United States Patent

[11] **3,578,965**

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[54] **FOLDABLE LUMINAIRE**
8 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **240/36,** 240/1.3, 240/3, 240/41.35, 240/41.36, 240/103
[51] **Int. Cl.** **F21v 7/18**
[50] **Field of Search** ..... 240/3.1, 6.4, 10.5, 36, 46.27, 41.35, 41.36, 103, 103 (A), 46.09, 44.1, 44, 3, 41.1, 1.3

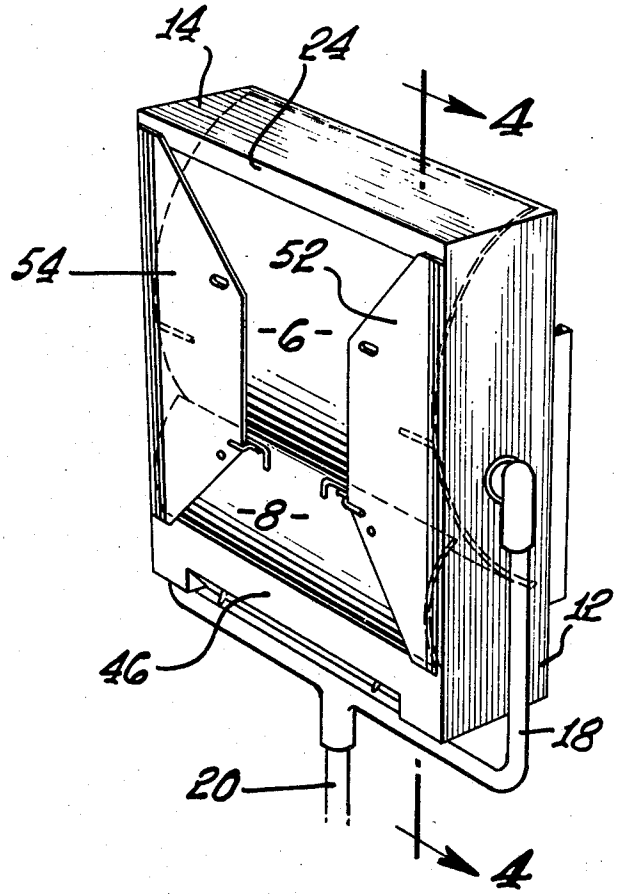
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Assistant Examiner—T. A. Mauro
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ABSTRACT: The reflector part of the luminaire is made in sections hinged to the main housing. Each section is foldable from a first extended operative position in which the sections project rearwardly away from the reflector opening to a second position in which all of the sections are located close to the plane of the opening of the reflector.



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FIG. 2.

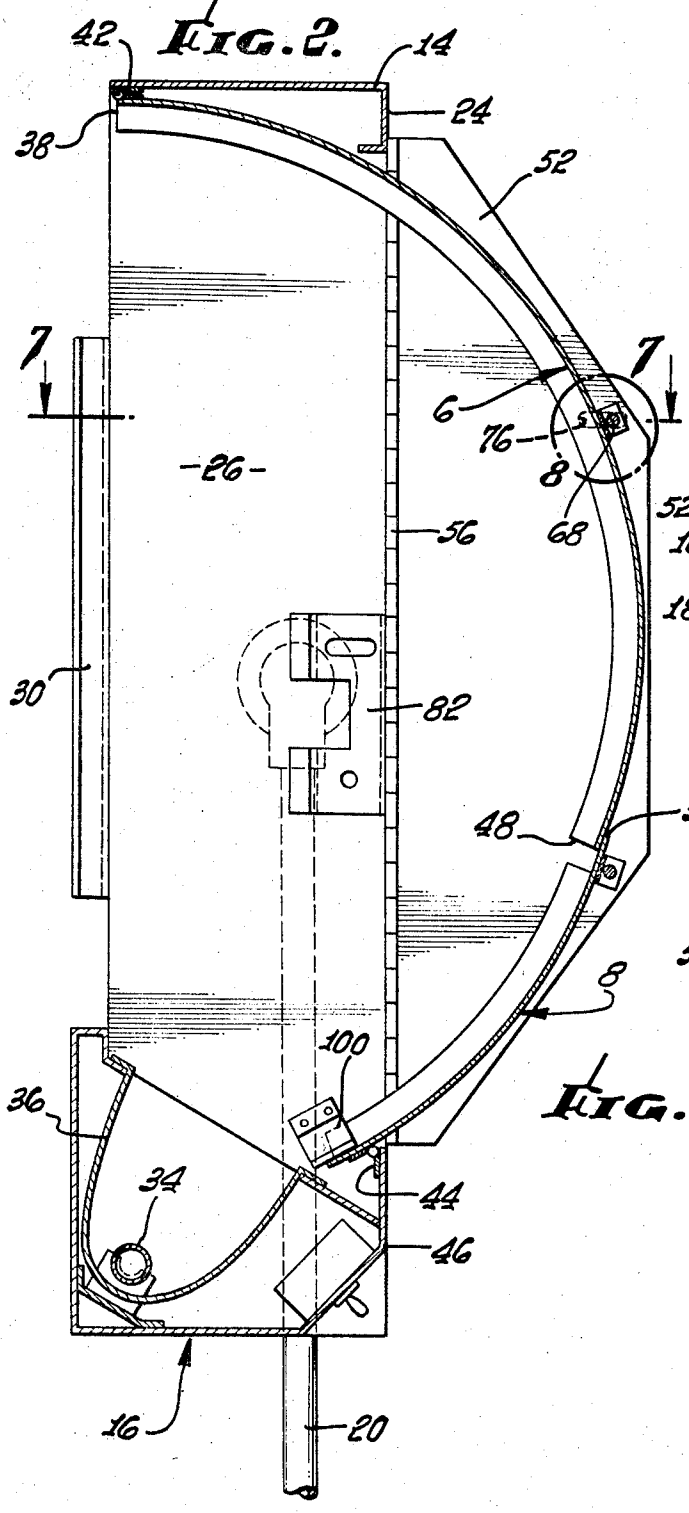


FIG. 1.

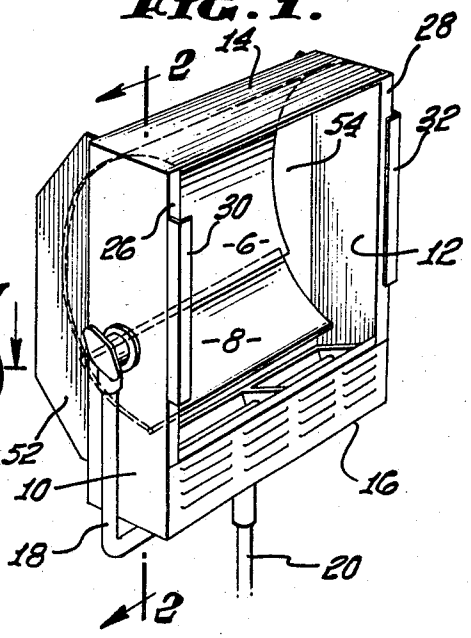
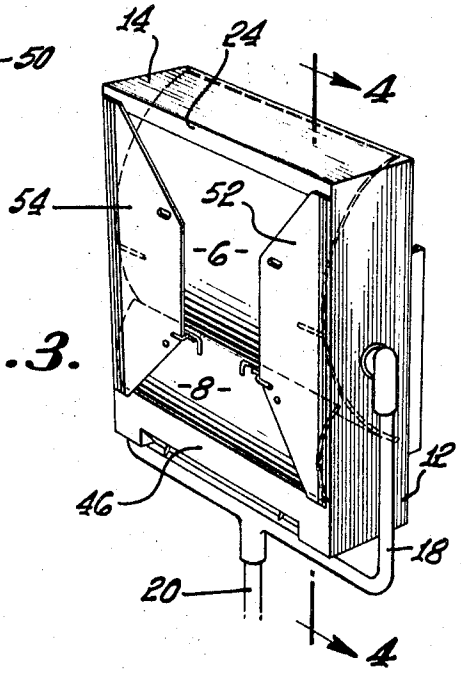


FIG. 3.



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FIG. 4.

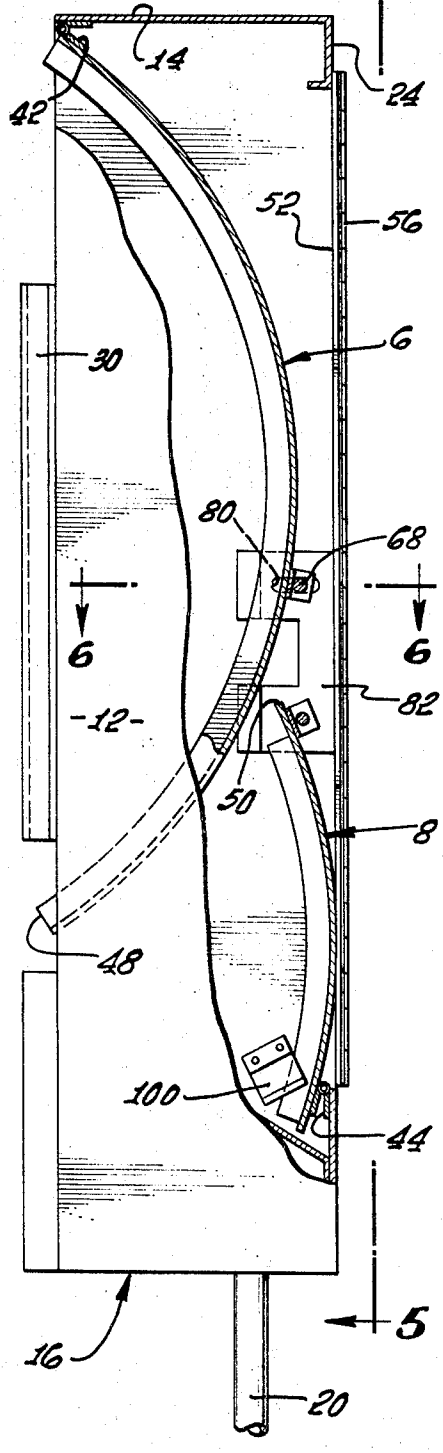
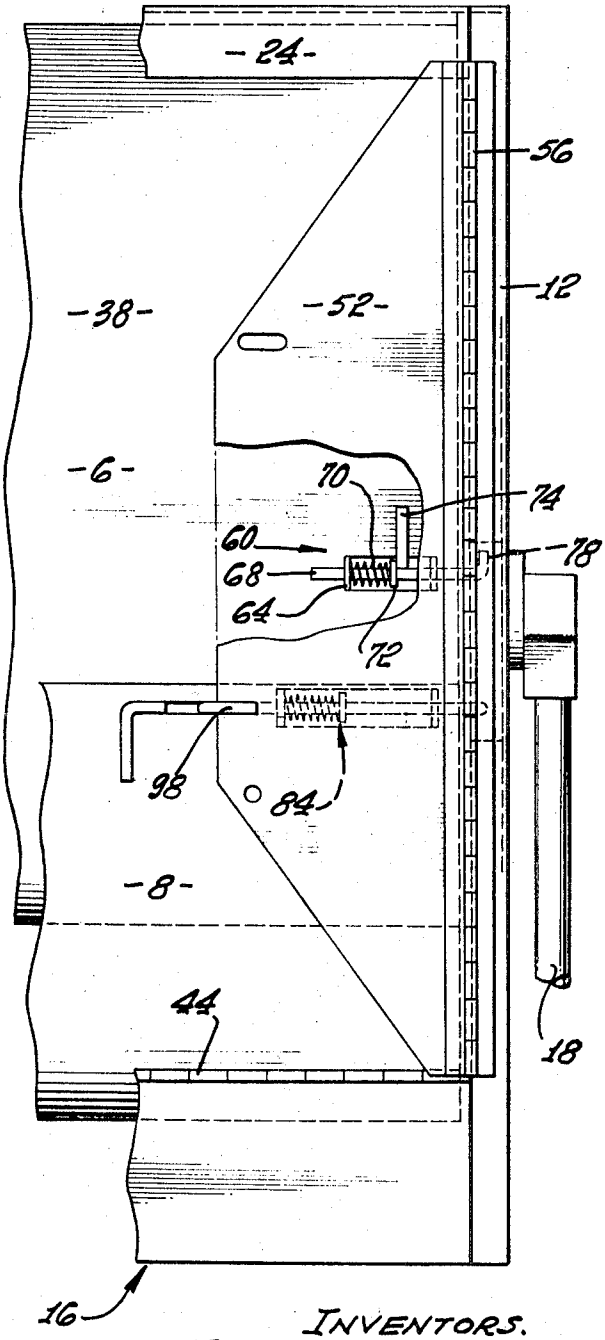


FIG. 5.



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FIG. 6.

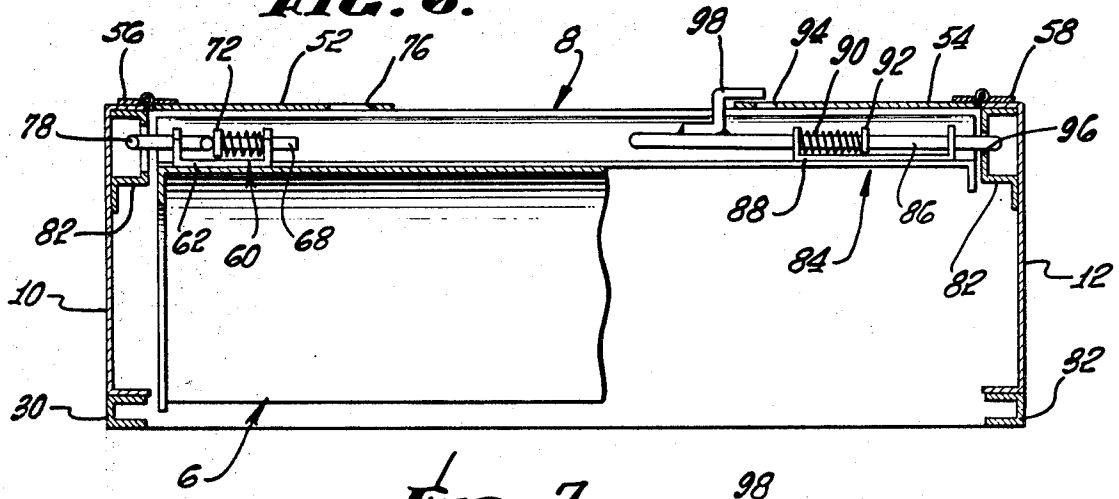


FIG. 7.

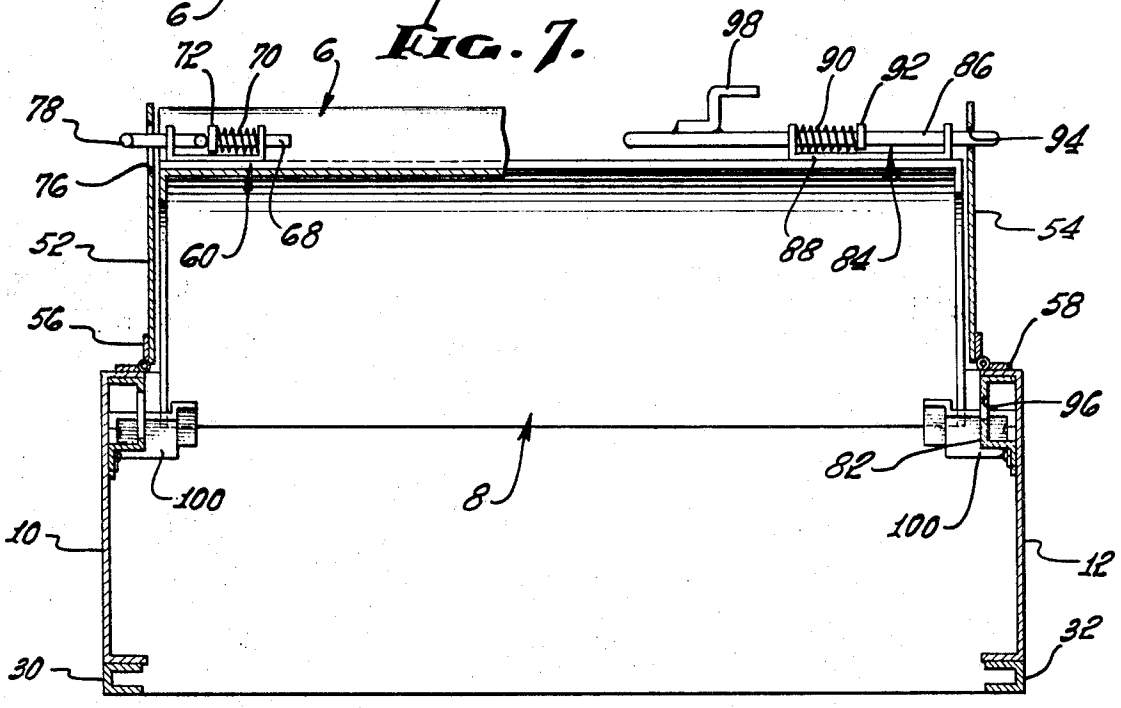
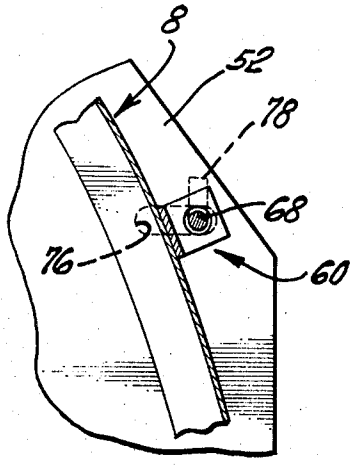


FIG. 8.



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FOLDABLE LUMINAIRE

BACKGROUND OF THE INVENTION

This invention relates to a luminaire intended primarily for use in a television or motion picture studio. Seemingly an infinite variety and infinite number of luminaires must be available for all contingencies. The penalty for lighting capacity and versatility is inadequate storage space. Transporting lighting equipment from remote storage is not an acceptable solution. The need for compact studio lighting equipment gas been long felt.

Certain equipment, such as high-intensity spots of floods, have been made more compact of late by the recently popularized quartz-iodine lamps. Other equipment, for example, equipment designed to produce a "soft" light, necessarily requires a very large reflector in conjunction with an indirect light source in order to avoid harsh shadows or lighting contrasts These soft lights accordingly are bulky.

The primary object of this invention is to provide a knockdown or foldable luminaire so that its storage size is about halved while the time necessary for setting it up is virtually nil. At the same time, a small size is not unwelcome when the need for shipment arises.

SUMMARY OF INVENTION

For these purposes, we provide an arrangement in which the reflector, instead of being a one-piece device, is made in sections. Each section is hingedly connected to the housing to move from a compact folded position to an extended position in which the sections complement each other to form an operative reflector. Simple latch mechanisms positively secure all of the movable reflector elements both in the open operative position and in the closed position.

BRIEF DESCRIPTION OF THE DRAWINGS

A detailed description of the invention will be made with reference to the accompanying drawings. These drawings, unless described as diagrammatic or unless otherwise indicated, are to scale. The description of the invention is of the best presently contemplated mode of carrying out the invention. This description is not to be taken in a limiting sense but is made merely for the purpose of illustrating the general principles of the invention.

FIG. 1 is a front pictorial view of luminaire incorporating the present invention, the reflector elements being shown in operative position.

FIG. 2 is an enlarged vertical sectional view of the luminaire taken along a plane corresponding to line 2–2 of FIG. 1.

FIG. 3 is a rear pictorial view similar to FIG. 1 but showing the reflector elements in closed position.

FIG. 4 is an enlarged sectional view similar to FIG. 2, taken along a plane corresponding to line 4–4 of FIG. 3, and showing the reflector elements in closed or folded position.

FIG. 5 is a fragmentary rear elevational view taken along a plane indicated by line 5–5 of FIG. 4.

FIG. 6 is a horizontal sectional view taken on an offset plane indicated by line 6–6 of FIG. 2 to shown one of the top latch structure at the left-hand side and one of the bottom latch structure at the right-hand side.

FIG. 7 is a horizontal sectional view similar to FIG. 6, taken along an offset plane corresponding to line 7–7 of FIG. 2 to show one of the top latch structures at the left-hand side and one of the bottom latch structures at the right-hand side.

FIG. 8 is an enlarge detail view of the area indicated by the numeral 8 in FIG. 2.

DETAILED DESCRIPTION

Two large elements 6 and 8 together define, in their operative position, a generally semicylindrical reflector with its axis horizontal. These and companion end elements of the reflector are supported by a shallow rectangular housing. The inner surfaces of the elements 6 and 8 may be finished in any suitable manner to provide the desired reflecting characteristics.

The housing is formed primarily by sheet metal sidewall members 10 and 12 joined to sheet metal top and bottom members 14 and 16. Suitable bearing brackets on the outside of the sidewall members cooperate with a yoke 18 whereby the housing may be angularly moved about a horizontal axis. The yoke 18 in turn is mounted on a standard 20.

The bottom frame member 16 is a generally U-shaped, upwardly opening channel. The side frame members 10 and 12 are in the form of shallow channels (FIGS. 6 and 7). The top frame member 14 is an L-shaped bracket having a flange 24 (FIGS. 2 and 3) that extends downwardly along the rear of the housing. Front walls of flanges 26 and 28 of the side frame member (FIG. 1) carry channel brackets 30 and 32 that slidably accommodate scrims, filters or the like.

In the present instance, the luminaire is designed to provide a "soft" light. This is achieved by directing light rearwardly against the reflector elements 6 and 8 from a source shielded from the field intended to be illuminated. For this purpose, high-intensity lamps 34 are mounted in the lower channel 16 by suitable bracket structures. Small parabolic reflectors 36 define a radiation pattern directed upwardly and rearwardly of the reflector housing to be intercepted by the reflector elements 6 and 8. The elements 6 and 8 redirect the radiation pattern forwardly through the rectangular opening defined by the luminaire housing.

The top edge 38 of the upper reflector element 6 is mounted to swing along an axis located at the front edge of the top housing member 14. For this purpose, a hinge 42 is provided. The lower end of the lower reflector element 8 is mounted to swing along the upper edge of the rear wall 46 of the channel 16. The distal edges 48 and 50 of the reflector elements overlap near the center of the reflector when the elements 6 and 8 are swung rearwardly to operative position of FIG. 2. The reflector elements 6 and 8 may be folded inwardly to the position of FIG. 4 just forwardly of the rear edges of the frame members 10, 12, 14 and 16.

The ends of the semicylindrical reflector elements 6 and 8 when in operative position are closed in part by the sidewalls 10 and 12. Flaps 52 and 54 form rearward extensions of the sidewalls and complete the lateral enclosure. These flaps are attached along the rear edges of the side frame members 10 and 12 by hinges 56 and 58 (FIGS. 4, 5 and 6). The flaps and sidewalls form elements of the reflector, functioning in this instance to confine the reflector aperture to the frontal opening of the housing.

When the main curved reflector elements 6 and 8 are positioned inwardly as shown in FIG. 4, the flaps 52 and 54 can be folded over as shown in FIGS. 3, 5 and 6 to provide a compact arrangement in which no part projects rearwardly of the housing provided by the frame members. Suitable latch mechanisms and stopes serve releasably to hold the reflector elements 6, 8, 52 and 54 both in the open position of FIGS. 1 and 2 and the closed position of FIGS. 3 and 4.

For this purpose, two similar sliding latches are mounted respectively at the sides of the top reflector element 6 and two similar sliding latch elements are mounted respectively at the sides of the bottom reflector element 8. One of the top latch assemblies 60 is shown in FIGS. 5, 6 and 7. It includes a clevis 62 attached to the rear of the element 6. Ears 64 and 66 of the clevis slidably mount a latch bar 68. A compression spring 70 surrounds the bar 68 and is located between one of the ears 64 and an intermediate stop collar 72 carried by the latch bar. The spring 70 urges the latch bar in a direction outwardly past the side edge of the reflector element 6. A finger piece 74 projects laterally from the latch bar 68 and serves as a means for operating the latch. In the open position, the projecting end of the latch bar 68 cooperates with an elongated slot 76 in the flap 52 (FIGS. 2 and 7) and accordingly comes to rest on the lower horizontal edge of the slot. A hook end 78 of the latch bar interlocks the flap 52 to hold it against the side edge of the reflector element 6. The latch bar is moved angularly to position the hook end in and out of alignment with the slot 76.

In the folded position, the latch bar 68 (FIGS. 4 and 6) cooperates with an elongated slot 80 in a bracket 82 attached

to the inside of the channel provided by the side frame member. The companion latch structure for the upper reflector element operates in a similar manner.

The latch structures for the lower reflector element **8** are generally similar. However, these latch structures serve to hold the flaps in closed position whereas the latch structures carried by the top reflector element **6** hold the flaps in open position. One of the lower latch structures **84** is shown in FIGS. **4**, **5**, **6** and **7**.

The latch structure **84** includes a latch bar **86** (FIGS. **6** and **7**) mounted by a clevis **88** attached to the rear of the reflector element **8** near its side edge. A coil spring **90** engages an abutment **92** on the latch bar and projects the latch bar outwardly so that one end engages a circular opening **94** in the corresponding flap **54** in the open position of FIG. **7**. In the closed position, this end of the latch bar engages a circular opening **96** in the lower portion of the bracket **82** (FIG. **6**).

The other end of the latch bar **80** projects a substantial distance beyond the clevis **88**. This end mounts a hook **98** that serves as a handle for retracting the latch bar and, additionally, as a means for holding the flap in the closed position of FIG. **6**.

The lower edge of the lower reflector element **8** projects beyond the hinge **44** and into the channel **16**. This projecting part moves to engage stops **100** carried by opposite side members. By so stopping the movement of the lower reflector element **8**, its upper edge **50** never moves out of the circle described by the lower edge **48** of the upper reflector element **6**. Accordingly, the lower reflector element **8** forms a stop for the upper reflector element and there is thus no possibility of the parts being moved too far rearwardly which might cause damage or improper latch alignment.

The latch mechanisms are easily operated. All of the components are firmly latched in position, both in the closed and open positions. In the closed position, the luminaire is exceedingly compact.

We claim:

1. In a luminaire for studio lighting or the like:

a. a shallow housing defining a frontal reflector opening and a rear opening;

b. a plurality of individual reflector elements;

c. means movably mounting each reflector element on the housing to permit the element to project beyond said rear opening and to a retracted position in which the element does not project beyond said rear opening;

d. said reflector elements when projected rearwardly together providing a reflector, and said reflector elements when retracted being in overlapped relationship;

e. means mounting a source of illumination in the housing laterally beyond said housing opening to be shielded from the field to be illuminated;

f. means directing the illumination of said source to the composite reflector formed by said reflector elements when said elements are in their rearward projected position; and

g. latch means for holding said reflector elements in projected and retracted positions.

2. The luminaire as set forth in claim **1** in which said housing is substantially rectangular, there being a channel along one side of the housing in which said source mounting means is located; a first reflector element having an edge extending along the side of the rear housing opening at said channel and pivoted thereto; a second reflector element having an edge extending along the side of said housing opposite said channel and pivoted thereto; the distal edges of said first and second reflector elements overlapping when in retracted position.

3. The luminaire as set forth in claim **2** in which third and fourth reflector elements have edges respectively extending along edges of the rear opening at opposite ends of said channel, and forming flaps overlying said first and second reflector elements when said elements are in retracted position.

4. The luminaire as set forth in claim **3** in which said latch means comprises first latch bar means carried on the rear of said first reflector element and cooperable with aperture means of the flaps and with aperture means in the housing for holding said first reflector element in projected and retracted position; second latch bar means carried on the rear of said second reflector element and cooperable with aperture means of the flaps and with aperture means in the housing for holding said second reflector element in projected and retracted position; one of said latch bar means having hook means for holding said flaps in projected position; the other of said latch bar means having hook means for holding said flaps in retracted position.

5. The combination as set forth in claim **4** together with stop means for limiting projecting movement either of the first or second reflector element whereby its distal edge remains in the path of projecting movement of the companion reflector element to form a stop therefor.

6. In a luminaire for studio lighting or the like:

a. top, bottom and side frame members connected together to form a shallow generally rectangular housing with a front opening and a rear opening;

b. said bottom frame member comprising a channel opening inwardly of said housing;

c. bracket means for mounting lamps in said channel to be shielded laterally of said opening;

d. a first curved reflector element having a straight edge extending along the rear wall of said channel;

e. hinge means pivotally connecting said first reflector element to said rear wall of said channel so that said first reflector element is swingable from a retracted position in which said first reflector element is entirely within said housing to a second position in which at least part of said first reflector element projects rearwardly of said housing;

f. a second curved reflector element having a straight edge extending along the front edge of the top frame member;

g. hinge means pivotally connecting said second reflector element to said front edge of said top frame member so that said second reflector element is swingable from a retracted position in which said second reflector element is entirely within said housing to a second position in which part of said first reflector element projects rearwardly of said housing;

h. a pair of substantially flat third and fourth reflector elements hingedly connected respectively along the rear edge of the side frame members for swinging movement from a retracted position in which said flaps overlie said first and second reflector elements with said third and fourth reflector elements extending substantially in the plane of the rear opening of said housing, to a projected position in which said flaps extending along the corresponding side edges of said first and second reflector elements when said first and second reflector elements are projected; and

i. means for determining the projected positions of said reflector elements whereby said reflector elements together form an operative unit directing illumination through said front opening of said housing.

7. The luminaire as set forth in claim **6** together with a first pair of latch bars carried by said first reflector element at the rear surface thereof, and mounted respectively to project beyond the side edge of said first reflector element; there being latching apertures in said flaps and latching apertures in said housing to hold said first reflector element in projected and retracted positions respectively; a second pair of latch bars carried by said second reflector element at the rear surface thereof, and mounted respectively to project beyond the side edges of said second reflector element; there being latching apertures in said flaps and latching apertures in said housing to hold said second reflector element in projected and retracted positions respectively; one or more of said latch bars having hook means for securing said third and fourth reflector elements in projected and retracted positions.

8. The luminaire as set forth in claim **7** together with stop means limiting the projecting movement of said first and second reflector elements.