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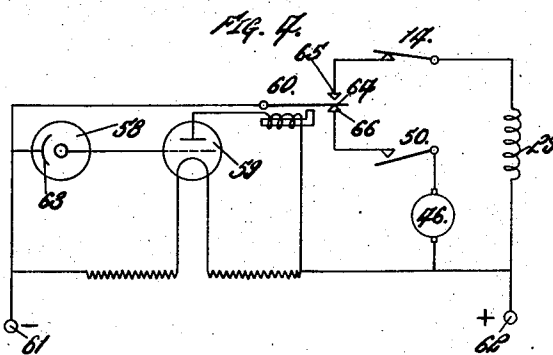
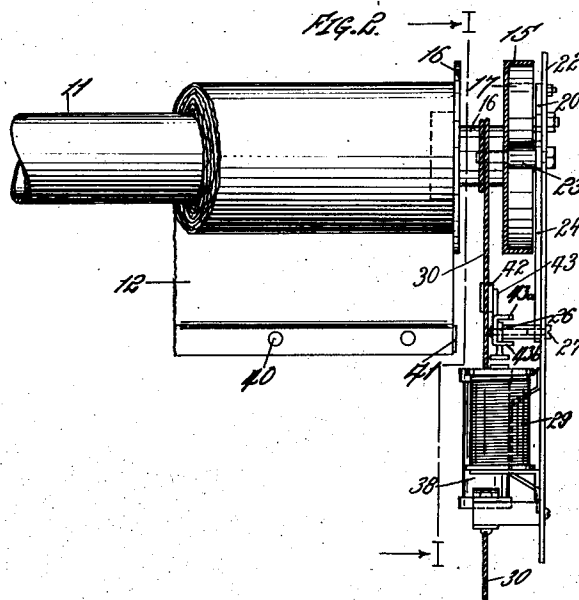
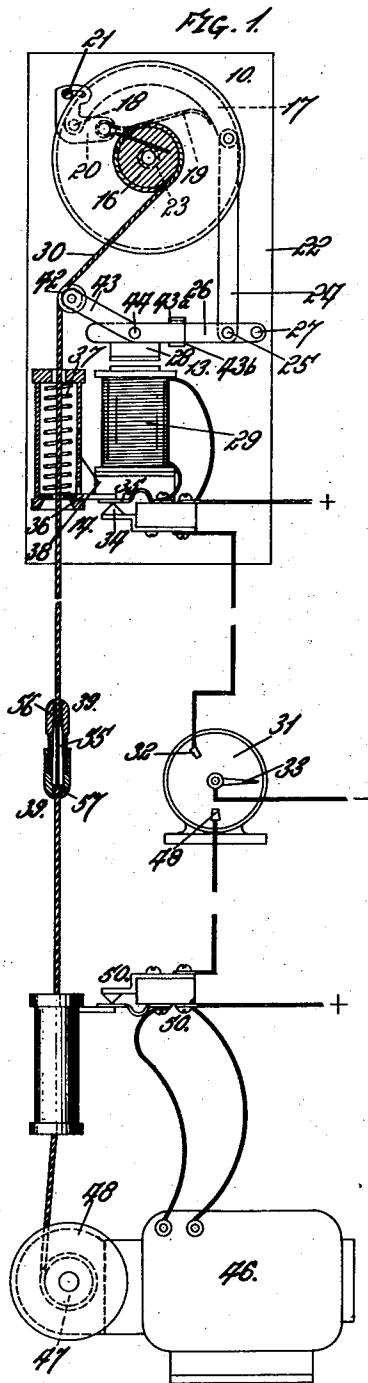
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BLIND CONTROL

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BLIND CONTROL

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This invention is for improvements in or relating to means for controlling blinds, awnings or the like hereinafter referred to collectively as "blinds".

One particular object of the invention is to provide control means for blinds which will give automatic or semi-automatic control of the movement of the blind from its stowed or rolled position to its extended or unrolled position. Automatic or semi-automatic rolling of blinds from their extended positions is quite general in many known forms of spring-controlled blind, but this invention is more particularly concerned in providing automatic or semi-automatic control for the movement of a blind from its stowed to its extended position. One of the more important applications of such an arrangement is to shop windows for preventing damage or deterioration by sunlight of the goods exhibited in the window; for instance, it is a popular method of displaying goods in shop windows to have such windows brilliantly lit during the late evening with interior blinds drawn up, and unless these interior blinds are drawn down when the lights are switched off, or when the intensity of illumination on the window is comparatively high, the goods displayed are often affected by the early morning sunlight before the shop is normally opened, or during the week-end and other holidays. Thus, the invention aims at providing a blind control which differs from the known form of spring-rolled blinds in that the blind is automatically unrolled according to predetermined conditions of time or intensity of illumination. Of course the invention is applicable and contemplates the automatic rolling of a blind to its stowed position also according to predetermined conditions. Although shop windows is one of the main fields of application of the invention it will be appreciated that the control means can be applied to any other form of blind or screen such as those used for covering pictures in galleries, display cabinets in museums, or even domestic blinds.

Broadly the invention provides in or for use in combination with a blind adapted for movement from an inoperative or stowed position to an operative or extended position and vice versa, a slave driving or brake mechanism effecting or controlling the movement of the blind from the stowed to the extended position and/or vice versa, and a master control governing the operation of the slave mechanism.

More particularly a control mechanism for a roller blind adapted to be rolled on to and off a rotatable roller comprises a brake mechanism

operatively connected to the blind-roller, means normally maintaining the brake operative to prevent rotation of the roller, an electro-magnetic device operatively connected to the brake and adapted to release the brake when the normal current condition of the electro-magnet is changed, and a time switch or light-sensitive device connected in the circuit of the electro-magnet for changing the normal current condition thereof at a pre-determined time or in accordance with pre-determined light conditions. The aforesaid combination preferably includes a cord rolled on a pulley connected to the blind roller, the cord being wound on to the pulley as the blind is unrolled and wound off as the blind is rolled, and a striker is attached to the cord for tripping a switch in the circuit of the electro-magnet to limit the amount of unrolling of the blind. The term "cord" is used in this specification to include any elongated flexible member of a similar character to a cord such as a chain or a wire. The term "brake" is to be taken as including any device for stopping the rotation of the blind roller, and includes all known forms of friction brake or other brakes which place a fluid or electrical influence on the rotary member to prevent the rotation thereof.

Other features of the invention will be referred to in the following description and more specifically pointed out in the appended claims.

The invention will be further described with reference to the accompanying diagrammatic drawings, whereon:—

Figure 1 is a sectional side elevation on the line I—I of Figure 2 showing the invention applied to blinds of the kind used on the inside of windows such as shop windows,

Figure 2 is a rear elevation of part of the apparatus shown in Figure 1, a part of this figure being shown in section so as to illustrate certain details more clearly,

Figure 3 is a detail view of a free-wheel mechanism which may be used in connection with the apparatus shown in Figures 1 and 2,

Figure 4 is a wiring diagram showing a method of connecting the apparatus up electrically so as to operate automatically in accordance with pre-conceived light conditions,

Figure 5 is a sectional side elevation of part of a shop window showing the application of the invention to blinds of the awning type,

Figure 6 is an elevation of part of a shop front showing the invention adapted for the operation of a plurality of awnings,

Figure 7 is a sectional side elevation (of a modi-

fied construction similar to Figure 5) of the arrangement shown in Figure 6, and

Figure 8 shows an arrangement in which an auxiliary blind is provided for covering any space between the edges of adjacent blinds.

Referring to the drawings and more particularly Figures 1 and 2, the apparatus comprises a brake 10 controlling the roller 11 of a blind 12. The brake is operated so as to release the blind by an electro-magnetic device 13. The brake and the electro-magnetic comprise a slave mechanism the operation of which is effected at a pre-determined time or in accordance with pre-determined conditions by a master control as hereinafter described.

The brake 10 comprises a brake drum 15 fixed to a pulley 16 secured to the roller 11 of the blind. A brake shoe 17, which may be provided with a friction lining, is located within the drum 15 and is pivoted thereto at 18. The brake shoe 17 is normally pressed into engagement with the drum 15 by means of a spring 19 carried on a lever 20 mounted on the pivot 18 of the shoe. The lever 20 can be adjusted angularly and clamped in any position of adjustment by means of a screw 21 so as to vary the pressure with which the brake shoe bears on the drum. The roller of the blind together with the brake and its associate mechanisms is supported on a plate 22 by means of a pillar 23 secured to the plate. The plate 22 is adapted to be secured at the side of a window frame so that the blind roller occupies its normal position with respect to such window. The brake shoe 17 is operatively connected to the electro-magnetic device 13 by a link 24 connected at 25 to a lever 26 pivoted at 27 to the plate 22. The lever 26 carries an armature 28 which works in connection with the electro-magnet 29. When the electro-magnet is energized the armature 28 is attracted and pulls the lever 26 down, thus releasing the brake and permitting the blind to fall. The blind is re-wound by means of a cord 30 reeved over the pulley 16. Operation of the electro-magnetic device 10 to release the brake and permit the blind to fall at a predetermined time is effected by a master control which may comprise a time switch 31 having a contact 32 which at a predetermined time is engaged by a moving contact arm 33. When the blind has fallen to its extreme position the supply of electrical energy to the electro-magnet 29 is cut off by a switch mechanism 14 which comprises a fixed contact 34 and a spring contact 35 which is normally held in engagement with the contact 34 by a holding member 36 which is pressed into engagement with the contact 35 by a spring 37 located within a casing 38. The cord 30 passes through the casing 38 and carries a striker 39. It will be appreciated that as the blind falls the cord 30 will be wound on to the pulley 16 and when the blind has been completely lowered the striker 39 engages the holding member 36 and raises it slightly against the action of the spring 37 (which also cushions the blind in its descent), thus permitting the spring contact 35 to spring out of engagement with the contact 34 and break the circuit of the electro-magnet 29. This permits the brake shoe to return into engagement with the brake drum. If necessary the blind may be weighted, for example by means of lead rivets 40 passed through the batten 41. To re-wind the blind the cord 30 is pulled downwards, thus rotating the roller 11. It will be appreciated that before the roller can be rotated the

brake shoe 17 must be disengaged from the brake drum 15 and this is effected by means of a jockey pulley 42 mounted on a lever 43 pivoted at 44 to the lever 26. The lever 43 is permitted a limited amount of movement with respect to the lever 26 between stops 43a and 43b and when the cord 30 is pulled the tension thereof causes the stop 43b to engage the lever 26 which becomes rigid with the lever 43 and is pulled downwards about its pivot 27 thereby releasing the brake. The operation of the cord 30 to re-wind the blind may be effected by hand.

In some cases, however, it may be desirable that the blind should be re-wound automatically at, for example, a predetermined time, and this may be effected by means of a slave mechanism or electric motor 46 which drives a pulley 47, for winding the cord 30, through a reduction gear located in a casing 48. The motor is switched on at a predetermined time to re-wind the blind by means of a master control which may comprise the time switch 31. The time switch is provided with a contact 49 which when engaged by the contact arm 33 completes the motor circuit. When the blind has been completely rolled the motor circuit is broken by means of a switch mechanism 50 similar to the switch mechanism 14 and which is operated by the downward movement of the striker 39. To permit the pulley 47 to free-wheel when the brake 10 is released and the blind falls, a free-wheel, which is shown in detail in Figure 3, is incorporated in the gearing of the motor. This free-wheel comprises a driven member 51 and a driving pawl 52 which is fitted in a slot in the motor shaft 53. The driven member 51 is provided internally with a plurality of teeth 54 which when the motor shaft is rotated in the direction of the arrow are engaged by the pawl 52 so that the pulley 47 is rotated. The member 51 is free to rotate in the reverse direction when the blind is falling by oscillating the pawl 52 from side to side in its slot in the motor shaft 53.

It is important that the striker 39 should be adjustable on the cord 30 so that the amount of rise and fall of the blind can be controlled. A suitable form of adjustable striker is shown in Figure 1 and comprises a split cone 55 fitted in a tapered socket 56 on to which is threaded a clamping nut 57. The cord 30 is passed through the socket 56 the cone 55 and the nut 57, after which the nut 57 is screwed on to the socket 56 so as to force the cone 55 into the socket and contract it on to the cord, whereby the striker is firmly clamped to the cord. The position of the striker can be easily adjusted by slackening the nut 57 and sliding the striker along the cord. If necessary separate strikers may be provided for operating the switches 14 and 50 respectively.

As described above the apparatus may be operated at a pre-determined time. It is possible however to operate the apparatus for releasing and/or re-winding a blind, in accordance with pre-determined conditions, such as the intensity of light on a shop window. A diagrammatic arrangement of a master control for operating the apparatus in accordance with the intensity of light is shown on Figure 4.

The arrangement shown on Figure 4 comprises a photo-electric cell 58, a thermionic amplifier valve 59, and a relay 60 controlling the flow of current selectively to the electro-magnetic coil 29 and the motor 46 which are connected to the relay through the switch mechanisms 14 and

50. The arrangement shown in Figure 4 is adapted to be supplied with current from the mains 61, 62, and operates as follows:—

Assuming that the blind is up and the intensity of light on the photo-electric cell has just reached an intensity at which the blind is to be released. Electron emission from the cathode 63 will produce a negative charge on the grid of the valve 59 which is connected to the anode of the photo-electric cell. This negative charge will reduce the flow of current through the relay 60, the armature 64 of which will be released into engagement with the contact 65, thus completing the circuit of the coil 29 of the electro-magnetic device 13. This operation of the electro-magnetic device releases the brake 10 and accordingly the blind falls until the striker 39 breaks the circuit of the coil 29 at the switch 14. The blind will remain down until the intensity of the light on the photo-electric cell falls to a predetermined low limit. At this low limit the negative charge on the grid of the valve 59 will be such that the armature 64 will be attracted out of engagement with the contact 65 and into engagement with a contact 66, thus completing the circuit of the motor 46 which thereupon re-winds the blind until the motor circuit is opened by the striker 30 operating the switch 50. In some cases it may not be necessary to use a motor for re-winding the blind and it is to be understood that the motor circuit and the control switches therefor shown in Figure 4 may be omitted the blind being unwound under the control of the photo-electric cell and re-wound by hand. A cord absorber may be provided for taking in the slack of the cord 30 when the blind is re-wound by hand. This cord absorber may comprise a pulley on to and off which the cord is wound and a helical spring connected to the pulley and arranged to be tensioned when the blind is unwound so that it will re-act to wind in the cord when the blind is raised.

The application of the invention to blinds of the awning type is shown in Figures 5, 6, 7 and 8 of the drawings. The arrangement shown on Figure 5 which is suitable for use more particularly with a single window comprises cantilever arms 67 supported on stub shafts 68 carried on brackets 69 supported on opposite sides of the window. The awning 70 is supported on a roller 71 mounted in a blind casing 72. The outer end of the awning is connected to the usual batten 73 which is attached to the cantilever arms 67. A worm wheel 74 is attached to at least one of the cantilever arms 67 and meshes with a worm 75 driven from an electric motor 76 through bevel wheels 77. The motor 76 can be located in the space usually provided under a shop window. The worm 75 is supported on a shaft 78 journaled in a bearing 79 supported at one side of the window. To draw the awning into its extended position the cantilever arms are swung into the position shown in chain lines, thus winding the blind off its roller. To wind the blind up the cantilever arms are swung back into the position shown in full lines and the blind may be positively wound on to its roller by the usual spring means incorporated in the roller and tensioned when the blind is unrolled. The motor 76 is of the reversing kind, the worm 75 being rotated in one direction to unwind the blind and in the opposite direction to wind the blind. Switching on of the slave mechanism, i. e. the motor to operate the blind can be effected at a predetermined time by means of a master

control such as a time switch or photo-electric cell arrangement similar to that shown and described with reference to Figures 1, 2 and 4 of the drawings. It will be appreciated that means must be provided for stopping the motor when the blind reaches its fully extended or its rolled position, and such means is shown diagrammatically in Figure 5 at 80. This means comprises a worm shaft 81 which traverses a traveller 82 backwards and forwards along a guideway 83 according to the direction in which the motor is being rotated. The traveller 82 carries a threaded shaft 84 upon which are mounted adjustable strikers 85, 86, which operate a switch member 87. The operation of the means just described is as follows:—

Assuming the time switch or the light-sensitive means has just been operated to unroll the blind the motor 76 will be rotated in the direction necessary to swing the cantilever arms 67 outwards, and the worm 81 will be rotated so as to drive the traveller to the right. As soon as the striker 85 engages the switch member 87 the circuit of the motor will be broken across the contacts 88, 89, and this movement of the switch member 87 coincides with the movement of the blind into its fully extended position. In breaking the circuit of the motor across the contacts 88, 89, the striker also brings contacts 90, 91 into engagement, these contacts being connected to the motor so that the current will flow in the opposite direction when the switch or light-sensitive device is operated to re-wind the blind, the motor being rotated in the reverse direction, and continuing to rotate until the striker 86 breaks the circuit of the motor across the contacts 90 and 91 and re-engages the contacts 88, 89, ready for the next unwinding of the blind. It will be appreciated that the number of contacts 88, 89, 90, 91, necessary to reverse the motor will vary according to the phase windings of the motor.

With slight modifications the arrangement shown in Figure 5 may be applied to the operation of a plurality of blinds, from a common driving mechanism. An arrangement of this kind is shown in Figures 6 and 7. Referring to Figure 6, the battens 92, 93, of a pair of adjacent blinds are connected to a common cantilever arm 94 which is adapted to be swung in and out about a pivot 95. It will be appreciated that there is very little space available for supporting the cantilever arm and its driving mechanism between two adjacent windows, and a method by which this can be effected is shown in Figures 6 and 7. The cantilever arm is secured to a worm wheel 96 which is driven from a power shaft 97 common to a plurality of blinds through a chain 98, bevel wheel 99 and a worm 100. The bevel wheels 99 are housed in a casing 101 secured to, for example, the woodwork above a shop window, and the casing 101 helps to support a casing 102 for the worm and worm wheel 96 and 100. This casing also provides bearings for the shaft 95 of the cantilever arm 94. To further support the casing 102 it is connected by a bracket 103 to a stay 104 secured between adjacent windows. The casing 101 and 102 will be made in parts so that they can be assembled after the various driving mechanisms have been located in position and in order to close the aperture 105 provided in the casing 102 for the movement of the cantilever arm 94, a revoluble cowl 106 may be provided.

In order to cover any space which may exist between two adjacent awnings, an auxiliary blind

107 may be provided as shown in Figure 8. This auxiliary blind is carried on a roller 108 mounted in the blind housing 109. An auxiliary blind 107 is secured to the batten of one of the blinds so that it is drawn out automatically together with said blind.

The operation of the power shaft 97 to roll or unroll the awnings can be effected at a predetermined time under the control of a time switch or in accordance with the intensity of light in a similar manner to that described with reference to Figure 4.

Modifications may be made in the examples above set forth without departing from the nature of the invention, for example, where the apparatus is adapted for operation from the electricity supply mains, a transformer may be provided for stepping down the current to the electromagnetic device 13 or the electromagnetic device may be operated by a battery. Furthermore the driving connection between the motor for rolling and/or unrolling the blind may incorporate a spring clutch arrangement which should the motor fail to stop when the blind has reached its extreme position in one direction will automatically break the driving connection between the blind and the motor. In cases where the lights in a shop window are adapted to be switched on and off at a predetermined time by means of a time switch a common time switch may be used for controlling the lights and the blinds. Or a light-sensitive device may be used for controlling the artificial lights and the blind, and if necessary a photo-electric cell will be shielded or placed in such a position that it is not affected by the artificial lighting. While the operation of a plurality of blinds from a common control has been described more particularly as applied to blinds of the awning type it is to be understood that a plurality of blinds of the kind shown in Figures 1 and 2 can be operated from a single control. For example, a single brake may be provided for controlling a plurality of blinds carried on a common shaft or roller.

I claim:—

1. For use in combination with a roller blind adapted for movement from a stowed position to an extended position and vice versa, a brake mechanism operatively connected to the blind roller, means normally maintaining the brake operative to prevent rotation of the roller, an electro-magnetic device, an operative connection between the electro-magnetic device and the brake, whereby the brake is released when the normal current condition of the electro-magnet is changed, and a master control connected in

the circuit of the electromagnet for changing the normal current condition thereof.

2. For use in combination with a blind adapted to be rolled on to and off a rotatable roller, a brake mechanism operatively connected to the blind roller, means normally maintaining the brake operative to prevent rotation of the roller, an electro-magnetic device, an operative connection between the electro-magnetic device and the brake, whereby the brake is released when the normal current condition of the electro-magnet is changed, a master control connected in the circuit of the electromagnet for changing the normal current condition thereof, a pulley connected to the blind roller, a cord reeved over said pulley and adapted to be wound on to the pulley as the blind is unrolled and wound off the pulley as the blind is rolled, a switch in the circuit of the electro-magnet and a striker secured to said cord and arranged to trip the switch in its upward movement as the blind is unrolled, whereby the brake is applied after a predetermined length of the blind has been unrolled.

3. The combination claimed in claim 2 wherein the striker comprises a clamp by which it may be fixed to the cord in any position of adjustment.

4. The combination claimed in claim 2, wherein the cord is reeved over a jockey pulley mounted on a pivoted lever operatively connected to the brake and adapted to release the brake when moved in one direction, and wherein the cord when tensioned to roll the blind moves said pivoted lever in brake releasing direction.

5. The combination claimed in claim 2 wherein the cord is wound off its pulley to roll the blind up by an electric motor, the operation of which to roll the blind is governed by a master control, and wherein the cord carries a striker adapted to trip a switch connected in the motor circuit when the blind has been wound to a predetermined height, whereby the motor is stopped.

3. The combination claimed in claim 2, and further including a shock-absorbing device located in the path of travel of the striker whereby the blind is brought to rest without shock.

7. The combination claimed in claim 2, wherein the cord is wound off its pulley to roll the blind up by an electric motor, the blind rolling operation of which is governed by a master control, and wherein a unidirectional driving mechanism operatively couples the pulley to the electric motor in the blind winding direction.

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