Our Invention relates, generally, to searchlight construction, and, more particularly, to ventilating and cooling systems for searchlights and the like, such, for example, as high-intensity arc searchlights.

It is an object of the present invention to provide a ventilating and cooling system for searchlights and similar devices which shall be extremely simple and efficient in operation, which may be easily and economically produced and which will effectively cool the searchlight structure as a whole and remove the hot gases and combustion products therefrom.

A more specific object of our invention is to provide a cooling and ventilating system for a searchlight wherein the cooling air is introduced into the drum in such manner that it effectively cools and equalizes the temperature of the reflector.

Another object of our invention is to provide for effectively removing the hot gases and products of combustion from the arc region in order that the cooling air introduced into the drum will remain at as low a temperature as possible and will not become contaminated.

A further object of our invention is to provide for exhausting air from the drum by means operated from the blower which supplies the ventilating and cooling air to the drum.

Another object of the invention is to provide for utilizing an ejection or plurality of ejections, suitably located in the discharge openings of the drum and operated from the blower which supplies cooling and ventilating air, for exhausting air from the drum.

A still further object of the invention is to provide for ventilating and cooling a searchlight by means of introducing air into the drum back of the reflector and controlling the flow of the discharge air from the drum.

A further object of the invention is to provide for maintaining the arc head mechanism and other parts inside the drum at a low temperature through the constant and effective removal of a large portion or substantially all of the hot gases produced by and immediately above the arc.

These and other objects of the invention will become apparent from the following description read in conjunction with the drawings wherein:

Figure 1 is a back elevational view of a searchlight embodying the principal features of the invention.

Fig. 2 is a view partly in section and partly in elevation of the searchlight shown in Fig. 1, Figs. 3 and 4 are views similar to Figs. 1 and 2, respectively, showing a modification of the invention.

Fig. 5 is a view partly in section showing the discharge openings and shields at the top of the drum.

Fig. 6 is a sectional view in elevation of the air spray head shown in Fig. 4.

Fig. 7 is an elevational view of the same.

Fig. 8 is a side elevational view of the air spray head shown in Fig. 2.

Fig. 9 is a front elevational view of the same.

Fig. 10 is a perspective view of the ejection device shown in Fig. 4.

Fig. 11 is an enlarged view of a portion of the back of the drum showing the radially disposed ribs for directing the air flow, and Fig. 12 is a sectional view through one of the ribs and reflector showing how the joints between the ribs and reflector are sealed against air leakage.

In practicing the invention in what is now believed to be its preferred form, the cooling and ventilating medium, preferably air, is introduced into the drum, through an opening centrally disposed in the back thereof, by means of a suitable blower device supported on the back of the drum. The reflector is spaced from the back of the drum and being of less diameter than the drum it forms an annular passage between its edge and the sides of the drum. The inlet in the back of the drum is covered by means of a spray head which directs the air discharged by the blower, radially over the back of the reflector toward the annular passage. A plurality of radial ribs are also interposed between the back of the reflector and the drum to direct the cooling air radially in different predetermined channels in order to insure a more even distribution of the air flowing over the back of the reflector and a more even discharge of air through the annular passage into the drum proper.

The drum is provided with main discharge openings at the top, preferably located on opposite sides of the center line, through which the used air is discharged. These openings may be varied as to size in order to control the volume and action of the air within the drum. The hot gases and products of combustion of the arc are removed directly by means of a hood device which extends downwardly from the top of the drum and communicates with another opening at the top of the drum, preferably located centrally between the main discharge openings.

The discharge openings are covered by means of shields to prevent the escape of light and to...
direct and facilitate the air flow. The centrally disposed opening for the hood device is covered by a shield which in turn is covered by a larger one which covers the main openings. In one embodiment of the invention air nozzles or ejectors are suitably placed in the main discharge opening, or in the central or auxiliary opening, or in both, which are supplied with air from the blower to produce an ejector action for facilitating the air discharge from the drum.

Referring now to Figs. 1 and 2 of the drawings, there is shown a searchlight embodying the principal features of the preferred embodiment of the invention comprising a drum 10 which is adapted to be mounted upon a suitable base for movement in both azimuth and elevation in accordance with well known construction. In this instance, the drum 10 comprises a main body portion 11 having a back 12 and a front door 13 hinged to the body portion 11 as shown at 14. An arc mechanism 15 may be supported within the drum and controlled in any suitable and well known manner. Since the particular type of arc mechanism used is immaterial to the functioning of the invention, and further, since devices of this kind are well known in the art, it has been deemed unnecessary to illustrate or describe it in detail. A reflector or mirror 16 is mounted within the drum in a spaced relation to the back and sides of the drum, forming an air chamber 17 between the reflector and the drum back 12 and an angular passage 13 between the edge of the reflector and the sidewalls of the drum. The reflector may be supported in any suitable manner preferably by clips or clamps spaced around the edge thereof and which are secured to the drum.

In this instance, the cooling and ventilating medium, preferably air, may be supplied to the drum by means of a blower device 18 secured to the back of the drum. The device shown comprises two separate blowers 21 and 22 actuated by a common motor 23 although a single blower may be used if desired.

In order to provide for introducing the cooling and ventilating air into the drum in such manner as to uniformly cool and equalize the temperatures of the reflector and to produce the distribution of the air within the drum provision is made for introducing the air in such manner that it will be passed or sprayed over the back of the reflector 16 before it enters the drum proper. This result may be effected in various ways, however, a highly satisfactory and efficient way to accomplish it is to provide a centrally located opening 24 in the back of the drum and connect the blower or blowers thereto by means of an air duct 25.

The distribution and direction of flow of the incoming air may be controlled by means of a spiral 26 located over the main opening 24 and so designed that the air delivered by the blower device 18 is uniformly and radially discharged within the chamber 17 and toward the passage 13. The spray head 28 may take any desired form, such, for example, as that shown in Figs. 3 and 4, which are sectional views of the spray head shown in Fig. 2. In this instance, the spray head is dish-shaped having a flange 27 for securing it to the back of the drum and is provided with a circumferential discharge opening 28 and a plurality of openings 29 in the face thereof. As shown, the body portion 31 is secured to the flange 27 by means of suitable ribs 32 which function to secure the two parts together when the circumferential slot 28 is cut into the body portion and, in addition, serve to initially direct the flow of incoming air. As will be readily understood, the greatest part of the blower discharge passes radially outward through the discharge opening 28, whereas a suitable and smaller quantity of air is discharged through the openings 29 directly upon the back of the reflector. In order to more effectively direct the flow of cooling air along the back of the reflector and to ensure a uniform discharge of air into the drum proper, a plurality of spaced ribs 33, shown in detail in Fig. 11, are interposed between the reflector and the back of the drum. In this instance, the ribs 33 are formed integrally with the back of the drum, however, they may be separated therefrom if desired. In order that the ribs may function to define separate air channels in the chamber 17 back of the reflector provision is made for securing the joint between the face of the ribs and the back of the reflector which is shown in detail in Fig. 12. The joint may be effectively sealed by means of an asbestos packing strip 34 disposed upon a suitable carrier 35 which may be bolted or otherwise secured to the face of the ribs 33. It is to be understood that the packing 34 functions merely as a seal and does not in any way support or interfere with the normal movements of the reflector.

In this instance, the cooling and ventilating air is discharged from the drum through a plurality of main outlets 36 and 37 positioned at the top of the drum on opposite sides of the center thereof, as shown in Fig. 5. In order to control the volume of air flowing through the drum and consequently the effectiveness of the ventilation thereof, provision is made for varying the effective size of the main outlets 36 and 37 and by means of suitable covers 38 and 39 which may be readily adjusted to change the area of the openings.

It will be readily understood that, in the operation of the ventilators of this kind, the arc produces a large volume of extremely hot gases in addition to a considerable quantity of smoke or soot which may be referred to as the products of combustion. In order that these elements may be effectively removed from the drum without in any way contaminating or raising the temperature of the ventilating and cooling air, provision is made for collecting and discharging them as a separate function of the ventilating system.

In this embodiment of the invention, this function is effected by means of a channel created by means of a hood 41 suspended from the top of the drum in such manner that its mouth 42 is positioned directly above the main opening 24. The hood 41 communicates with a third or auxiliary discharge opening 43 located in the top of the drum, preferably between the main outlets 36 and 37 as shown in Fig. 5. It is apparent that the hood 41 is so located and shaped that the hot gases produced by the arc are effectively collected and moved upwardly by convection to the discharge opening 43.

In order to prevent the leakage of light from the drum and to effectively control the direction of the discharge of the gases, solid matter and air therefrom, the main outlets 36 and 37 and the auxiliary outlet 43 are covered by means of shields 44 and 45, respectively, as shown in Figs. 2 and 6. The shield 45 may be termed a smoke discharge...
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nozzle and is located within the shield 44 for the main outlets. The shield 45 is so shaped and provided with a baffle 46 that it functions as an ejector to facilitate the flow of gases and products of combustion through the hood 41. The main shield 44 is dome shaped and provided with a restricted discharge opening to also cause it to function as an ejector. In addition, the main shield is provided with baffles 47 in order to block off or screen any light rays which may be reflected from the inside surface of the shield. This baffle also functions to direct the smoke and other elements discharged from the drum in an upward direction.

Referring now to Figs. 3 and 4, there is shown a modification of the invention which is generally the same as the embodiment described hereinbefore, except that provision is made for utilizing an ejector or ejectors in the discharge openings at the top of the drum for increasing the velocity and volume of the cooling and ventilating air passing through the drum.

In utilizing ejectors in the top openings of the drum, it has been found advantageous to use a unit such as is shown in Fig. 10 which takes the form of a header 52 provided with a plurality of discharge openings 53 and which is attached to a suitably-shaped body portion 54 which may be positioned within the top opening 43 of the drum. As shown, the two jets 55 on the left-hand side of the header would be positioned within the main outlet 36 and the two jets 52 at the right-hand side of the header in the main outlet 37. The centrally located jet 50 is positioned in the discharge opening for the hood 41. It is apparent that with this device any variation in the arrangement and number of jets may be readily made simply by inserting or removing suitable plugs from the openings 53.

In order to readily provide for operating the ejectors provision is made for utilizing the discharge of the blower 19 by adding an extension 51 to the air duct 25 and connecting it to the header 52 by means of suitable ducts or pipes 55 as shown in Fig. 4.

The relative amounts of air which are supplied to the drum and to the ejectors may be controlled by means of an adjustable valve 56 disposed opposite one of the central opening 24 on the back of the drum. The valve 56 is adjustable in order that any desired volume of air may be caused to flow through the central opening 24.

In this instance, the spray head 51 takes a slightly different form which is shown in detail in Figs. 6 and 7. This spray head is generally similar to that shown in Figs. 8 and 9, except that in this instance the periphery thereof is provided with a plurality of discharge openings 53 which function to discharge the air radially in the form of a plurality of definite streams or jets. It will be apparent, however, that any other suitable spray head may be used.

This construction of the searchlight also makes use of the radial ribs 33 interposed between the reflector and the back of the drum. Likewise, the main and auxiliary outlets at the top of the drum, which are substantially the same as shown in Fig. 5, are also provided with suitable shields and baffles. However, in this instance the main shield 61 is of slightly different shape in order to provide a freer discharge opening and the auxiliary shield 62 is slightly more dome shaped in order to produce a greater ejector action. The baffles 63 and 64 function in substantially the same manner as described hereinbefore.

It will be observed that the main and auxiliary outlets at the top of the drum are located preferably towards the front and near the joint formed by the door and the front edge of the drum. This permits the cooling and ventilating air to circulate throughout the entire interior of the drum and more effectively performs the cooling and ventilating function.

It may be desirable in some instances, although not necessary, to utilize a shield or baffle 65, such as is shown in both Figs. 2 and 4, in order to extend the discharge passage 18 further toward the front of the drum, and thereby preclude any possibility of the incoming air interfering with the proper functioning of the hood. Since the 15 ventilating and cooling system functions in a satisfactory manner without the shield 65 it may be considered as a refinement.

In view of the foregoing, it is apparent that in either of the embodiments of the invention described, provision is made for passing a large volume of cooling and ventilating air through the drum and, in addition, provision is made for directly collecting and discharging the hot gases and products of combustion. This method of ventilating in general, provides for effectively cooling and equalizing the temperatures of the reflector and ensures that a continuous stream of clean cool air is passed through the drum. The effective removal of the hot gases maintains the cooling and ventilating air at a minimum temperature and thereby increases the effectiveness of this air in cooling the sides of the drum, the glass front and the arc mechanism. Consequently, no special provision is necessary for directing the air stream upon the arc head or causing currents of air to flow upwardly across the glass front or over the face of the reflector.

Attention is directed to the fact that the blower 19 is located at the lowest position in order that the incoming air will be of minimum temperature, whereas the discharge openings are located at the top of the drum in the region of the highest temperature.

It may be stated in conclusion that while the illustrated examples constitute practical embodiments of our invention, we do not wish to limit ourselves strictly to the exact details herein illustrated since modifications of the same may be made without departing from the spirit of the invention as defined in the appended claims.

We claim as our invention:

1. In a searchlight, a drum having a central outlet at the top thereof and other outlets on opposite sides of the central outlet, a reflector in the drum spaced from the back thereof and forming a passage between its edge and the sides of the drum, means for introducing a cooling medium into the drum back of the reflector, said cooling medium flowing radially over the back of the reflector through the said passage into the drum proper and out through the outlets on opposite sides of the central outlet, and means for collecting and discharging the hot gases and products of combustion through said central outlet.

2. In a searchlight, a drum having an outlet at the top thereof and additional outlets on opposite sides of the top outlet, a reflector in the drum spaced from the back thereof and forming a passage between its edge and the sides of the drum, means for introducing a cooling medium into the drum back of the reflector, said cooling medium flowing radially over the back of the reflector through the said passage and out.
through the outlets on opposite sides of the top outlet, and a hood device communicating with said top outlet and having an inlet opening adjacent the arc for collecting and discharging the gases and combustion products from the drum.

3. In a searchlight, a drum having an outlet at the top thereof, a reflector in the drum spaced from the back thereof and forming a passage between its edge and the sides of the drum, a motor-operated blower mounted on the back of the drum for blowing air into the drum through a centrally disposed opening in the back thereof, and means interposed between the back of the drum and the reflector forming a plurality of radial channels for directing the incoming air radially over the back surface of the reflector and through the said passage into the drum proper to be discharged through said outlet.

4. In an arc searchlight, a drum having an auxiliary outlet at the top thereof and main outlets on opposite sides of the auxiliary outlet, a reflector in the drum spaced from the back thereof, a passage between its edge and the sides of the drum, means for forcing air into the drum through a centrally disposed opening in the back thereof, means interposed between the back of the drum and the reflector for directing the incoming air radially over the back surface of the reflector and through the said passage into the drum, a shield over the auxiliary outlet to direct the air discharge in a predetermined direction, and means for varying the size of the auxiliary outlet to control the volume of air passing over the back of the reflector and through the drum.

5. In an arc searchlight, a drum having a plurality of air outlets at the top and a central air inlet in the back thereof, a reflector mounted in the drum in spaced relation to the back and side walls thereof, means for introducing air into the drum back of the reflector through the central air inlet, a shield over the air outlets to direct the air discharge in a predetermined direction, and means for varying the size of the air outlets to control the volume of air passing over the back of the reflector and through the drum.

6. In an arc searchlight, a drum having a centrally located air inlet in the back thereof and an air outlet at the top thereof, a reflector mounted in said drum in spaced relation to the back and side walls thereof to provide a chamber between said reflector and the back of the drum and an outlet around the periphery of the reflector whereby cooling air may flow through the drum from the inlet to the outlet, blower means for introducing air through said inlet in the back of the drum, and manually adjustable means for varying the size of the air outlet at the top of the drum to control the volume of air passing over the back of the reflector and through the drum.

7. In an arc searchlight, a drum having a central inlet in the back thereof and an outlet at the top thereof, a reflector mounted in said drum in spaced relation to the back and side walls thereof to provide a chamber between said reflector and the back of the drum and an annular outlet around the periphery of the reflector whereby cooling air may flow through the drum and over the back of the reflector, means for blowing air through said inlet at the back of the drum, adjustable means for varying the size of the outlet at the top of the drum to control the volume of air passing through the drum, a second outlet at the top of the drum, and ejector means operated by the blower means for collecting and discharging the hot gases produced by the arc through said second outlet.

8. In an arc searchlight, a drum having a central opening in the back and a plurality of openings at the top thereof, a reflector in said drum spaced from the back and side walls of the drum, means in the drum for producing an arc, blower means for forcing air into the drum through the opening in the back thereof and over the back of the reflector and out one of the top openings, and means for collecting and discharging from the drum through another of the top openings the hot gases and products of combustion produced by the arc.

9. In a searchlight, a drum having a central opening in the back and a plurality of openings at the top thereof, a reflector in said drum spaced from the back and side walls of the drum, means in the drum for producing an arc, means for blowing air into the drum through the opening in the back thereof and over the back of the reflector and out one of the top openings, and means for collecting and discharging from the drum through another of the top openings the hot gases and products of combustion produced by the arc.

10. In a searchlight, a drum having an auxiliary outlet at the top thereof and main outlets on opposite sides of the auxiliary outlet, a reflector in the drum spaced from the back thereof, a passage between its edge and the sides of the drum, means for forcing air into the drum through a centrally disposed opening in the back thereof, means interposed between the back of the drum and the reflector for directing the incoming air radially over the back surface of the reflector and through the said passage into the drum, a reflector means formed from a position adjacent the arc to the auxiliary outlet at the top of the drum to discharge the dirt, smoke and gases produced by the arc.

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11. In a searchlight, a drum, a reflector mounted within said drum and spaced from the back and side walls thereof, a plurality of openings at the top of the drum, means for forming a passage between said drum and the reflector for introducing air into the drum through a central opening in the back of the drum, blower means for introducing air into the drum through the opening at the top of the drum and ejector means operated by the blower means for discharging air from the drum.

12. In a searchlight, a drum, a reflector in said drum and spaced from the back thereof, a central opening in the back of the drum, blower means for introducing air into the drum back of the reflector through the central opening, an outlet opening at the top of the drum, and ejector means actuated by air from the said blower means for exhausting air through said outlet opening.

13. In a searchlight, a drum, a reflector in said drum and spaced from the back and side walls thereof, blower means mounted on the back of the drum for introducing air into the drum through a central opening back of the reflector, means for directing the air radially over the back of the reflector, a discharge opening at the top of the drum, and ejector means operated by air delivered by the blower means for exhausting air through the discharge opening.

14. In a searchlight, a drum having an opening centrally located in the back thereof, a reflector in the drum spaced from the back and side walls of the drum, means for introducing air into the drum through the opening in the back of the drum, and a plurality of radially disposed ribs interposed be-
tween the reflector and the back of the drum for directing the air flow over the back of the reflector into the drum proper.

15. In a searchlight, a drum having an opening centrally located in the back thereof, a reflector in the drum spaced from the back and side walls of the drum, blower means for forcing air through said centrally located opening into the drum back of the reflector, means positioned over the discharge opening of the blower means for discharging the incoming air radially over the back of the reflector and a plurality of radially disposed ribs interposed between the reflector for directing the air discharge.

16. In a searchlight, a drum having a discharge opening, a reflector mounted in said drum and spaced from the back and side walls thereof, blower means for blowing air into the drum back of the reflector, means for guiding the air radially over the back of the reflector, and manually adjustable means for varying the size of the discharge opening to control the volume of air passing through the drum.

17. In an arc searchlight, a drum, a reflector in said drum spaced from the back and side walls thereof, means for blowing air into the drum over the back of the reflector, and means formed integral with the back of the drum for directing the incoming air in a plurality of channels radially over the back of the reflector into the space in front of the reflector.