pole 110 of the cutout switch, the main line 111 returns to the power source 103.

The timer in starting the current thru the adjacent microswitch, starts the motor, which continues to run until the window approaches the closed position at which point the switch actuating plate, attached to the bottom of the window frame moves the toggle lever of the cutout switch, thus shutting off the flow of current to the motor. Where an excess load is placed upon the motor, the circuit breaker shuts off the flow of the current to the motor, until the obstruction is removed and the reset button is pressed to again set the circuit breaker into its normal operating position.

While the construction shown in the drawings, Fig. 5, and hereinbefore described is attached to the top of the window sill, this is primarily designed for installation in an existing building, where the sash and sills are in place. In new construction, arrangements can be made to cut a slot in the sill and sash, while the building is in process of construction, so that almost the entire casing can be mounted within the slot, the top of the casing being substantially flush with the top of the sill.

In such construction the cable guide pulley, and the cut-out toggle-switch would be mounted near the top of the casing, instead of on the base, as shown in Figs. 1 and 3.

The timer and timer knob would be mounted, either on the forward wall of the casing near the top, with the timer shaft rotatably attached to the top of the casing, so that the timer control knob projects slightly above the top of the casing, or at the upper end of the rear wall of the housing, in the manner shown in Figs. 1 and 3.

While the unit, as shown in the drawings is directed primarily toward the closing of windows of the conventional sliding type, the essentials of the apparatus, with some modification, may be utilized for a number of other purposes, as well.

Thus by changing the position of the cable 28, the unit may be set near a furnace, to open the furnace doors at a predetermined time, or by running the cable over a guide pulley or a plurality of pulleys, the apparatus may be used for clos-

ing furnace or other types of doors, such as those in cabinets and the like.

It will, accordingly, be appreciated that the time-controlled automatic window closing device, herein described, has new and useful constructional and operational features offering distinct advantages over other apparatus employed for this purpose. It will, moreover, be understood that the foregoing description of the various modifications of the construction is illustrative, and that various changes can be made therein, without departing from the essentials of the invention which is, rather, defined by the appended claims.

What I claim as new, and desire to cover by Letters Patent, is:

1. In a window closing device, a base, a housing substantially enclosing the device removably attached to the base, a motor mounted on said base, a speed reduction mechanism attached to and driven by said motor, a shaft rotatably driven by said reduction mechanism, a cable, a loop formed at one end of said cable, a bracket attached to the frame of the window for demountably attaching the loop to the window, a pulley slidably and rotatably mounted on the reduction mechanism shaft, the inner end of the cable being attached to said pulley, a clutching mechanism for driving said pulley from the reduction mechanism shaft, a timer having a shaft rotatably attached thereto and driven thereby, a switch controlling the flow of current to the motor, mounted adjacent the timer, means attached to the timer shaft for manually presetting the timer, rotatable means attached to the timer shaft for actuating the switch after a predetermined time interval, a throw out switch for shutting off the flow of current to the motor, and means attached to the frame of said window for opening said throw out switch, the cable being wrapped around the pulley, thereby drawing the window toward its closed position, when the pulley is rotated by the motor, said throw out switch shutting off the flow of current to the motor when the window reaches its closed position, said motor and operating mechanism being contained within the housing.

2. A window closing device comprising a base, a housing demountably attached to said base, an electrically-driven motor, a reduction gear attached to said motor and driven thereby, a shaft rotatably attached to said reduction gear, a flexible element, means for demountably attaching one end of said flexible element to the frame of the window, a timer having a shaft rotatably extending therefrom, means for manually presetting the operating position of the timer, a micro-switch controlling the flow of current to the motor, means attached to the timer shaft for actuating the micro-switch when the timer shaft reaches a predetermined position, a pulley slidably and rotatably mounted on said reduction gear shaft, a clutching mechanism for driving said pulley, a throw out switch for shutting off the flow of current to the motor, and means attached to the frame of the window for opening the throw out switch, one end of said flexible element being attached to said pulley, the flexible element being wrapped around the pulley thereby drawing the window towards its closed position, when the pulley is rotated by the motor, said throw out switch shutting off the flow of current to the motor when the window reaches its closed position, said motor and operating mechanism being contained within the housing.

3. An automatic window closing apparatus comprising a base, a housing removably attached to said base, a motor mounted on said base, a reduction gear attached to and driven by said motor, a shaft rotatably extending from said reduction gear, a flexible element, a loop formed at one end of said flexible element, a bracket attached to the frame of the window for demountably connecting the loop to the window, a pulley slidably and rotatably mounted on the reduction gear shaft, the inner end of said flexible element being attached to the pulley, a clutching mechanism for driving the pulley from the shaft, a timer having a shaft rotatably extending therefrom, a control knob attached to the timer shaft for manually presetting the operating position of the timer, a micro-switch controlling the flow of current to the motor, mounted adjacent the timer, means mounted on the timer shaft for actuating the micro-switch when the timer shaft reaches a predetermined position, a throw out switch for shutting off the flow of current to the motor, and means attached to the frame of the window for opening the throw out switch, the flexible element being wrapped around the pulley, thereby drawing the window toward its closed position, when the pulley is rotated by the motor, said throw out switch shutting off the flow of current to the motor when the window reaches its closed position, said motor and operating mechanism being contained within the housing.

4. A window closing device comprising a base, a housing removably attached to said base, a motor mounted on said base, a reduction gear attached to said motor and driven thereby, a shaft rotatably driven by said reduction gear, a cable, a loop formed at one end of said cable, a bracket attached to the frame of the window for demountably connecting the loop to the window, a pulley slidably and rotatably mounted on said reduction gear shaft, the inner end of the cable being attached to the pulley, a bracket attached to the base, a guide pulley rotatably mounted on said bracket, said pulley guiding the cable toward the cable pulley, a clutch, one section of said clutch being attached to the reduction gear shaft, the mating section being attached to the pulley, flexible means for pressing said clutch elements into engagement with one another, means for drawing one of said clutch elements out of engagement with the other, a collar, attached to the pulley, slidably mounted on the reduction gear shaft, a torsion spring supported by said collar, the inner end of said spring being attached to the collar, the outer end being fixed to the base, said torsion spring rotating the pulley, thereby wrapping the cable around the pulley when the clutch elements are disengaged, while the cable loop is detached from the window frame bracket, the guide pulley and bracket co-operating to arrest the movement of the cable when the cable loop reaches the guide pulley, the cable drawing the window toward its closed position, when the pulley is rotated by the motor, while the loop of the flexible element is attached to the window frame bracket said motor and operating mechanism being contained within the housing.

5. A window closing device comprising a base, a housing removably attached to said base, a motor mounted on said base, a reduction gear attached to said motor and driven thereby, a shaft rotatably driven by said reduction gear, a flexible element, a loop formed at one end of said flexible element, a bracket attached to the frame of the window for demountably connecting the loop to

11

the window, a pulley slidably and rotatably mounted on said reduction gear shaft, the inner end of the flexible element being attached to the pulley, a clutch, one section of said clutch being attached to the reduction gear shaft, the mating section being attached to the pulley, flexible means for pressing said clutch elements into engagement with one another, a collar attached to the pulley, slidably mounted on the reduction gear shaft, a torsion spring supported by said collar, the inner end of said spring being attached to the collar, the outer end being fixed to the base, a grooved collar attached to the cable pulley, a yoke slidably fitting the groove in said collar, a lever pivotally attached to the base, and means connecting said lever to the yoke, said collar moving the clutch elements out of engagement with one another when the clutch throw out lever is moved rearward, said torsion spring rotating the pulley, thereby wrapping the cable around the pulley when the clutch elements are disengaged, while the cable loop is detached from the window frame bracket, the cable drawing the window toward its closed position, when the pulley is rotated by the motor, while the loop of

12

the flexible element is attached to the window frame bracket said motor and operating mechanism being contained within the housing.

References Cited in the file of this patent

UNITED STATES PATENTS

	Number	Name	Date
	1,369,614	Bradshaw	Feb. 22, 1921
	1,485,578	Wolgemuth	Mar. 4, 1924
10	1,554,674	Herod	Sept. 22, 1925
	1,618,761	Landsberger	Feb. 22, 1927
	1,632,532	Blue	June 14, 1927
	1,819,992	Vallee	Aug. 18, 1931
	1,868,599	Griffin	July 26, 1932
15	1,870,992	Freuler	Aug. 9, 1932
	1,933,700	Blodgett	Nov. 7, 1933
	2,124,037	Lavigne	July 19, 1938
	2,317,697	Simpson	Aug. 27, 1943
	2,345,594	Gardner	Apr. 4, 1944
20	2,419,659	Sabor	Apr. 29, 1947

FOREIGN PATENTS

	Number	Country	Date
	17,833	France	June 5, 1913
25	552,187	Great Britain	Mar. 25, 1943