Jan. 20, 1959 H. H. FORD 2,869,908

COVER ATTACHING ASSEMBLY

Filed Aug. 27, 1956

FIG. 1.

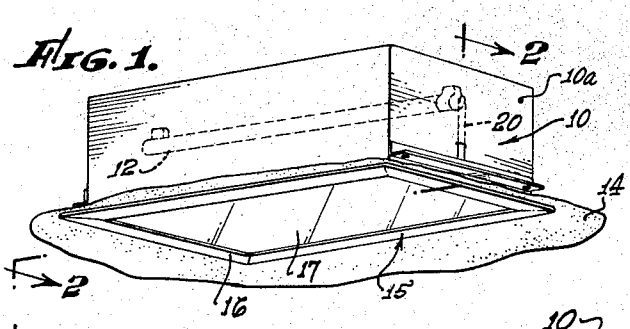


FIG. 5.

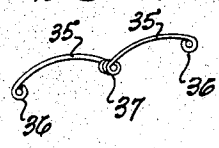


FIG. 2.

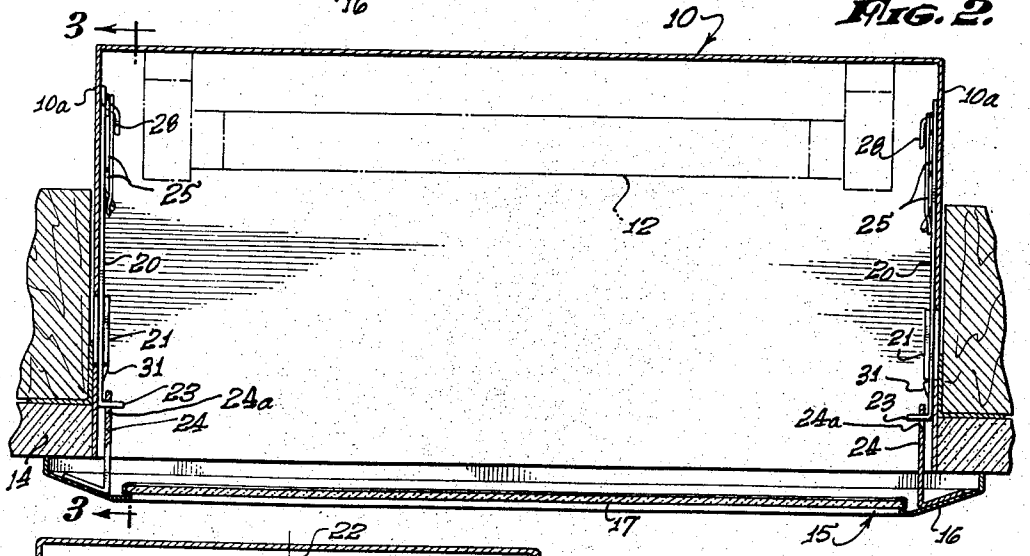


FIG. 3.

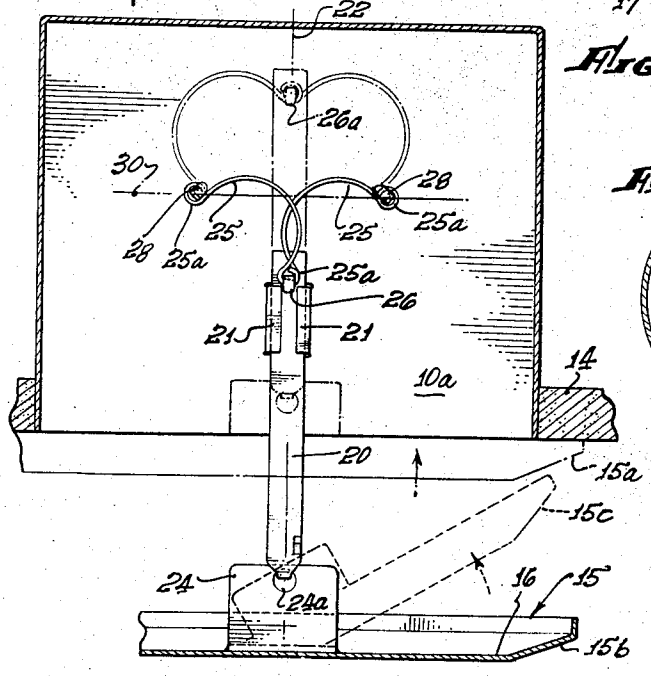


FIG. 4.

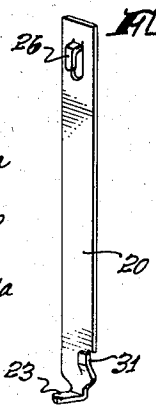
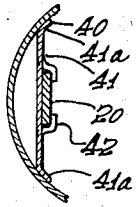


FIG. 6.



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COVER ATTACHING ASSEMBLY

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5 Claims. (Cl. 292—1)

The present invention relates generally to closure means and more particularly to means for removably attaching a cover or similar member to a box or a housing or the like having an opening closed by the cover.

A typical application of such means is found in a sheet metal housing enclosing a fan or the like and set into the wall or ceiling of a room. The housing is so mounted that it has one side open at the face of the wall and this side is closed by a cover consisting of a perforated grille, in the case of a ventilating fan, or a frame holding a glass lens, in the case of a light. With equipment of this character, it is important to have easy access to the interior of the housing for necessary service and replacement of parts. An electric light burns out after a time and needs replacing. A ventilating fan needs periodic oiling or cleaning. These requirements for periodic, and sometimes frequent, access to the interior of the housing make it desirable that the cover closing the opening in the housing be easily removable, preferably without the use of any tools at all. Yet the cover must be held firmly in place in order to perform properly its usual functions.

In the case of lighting and ventilating equipment, the housing is often installed in the ceiling of a room which means that a person servicing the equipment is standing on a ladder. When working under these conditions, it is obviously desirable that the cover be removable easily, without tools, and by simple hand movements. In order to eliminate the danger of breakage by dropping it and also to render the workman more efficient so that he does not need one hand to hold the cover during the servicing operation, it is desirable that the cover be held securely by the attachment means at all times, even after it is removed from engagement with the housing to a position permitting access to the housing interior.

Consequently, it is a general object of my invention to provide an attaching means of novel design having all these desirable characteristics, and yet a means which is simple and inexpensive to manufacture and which is reliable in operation.

These and other advantages of my invention have been attained by the herein described embodiment of my invention. My preferred form of attaching means includes a body member slidably mounted on a wall of the housing and connected at one end to the cover, said body member being movable relative to the housing in order to allow the cover to be moved between a first position in which the cover engages the housing to close the opening and a second position in which the cover is spaced from the housing sufficiently to permit access to the interior of the housing. Suitable stop means may be provided to limit the travel of this body member in one or both directions. Spring means of novel design is connected to the housing and to the body member, the spring means being adapted to resist movement of the body member from either of said two positions toward the other position, thus holding the cover in either of the said positions but yielding under force

applied to the cover to move it to the other position. Ordinarily two such attachment means are employed, one at each of two opposite sides of the housing, to hold the cover in place.

The spring means may take various forms but in a preferred form is a bow-shaped spring means which is connected at its ends to the housing at points located one on each side of the sliding body member and is centrally connected to the body member. Movement of the sliding member is transverse to a line passing through the two points of connection of the spring means to the housing and the connection of the spring to the slide moves across this same line. As a result, when the slide is moved to bring the central point of connection at either side of this connecting line, the spring exerts a force moving the slide away from the line and toward one of the two above named positions.

How the above objects and advantages of my invention, as well as others not specifically mentioned herein, are attained will be better understood by reference to the following description and to the annexed drawing, in which:

Fig. 1 is a perspective view of a housing enclosing a lamp and to which a cover attaching mechanism has been applied;

Fig. 2 is a vertical longitudinal section through the housing as on line 2—2 of Fig. 1, showing cover attaching means at each end of the housing holding the cover in the closed position;

Fig. 3 is a transverse vertical section on line 3—3 of Fig. 2 showing in elevation the cover attaching means at one end of the housing, two positions of the cover being indicated;

Fig. 4 is a perspective view of the slidably mounted member;

Fig. 5 is a perspective of a variational form of spring means; and

Fig. 6 is a fragmentary transverse section showing a variational way of mounting the attaching means on the housing.

Referring now to Fig. 1, there is shown a box-like housing 10 of sheet metal that provides an enclosure for lamp 12. The lamp is merely typical of various items of heating, lighting or ventilating equipment which might be contained within housing 10 since the nature or presence of these items is in no way limitative upon the invention. Housing 10 is shown as it would appear when installed in the ceiling 14 of a room, the lower side of the housing being open and substantially flush with the surface of ceiling 14. In this case, the opening to be covered is the entire under side of housing 10 and this side lies in a single plane.

The cover for the housing is generally indicated at 15. In equipment of this type, the cover is commonly referred to as a "front." Front 15 consists of an open metal frame 16 in which is mounted a sheet of glass 17 closing the area bounded by metal frame 16. It will be understood that the construction of the front is not limitative upon the invention. If a ventilating fan is contained within housing 10 instead of lamp 12, a front would comprise a perforated grille permitting the passage of air into the housing. A grille, being usually made of metal, is ordinarily made in one piece including frame 16.

Housing 10 has rectangular walls, including two flat, parallel end walls 10*a*; but the shape of the housing is in no way limitative upon the invention. One entire side of the housing is open, to be closed by front 15. The frame 16 conforms to the shape of the opening, here rectangular, to be closed. Accordingly if housing 10 is cylindrical with a circular opening at one end,

frame 16 is made circular. Wall members 10*a* are perpendicular to the plane of the opening closed by front 15. On each of these walls 10*a* is mounted means for attaching front 15, according to my invention. The two cover attaching means now to be described are duplicates of each other and accordingly it will be necessary to illustrate and describe in detail only one, as the same description applies to both.

The attaching means comprises a body member 20 which is slidably mounted upon the inner surface of the end wall. Any suitable means may be provided for thus mounting the member 20. However I have found it convenient to make two 3-sided cuts in wall 10*a* forming two rectangular tabs that are then each given two 90° bends in opposite directions to produce two angular lugs 21 from a portion of wall 10*a*, as may be seen particularly in Fig. 3. The sides of these two lugs are spaced apart by the width of body member 20 to provide a guide channel within which member 20 can slide longitudinally. The guide means formed by lugs 21 confine the movement of slide 20 substantially to linear movement in the direction of longitudinal axis 22 of body 20.

As may be seen particularly in Fig. 4, the tip 23 at one end of body member 20 is bent at a right angle to the main body. This provides means for attaching body member to cover 15. Cover 15 is provided at each end with a bracket 24 having an opening 24*a* which receives tip 23 of the associated body member. This is a simple way of effecting a pivotal connection between the attachment means and the cover, the advantages of which are mentioned below.

Movement of body member 20 is regulated by spring means of novel design. Although this spring means is, for practical reasons, made in two sections, broadly speaking it may be regarded as a single spring which is adapted to hold the body member at either end of its range of travel and resist movement away from that position, although the spring means yields to sufficient force to allow the body member to move. As is shown best in Fig. 3, the spring means comprises two sections 25 which are duplicates of each other so that the spring means as a whole is symmetrical about axis 22. Each section 25 is a separate spring made from a short length of spring wire having at each end a complete loop 25*a* for the purpose of securing the spring in place.

One end of each spring section 25 is attached to body member 20 at a common point of connection by slipping the loop 25*a* at the end of the spring section over a hook 26 formed on the body member by cutting from it a tongue and then bending the tongue into angular form. If the hook 26 so formed has two equal bends of about 90° it resembles in cross-section one lug 21.

The other end of each spring 25 is connected to the housing wall. This connection may be of any type but again it is convenient to cut a small tongue 28 from the wall and bend it upwardly and then parallel to the wall to form a hook over which the loop 25*a* at the end of the spring can be slipped to anchor the spring to the housing wall. It will be noted that the two hooks 28 fastening the spring means to the housing wall are located at equal distances from axis 22 with one hook on each side of this axis. If the axis 30 is drawn through the two connections 28, this line preferably makes a right angle with axis 22. In general, movement of slide 20 along axis 22 may be defined as being transversely of axis 30 passing through the two points 28; but operation of the slide is rendered more satisfactory if its linear motion is perpendicular to axis 30. Axis 22 then becomes an axis of symmetry for the spring means at all positions of slide 20.

Spring sections 25 are each made of such length that when they are connected to the housing and to the slide as shown in Fig. 3, they are under some compression which normally urges the ends of the spring sections apart. This is true for all positions for slide 20. In the closed

position, cover 15 is drawn slightly against the housing or against the surface of the wall surrounding the housing as shown in Fig. 2, so that the open side of the housing is closed. This position 15*a* is indicated in dot-dash lines in Fig. 2. In this position the hook representing the common connection between slide 20 and the two spring sections 25, is at 26*a* above axis 30. When the body member 20 is drawn downwardly to the full line position 15*b* of Fig. 3, cover 15 is spaced from and below housing 20 and the surrounding wall 14, permitting free access to the interior of the housing. In this second position, hook 26 is below axis 30, that is, it is on the opposite side of line 30 from the position occupied when cover 15 is closed.

These two positions represent the extreme range of movement of slide 20. In either position, the spring means exerts a force upon the slide which is away from the axis 30 and thus tends to hold the slide member in the occupied position and to resist any movement of the slide in the opposite direction toward axis 30.

It will be evident from Fig. 3 that a greater size of opening at one side of cover 15 can be obtained by pivotally mounting the cover upon the ends of the two slides 20 so that the cover can tilt from the full line position 15*b* to the dotted line position 15*c*.

Because of the shape of the spring means especially in the upper or retracted position, it may be described as being a bow-shaped spring. The slide 20 is connected centrally of the bow to be urged longitudinally of the slide by the force supplied by the spring means. This type of spring has an over-center action. When hook 26 is on axis 30, the distance between it and each of the two points 28 is a minimum so that force exerted by the spring sections 25 is a maximum. However the force exerted by each half of the spring means opposes that exerted by the other half so that the two forces are neutralized. As the common point of connection 26 moves away from axis 30 in either direction, the distance between point 26 and the two anchor points 28 increases, thus reducing the compression in the spring section and the force exerted by each section. However, the force exerted by each section becomes more nearly parallel to axis 22 so that a greater component of this force is along axis 22, within the normal range of movement of slide 20.

The inner end of lugs 21 serves as a means to limit the travel of the spring outwardly of the housing by engagement with hook 26 and the loops of the springs thereon. Travel in the opposite direction or inwardly of the housing is normally limited by engagement of cover 15 with the wall around the housing, as shown, or engagement with the housing itself. To limit the inward travel of slide 20 when the cover is not attached to the slide 20, a stop 31 is provided on slide 20. This projection 31 on slide 20 engages the lower end of one of the lugs 21 for this purpose.

When within housing 10, the two body member 20 engages the inner surface of a wall 10*a* which holds the slides against moving away from each other. This insures that tips 23 of the slides do not spread outwardly to disengage brackets 24 on the front. However, when the slides are extended outwardly from the housing, they are unsupported by the housing wall for a sufficient length that they can be sprung apart far enough to disengage brackets 24, thus permitting the cover to be easily connected to or disconnected from the attaching means, when it is desired do so. The normal spacing between these slides is ordinarily maintained so that the cover is at all times securely held by the slides, even when it is moved away from the housing to the spaced position 15*b* shown in Fig. 3.

A variational form of spring means in one piece is shown in Fig. 5. Although for practical reasons it is easier and simplier to make each section 25 of the spring means as a separate member, the entire spring may be

made from a single continuous length of spring wire. This is accomplished by shaping the spring with two arcuate end sections **35** each terminating at its outer end in a loop **36** and joined together at the center of the spring by a short coil **37** having two or three turns. This coil then forms the means for connecting the spring to slide **20** in the manner described or by any other suitable connecting means.

The attaching means is not necessarily mounted directly on the housing wall, though that is the most convenient way when the wall has a flat area of sufficient size. When used with a cylindrical housing, as an example the front attaching means may be mounted on a back plate which is fastened to the housing by any suitable means, as spot welding. Such an arrangement is shown in Fig. 6 where a portion of a curved housing wall is shown at **40**. A flat back plate **41** is fastened to the wall **40**, the plate **41** typically having marginal portions **41***a* that lie against the wall **40** and are adapted for spot welding to the housing. The sliding member **20** is then held in guides **42** that are cut from plate **41** in the same way as lugs **21**, described above. Otherwise the construction and operation of the front attaching means is the same as already described.

From the foregoing description it will be evident that various changes in the design and arrangement of parts will occur to persons skilled in the art and that these changes may be made in my invention without departing from the spirit and scope thereof. Accordingly, it is to be understood that the foregoing description is considered to be illustrative of, rather than limitative upon, the invention as defined by the appended claims.

I claim:

1. Means for attaching to a housing or the like a cover closing an open side of the housing, comprising: a body member slidably mounted on one wall of the housing and connected at one end to the cover, said body member being movable linearly over the surface of said wall between a first position in which the cover closes the opening and a second position in which the cover is spaced from the opening; and spring means connected near its mid-point to the body member and at its ends to the wall of the housing at two fixed points equally spaced from and at opposite sides of the body member, the section of the spring between its mid-point and each of the two fixed points of connection being under endwise compression whereby the mid-point is continually urged away from said fixed points, the body member being movable along a path substantially perpendicular to a line connecting said two fixed points to move said mid-point between positions at opposite sides of said line connecting the fixed points.

2. The combination of: cylindrical wall means defining a circular opening; two parallel flat wall members mounted on the cylindrical wall means and extending substantially perpendicular to the plane of the opening; a cover adapted to close the opening; a pair of flat, elongated members connected to the cover and disposed one at each of said flat wall members and movable relative thereto; a guide channel at each flat wall member provided by two lugs cut from the wall member for restraining movement of each elongated member to linear movement toward and away from the opening; and spring means at each flat wall member connected to the elongated member at a first point on the spring means and to the flat wall member at a second point on the spring means spaced from the first point, said spring means between said points of connection continually urging the points of connection apart.

3. Means for attaching to a housing or the like a cover closing an opening at one side of the housing comprising: a body member pivotally connected at its outer end to the cover; means mounting the body member on the housing for sliding movement relative to the housing to carry the cover between a first position closing said opening and a second position in which the cover is spaced from the opening; and spring means connected to the body member at a first point on the spring means and to said housing at a second point on the spring means spaced from the first point, said spring means between said points of connection continually urging the points of connection apart; said mounting means including guide means confining travel of the body member to a linear path located so that the minimum distance between said two points of connection occurs when the body member is intermediate the ends of its travel between said two positions of the cover.

4. The combination with a housing having an opening at one side, and a cover for said opening, of cover attaching means adapted to support the cover in a first position closing said opening or in a second position in which the cover is spaced from the opening, said cover attaching means comprising: a body member pivotally connected at its outer end to the cover and movable relative to the housing to travel with the cover between said two positions; spring means connected to the body member at a first point on the spring means and connected to said housing at a second point on the spring means spaced from the first point, said spring means between said points of connection continually urging the points of connection apart; means mounting the body member on the housing including guide means confining travel of the body member to a linear path located so that the minimum distance between said points of connection occurs when the body member is intermediate the extremes of its travel between said two positions of the cover; and stop means to limit travel of the body member when the cover is at said second position.

5. The combination of claim 4 in which the body member is mounted inside the housing and moves substantially perpendicular to the opening therein.

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