

Jan. 31, 1967

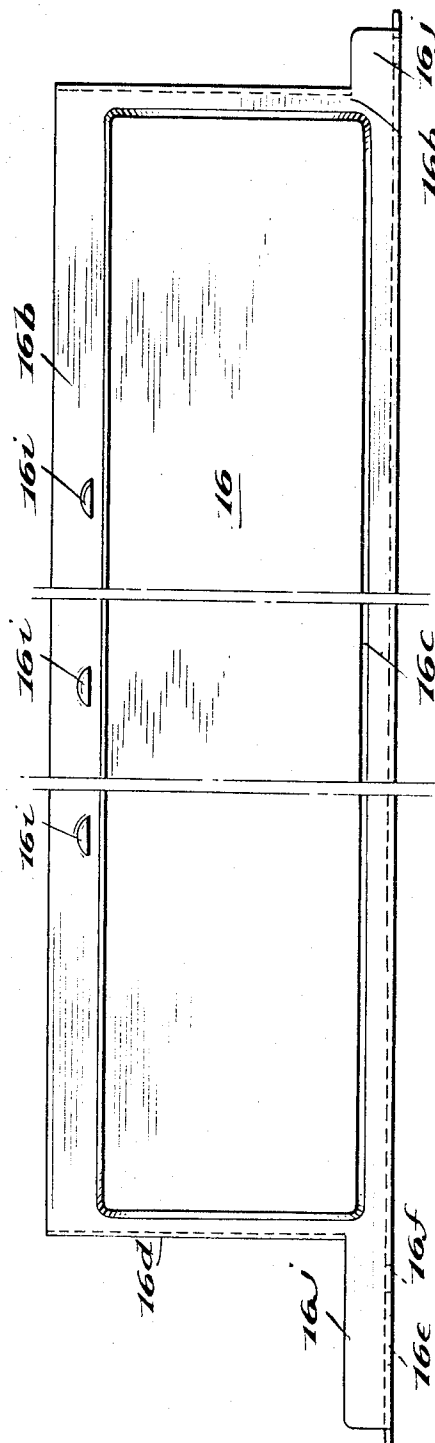
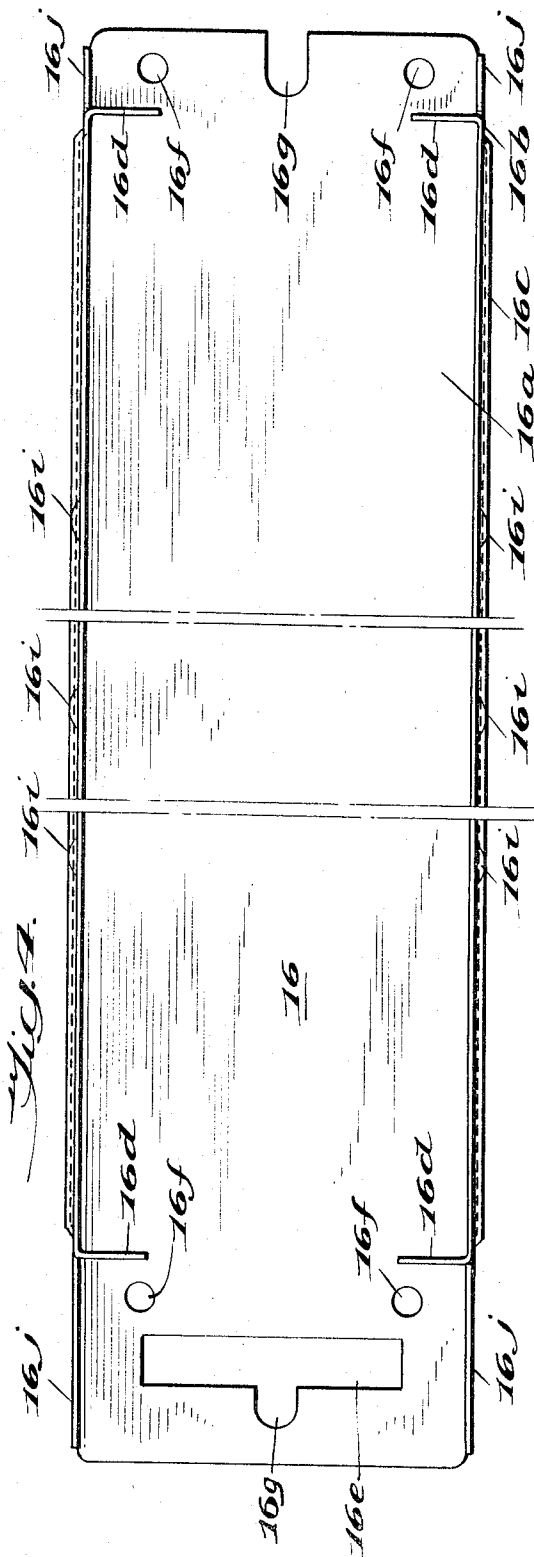
R. E. HANSON ET AL

3,302,017

LUMINAIRE BALLAST HOUSING

Original Filed Aug. 30, 1963

4 Sheets-Sheet 2



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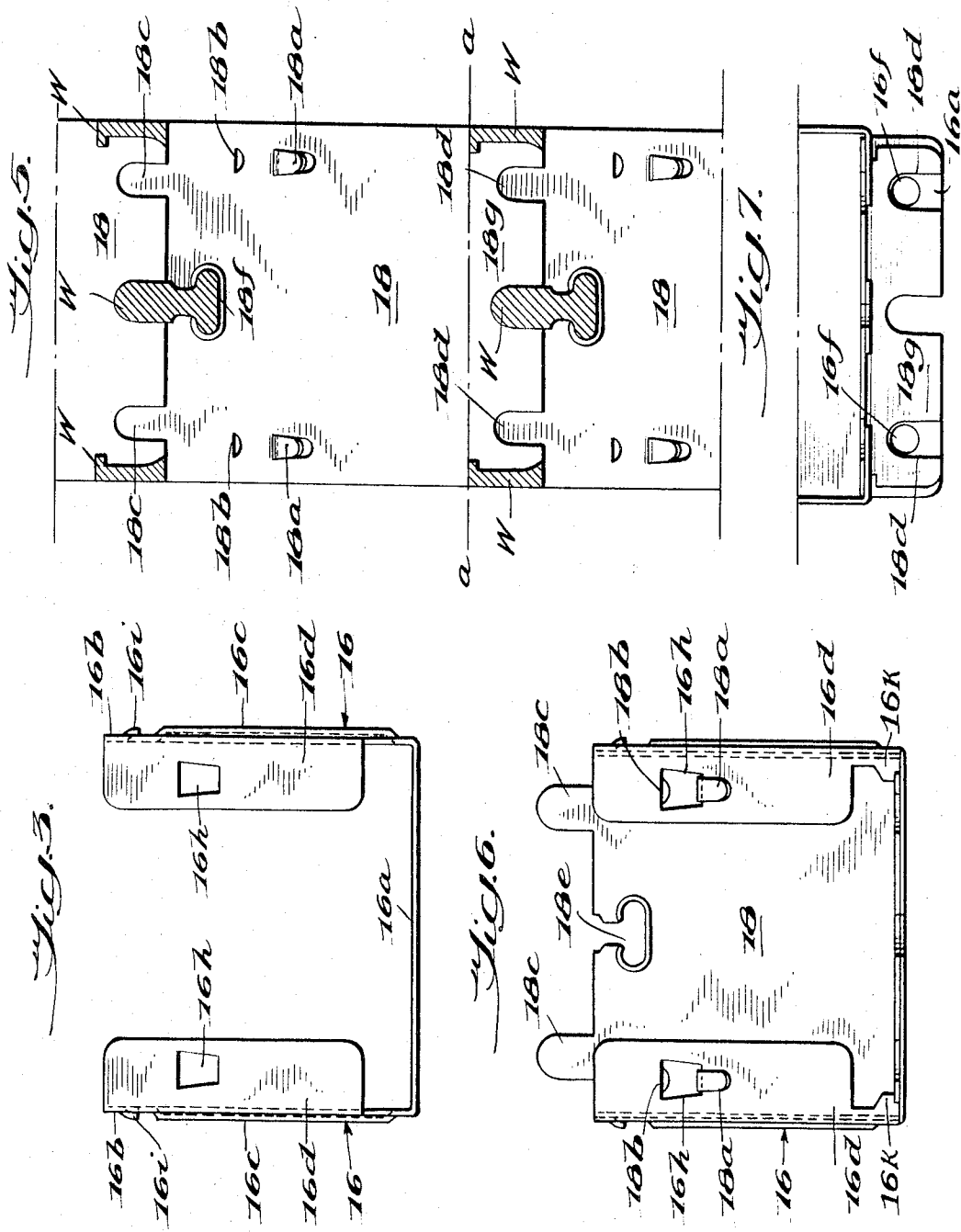
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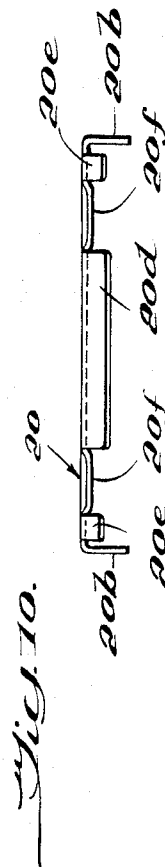
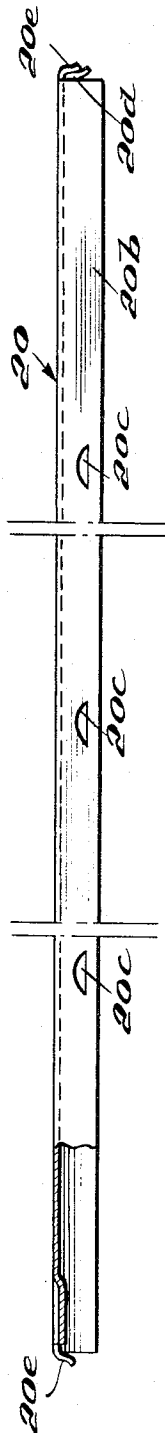
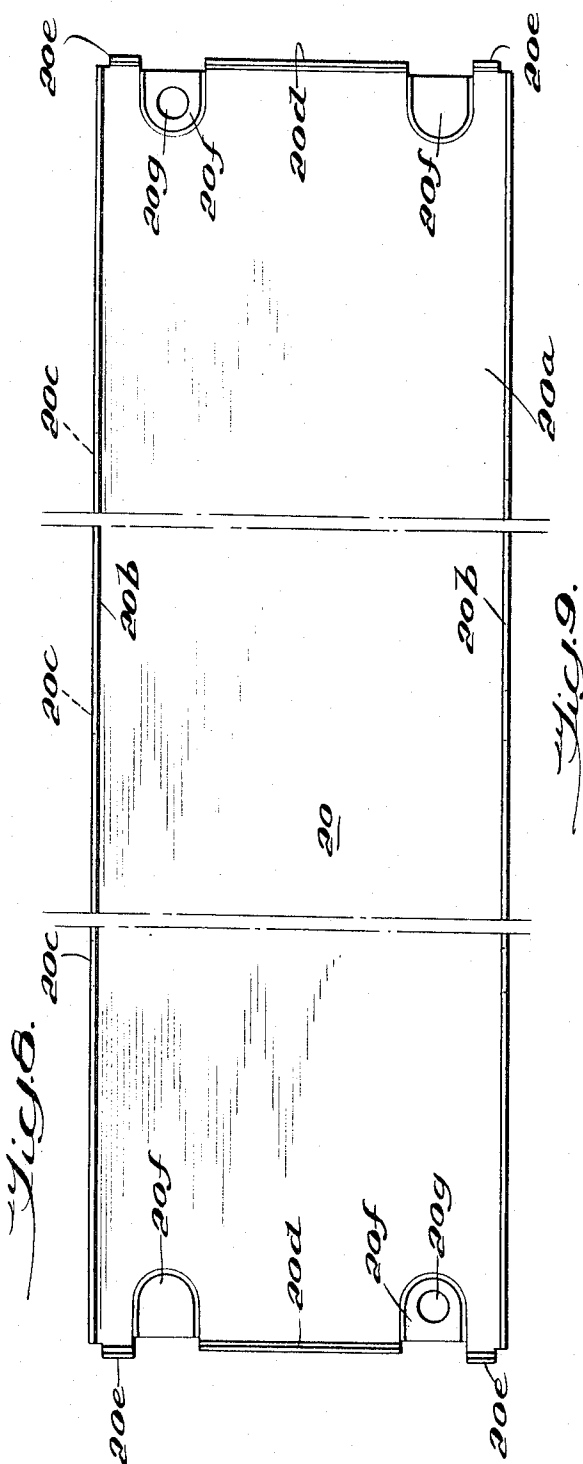
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LUMINAIRE BALLAST HOUSING

Richard E. Hanson, Willowick, and Archie R. Cornell,
Avon Lake, Ohio, assignors to Westinghouse Electric
Corporation, Pittsburgh, Pa., a corporation of Pennsylvania

Continuation of application Ser. No. 305,662, Aug. 30,
1963. This application Feb. 23, 1966, Ser. No. 536,515
10 Claims. (Cl. 240—51.11)

This invention is a continuation of copending application Serial No. 305,662, filed on August 30, 1963, by the same inventors, and assigned to the same assignee and now abandoned.

This invention relates generally to a fluorescent ballast housing formed from sheet metal members, and to a fluorescent lighting fixture incorporating such a ballast housing. The invention is characterized in that the means connecting the members to define the ballast housing, and the means connecting the housing to the lighting fixture, are formed from the various members and elements themselves.

Manufacturers must bear in mind several important and sometimes conflicting considerations in the design and production of fluorescent lighting fixtures. On the one hand, the lighting fixtures must have a pleasing appearance, be of rigid and durable construction, and must fully meet the operational and safety requirements of the electrical codes. On the other hand, it is desirable that the fixture components be manufactured from inexpensive materials with a minimum amount of waste. Furthermore, the fixtures should be so designed that the components thereof may be readily assembled by semi-skilled labor without special tools and with a minimum quantity of hardware.

In view of these and other considerations, an object of the invention is to provide an improved fluorescent lighting fixture and ballast assembly which meets all the esthetic, operational, safety and structural requirements of the art and yet which is less expensive to manufacture and more easily assembled and disassembled than the known devices.

Another object of the invention is to provide a fluorescent ballast housing formed solely from a plurality of sheet metal members connected by means stamped from the members themselves.

A further object of the invention is to provide a fluorescent lighting fixture including a supporting element, a sheet metal ballast housing, and connecting means stamped from the element and/or the housing for rigidly securing the ballast housing to the fixture element.

In accordance with the invention, at least some of the connections are of the snap-fit type defined by the cooperation between projections formed in one of the members with edge portions of, or openings formed in, another of the members. By proper design of the connecting means, manufacture of the fixture components may be achieved in a substantially waste-free manner from rectangular sheet metal stock. In addition to the simplicity and reduction in assembly time afforded by the snap-fit connections, the additional advantage is presented that the necessity of auxiliary connecting hardware and special assembling tools is obviated. Because of the flat surfaces afforded by the sheet metal housing, and in view of the minimum number of uncovered openings therein, efficient heat transfer from the ballast load is obtained.

A more specific object of the invention is to provide an improved, inexpensive fluorescent lighting fixture including a ballast housing formed from a sheet metal body, end wall and cover members, said body member being

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connected with said cover and end wall members, respectively, by snap-fit connecting means stamped from the sheet metal members themselves. In the preferred embodiments of the invention, tongue projections are stamped in the sheet metal end wall members and extend through—and downwardly over the edges of—corresponding openings in adjacent fastening portions of the body member to prevent coplanar movement of said end wall member in one direction relative to the body member. Lance, tab, dimple or other projections stamped or pressed from the end wall members cooperate with said body member fastening portions to prevent relative movement of the end wall member in the opposite direction. The cover and body members may be rigidly connected by cooperating lance and opening means formed in the members themselves. To further secure the cover member in place, tab portions on the end wall members may be bent downwardly upon the upper surface of the cover member.

A further object of the invention is to provide a fluorescent lighting fixture including a supporting element and a sheet metal ballast housing rigidly connected to said supporting element by snap-fit connecting means. Spring finger and lance means partially punched from the supporting element cooperate with edge portions of, and one or more openings in, a body member of the ballast housing to rigidly connect the housing to the lighting fixture.

Other objects and advantages of the invention will become apparent from a study of the following specification when considered in conjunction with the accompanying drawing in which:

FIGURE 1 is a perspective view of a fluorescent lighting fixture;

FIGURES 2–4 are side elevation, end elevation and top plan views, respectively, of the body member of the ballast housing;

FIG. 5 illustrates the scrap-free manner in which the end members of the ballast housing are stamped from a metal sheet;

FIGS. 6 and 7 are end elevation and detailed top views, respectively, illustrating one manner in which an end wall member is connected to the body member;

FIGS. 8–10 are bottom, side elevation, and end elevation views, respectively, of the cover member of the ballast housing;

FIG. 11 is a perspective view illustrating the manner in which the assembled ballast housing is secured to a channel element of the fluorescent lighting fixture;

FIG. 12 is a detailed end elevational view of another manner of connecting the body and end members of the ballast housing, and FIG. 13 is a sectional view taken along line 13–13 of FIG. 12;

FIG. 14 is a detailed end elevation of a further manner of connecting the body and end members; and

FIG. 15 is a sectional view taken along line 15–15 of FIG. 14.

Referring first to FIG. 1, the fluorescent lighting fixture 2 includes a longitudinal channel element 4 to the ends of which are secured lamp holders 6. Fluorescent tubes 8 are mounted between the lamp holders, and reflector 10 is secured to the lower surface of the channel element above the fluorescent tubes. As is conventional in the art, the fixture is provided with a ballast assembly 14 secured to the upper surface of channel element 4.

The ballast assembly includes a housing consisting of a body member 16 (FIGS. 2–4), a pair of end wall members 18 (FIG. 5) and a cover member 20 (FIGS. 8–10). Each of the housing members is formed, by stamping, from a sheet metal strip (for example, a 0.0329 steel strip). Body member 16 includes a base portion 16a and a pair of side walls 16b. Each of the side walls

is strengthened by an outwardly pressed, longitudinally extending protuberance 16c. At each end, side walls 16b are provided with end wall fastening portions 16d which are bent inwardly at right angles about vertical axes. At one end, base 16a extends beyond fastening portions 16d and is provided with a rectangular opening 16e, a slot 16g and a pair of circular openings 16f. At its other end, base 16a extends beyond fastening portions 16d and is provided with a pair of circular openings 16f and another slot 16g. As shown in FIG. 3, a four-sided opening 16h is provided in each fastening portion 16d. Punched outwardly from the upper portion of each side wall are a plurality of longitudinally-spaced "thumbnail" lances 16i. The side walls terminate at each end in vertical flanges 16j.

The end wall members 18 of the ballast housing are stamped from a sheet metal strip in a substantially waste-free manner as shown in FIG. 5. Each end wall member includes a pair of downwardly extending tongue projections 18a, a pair of thumbnail lances 18b, a pair of tabs 18c (which define slots 18d in the lower edge of the adjacent end wall member stamping) and a slot 18e having a rolled edge 18f. It is apparent from FIG. 5 that scrap portions W are the only waste resulting from the end member stamping operation. Prior to assembly, the lower portion 18g of the end wall member is bent outwardly at a right angle about line a-a of FIG. 5.

To assemble the end wall and body members (FIGS. 6 and 7), member 18 is moved vertically downwardly behind fastening portions 16d to cause tongues 18a to project through openings 16h and to engage the lower horizontal edges thereof. During its downward movement, member 18 is pressed against the fastening portions to cause lances 18b to snap beneath the upper horizontal edges of openings 16h. Horizontal lower portion 18g is now seated upon base portion 16a with slots 18d opposite openings 16f. The vertical edges of member 18 are in engagement with the inner surfaces of side walls 16b. Additionally, fastening portions 16d may be provided with an extended lower portion in the form of a tab 16k (FIG. 6). Tabs 16k lock into slots formed at the edges of lower portion 18g where it connects to the main end wall member 18 to securely lock the bottom edge of end members 18 to body member 16. In the assembled condition of FIGS. 6 and 7, end wall member 18 is locked against both coplanar and longitudinal movement relative to body member 16.

Referring now to FIGS. 8-10, cover member 20 includes a cover portion 20a, downwardly depending side wall portions 20b containing semi-circular openings 20c, and downwardly depending end wall center and tab portions 20d and 20e, respectively. For smaller configurations, tab portions 20e are unnecessary. Base portion 20a contains depressed portions 20f intermediate the center and tab portions. If desired, auxiliary securing holes 20g may be formed in one diagonally opposite pair of the depressed portions 20f.

Referring now to FIG. 11, after the ballast unit has been positioned within the space defined by the assembled body and end wall members 16 and 18, respectively, cover 20 is mounted in the illustrated position as shown to complete the assembly of the ballast housing. As cover 20 is displaced downwardly toward the illustrated position, side walls 20b are resiliently biased outwardly until the lances 16i are opposite openings 20c, whereupon the side walls 20b snap inwardly and the cover is secured in position by the snap-fit cooperation between the lances and openings. To further secure the cover in position, tabs 18 are bent downwardly to horizontal positions in cover depressions 20f. If desired, holes may be formed in those tabs 18 opposite openings 20g, and metal screws 30 may be screwed into the aligned holes.

The ballast housing is secured to the sheet metal channel element 4 of the lighting fixture as shown in FIG. 11. Channel element 4, which is preferably formed from

a sheet metal stamping, is provided with two sets of longitudinally spaced, partially punched out spring fingers 4a and with a transverse lance 4b. During assembly of the ballast housing 14 to the channel element, the right-hand edge of base portion 16a and the left-hand transverse edge of opening 163 are positioned under the extremities of the associated sets of spring fingers 4a. The housing is then displaced to the right relative to the fixture element until the left-hand edge of base portion 16a snaps over the lip of lance 4b. The lance and spring fingers cooperate with the various edge portions of the base 16a to prevent longitudinal movement of the housing relative to the channel element. If desired, the base portion 16a may be secured to channel element 4 by means of screws (not shown) that extend through openings 16f and corresponding openings in element 4.

One or more of the spring fingers 4a of the right-hand set of FIG. 11 may be replaced by a tab, lance or dimple formed in the channel element and arranged for cooperation with the adjacent edges of wall portion 18g and base portion 16a to prevent right-hand movement of the ballast housing relative to the channel element. Furthermore, the outermost ones of the right-hand set of spring fingers 4a may be arranged for cooperation with flanges 16j to prevent lateral movement of the ballast housing relative to the channel. Depending on the construction of the lighting fixture, the electrical leads (not shown) from the ballast unit may extend outwardly from the housing through appropriate openings (for example, through one or more of the slots 18e) or downwardly through aligned openings provided in base portion 16a and channel element 4.

While the ballast housing has been illustrated as being connected to the upper surface of the channel element, it is apparent that in certain types of lighting fixtures, the housing might be similarly secured to the lower surface of the web portion of the channel element, or to other portions of the lighting fixture as desired.

FIGS. 12 and 13 illustrate another snap-fit connection between an end wall member 118 and a body member 116. In this embodiment the end wall member contains a dimple 140 that extends through a corresponding opening in fastening portion 116d, a tongue projection 118a that extends through, and downwardly over the lower edge of, opening 116h, and a lance 118b that abuts the lower edge of fastening portion 116d. Upward movement of the end wall member 118 relative to the body member is prevented by projection 118a and dimple 140, and downward movement is prevented by projection 118a and dimple 140.

In the embodiment of FIGS. 14 and 15, tab 218m extends from end wall member 218 and is bent upwardly about the lower edge of fastening portion 216d of body member 216. Tongue 218a extends downwardly over the lower edge of opening 216h. Tab 216k, protruding from the lower end of fastening portion 216d, is held in place in the groove formed by bent portion 216a of body member 216 and the main body portion of end wall member 218. It will be seen that one or more grommets 242 may be provided for securing bent portion 218g of end wall member 218 to the base portion 216a of body member 216. Similar grommet securing means may be utilized with the FIG. 6 and 12 embodiments if desired.

As a consequence of the invention, fixture assembly time is reduced and much of the conventional hardware is eliminated, thus affording a material reduction in the manufacturing cost of the lighting fixture. In addition to the substantially scrap-free manner in which the ballast housing members are stamped from the rectangular metal sheets, the housing is easily and economically assembled without the necessity of special tools or extra and expensive forming operations. In view of the flat surfaces afforded by the ballast housing, the fixture has excellent heat transfer characteristics. When the ballast assembly is properly secured to the channel element, ballast noise

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and heating of the fixture components are alleviated. The housing has a minimum number of openings so that the possibility of leakage of compound from the fluorescent ballast unit is minimized. Furthermore, since the ballast assembly completely covers the channel openings, the requirements of the electrical codes are fully met. The body, end wall and cover elements of the housing are snap-fit into locking engagement in a rapid simple manner, and the resulting assembly and its connection to the fixture frame are quite rigid and tight. Replacement of a defective ballast unit is readily achieved without special tools.

While in accordance with the patent statutes, the best form and embodiments of the invention have been illustrated and described, and it will be apparent to those skilled in the art that changes may be made in the apparatus described without deviating from the broad spirit and scope of the invention.

We claim as our invention:

1. A housing for fluorescent lamp ballasts, said housing comprising:

a unitary body member including a generally flat base portion adapted to be mounted horizontally and having a pair of vertical side walls extending upwardly therefrom, a plurality of coplanar fastening portions connected to the vertical edges of said side walls at each end thereof and extending inwardly at right angles relative to said side walls, and securing members formed by end extremities of said base portion and extending beyond the vertical end extremities of said side walls;

a pair of parallel vertical end wall members positioned at the ends of said housing and in contiguous engagement with said fastening portions and the inner surface of said side walls, a horizontal retaining member connected to each of said end wall members and overlaying said securing members;

a horizontal cover member seated on the upper edge of said side walls and said end wall members; and each of the members comprising said housing being formed of sheet metal, and connecting means formed from said unitary body member, said end wall members and said cover member for rigidly interconnecting said members.

2. The housing as specified in claim 1, wherein vertical flanges extend upwardly from each of the sides of said securing members, and each said horizontal retaining member is positioned between said vertical flanges.

3. The housing as specified in claim 1, wherein the upper edge of each of said end walls substantially interfits with the outwardly extending edge of each of said retaining members to permit formation from a sheet of metal with a minimum of waste.

4. The housing as specified in claim 1, wherein said housing is secured to a fluorescent fixture having an element which is substantially planar and horizontal, finger means are punched from said fixture element, and said finger means cooperate with said flat base portion of said unitary body member to secure said ballast housing to said fixture element.

5. The housing as specified in claim 1, wherein said connecting means are of the snap-fit type and include projection means punched from said end wall members, said projection means cooperating with apertures provided in said fastening portions to secure said end wall members to said body member.

6. The housing as specified in claim 5, wherein said cover member includes side walls extending downwardly adjacent the external surfaces of the side walls of said body member, and further wherein said snap-fit connecting means include projection means partially punched from the side walls of one of said members and cooperat-

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ing with corresponding openings in the side walls of the other of said members.

7. A housing for a fluorescent lamp ballast, said housing comprising:

a body member including a base portion having a pair of spaced side walls extending upwardly therefrom, a plurality of coplanar fastening portions connected to a substantial portion of the ends of said side walls and extending inwardly generally at right angles to said side walls, and retaining tabs connected to the ends of said side walls at the bottom portions thereof and extending inwardly generally at right angles to said side walls;

end wall members positioned at the ends of said housing and secured to said body member, an outwardly extending retaining member connected to the bottom edge of each of said end wall members, and a slot provided proximate each inner edge of said retaining members proximate said end wall members; and snap-fit connecting means securing said end wall members to said body member, said snap-fit connecting means comprising:

(a) spaced tongue projections and lances on one of said end wall members and said coplanar fastening portions at a location intermediate the top and bottom thereof;

(b) aperture means having spaced edges in the other of said end wall members and said coplanar fastening portions;

(c) each said tongue projection extending through one of said aperture means and contacting an edge thereof, and each said lance extending through one of said aperture means and contacting another edge thereof to provide a tongue and lance locking arrangement between said end wall members and said coplanar fastening portions; and

(d) each of said retaining tabs interfitting with one of said slots to lock the bottom edge of said end members to said body member.

8. The housing as specified in claim 7, wherein said tongue projections and said lances are provided proximate each upstanding edge of each of said end wall members, said aperture means are provided in each of said coplanar fastening portions, and said tongue projections are made of a resilient material.

9. The housing as specified in claim 8, wherein said tongue projections and said lances are vertically aligned.

10. The housing as specified in claim 7, wherein a horizontal cover member is seated on the upper edges of said side walls and said end wall members, said cover member including side walls extending downwardly toward said body member adjacent the external surfaces of the side walls of said body member, and snap-fit connecting means are provided between said side walls and include projection means punched from the side walls of one of said members and cooperating with corresponding openings in the side walls of the other of said members.

References Cited by the Examiner

UNITED STATES PATENTS

2,375,589	5/1945	Rozier	240—51.11
2,480,805	8/1949	Buckels	248—221
2,552,400	5/1951	Brunia	220—3.94 X
3,113,694	12/1963	Sulzer	220—3.92 X

JOHN M. HORAN, *Primary Examiner.*

NORTON ANSHER, *Examiner.*

CHARLES R. RHODES, CLIFFORD B. PRICE,
Assistant Examiners.