

Feb. 10, 1925.

1,525,541

T. HALL

SHUTTER FOR SEARCHLIGHTS

Filed Jan. 10, 1918

2 Sheets-Sheet 1

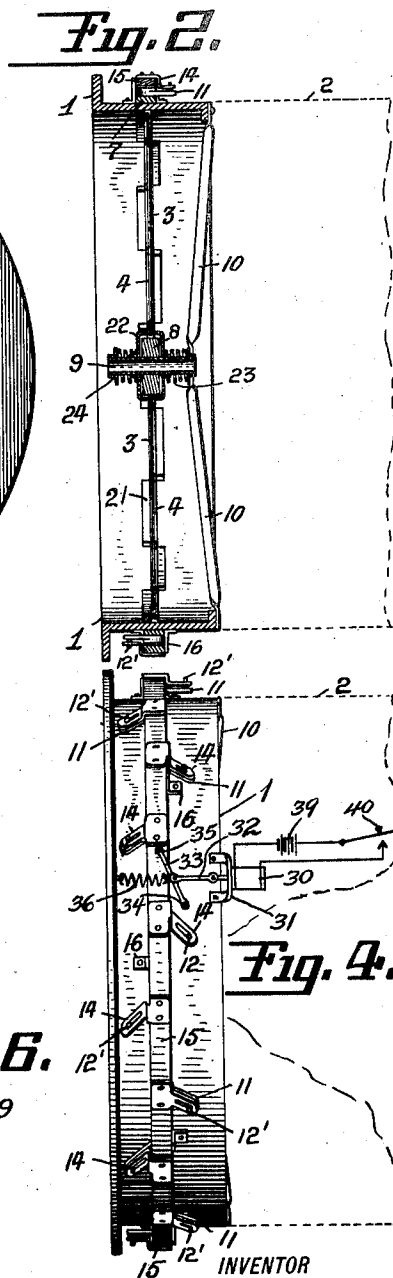
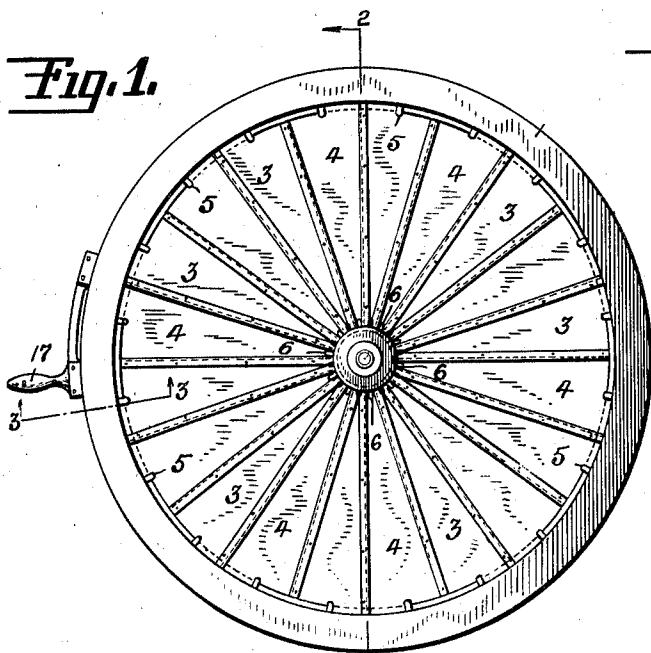


Fig. 12.

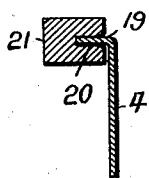


Fig. 3.

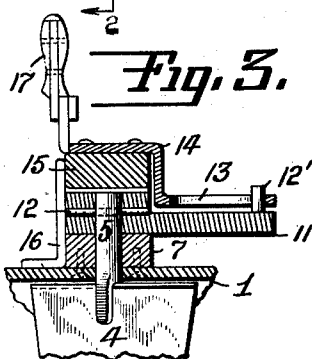


Fig. 5.

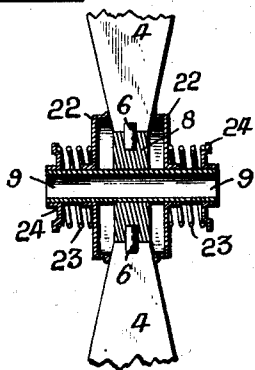
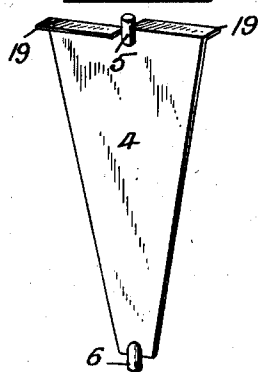


Fig. 6.



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2 Sheets-Sheet 2

Fig. 7.

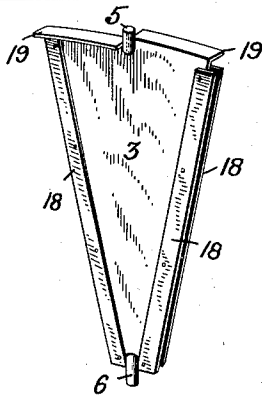


Fig. 8.

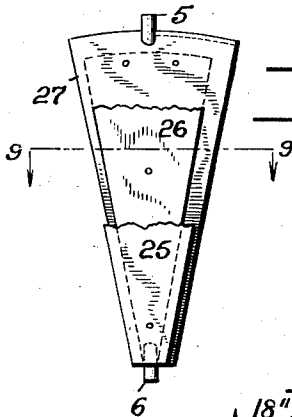


Fig. 10.

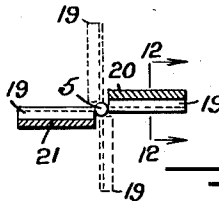


Fig. 11.

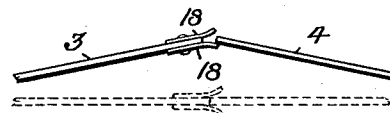


Fig. 9.

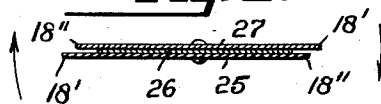
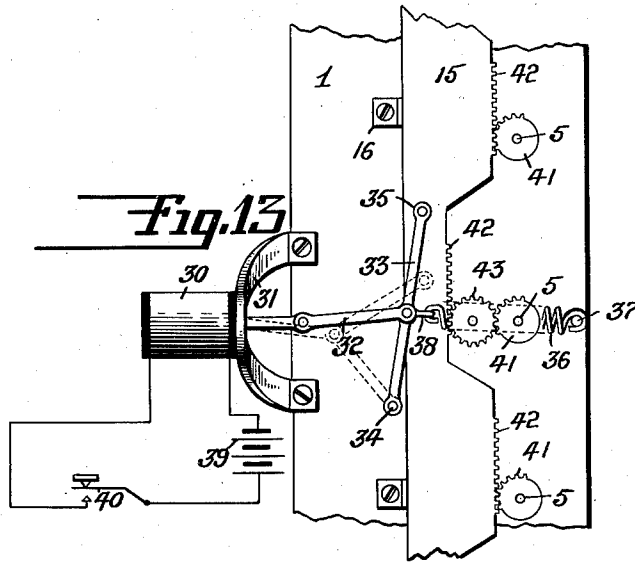
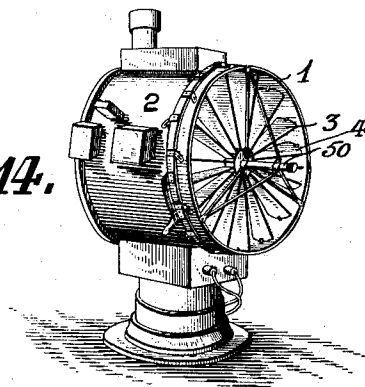


Fig. 14.



INVENTOR

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UNITED STATES PATENT OFFICE.

THEODORE HALL, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE SPERRY GYROSCOPE COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

SHUTTER FOR SEARCHLIGHTS.

Application filed January 10, 1918. Serial No. 211,288.

To all whom it may concern:

Be it known that I, THEODORE HALL, a citizen of the United States of America, residing at 455 Fortieth Street, Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Shutters for Searchlights, of which the following is a specification.

This invention relates to light interrupting shutters, more specifically to shutters adapted to be employed in connection with searchlights for interrupting the beam of the latter.

While my invention is capable of broader application it has been designed principally for use in connection with searchlights adapted to be employed in the Army or Navy. Up to the present time it has been necessary, in order to meet the requirements of the Army and Navy, to provide two shutters on each searchlight; one of the "iris" type and the other of the "Venetian blind" type. The former type possesses the advantage that it is adapted to form an absolutely light tight closure for the searchlight, but is incapable of being operated with the rapidity necessary for signalling purposes. On the other hand the "Venetian blind" type, while capable of being rapidly operated, is not light tight when closed so that if this type of shutter were used alone it would be impossible to shut off the light absolutely without extinguishing the arc or other light source.

The principal object of the present invention is to provide a single shutter possessing the advantages of both of the above mentioned types of shutters. Other objects and advantages will appear as the invention is hereinafter developed.

Referring to the drawings which illustrate what I now consider the preferred forms of my invention:

Fig. 1 is a front elevation of one form of shutter.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged sectional detail taken on line 3—3 of Fig. 1.

Fig. 4 is a side elevation of the shutter shown in Figs. 1 and 2.

Fig. 5 is an enlarged sectional detail of the central portion of the structure shown in Fig. 2.

Figs. 6 and 7 are detail views illustrating

alternate blades of the shutter shown in Fig. 1.

Fig. 8 is a detail, with parts broken away, illustrating a modified form of blade.

Fig. 9 is a section on line 9—9 of Fig. 8.

Fig. 10 is a sectional detail illustrating one form of interengaging means between the outer ends of the blades and shutter frame.

Fig. 11 is a fragmentary detail view illustrating one form of interengaging means between adjacent blades of the shutter.

Fig. 12 is a section taken on the line 12—12 of Fig. 10.

Fig. 13 is a fragmentary detail illustrating a modification of the means for operating the shutter.

Fig. 14 is a perspective of a searchlight embodying one form of my invention.

Viewed from a generic aspect, my invention comprises a frame having a central opening, blades pivoted within the frame and means for preventing the passage of light rays between the blades and between the frame and blades when the latter are in closed position.

Calling attention to Figs. 1, 2 and 4, it will be seen that I have illustrated an annular frame 1, forming an integral part of, or adapted to be connected in any suitable manner to a searchlight drum 2. While various forms of blades may be employed I have shown a plurality of sector-shaped blades 3, 4 pivoted for rotation about radial axes within the frame 1.

Each of the blades 3, 4 is shown as being provided at opposite ends with stub shafts 5, 6; the shafts 5 being rotatably mounted in a ring 7 secured to the outer periphery of the frame 1. Inner shafts 6 are shown rotatably mounted in a block or hub 8, supported by a member 9 carried at the center of the frame by means of straps 10. While the shutter is adapted to be used with various types of lights, I have shown the member 9 in the form of a sleeve through which the positive carbon or carbon holder 50 is adapted to pass when the shutter is used with the Sperry searchlight, the member thus serving also to support the electrode.

Various forms of mechanism may be adopted for operating the blades from open to closed position, and vice versa. One form of mechanical means for accomplishing this function is shown in Figs. 1 to 4, inclusive,

and may be constructed substantially as follows. Each of the outer shafts 5 is provided with an arm 11 secured thereto by any suitable means such as through pins 12.

5 The arms 11 which are connected to the blades 4 preferably extend to one side of the ring 7 while the arms 11 of the alternate blades 3 project to the opposite side. Each of the said arms 11 is provided with

10 an outwardly extending pin 12' adapted to operate in a slot 13 provided in a corresponding arm 14, the arms 14 being secured to the ring 15 provided on the periphery of the frame 1.

15 The above described parts are so designed that when the ring 15 is shifted about its axis, the arms 11 will be thrown or operated through an angle approximately equal to 90° so that the blades will be operated from

20 closed position, as shown in Fig. 1, to open position, as indicated in Figs. 5 and 14; or vice versa. A plurality of guide brackets 16 may be secured to the outer periphery of frame 1, on opposite sides of the ring 15 for

25 the purpose of preventing longitudinal displacement of the latter. The ring 15 may be shifted manually by means of a handle 17 secured thereto or may be shifted electrically, as will hereinafter be described.

30 In order to prevent leakage or passage of light between the blades when the latter are in closed position, strips 18 may be secured to the radial edges of certain of the blades. I prefer to provide the strips 18 on the alternate blades, as for example, the blades 3,

35 the remaining blades being of but one thickness of metal, in order that the beam of the searchlight or other light source be obstructed as little as possible when the shutter is in open position.

40 Calling attention to the fact that the blades 3 operate in the same direction, but in a direction opposite to that of blades 4, it will be seen that the strips 18, which are

45 preferably flared slightly, will serve to guide the edges of the blades 4 into the adjacent grooves formed by said strips 18 when the blades are operated to closed position, as indicated in dotted lines in Fig. 11. On inspection of the last mentioned figure, it will

50 be apparent that an absolutely light-tight joint is formed between the blades when in closed position.

I prefer also to provide means for preventing the passage of light between the

55 outer edges of the blades and the frame when the blades are in closed position. Thus, each of the blades 3, 4 may be provided with oppositely extending flanges 19 adapted to enter grooves 20 provided in

60 blocks 21 secured to the inner periphery of the frame 1, when the blades are operated to closed position. Means are also provided for preventing the leakage of light at the

65 central portion of the shutter. The last

named means is shown in the form of a pair of disks or cup shaped members 22 slidably mounted on the sleeve 9 on opposite sides of the hub 8. The members 22 are shown as

70 biased to blade-engaging-position by means of springs 23, each abutting at one end a corresponding one of members 22 and at the other end a corresponding disk or collar

75 24 fixed on said sleeve 9. It will be seen that the springs 23 will permit the members 22 to spread apart on opening of the shutter and will cause said members 22 to engage

80 the blades 3—4 when the latter are in closed position.

It will be obvious from the above description that I have provided a shutter which, while being absolutely light tight in closed position, is capable of being operated with

85 such rapidity as to render it capable of being used for code or other signalling purposes.

My invention may be modified in various ways, for example, the blades 3, instead of being constructed as above described and as shown in Fig. 7, may be constructed as

90 shown in Figs. 8 and 9. As shown in the last mentioned figures, each of the blades 3 comprises three blades of metal 25, 26 and 27. The blades 25 and 27 are exactly similar, both as to size and shape, while the central

95 blade 26 is somewhat smaller. On inspection of Fig. 9, it will be seen that the said blades 25, 26 and 27, are secured to each other by means of rivets or other suitable means in such a manner as to provide radial

100 grooves similar to the grooves between the strips 18, hereinbefore described.

As previously mentioned, electrical means may be employed for operating the ring 15. Thus, in Figs. 4 and 13, I have shown a solenoid 30 secured to the frame 1, by means of

105 bracket 31, the core of said solenoid being secured by means of a link 32 to toggle mechanism 33. The last mentioned mechanism is secured at one end 34 to the frame

110 1, and at the other end 35 to the operating ring 15. The spring 36 may be secured at one end to the pin 37 carried by the frame 1, and at the other end 38 to the toggle mechanism. On energization of the solenoid 30,

115 the core of the latter will be attracted to pull on the toggle mechanism to cause the ring 15 to move in such a direction as to operate the blades 3—4 to open position. On deenergization of the solenoid, the

120 spring 36 will act to restore the parts to normal position, in which position the shutter is closed. The solenoid 30 may be energized by means of a battery or other source of potential 39, the said battery being connected

125 in series with said solenoid, and with a key 40.

I have shown in Fig. 13, a modified form of operating connection between the ring 15 and the shafts 5. In this figure, the last

130

mentioned shafts, instead of being provided with arms 11, are each provided with a segmental gear 41 adapted to engage corresponding rack teeth 42 provided on the ring

15. As previously stated, I prefer to rotate alternate blades in the same direction, and for this purpose idlers 43 may be provided between the teeth 42 and those of gears 41, which are connected to the blades 3. The edge strips of blades 3 may either be constructed so as to project beyond the blades an equal amount, as indicated in Fig. 11 or a pair of diagonally opposite members 18' (see Fig. 9) may be made longer than the remaining pair 18". With the last described arrangement, by making the members 18' and 18" resilient, the said members 18' will serve to guide the adjacent blades 4 into the grooves of blades 3 when the latter are operated to closed position as indicated by the arrows in Fig. 9.

In accordance with the provisions of the patent statutes, I have herein described the principle of operation of my invention, together with the apparatus, which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means. Also, while it is designed to use the various features and elements in the combination and relations described, some of these may be altered and others omitted without interfering with the more general results outlined, and the invention extends to such use.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. A light interrupting shutter comprising a frame, a plurality of blades pivoted within said frame, means connecting adjacent blades for rotation in opposite directions and means carried by certain of said blades for overlapping the adjacent blades on both sides of the latter when said blades are in closed position.

2. A signalling shutter for searchlights comprising a frame having a substantially circular opening, a plurality of blades pivoted within said frame and means comprising flanges carried on opposite sides of alternate blades for preventing passage of light between adjacent blades and additional flanges on said blades to prevent passage of light between said frame and blades when the latter are in closed position.

3. A signalling shutter for searchlights comprising a frame, a plurality of blades radially pivoted on said frame and means comprising a member resiliently connected to said frame and adapted to follow the movement of said blades for preventing leakage of light at the inner ends of said blades.

4. A signalling shutter for searchlights comprising a frame, a plurality of blades radially pivoted on said frame, a shield mounted adjacent the inner ends of said blades and resilient means for urging said shield into engagement with said blades.

5. A signalling shutter for searchlights comprising a frame, a plurality of blades radially pivoted on said frame, a pair of shields, one located on each of opposite sides of said blades and adjacent the inner ends thereof, and resilient means for urging said shields into engagement with said blades.

6. A signalling shutter for searchlights comprising a frame, a plurality of radially pivoted sector-shaped blades connected to said frame, and means, including an annular member connected to said blades and surrounding said frame, for operating said blades.

7. A signalling shutter for searchlights, comprising a frame, a plurality of radially pivoted sector-shaped blades connected to said frame, means including an annular member connected to said blades for operating said blades, a solenoid operatively connected to said annular member, a source of E. M. F. and a signalling key for controlling said solenoid.

8. A signalling shutter for searchlights, comprising a frame, a plurality of radially pivoted sector-shaped blades connected to said frame, an arm on each of said blades, the arms on adjacent blades projecting in opposite directions, an annular member provided with arms projecting alternately on opposite sides, each of said first mentioned arms being connected to a corresponding one of said second mentioned arms, whereby the actuation of said annular member will rotate adjacent one of said blades in opposite directions.

9. A signalling shutter for searchlights, comprising a plurality of radially disposed sector-shaped blades, means for rotating said blades on radial axes and in opposite directions for opening and closing said shutter, a slot provided in the radial edges of alternate blades for overlapping on both sides the edges of intermediate blades when in closed position.

10. A light-tight shutter comprising a plurality of pivoted blades, alternate blades being provided on opposite edges with a portion adapted to overlap on the same side of said shutter the intermediate blades, and means for moving said alternate and said intermediate blades simultaneously in opposite directions.

11. A light-tight shutter comprising a plurality of pivoted blades, alternate blades being provided on opposite edges with a portion adapted to overlap the intermediate blades, and means comprising an annular member connected to said blades for operat-

ing adjacent blades simultaneously in opposite directions.

12. A signalling shutter for searchlights, comprising a frame, a plurality of blades pivoted therein on radial axes, means for rotating adjacent blades in opposite directions to closed position, and means carried by certain of said blades for overlapping the adjacent blades when said blades are in closed position.

13. In combination with a searchlight, a shutter therefor comprising an outer annu-

lar portion, a central hub portion, a plurality of blades pivoted on substantially radial axes between said portions, each edge of alternate blades being provided with a groove adapted to receive the edge of adjacent blade, and means for rotating adjacent blades about their axes simultaneously in opposite directions.

In testimony whereof I have affixed my signature.

THEODORE HALL.