

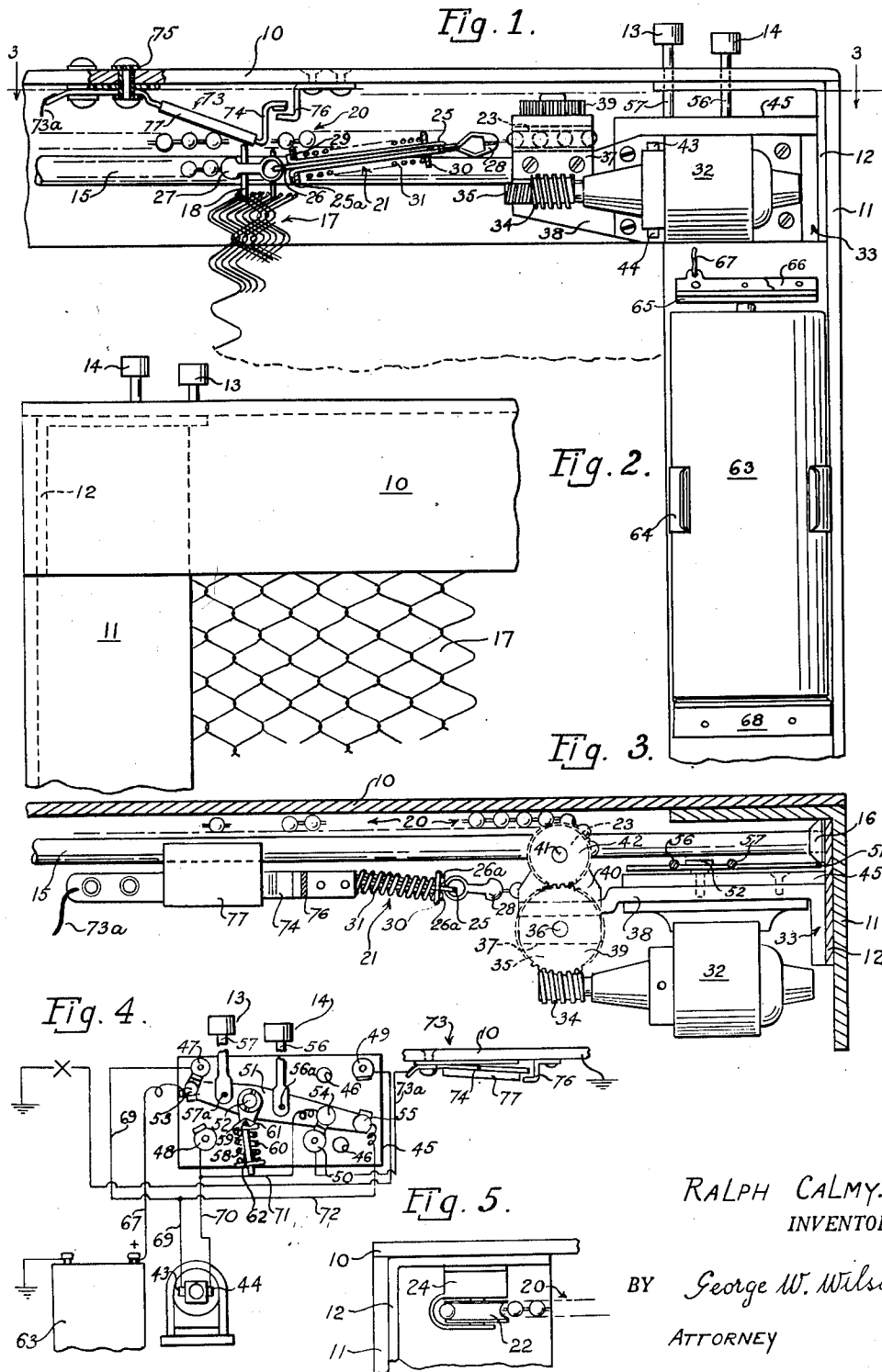
April 6, 1954

R. CALMY

2,674,307

ELECTRICALLY OPERATED CURTAIN FIRE SCREEN

Filed June 26, 1951



RALPH CALMY.
INVENTOR.

BY George W. Wilson.
ATTORNEY

UNITED STATES PATENT OFFICE

2,674,307

ELECTRICALLY OPERATED CURTAIN FIRE
SCREEN

Ralph Calmy, Glendale, Calif.

Application June 26, 1951, Serial No. 233,622

2 Claims. (Cl. 160—331)

1

My invention relates to curtain type fire screens of the kind having a traverse curtain mounted for sliding movement across the fireplace, and has as a particular object the provision of novel means for opening and closing such fire screens.

The invention will hereinafter be described with particular reference to the fire screen disclosed in my U. S. Patent No. 2,512,480 issued June 20, 1950, but it is to be understood that, while the invention is not necessarily limited to incorporation with that screen, reference may be made thereto for more detailed information as to structural features that may be thought necessary to the understanding of the present invention.

Curtain type fire screens are made with metal screen curtains, and in order to insure proper functioning thereof, should be provided with means to move the relatively heavy screens with a quick but even motion so that the mesh material will drape properly, similarly to window drapes.

It is accordingly an object of my invention to provide electrically actuated mechanism for the purpose described, which operates mechanism in which frictional losses are reduced to a minimum, so that a small motor can supply the needed power.

Fire screens of the type to which my invention relates require a supporting frame, providing a guideway for members supporting the curtains, or in which a rod is mounted from which the metal mesh curtains are slidably supported, the rod being secured in a horizontal frame member extending across the top of the fireplace and being preferably, though not necessarily, supported on vertical frame members. The horizontal frame member serves to also cover the top of the curtains and the means by which they are suspended from the rod, as well as a chain by which they are moved back and forth.

It is another object of my invention to provide electrically operated means which are arranged so as to be hidden by the frame members of the fire screen, so that the appearance of the fire screen is in no way detracted from, as would be the case if the operating means were mounted, on the fire screen frame so as to be visible from the room.

A point requiring consideration in arranging the means requiring to be manipulated to open and close the curtains of curtain type fire screens mounted in a vertical frame is that there should be no danger of tipping over the screen when operating said means.

2

It is another object of my invention to provide switch means controlling the operation of electrical opening and closing means so arranged that no appreciable force is required to manipulate the switch, and the screen curtains may be moved to full open from closed position and vice versa by a single movement of the switch. The operating means are automatically stopped at completion of the screen movement so that no skill is required to operate the fire screen of my invention.

Since the movement of a curtain of the fire screen may be at times stopped by some obstruction, it is another object of my invention to provide operating means so arranged that no damage is caused by such a stoppage of the screen.

Still further objects and features of my invention will hereinafter appear from the description of my invention read with reference to the accompanying drawings which illustrate an embodiment of the invention at present considered preferable by me.

In the drawings which are on a larger scale than full size:

Fig. 1 is a fragmentary back elevation of an upper corner of a curtain type fire screen fitted with electrically operated actuating means of my invention; the screen being indicated as in full open position.

Fig. 2 is an elevation of the same corner of the fire screen as shown in Fig. 1 but viewed from in front; and with the screen shown in closed position.

Fig. 3 is a cross section on the line 3—3 of Fig. 1, with curtains omitted.

Fig. 4 is a pictorial diagram showing switches controlling the electric circuit of the electrically operated screen.

Fig. 5 is a fragmentary detail view showing a pulley around which an endless chain, driven by an electric motor, is guided at one end of the top horizontal member of the frame of the fire screen.

Referring now to Fig. 1, the numeral 10 indicates the top horizontal member of the frame of the fire screen, a vertical side member of the frame being indicated at 11, and a corner reinforcement member at 12.

It is to be understood that the frame of the fire screen may be constructed in any suitable way but for convenience and ease of fabrication, I prefer to utilize angle material, suitably strengthened at the upper corners with stamped reinforcing members, and supported by stands or feet secured to the lower ends of the vertical frame members. One face of the angle frame

members is turned toward the room in which the fireplace is situated, while the other face is directed backwardly from the outer edge; an area hidden from view from any angle is thus provided in which are arranged the means supporting the screen and the means operating it.

As shown in Fig. 2, no indication of the operating means are observable from front or sideways of the screen except a pair of small switch buttons 13 and 14, which, of course, are much less noticeable than the chain and two pull handles provided for manual operation of the curtain type screen disclosed in my patent previously referred to.

A length of rod 15 is mounted in sockets 16 (Fig. 3) brazed or otherwise secured toward the upper ends of the vertical side members 11. A pair of curtains, only a portion of the left hand one 17 being shown in the drawings, is slidably supported by a plurality of rings 18 threaded on the rod, the rings at the inward edge of each curtain being of greater thickness than the other rings for a purpose which will be later explained.

The outer edges of the curtains are connected by any suitable means, not shown, to the frame so that those edges remain in position behind the outer face of the side frame members.

The curtains are preferably formed from lengths of helically wound wire, each length being intermeshed with the lengths on each side. The upper and lower ends of each length of wire are connected to the ends of the wires on each side by small interengaging loops, which construction enables the wires of the curtains to be collapsed laterally together when in open position and provides a laterally pliant, yet stable construction when in position suspended from the rod 15.

The curtains are opened and closed by means of an endless flexible member 20, which for the purpose of ease of operation and installation, is preferably in the form of a ball chain. The ball chain is formed into an endless loop by means of a resilient connecting and tensioning member generally indicated at 21. The chain is mounted on two chain pulleys 22 and 23 arranged above the level of rod 15, so that one run of the loop extends along each side of the rod. Each run of the chain is connected to the inner edge supporting ring of one curtain, one connection being conveniently made with the member 21 and the other by passing the edge ring of the screen through a hole drilled through a connector of the usual type used in ball chains. It may be pointed out that, since the inner edges of the screens in full open position do not reach the pulleys 22 and 23, the members connecting the ball chain with the inner edges of the curtains do not interfere with the free running of the chain on the pulleys. The pulley 22 is secured on a bracket 24 (Fig. 5) brazed to the corner reinforcing member 12 of the frame at the end thereof, opposite to the location of pulley 23, which is the drive element effective to move the chain 20 in one direction or the other to open or close the screen curtains.

I prefer to provide smooth surfaced pulleys 22, 23 and mount the chain 20 on them under sufficient tension to insure proper operation of the curtains under normal conditions while allowing the driving pulley 23 to slip relative to the chain, should the movement of either curtain be stopped momentarily by some obstruction, such as, for instance, a log from the fireplace rolling against a curtain or the curtain catching against an improperly positioned log.

While I may utilize various arrangements to keep the chain 20 under proper tension, use of the member 21 is preferred for the sake of simplicity and the fact that no deflection in direction of the chain is caused, thereby avoiding additional friction.

The member 21 comprises two elongated U shaped elements 25, 26 nested together with their looped ends opposite one another and having chain connectors 27 and 28 hooked into the loops. The ends of the elements 25, 26 are bent outwardly at 25a, 26a and engage against the outer faces of washers 29, 30. A coil spring 31 under compression is mounted over the nested elements 25, 26 and between washers 29 and 30. The end balls of the length of chain are secured in connector members 27 and 28. The effect of the described construction of tensioning member 21 is to hold the chain on the chain pulleys under a degree of tension dependent on the strength of the spring which, of course, is chosen of sufficient strength to insure proper functioning under normal conditions.

The power means for the drive pulley 23, in the preferred embodiment of the invention, consists of a miniature permanent magnet direct current motor, generally indicated at 32, mounted on a bracket 33 secured as by brazing or by machine screws, to a vertical frame member 11 or to a corner reinforcing corner member 12. A worm 34 mounted on the shaft of the motor engages a worm wheel 35 fixed on the lower end of a shaft 36 mounted vertically in a bearing block 37 secured to one side of the projecting arm 38 of bracket 33. A spur gear 39 is fixed to shaft 36 above the bearing block, which is provided with a lateral or offset extension 40 projecting to the opposite side of arm 38.

Drive pulley 23 is secured to the lower end of a short shaft 41 mounted vertically in the offset extension 40 of the bearing block, and a spur gear 42 is secured to the upper end of shaft 41 and meshes with spur gear 39. Thus, the whole driving unit of motor and transmission gearing from the motor shaft to the drive pulley 23 is mounted on a single bracket and forms a compact sub-assembly which may be easily and accurately installed on a screen frame fitted with curtain supporting rod, curtains, and with a chain end pulley 22.

The motor 32 is fitted with two terminals 43, 44, one leading the electric current to the motor winding, and the other being connected to ground, when the motor is rotating in one direction; while when direction of rotation of the motor is reversed, the functions of the terminals is reversed, the direction of rotation of the motor depending on the direction of current flow through the motor winding.

The necessary switching arrangement to supply electric current to one or the other terminal and connect the remaining terminal to ground, may be arranged in various ways, a suitable switch panel arrangement being shown in Fig. 4. The panel 45 is of insulation material, such as hard rubber, and is mounted on the bracket arm 38 by machine screws passing through holes 46 drilled in the panel and engaging in threaded holes in the bracket. On the face of the panel two spaced apart, positive terminals 47, 48 are positioned toward one edge of the panel, and two negative terminals 49, 50 are positioned toward the opposite edge and connected to ground.

A switch arm 51 is pivotally mounted on the panel by a stud 52 and is fitted with a positive

5

contact 53 adapted to engage with either panel positive terminal 47 or 48. The opposite end of switch arm 51 is fitted with two negative contacts, one 54 adapted to engage with panel negative terminal 50 when arm 51 is in position to engage contact 53 and terminal 47. A second negative contact 55 is mounted on arm 51 and is adapted to engage with panel negative contact 49 when arm 51 is in position to engage contact 53 and terminal 48. Both contacts 54 and 55 are connected to the fire screen frame as ground through terminals 50 and 49.

The arm 51 is rocked about its pivot in one direction by a plunger 56 pivotally connected at its lower end to arm 51 by pin 56a, the plunger passing through a hole drilled in the horizontal top frame member 10 and having the push button 14 secured on its upper end.

The arm 51 is rocked in the opposite direction by a second stem 57 pivotally connected to the arm on the opposite side of the pivot of the arm at an equal distance thereto by pin 57a as the connection of plunger 56 to the arm. Plunger 57 passes through a hole drilled in the frame member 10 and the push button 13 is secured to its upper end.

The arm 51 is maintained in either operated position by a spring 58 arranged under compression between a head 59 on a pin 60 pivoted at 61, to the arm at a point in the transverse axis passing through the pivot axis of the pin but spaced from said pivotal axis, and an abutment 62 pivoted to the panel 45 in a line vertical to the axis of rotation of the arm 51 and perpendicular to the longitudinal axis of the switch arm. Pin 60 passes through a hole drilled in the abutment. The described arrangement results in the spring being placed under maximum compression when the pivotal axes of the switch arm, pin and abutment are in line, which can only occur as the arm is moved from one position to the other. In Fig. 4, for the sake of simplicity, the contacts mounted on the panel and on the switch arm as shown as of the face to face type, in which case the contacts mounted on the panel serve also as stops limiting movement of the arm. I may prefer, however, to provide panel contacts of the wiping type and to provide stops to limit the movement of the switch arm.

The source of electrical energy shown in the drawings (Fig. 1) is a 2-cell dry cell battery pack 63. The pack is releasably held in a clip 64 secured to a vertical screen frame member. The positive terminal of the pack is engaged with a spring contact member 65 mounted on, but insulated from, the frame member as shown at 66. A positive lead 67 of insulated wire is secured to battery contact 65 and is connected to the positive contact 53 of the switch arm. The battery pack 63 is supported on a bracket 68 secured to the vertical frame member, the cells of the pack being thereby grounded to the metal frame of the fire screen.

Leads 69 and 70 from the positive panel terminals 47, 48 to the terminals 43, 44 of the motor are connected as shown in Fig. 4, lead 70 being also connected to switch arm negative contact 54 by lead 71, and lead 69 being also connected to switch arm negative contact 55 by lead 72.

The connections and switch provided will therefore cause motor 32 to rotate in one or the other direction, according to the position of the switch arm 51.

In order to interrupt the circuit of the motor when the screen curtains have reached the full

6

open or closed positions, a limit switch is positioned in the ground lead of negative panel terminals 49 and 50. Since these limit switches are identical, the description of the full open limit switch, generally indicated at 73 as shown in Fig. 1, will serve to describe both.

The limit switch comprises a resilient strip 74 of conductive material secured to the horizontal frame member but insulated therefrom, as indicated at 75, the lead 73a from negative panel contact 50 being connected to strip 74. Strip 74 is bent downwardly so as to be engaged by the inner vertical edge supporting ring 18 of a screen curtain, and resiliently bears against the horizontally bent end of a fixed contact strip 76 secured in conductive relation to the top horizontal frame member. The length of strip 74 engaged by ring 18 is covered by insulation 77, such as a short flattened length of hard rubber tubing. During movement of the screens to open position, a circuit from the battery through the described switch means to ground is therefore established, but this circuit is interrupted when limit switch 73 is opened. When the switch arm 51 is in its opposite position, a circuit is established, causing the motor to rotate in the opposite direction, and therefore the motor moves the screen curtains toward closed position until the closed curtains limit switch (not shown), which is arranged to be operated by ring 18 on reaching the end of its inward movement, is opened, and the circuit interrupted. The limit switch may also be so formed as to provide a stop arresting movement of the screen, if desired.

The electrical means operating the screen have been described as a direct current motor supplied by a dry cell battery, but it is obvious that the motor may be driven, if preferred, by the usual alternating house current; in the latter event, a small transformer and rheostat being mounted on the frame of the screen and an extension cord with plug being arranged for connection with a wall outlet.

In installing the fire screen of my invention, a size is chosen preferably larger than the fireplace opening so that said opening is fully uncovered when the curtains are opened. This also results in the protection of the operating means from the effects of heat.

While the described embodiment of my invention provides a novel, simply operated, and effective fire screen, it is to be understood that various changes may be made in the described construction by those skilled in the art without departing from the scope of my invention as intended to be defined by the appended claims.

I claim:

1. A fireplace screen of the kind described, including: screen supporting means on which said screen is mounted for transverse back and forth movement; a reversible miniature electric motor mounted on and concealed from view from in front of the screen by said supporting means; means supplying electrical energy to said motor; a single manually operable switch controlling the direction of rotation of said motor; pulleys mounted on the back of said screen supporting means and similarly concealed from view; an endless length of ball chain mounted on said pulleys and connected to said screen at free edges thereof; a reduction gear mounted on the screen supporting means and similarly concealed from view driven by said motor and driving a pulley around which said ball chain is trained thereby provid-

ing a drive capable of slipping to enable the motor to continue to rotate until reversed in the event full movement of the screen in one direction or the other is prevented; and automatically operated limit switches effective to stop the motor when the screen is fully closed and opened.

2. A fireplace screen as set forth in claim 1 and in addition comprising a common support for the motor, gear reduction means and the manually operable switch.

References Cited in the file of this patent

UNITED STATES PATENTS

	Number	Name	Date
5	1,497,281	Morris -----	June 10, 1924
	1,595,669	Kurner -----	Aug. 10, 1926
	2,256,008	Armstrong -----	Sept. 16, 1941
	2,378,262	Vallen -----	June 12, 1945
	2,512,480	Calmy -----	June 20, 1950
10	2,553,780	Murphy -----	May 22, 1951