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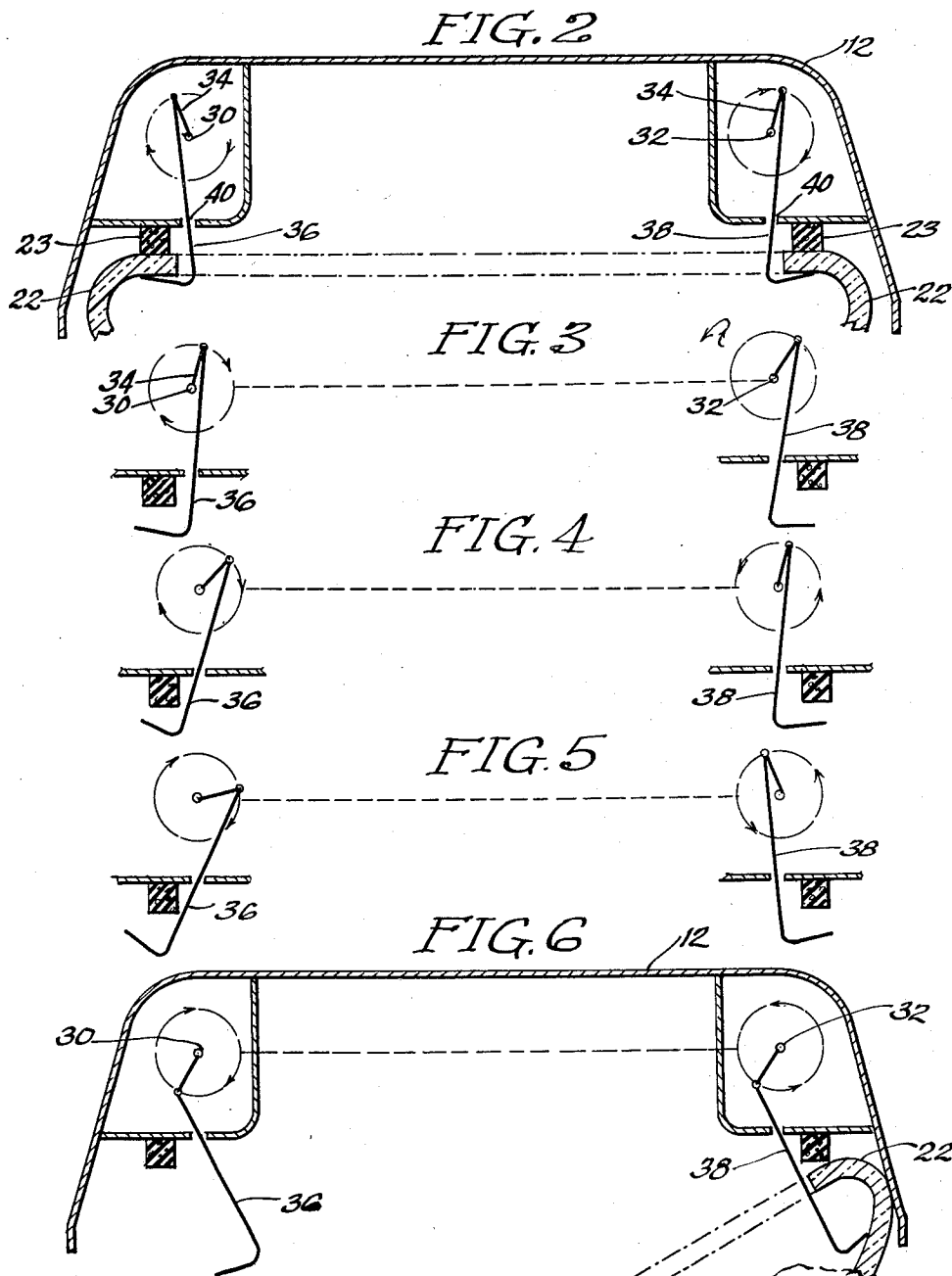
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OUTDOOR LIGHTING FIXTURE FOR FLUORESCENT LAMPS

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3 Sheets-Sheet 2



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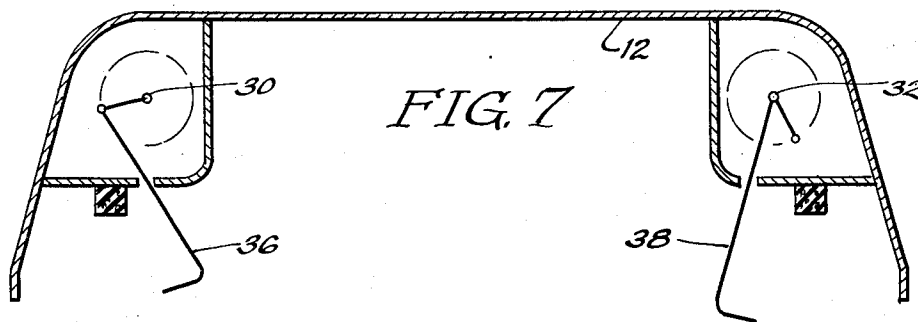
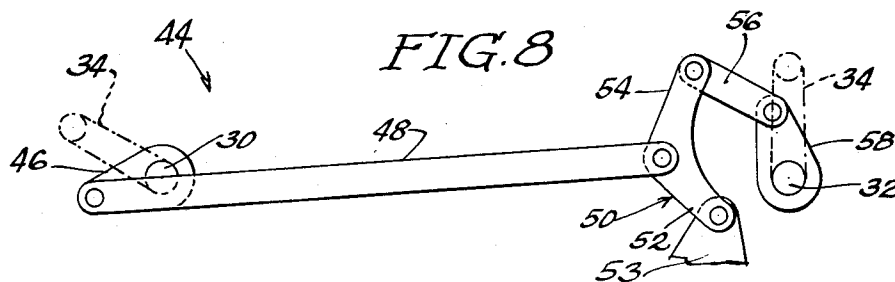
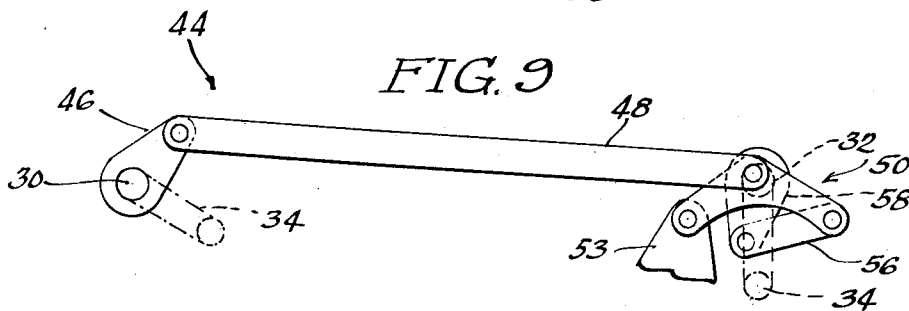
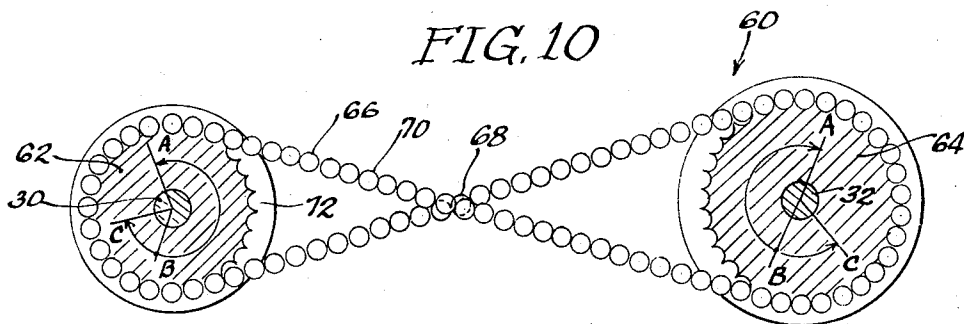
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OUTDOOR LIGHTING FIXTURE FOR FLUORESCENT LAMPS

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3 Sheets-Sheet 3



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OUTDOOR LIGHTING FIXTURE FOR FLUORESCENT LAMPS

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13 Claims. (Cl. 220—34)

This invention relates to a fixture for supporting appliances therein, and more particularly to an outdoor light fixture provided with a removable hinge connected closure.

Housings for outdoor light fixtures have an opening to provide access to its interior for repairs or for the replacement of the lights. A closure, usually the transparent or translucent glass cover bowl or pan is adapted to be connected to the housing over this opening to protect the housing interior from the weather. Since these outdoor light fixtures are frequently mounted at elevated positions, i.e. on the top of poles, the light bowls or closures are sometimes connected to the housing by hinges, so that the serviceman can gain access to the interior of the housing without having to support the heavy and bulky light bowl. Some of these hinges, as described in copending application Serial No. 679,726, filed August 22, 1957, entitled "Lighting Equipment and Housing and Hinges for Same," now Patent No. 2,861,711, issued November 25, 1958, and the application filed concurrently herewith entitled "Outdoor Lighting Fixture," are mounted inside the housing for protection against the corrosive effects of the elements. These hinges are generally satisfactory except that they depend upon the frictional engagement between the periphery of the cover bowl and the housing to hold the closure or glass cover bowl in a closed position against the housing opening. This is not particularly desirable because storms may overcome this frictional engagement and blow the cover bowl open, or prolonged exposure of the fixture to the elements may produce changes in the dimensions or the physical properties of the housing, decreasing the frictional engagement between the housing and the closure, and permitting the closure to fall open. Since these closures are usually the glass cover bowl or pan, ordinary latches do not provide a satisfactory way of keeping the cover bowl over the housing opening because the bowl has to be milled or drilled so that part of the latch can be attached to it. This is an expensive operation because glass light bowls are fragile and hard to work with, and they are seriously weakened by such operations. It is also important to prevent these latch members from being exposed to the elements because they are made so cheaply, in the interests of economy, that they are very susceptible to corrosion. What is needed, therefore, and comprises one important object of this invention, is a fixture for supporting appliances wherein the glass cover bowl is pivotally connected to the housing by internally mounted hinges, and where a positive internally mounted latch or lock for holding the glass cover bowl tightly against the housing opening is provided, which does not require the glass cover bowl to be drilled or machined in any way.

It is also important to be able to completely and conveniently detach the cover bowl from the housing for replacement when it becomes necessary, particularly when the light fixture is at an elevated position. Some of the hinges described in the above mentioned copending patent

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applications could do this, but they all depended upon a resilient connection between one of the hinges and the glass cover bowl. This was not very satisfactory because the resilient property of these hinges may change with time so that after a while the glass cover bowl could completely fall away from the housing. What is needed, therefore, and comprises still another important object of this invention is an outdoor light fixture with internally mounted hinges connected between the glass cover bowl and the housing which is independent of the resilience of the material, and which can be conveniently separated from the glass cover bowl so that the cover bowl can be easily replaced.

The increasing cost of labor and materials has caused a re-examination of the construction of these outdoor light fixtures which are mounted upon light poles. It has been found that a less massive and consequently a less expensive pole would often be just as satisfactory, and in some areas which are subject to severe weather conditions, a thin resilient pole or mast which can bend with the wind is actually preferable. Since these thinner and more flexible masts are usually less expensive than the more massive conventional type, it would be desirable to use them to support outdoor light fixtures, but it is difficult to provide a rigid economical connection between such a mast and a conventional outdoor light fixture which can withstand severe winds and weather conditions. What is needed, therefore, and comprises yet another important object of this invention is a fixture which is adapted to be economically and conveniently mounted upon a thin resilient mast.

All of the above mentioned objects of this invention have been economically and efficiently achieved through the use of an elongated bottle shaped fixture housing having a projecting mast receiving neck opening at one end. A bracket, mounted inside the housing is aligned with this neck opening and is adapted to be clamped to the end of a mast so that the fixture is rigidly supported by it. This housing has an additional axially extending appliance receiving opening, and a glass cover bowl or pan is provided to cover it. First and second groups of closure members are movably mounted inside the housing on the opposite sides of this opening. These groups of closure members are connected together by a linkage mechanism driven by an actuating lever, so that moving the actuating lever to one position causes all the closure members to move into engagement with the cover bowl to hold it tightly over the appliance receiving opening, and moving the actuating lever to another position causes all the closure members in one group to move out of engagement with the cover bowl so that the closure members in the remaining group still in engagement with the cover bowl act as hinges, permitting the cover bowl to be pivoted open, and moving the actuating lever to still another position causes all the closure members in both groups to move out of engagement with the cover bowl so that the cover bowl can be completely removed from the housing.

Other objects of this invention will become more apparent when read in the light of the accompanying drawings and specification wherein:

Fig. 1 is a perspective view of one embodiment of the outdoor light fixture constructed according to this invention;

Fig. 2 is a cross-sectional view of this invention showing schematically the position of the hook members when they are all in engagement with the cover bowl;

Fig. 3 is a cross-sectional view of this invention showing schematically the reversal of direction by one of the crankshafts and the phase difference between them produced by one embodiment of the linkage mechanism connecting the crankshafts;

Figs. 4 and 5 show successive positions of the moving hook members as the actuating lever is moved toward the hinge position;

Fig. 6 shows the position of the hook members when the actuating lever has reached the hinge position with one group of hook members completely withdrawn from engagement with the cover bowl and with the other group of hook members in pivotal engagement with it;

Fig. 7 shows the position of the hook members when the actuating lever has reached open or release position showing both groups of hook members completely withdrawn from engagement with the cover bowl;

Figs. 8 and 9 show elevational views of one embodiment of the linkage mechanism illustrating the cooperation of the individual elements in various positions, and in addition Fig. 9 shows the position of the linkage mechanism when the hook members are all in engagement with the flanges of the cover bowl, and holding it tightly against the appliance receiving opening in the housing, and

Fig. 10 shows an elevational view of another embodiment of the linkage mechanism.

Referring now to Fig. 1 of the drawings, the outdoor light fixture indicated generally by the reference numeral 10 comprises a substantially cylindrical bottle-shaped housing 12 having a projecting neck 14 at one end. This neck is provided with a mast receiving opening 16 extending therethrough to the interior of the housing. A mast receiving bracket 17 is mounted inside the housing and is positioned in alignment with the opening 16. This bracket is adapted to be clamped to the end of a supporting mast inside the housing so that the light fixture can be rigidly supported thereon. The housing is provided with an additional axially extending opening 18 for receiving a fluorescent light 26 or other appliance. A transparent or translucent glass cover bowl or pan indicated generally by the reference numeral 20 is sized to cover this opening and seal the housing. This cover bowl is provided with integral inwardly projecting flanges 22 along its periphery for purposes to become apparent below.

A plurality of lug bearings 28 are mounted in the housing along the opposite sides of the opening 18. Spaced parallel crankshafts are rotatably mounted in aligned openings in these lugs. Each crankshaft is provided with a plurality of aligned and offset crank portions or arms 34. In the example shown, each crankshaft has three offset portions but it is apparent that others could be provided depending upon the length of the housing 12. As seen in Fig. 1, first and second groups of hook members 36 and 38, one each side of the housing, are articulated eccentrically or are pivotally mounted on each of these crank portions 34. The hook portions of these two groups of hook members project in opposite directions for purposes to become apparent below. Each of these hook members slidably moves in a window or a pivot and guide slot 40 which is formed in a lug member 42 integrally positioned opposite sides of the periphery of the housing section opening 18. With this arrangement, rotation of the crankshafts causes these hook members to slide and pivot in these slots 40.

The crankshafts 30 and 32 are connected together by a linkage mechanism, one embodiment of which is indicated generally by the reference numeral 44; see Figs. 8 and 9. This linkage comprises a first lever arm 46 which is rigidly secured to crankshaft 30 at one end and the other end is pivotally connected to one end of a push rod 48. The opposite end of this push rod is pivotally connected to the apex of a bell crank 50. The short arm 52 of this bell crank is pivotally connected to a fixed support 53, and the long arm 54 is pivotally connected to one end of a connecting rod 56. The opposite end of the connecting rod is pivotally connected to one end of a second lever arm 58, and the opposite end of this lever arm is rigidly connected to crankshaft

32 to provide a predetermined phase displacement between the offset or crank portions 34 on each crankshaft.

An alternative linkage mechanism indicated generally by the reference numeral 60, see Fig. 10, comprises a first toothed disc 62 rigidly mounted on the end of crankshaft 60, and a second toothed disc 64 having a larger diameter rigidly mounted on the adjacent end of a crankshaft 32. A crossed chain 66 is connected between the discs so that they rotate in opposite directions. To prevent binding at the intersection 68 of the chains, the chains are preferably formed from small connected balls 70. Accordingly the toothed discs must be provided with ball receiving recesses 72 along their periphery. It is apparent, however, that chains and gears, or belts and pulleys could be used instead of the ball chains and toothed discs shown in the drawings. To operate the closure members, regardless of which embodiment of the linkage mechanism is employed, a portion 31 of the end of crankshaft 30 is extended through the end of the housing. A manually operated lever 74 is rigidly secured to this portion of the crankshaft so that rotation of this lever causes both of the crankshafts to rotate.

As stated above, the rotation of these crankshafts must sequentially cause the first and second groups of hook members 36 and 38 to move from a position where they all engage the cover bowl or pan 20 to a position where the first group of hook members 36 move out of engagement with the cover bowl while the second group of hook members 38 remain in pivotal engagement with the cover bowl to provide an internal hinge connection, and finally to a position where both the first and second groups of hook members move out of engagement with the cover bowl, permitting it to be removed from the housing. The hook members and crankshafts, along with both modifications of the linkage systems described above are designed to satisfy these requirements. In closed position, and with the actuating lever 74 in the position indicated by the letter A in Fig. 1, the crankshafts 30 and 32 and the offset portions 34 are positioned as indicated in Fig. 2 and the linkage mechanism is disposed as shown in Fig. 9. In this position both groups of hook members 36 and 38 engage the underside of the flange 22 on the periphery of the cover bowl 20 and exert a clamping pressure on it which acts to draw the outer surfaces of these flanges against the packing 23 to seal the interior of the housing. Rotation of the actuating lever 74 towards the position indicated by the letter B in Fig. 1 causes crankshaft 30 and the crank portion 34 to rotate in the direction indicated by the curved arrows, see Fig. 2. It is noted that crankshaft 32 which initially rotates in the same direction as crankshaft 30 undergoes a change in the direction of rotation when the linkage system shown in Figs. 8 and 9 is used to connect the crankshafts. The reason for this change in direction can be seen by reference to Fig. 9. There, remembering that the bell crank 50 is pivotally secured to a fixed support 53, rotation of the crankshaft 30 in the clockwise direction initially causes the push rod 48 to push bell crank 50 around its pivotal connection with the fixed support 53 in a clockwise direction. This rotation is communicated to crankshaft 32 which is also rotated in the clockwise direction. Then after crankshaft 30 rotates beyond the dead point, where the axis of the first lever 56 and the push rod 48 are parallel to each other, continued rotation of the crankshaft causes the push rod 48 to pull rather than push against the bell crank 47 causing the above described change in direction of rotation of the crankshaft 32. As seen in Figs. 4 and 5, after the above described change in the direction of rotation of the crankshaft 32, the offset portions 34 on both crankshafts move with a predetermined phase difference and with different rotational speeds. The difference in rotational speeds is caused by the difference in length between the long and short arms 54 and 52 on the bell crank 50. Continued rotation of the actuating lever to

position B causes the crankshaft 30 to rotate in the clockwise direction, causing the hook members of the first group 36 to slide in slot 40 and pivot out of engagement with the flange 22 on adjacent side of the cover bowl or pan 20, see Fig. 6. Continued rotation of the actuating lever to position C causes a continued rotation of the crankshaft 30, but does not appreciably affect the position of the first group of hook member 36, but during this movement the continued counterclockwise rotation of crankshaft 32 causes the hook member 38 to slide in slots 40 and then pivot out of engagement with the flanges 22 of the cover bowl, permitting the cover bowl to be entirely removed, see Fig. 7.

In the modification shown in Fig. 10, the linkage system acts substantially the same way to cause the crankshaft to rotate in opposite directions and to produce the required phase and speed differences. The position of the discs corresponding to the three important positions of the actuating lever are indicated schematically on their face.

In order to prevent the actuating lever 74 from rotating accidentally from the hinge position B to hinge position C, a conventional spring 75 may be connected to one of the elements of the linkage system which, when the actuating lever 74 moves from position B to position C, exerts a resisting force on the lever with the result that the crankshaft 30 and the actuating lever 74 can be turned to the position C only by overcoming the force exerted by the spring 75.

With the structure described above, the closure mechanism will have two functions, depending upon the position of the actuating lever. In one position it acts as a locking mechanism to positively lock the cover bowl to the housing. In another position it acts as a releasable hinge to pivotally connect the cover bowl to the housing, and as a hinge, it can be totally disconnected from the glass cover bowl by moving the actuating lever to another position. Furthermore, the entire closure mechanism is mounted inside the fixture where it is substantially unaffected by the elements and so no special precautions need be taken to select a material particularly resistant to corrosion. With a fixture constructed according to this invention, a serviceman may ascend a light pole and quickly and conveniently manipulate the actuating lever to gain access to the interior of the housing or to completely remove the cover bowl from the housing for replacement or cleaning.

This invention may be embodied in other forms without departing from the spirit or essential characteristics thereof as set forth in the claims, and the present embodiment is therefore to be considered as illustrative and not restrictive, and it is intended to include all changes which come within the scope and range of the claims.

I claim:

1. A fixture for supporting appliances comprising in combination a hollow housing section and a cover section, said housing section having an appliance receiving opening, said cover section adapted to close said appliance receiving opening, at least one pair of gripping members movably mounted on one of the fixture sections, linkage means connecting said gripping members, actuating means drivingly connected to said linkage means and operable to selectively move the gripping members so that moving the linkage means to one position causes the gripping members to move into engagement with the other fixture section to hold said cover section in sealing position over said appliance receiving opening in said housing section, and moving the linkage means to another position causes one of each pair of gripping members to withdraw from engagement with said other fixture section so that the remaining gripping members form a pivotal engagement between the adjacent portions of the housing section and the cover section to provide access to the interior of the housing section, and moving the linkage means to still another position causes all

the gripping members to be withdrawn from engagement with the other fixture sections so that the housing section and the cover section can be completely separated from each other.

2. A fixture for supporting appliances comprising in combination a hollow housing section and a cover section, said housing section having an appliance receiving opening, said cover section adapted to close said appliance receiving opening, at least one pair of arms positioned in spaced relation to each other on one of the fixture sections, one end of each arm adapted to rotate on an axis, the axes of rotation of the arms parallel to each other, a gripping member pivotally connected to the opposite end of each arm, linkage means connecting said arms together to provide a predetermined phase displacement between them, an actuating means drivingly connected to said linkage means and operable to selectively rotate said arms and said gripping means so that moving the linkage means to one position causes the gripping members to move into engagement with the other fixture section to hold said cover section in sealing position over said appliance receiving opening in said housing section, and moving the linkage means to another position causes one of each pair of gripping members to withdraw from engagement with said other fixture section so that the remaining gripping members form a pivotal connection between the housing section and the cover section, and moving the linkage means to still another position causes all the gripping members to be withdrawn from engagement with the other fixture section so that the housing section and the cover section can be completely separated from each other.

3. A fixture for supporting appliances comprising in combination a hollow housing section and a cover section, said housing section having an appliance receiving opening, said cover section adapted to close said appliance receiving opening, a pair of shafts rotatably mounted on one of the fixture sections in spaced parallel relation to each other, at least one pair of arms, one end of each arm connected to one of said shafts, a gripping member pivotally connected to the opposite end of each arm, linkage means connected to said shafts to provide the arms with a predetermined phase difference, actuating means drivingly connected to said linkage means and operable to selectively rotate said shafts so that moving the linkage means to one position causes the gripping members to move into engagement with the other fixture section to hold said cover section in sealing position over said appliance receiving opening in said housing section, and moving the linkage means to another position causes one of each pair of gripping members to withdraw from engagement with said other fixture section so that the remaining gripping members form a pivotal connection between the housing section and the cover section, and moving the linkage means to still another position causes all the gripping members to be withdrawn from engagement with the other fixture section so that the housing section and the cover section can be completely separated from each other.

4. A fixture for supporting appliances comprising in combination a hollow housing section and a cover section, said housing section having an appliance receiving opening, said cover section adapted to close said appliance receiving opening, a pair of parallel shafts rotatably mounted on one of the fixture sections, at least one pair of arms, one end of each arm connected to one of said shafts, said one fixture section having guide and pivot portions, a gripping member pivotally connected to the opposite end of each arm, each of said gripping members in sliding and pivoting engagement with said guide and pivot portions, linkage means connected to said shafts to cause them to rotate in opposite directions and to provide the arms with a predetermined phase and speed difference, and actuating means drivingly connected to said linkage means and operable to selectively rotate said shafts and cause said gripping means to slide and pivot over said guide and pivot portions so that moving the linkage means

to one position causes the gripping members to move into engagement with the other fixture section to hold said cover section in sealing position over said appliance receiving opening in said housing section, and moving the linkage means to another position causes one of each pair of gripping members to withdraw from engagement with said other fixture section so that the remaining gripping members form a pivotal connection between the housing section and the cover section, and moving the linkage means to still another position causes all the gripping members to be withdrawn from engagement with the other fixture section so that the housing section and the cover section can be completely separated from each other.

5. A fixture for supporting appliances comprising in combination a hollow housing section and a cover section, said housing section having an appliance receiving opening, said cover section adapted to close said appliance receiving opening, a pair of parallel crankshafts rotatably mounted on one of the fixture sections, at least one pair of gripping members, one end of each gripping member pivotally connected to an offset arm portion on each crankshaft, said one fixture section having guide and pivot portions, each of said gripping members in sliding and pivoting engagement with said guide and pivot portions, linkage means connected between said crankshafts to cause them to rotate in opposite directions and to provide them with a predetermined phase and speed difference, and actuating means drivingly connected to said linkage means and operable to selectively rotate said shafts and cause said gripping members to slide and pivot over said guide and pivot portions so that moving the linkage means to one position causes the gripping members to move into engagement with the other fixture section to hold said cover section in sealing position over said appliance receiving opening in said housing section, and moving the linkage means to another position causes one of each pair of gripping members to withdraw from engagement with said other fixture section so that the remaining gripping members form a pivotal connection between the housing section and the cover section, and moving the linkage means to still another position causes all the gripping members to be withdrawn from engagement with the other fixture section so that the housing section and the cover section can be completely separated from each other.

6. The apparatus set forth in claim 5 wherein said linkage means comprises a first lever arm, a portion of said first lever arm secured to one of said crankshafts, another portion of said lever arm connected to a push rod, said push rod secured to the apex of a bell crank, one portion of said bell crank pivotally secured to a fixed support, another portion of said bell crank connected to a portion of a connecting rod, another portion of said connecting rod connected to a second lever arm, said lever arm connected to the other of the crankshafts so that the second lever arm is provided with a predetermined phase displacement with respect to the first lever arm.

7. The apparatus set forth in claim 5 wherein said linkage means comprises a first lever arm, one end of said first lever arm secured to one of said crankshafts, the other end of said first lever arm pivotally secured to one end of a push rod, the opposite end of said push rod pivotally secured to the apex of a bell crank, one end of said bell crank pivotally secured to a fixed support, and the other end pivotally secured to one end of a connecting rod, the opposite end of said connecting rod pivotally connected to one end of a second lever arm, the opposite end of said second lever arm secured to the other of the crankshafts so that the second lever arm is provided with a predetermined phase displacement with respect to the first lever arm.

8. The apparatus set forth in claim 5 wherein said linkage means comprises a first lever arm, one end of said first lever arm secured to one of said crankshafts, the other end of said first lever arm pivotally secured

to one end of a push rod, the opposite end of said push rod pivotally secured to the apex of a bell crank, said bell crank having a short arm and a long arm, the end of said short arm pivotally secured to a fixed support, the end of said long arm pivotally connected to one end of a connecting rod, the opposite end of said connecting rod pivotally connected to an end of a second lever arm, the opposite end of said second lever arm secured to the other of the crankshafts so that the second lever arm is provided with a predetermined phase displacement with respect to the first lever arm, and when said first crankshaft is rotated in one direction said second crankshaft will rotate in the opposite direction at a different speed.

9. The apparatus set forth in claim 5 wherein said linkage means comprises a toothed disc mounted on each crankshaft, said discs having different diameters, a crossed ball chain connected between said discs so that when one crankshaft is rotated the other shafts will rotate in the opposite direction and at a different rotational speed.

10. A light fixture comprising in combination an axially extending bottle shaped housing and a cover bowl, said housing provided with a projecting mast receiving neck opening at one end, a bracket mounted inside the housing for receiving and rigidly clamping the light fixture to a mast penetrating the housing through the neck opening, said housing having an axially extending opening, said cover bowl adapted to fit over and close said axially extending opening, a pair of spaced parallel crankshafts, said crankshafts parallel to the axis of the housing and rotatably mounted therein on opposite sides of the axially extending opening, pairs of hook members, each hook member pivotally connected at one end to the axially spaced offset arm portions of the crankshafts, said housing having a plurality of upwardly projecting axially spaced lugs, said lugs disposed along the opposite sides of the axially extending opening, each of said lugs having a guide and pivot slot therein, each hook member in sliding and pivoting engagement with one of said guide and pivot slots, the periphery of said cover bowl provided with inwardly projecting flanges, linkage means connected to said crankshafts to cause them to rotate in opposite directions and to provide them with a predetermined speed and phase difference, an actuating handle connected to one of said crankshafts to rotate them and cause the hook members to slide and pivot over said guide and pivot slots, so that moving the linkage means to one position causes the hook members to engage and grip the inwardly projecting flanges on the cover bowl to hold it in sealing position over said axially extending opening in said housing, and moving the linkage means to another position causes the hook members disposed along one side of the axially extending opening to move out of engagement with the adjacent inwardly projecting flanges on the cover bowl, so that the engagement between the remaining hook members and the adjacent cover bowl flanges provides a hinge connection between the housing and the cover bowl, and moving the linkage means to still another position causes all the hook members to withdraw from engagement with said cover bowl flanges so that the housing and cover bowl can be completely separated from each other.

11. The apparatus set forth in claim 10 wherein said linkage means comprises a first lever arm, one end of said first lever arm secured to one of said crankshafts, the other end of said first lever arm pivotally secured to one end of a push rod, the opposite end of said push rod pivotally secured to the apex of a bell crank, said bell crank having a short arm and a long arm, the end of said short arm pivotally secured to a fixed support, the end of said long arm pivotally connected to an end of a connecting rod, the opposite end of said connecting rod pivotally connected to an end of a second lever arm, the opposite end of said second lever arm secured to the other of the crankshafts so that the second lever arm is provided with a predetermined phase displacement with respect to the

first lever arm, and when said first crankshaft is rotated in one direction, said second crankshaft will rotate in the opposite direction at a different speed.

12. The apparatus set forth in claim 10 wherein said linkage means comprises a toothed disc mounted on each crankshaft, said discs having different diameters, a crossed ball chain connected between said discs so that when one crankshaft is rotated, the other crankshaft will rotate in the opposite direction and at a different rotational speed.

13. A fixture for supporting appliances comprising in combination a hollow housing section and a cover section, said housing section having an appliance receiving opening, said cover section being adapted to close said appliance receiving opening, at least one pair of gripping members movably mounted on one of the fixture sections, actuating means operatively connected to said gripping members and operable selectively to move the gripping members so that actuation to one position causes the gripping members to move into engagement with the other fixture section to hold said cover section in sealing posi-

tion over said appliance receiving opening the housing section and movement to another position causes one of each pair of gripping members to withdraw from engagement with said other fixture section so that the remaining gripping members form a pivotal engagement between the adjacent portions of the housing section and the cover section to provide access to the interior of the housing and movement of the actuating means to a still further position causes all of the gripping members to be withdrawn from engagement with the other fixture section so that the housing section and the cover section can be completely separated one from the other.

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