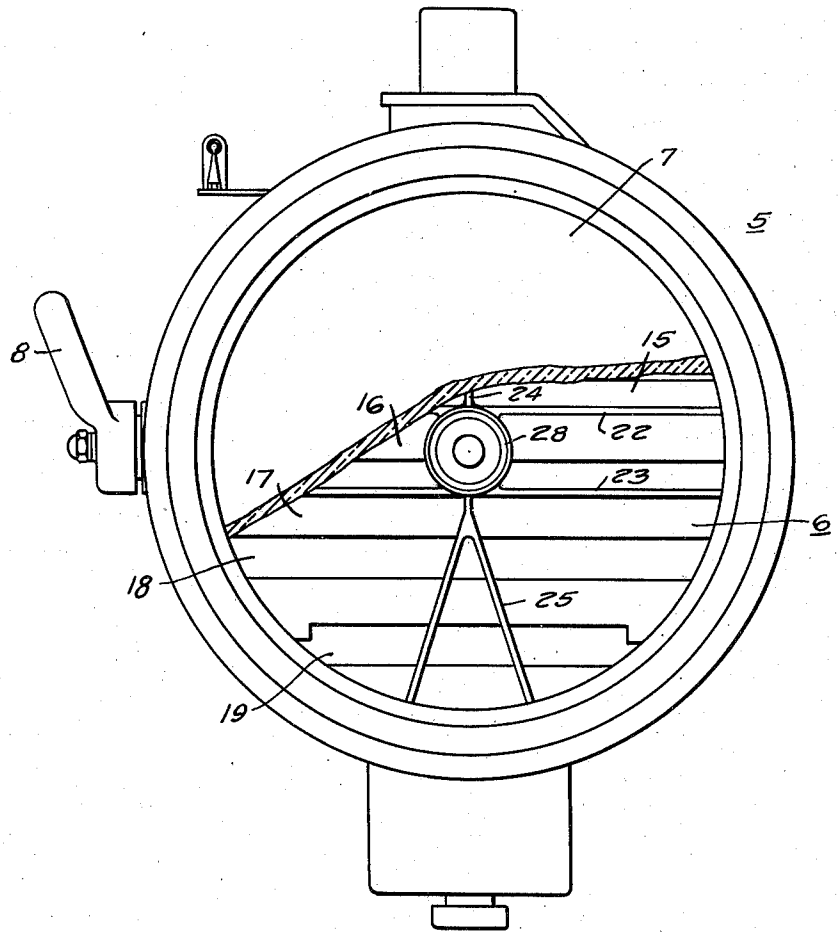
Sept. 14, 1948. W. A. PENNOW ET AL 2,449,503

SHUTTER

Filed June 2, 1945 2 Sheets-Sheet 1

Fig. 1.



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SHUTTER

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FIG. 3.

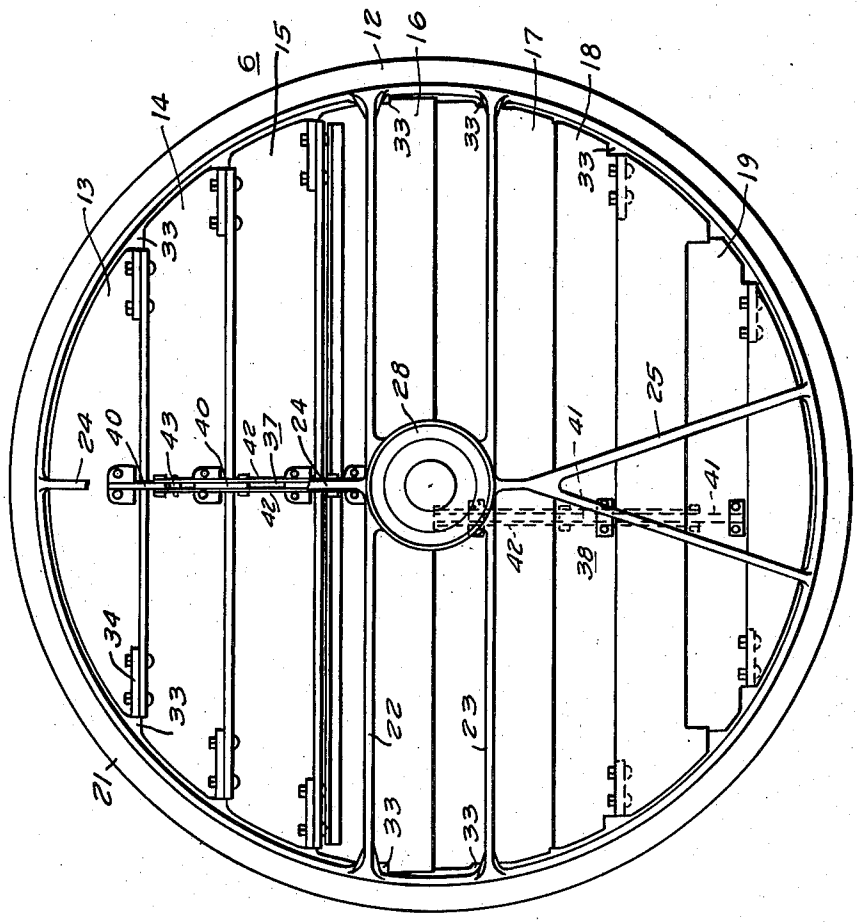
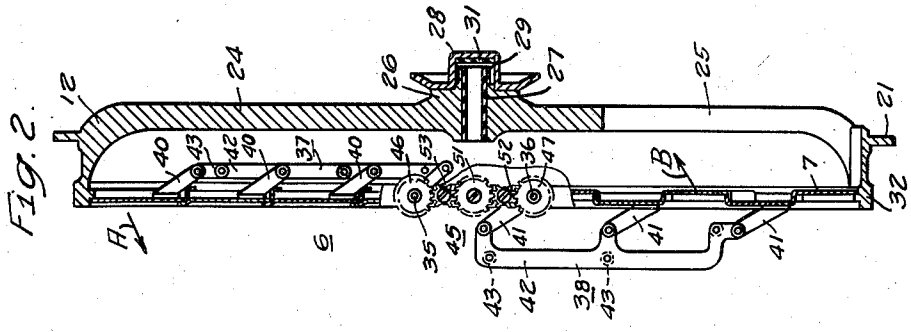


FIG. 2.



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2,449,503

UNITED STATES PATENT OFFICE

2,449,503

SHUTTER

Willis A. Pennow and Elroy W. Yungman, Cleveland, Ohio, assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application June 2, 1945, Serial No. 597,230

5 Claims. (Cl. 240—45.2)

1

Our invention relates, generally, to shutter mechanisms and, more particularly, to a signalling shutter mechanism or assembly for use with searchlights and, particularly, arc searchlights.

Heretofore signalling shutters on relatively large searchlights have been of the radial vane type regardless of the fact that a shutter of the Venetian blind type is more desirable from an operating standpoint. Attempts to use shutters of the Venetian blind type on large searchlights have not been successful for the reason that it is difficult to balance the shutter load to eliminate excessive torque on the driving parts of the mechanism. While shutters of the radial van type may be used on searchlights of any size and character, they are not desirable for the reason that the reflected light from the blades or vanes during the opening and closing operation is completely out of control, being scattered in all directions. This is a serious disadvantage where maximum concealment is desired as is the case in signalling searchlights used on naval vessels and the like where it is highly important that all stray and misdirected light be eliminated or reduced to a low minimum. The Venetian blind type of shutter is particularly desirable and effective for applications of this kind.

Accordingly, it is an object of our invention, generally stated, to provide a signalling shutter for searchlights which shall be of simple, rugged and economical construction, and which may be readily used with searchlights of all sizes, particularly those utilizing a carbon arc.

A more specific object of our invention is to provide a shutter of the Venetian blind type for searchlights which may be applied to relatively large searchlights and which provides a central opening to receive the positive electrode of a carbon arc searchlight.

Another object of our invention is to provide a shutter of the character described wherein the blades thereof are actuated in groups by a common actuator.

A further object of our invention is to provide a shutter of the character described wherein the blade load on the operating mechanism is so balanced as to eliminate excessive torque on the driving parts.

A still further object of our invention is to provide a shutter of the character described wherein the blades are actuated in groups by linkages associated with each group and the several linkages driven in unison by means of a gear train.

Another object of our invention is to provide a shutter of the character described wherein the

2

several blades are divided into upper and lower groups above and below the horizontal axis of the shutter assembly and the blades of each group connected together by a linkage, the linkage associated with one group being on the opposite side of the shutter blades from the linkage associated with the other group.

These and other objects of our invention will become more apparent from the following detailed description of one embodiment thereof when read in conjunction with the drawings, wherein:

Figure 1 is a front view in elevation of a searchlight embodying the shutter assembly of our invention with the lens or front cover glass broken away to show the shutter assembly,

Fig. 2 is a side elevational view partially in section of the shutter assembly, and

Fig. 3 is a front view in elevation of the shutter assembly.

Referring now to the drawings, Figure 1 is a front view in elevation of a searchlight 5 embodying the shutter assembly of our invention, the shutter assembly being designated generally by the numeral 6. In this view the front lens 7 is partially broken away to show the position of the shutter assembly 6 which is mounted back of the front lens 7 and in front of the light source, not shown, in order to control the light projected from the searchlight to effect signalling operations in a well known manner. It is to be understood, however, that this shutter assembly is actuated by a suitable operating mechanism which is not a part of this invention. The manual operating lever 8 of the operating mechanism is shown in order to indicate the position of this mechanism with respect to the shutter assembly.

Referring now to Figs. 2 and 3 of the drawings, there is shown a preferred embodiment of our shutter assembly 6. This assembly comprises, generally, a ring element 12 and a plurality of shutter blades 13 through 19 mounted in parallel relation in a common plane therein, as shown best in Fig. 2.

The ring element 12 is comprised of a circular portion 21 having a pair of horizontally disposed spaced brace portions 22 and 23, an upper vertical brace portion 24, and a lower Y-shaped brace portion 25. All of these brace portions 22 through 25 are joined to a hub portion 26, as shown. The hub portion 26 is provided with a central bore 27 for receiving the end of a positive carbon when the shutter assembly is used with a carbon arc searchlight in which the pos-

itive carbon must extend forwardly of the arc mechanism. The bore 27 is closed by a cap member 28 secured to the hub portion 26, as shown in Fig. 2. The opening thus formed is insulated by means of an insulating sleeve 29 and an insulating button 31.

In this embodiment of the invention, the shutter blades are divided into upper and lower groups, and the groups of blades are actuated in unison. In this instance, the upper group of blades comprises blades 13 through 16, and the lower group comprises blades 17, 18, and 19. The blades 13, 14, and 15 are single blades, and the remaining blades are double blades. In other words, the single blades are pivotally mounted so as to tilt or rotate about their lower edges, while the double blades are pivotally mounted to rotate about an axis centrally or intermediate of their side edges. It is to be understood, however, that both groups of blades may be single, double, or combinations of both.

As shown in Fig. 3, the rim portion 32 of the ring element 12 is provided with a plurality of internal bosses 33 for the purpose of mounting the blades. Each blade, except the two adjacent middle blades 16 and 17, is provided with a pair of pivot blocks 34 which have end openings engaging outwardly extending pin portions rigidly inserted in the inside faces of the bosses 33. This is shown clearly in the upper portion of Fig. 3. The two middle adjacent blades 16 and 17 are mounted for rotation upon drive shafts 35 and 36, respectively, which are journalled in the rim portion 32 of the ring, as shown in Fig. 2. The drive shaft 35 is common to all of the blades of the upper group and is utilized to drive this group of blades. The same is true with respect to the lower drive shaft 36.

In order to provide for operating all of the blades in each group in unison, the several blades of each group are connected together by means of linkages. The linkage for the upper group of blades is indicated generally by the numeral 37 and is disposed in front of the blades directly behind the vertical brace member 24. The linkage for the lower group of blades is designated generally by the numeral 38 and is disposed behind the V-shaped lower brace member 25 and behind the shutter blades when viewed from the front of the shutter assembly.

Each one of the blades of each group is provided with an actuating arm, there being four actuating arms 40 with the upper group of blades and three arms 41 with the lower group. The actuating arms 40 are connected together by the linkage 37 and the arms 41 by linkage 38, as shown best in Fig. 2, so that when either linkage is actuated, its associated group of blades is operated in unison between open and closed positions.

Each of the linkage mechanisms is comprised of a pair of links 42 held in spaced relation by means of spacers 43.

It will be apparent that by means of this arrangement of grouping and the use of linkages, a dead-center area is provided to accommodate the positive carbon electrode when the shutter is used on carbon arc searchlights. This results from the fact that the two middle adjacent blades 16 and 17 come together at their meeting edges along the horizontal axis of the shutter assembly and, of course, the searchlight. Therefore, when these blades are rotated in response to the rotation of the drive shafts 35 and 36, they move apart in such manner as to provide a large central opening.

With reference to Fig. 2, it will be apparent that the blades of the upper group are opened by the upward movement of the linkage 37 which causes the blades to tilt backwardly in the direction indicated by arrow A. In other words, these blades all pivot or rotate in a counterclockwise direction.

With respect to the lower group of blades, they are so mounted as to be opened by the downward movement of the linkage 38 which also causes these blades to rotate in a counterclockwise direction. The bottom portion of these blades move in the direction indicated by the arrow B.

In order to provide for driving both groups of blades in unison so that all of the blades will open and close in unison, the drive shafts 35 and 36 are driven by means of a gear train, indicated generally by the numeral 45. This gear train comprises a pair of drive gears 46 and 47 mounted upon the ends of the drive shafts 35 and 36, respectively, on the outside of the rim portion 32 of the shutter ring. These gears are driven in unison by means of a common main drive gear 51 connected thereto by means of idler gears 52 and 53.

It will be readily understood that when the main drive gear 51 is driven by a suitable operating mechanism, such, for example, as that disclosed in the copending application of Willis A. Pennow, Serial No. 594,633, filed May 19, 1945, and assigned to the assignee of this application, the drive shafts 35 and 36 will be actuated or rotated in unison to open and close the blades of the upper and lower groups. The use of the multiple drive shafts 35 and 36 makes it possible to reduce the torque on each to safe limits. This makes it possible to utilize a shutter of this type on large searchlights as well as small, and at the same time provide the necessary dead-center area for certain carbon arc searchlights.

This construction also makes it possible to cause all of the shutter blades to open and close in a single plane which restricts reflected light to a single direction. This construction also permits locating of the structural members of the shutter assembly in alignment with various operating members so as to reduce to a minimum the area of shadow in a searchlight beam when the shutter is opened.

In view of the foregoing description of the preferred embodiment of our invention, it will be apparent that it makes possible the use of a lattice or Venetian blind shutter assembly on large searchlights, eliminates multi-direction scattering of light by reflection during operation of the shutter assembly, and provides a dead-center area and a central opening for accommodating carbon electrodes. It also provides for reducing the area of shadow in the search-light beam when the shutter is opened.

While a preferred embodiment of our invention has been shown and described in detail, it is to be understood that changes and modifications may be made therein without departing from the principles of our invention.

We claim as our invention:

1. A signalling shutter assembly for searchlights comprising, a frame member, a plurality of blades pivotally mounted in parallel relation in a common plane in the frame member and constituting two groups of blades on opposite sides of the horizontal axis of the frame member, a drive shaft individual to each group of blades, said drive shafts supporting adjacent blades on opposite sides of said horizontal axis, a linkage connecting each drive shaft to the other blades

of its associated group, and gear means for rotating said drive shafts in unison.

2. A signalling shutter assembly for searchlights comprising, a frame member, a plurality of straight blades pivotally mounted in parallel relation in the frame member, a pair of shaft members rotatably mounted in the frame on opposite sides of its horizontal axis supporting adjacent blades, a linkage connecting each of said shaft members with the other blades above and below the said two adjacent blades, and a gear train connecting said shaft members, said gear train including a drive gear common to both shaft members.

3. A signalling shutter assembly for searchlights comprising, a frame member, a plurality of straight blades pivotally mounted in parallel relation in the frame member, a pair of shaft members rotatably mounted in the frame on opposite sides of its horizontal axis supporting adjacent blades, a linkage connecting each of said shaft members with the other blades above and below the said two adjacent blades, all of the blades on one side of said adjacent blades being pivotally mounted at their side edges and all of the blades therebelow being pivotally mounted intermediate their side edges, a gear mounted on each shaft member, a main drive gear mounted between said gears and in alignment therewith, and idler gears mounted between the main drive gear and each of said gears, thereby to provide for rotating said shaft members in unison from the main drive gear.

4. A signalling shutter assembly for searchlights comprising, a frame member, a plurality of shutter blades pivotally mounted in a common plane in parallel relation in the frame member, said blades being divided into two groups, one group on either side of a predetermined axis of the frame member, a linkage connecting the blades of one group, a linkage connecting the blades of the other group, said linkages being disposed on opposite sides of said blades, a drive shaft individual to each group of blades, said drive shafts being rotatably mounted in spaced

parallel relation on opposite sides of said axis and connected with said linkages, and a gear assembly mounted at adjacent ends of said shafts operable to rotate said shafts in unison.

5. A signalling shutter assembly for searchlights comprising, a frame member, a plurality of straight shutter blades pivotally mounted in spaced parallel relation in the frame member and in parallel relation to a predetermined axis of said frame member, said blades being divided into two groups one group on each side of said axis, a pair of shaft members rotatably mounted in the frame member in spaced parallel relation on opposite sides of said axis, said shaft members supporting the adjacent blades of the two groups, means pivotally securing the opposite ends of the other blades of both groups to the frame member, a linkage mechanism connecting each of the shaft members to the other blades of its associated group, said linkage mechanisms being connected to their associated blades intermediate their ends and also being disposed on opposite sides of the blades, and a gear mechanism for actuating said shaft members mounted at the side of the frame member and operatively connected with adjacent ends of the shafts to provide for rotating said shaft members in unison.

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