June 30, 1959 E. E. INGRAHAM 2,892,994

AIRPORT LIGHTING

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Fig. 1.

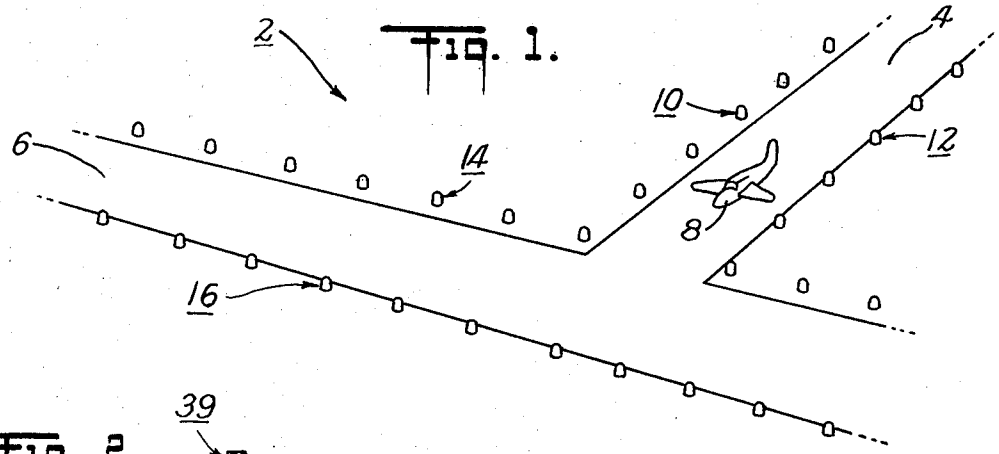


Fig. 2.

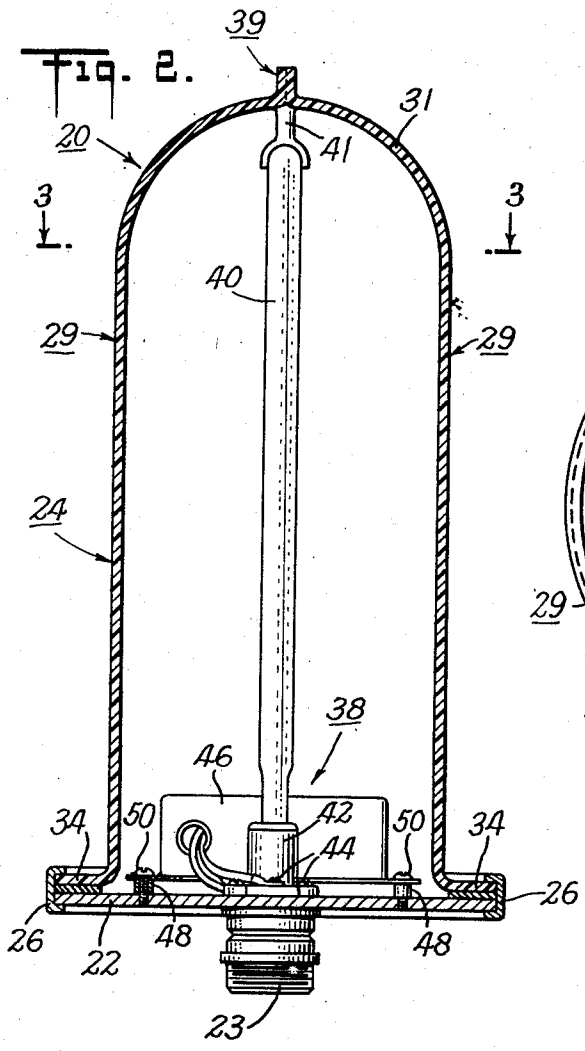
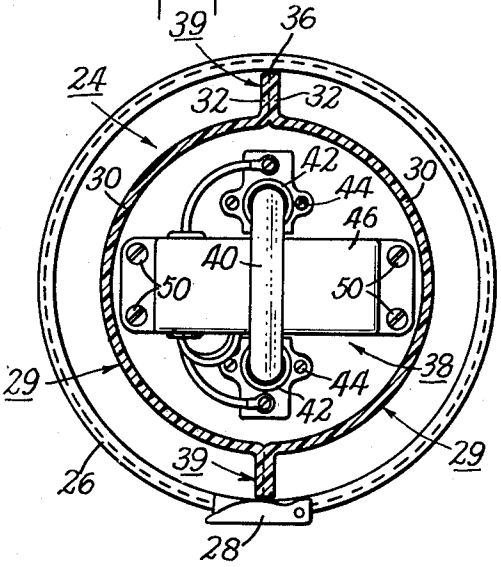


Fig. 3.



INVENTOR

Edward E. Ingraham

BY

Curtis Morris & Safford

ATTORNEYS

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AIRPORT LIGHTING

Edward E. Ingraham, Westbury, N.Y.

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2 Claims. (Cl. 340—26)

This invention relates to airport lighting, and more in particular to the lighting of the taxiways in airports in an efficient and dependable manner.

An object of this invention is to provide an improved lighting system for airports. Another object is to provide an improved light arrangement for taxiways or the like. A further object is to provide an improved airport light. A still further object is to provide an improved lighting construction. A further object is to provide aids to the pilots of aircraft and to the navigational and control personnel of aircraft and airports. These and other objects will be in part obvious, and in part pointed out below.

In the drawing:

Figure 1 is a perspective view of an airport taxiway constituting one embodiment of the invention;

Figure 2 is a side elevation of one of the lights of Figure 1 with parts broken away; and,

Figure 3 is a sectional view on the line 3—3 of Figure 2.

In airport lighting, a great deal of difficulty has been encountered because of the necessity for maximum visibility, particularly when fog conditions exist. Another difficulty has been to provide proper lighting without blinding the pilots who are landing or taking off. The high intensity lights which have been used are quite objectionable at times because they blind the pilot when he looks at them directly. Furthermore, high intensity lights, such as those which have been used as taxiway lighting and the like, appear to the observer as single-point light sources. Therefore, the observer has difficulty in judging the distance which he is from any particular light of this type. What is perhaps more serious, is that a person observing two rows of these prior lights along a taxiway may fail to get any clear concept as to the horizontal plane of the taxiway, or even the distance which the rows of lights are from him: and, the observer may get an entirely erroneous concept of that horizontal plane or the relative distances. The failure to get the proper concept of the taxiways and their relative locations may prove to be a very serious handicap to pilots in planes or to the control personnel at the edge of the field or in an adjacent control tower. In fact, it may be that a very hazardous condition will be created because of some misconception on the part of one or more of the personnel.

Lighting devices may be arranged to be turned during operation, for example by remote control, so as to provide light where needed by a particular plane, and this may avoid certain of the above objections, but the initial cost of such systems is very high, and they are expensive to operate and maintain. Other arrangements which have been proposed have not been satisfactory. It is an object of this invention to provide a lighting system for airports which avoids the many difficulties which have been encountered with prior systems and arrangements.

In accordance with the present invention, a lighting system is provided for airports which is formed by a

number of large lighting units, each of which produces considerable light, but the light emanates from a large area rather than from a small or "single-point" type of source. Such lighting units may be viewed directly without blinding and, in fact, without interference with proper vision in any way. At the same time, the taxiways of the airport are thoroughly lighted and marked so that the pilots and other personnel have no difficulty in determining the exact location, relative distance away, horizontal plane, and other limitations as to each taxiway.

As indicated above, the prior type of lights with a single-point light source give substantially the same appearance regardless of the distance to it. That is, the pilot or other observer of a taxiway with the prior type of lights, cannot gauge how far he is from the taxiway lights because each of them is substantially a point-light source. In accordance with the present invention, the light source has sufficient size and shape to permit the pilot or other observer to gauge accurately his distance from each lighting unit. The determination of the distance from a light, and the exact location of a taxiway lighted in accordance with the present invention is sensed automatically, even under adverse conditions, and the observer immediately gets a clear concept of the location of the taxiway and of any aircraft on or near it.

Referring to Figure 1 of the drawings, a portion of an airport 2 is represented as having two taxiways 4 and 6, and an airplane 8 is represented as taxiing from one taxiway to the other. Taxiway 4 has two rows of lights 10 and 12, and taxiway 6 has two similar rows of lights 14 and 16.

Each of the lights in the four rows indicated in Figure 1 is of the type shown in detail in Figures 2 and 3, and indicated at 20. This light has a base 22 and a dome 24 which is clamped to the base by a C-type barrel clamp 26. Clamp 26 is circular, with its ends interconnected by a clamping buckle 28. Clamping buckle 28 may be swung to disconnect the ends of the clamp so that the clamp may be removed. The light is mounted upon a frangible coupling 23 rigidly attached to base 22 and threaded into an anchor construction not shown. Dome 24 is formed of acrylic plastic, illustratively "Plexiglas," and is manufactured by first producing two identical half domes 30, each having a semi-cylindrical main body portion 29, and a half-dome top end portion 31. Each half dome 30 also has a side flange 32 and a bottom flange 34. The two half domes are then fitted together, as shown in Figure 3, and the side flanges 32 are fused together at 36. These side flanges, therefore, cooperate to form an inverted U-shaped reinforced rim 39 (Figure 2) extending along the cylindrical portion formed by portions 29 of the two half domes and also around the top of the hemispherical portion formed by the portions 31. The complete dome also has a continuous base rim formed by the flanges 34, and this base rim is clamped to base 22 by the clamp 26, as discussed above.

Mounted within dome 20 upon base 22 is the light unit 38 comprising a cold-cathode, hairpin tube lamp 40 positioned at the top by a plastic bracket 41 fused to the dome and mounted at its ends in a pair of sockets 42 which provide electrical connections with the lamp terminals. Sockets 42 are rigidly mounted on base 22 by screws 44. Also mounted on base 22 and extending between the sockets is a lamp ballast 46 which is supported on collars 48 and is clamped by screws 50.

Lamp 40 runs parallel to rim 39 so that it tends to create a zone of maximum lighting at the sides of this rim throughout the length thereof. The lamp is mounted at the side of the taxiway with the plane of rim 39 transverse of the taxiway. The zones of maximum il-

lumination, therefore, are presented longitudinally of the taxiway so that the light can be seen in both directions along the taxiway. It has been pointed out above that the light constitutes a light source which is in the nature of a lighted, vertically-extending area rather than a point source. Hence, when an actual installation of two rows of lights is observed from one end of a taxiway, the lights appear of progressively diminishing height somewhat like the fence posts along the side of a straight, level highway. Even if observed at the side of the taxiway and at some considerable distance, the two rows of these lights give an accurate concept of the exact location and plane of the taxiway. Therefore, if a person in a control tower sees an aircraft moving along a taxiway as in Figure 1, he can readily determine whether or not danger exists because of some other aircraft on another taxiway or in the air moving in a different direction. The pilot and other personnel can also determine readily the distance that any aircraft is from the end of the taxiway, and thereby judge whether or not the aircraft has sufficient distance to stop or to become airborne without danger.

In the illustrative embodiment, the dome **20** is of blue plastic so as to provide the proper light markers or guides. Under some circumstances, domes of other colors may be provided. For example, one half may be red and the other half green, or one half may be amber and the other half white. Certain of the domes are given special colors to identify individual taxiways. This is superior to merely numbering the taxiways because particular colors can be recognized from a great distance.

In this particular embodiment, dome **20** has a vertical height of the order of 24", and its outside diameter is 10". The bracket **41** is inverted U-shaped and of a clear plastic. It is adapted to snugly receive the upper end of the tube lamp so as to insure against being dislodged by movement of the light. The reinforcing rim **39** is tapered slightly from a maximum width at the base to a slightly lesser width at the top. The clamp **26** is slotted at the base of each side of rim **39** so that the rim fits into a slot of such width to permit the clamp to be tightened. Under some circumstances, a portion of the rim may be cut away to avoid slotting the clamp.

As various embodiments may be made of the above invention and as changes might be made in the embodiments above set forth, it is to be understood that all

matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In airplane landing facilities having taxiways which are positioned in a horizontal plane to provide for the landing of aircraft, a plurality of taxiway lights positioned along the opposite side edges of each taxiway in substantially equally-spaced relationship so as to outline the taxiway to the pilot of an incoming plane, each of said lights including a base plate which provides a mounting for the light and a dome of translucent material which has a substantially cylindrical vertical wall which projects vertically a distance of the order of two to two and one-half times its diameter, each of said lights also including means constituting a vertically elongated light source extending axially of said dome and providing substantially uniform light transmission from the entire surface of said dome whereby each of said lights has a recognizable vertical dimension and relative size which permits the pilot of an incoming plane to recognize and fully comprehend the exact position and relative inclination of the taxiway with respect to his plane and its direction of movement.

2. Aircraft landing facilities as described in claim 1, wherein said dome of each of said lights has a vertical height of the order of twenty-four inches and a diameter of the order of ten inches, and wherein said means constituting the source of light in each of said lights is an elongated tubular light element.

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