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ELECTRIC PLUG EJECTING MECHANISM

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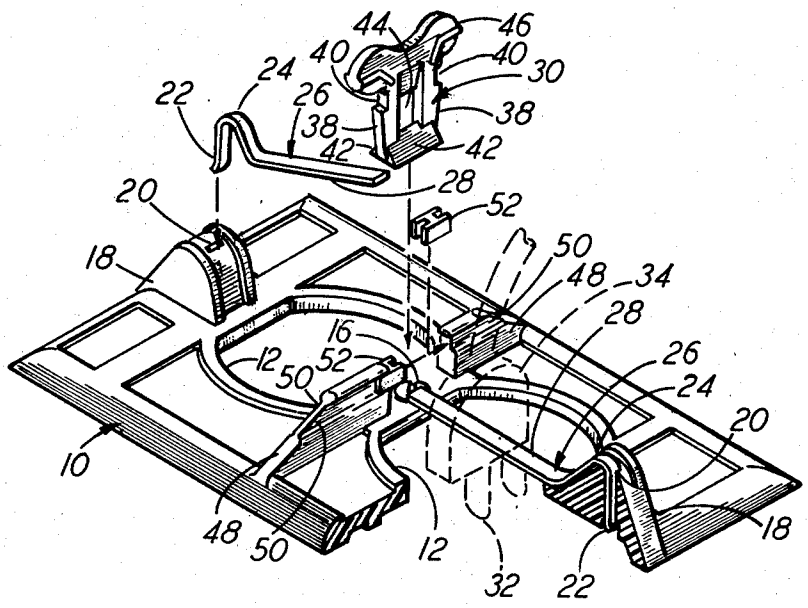


FIG. 1.

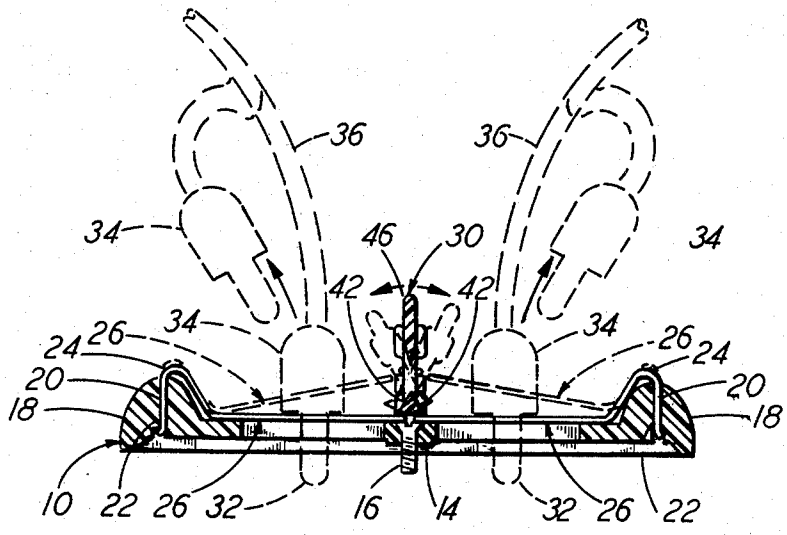


FIG. 2.

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ELECTRIC PLUG EJECTING MECHANISM

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10 Claims. (Cl. 339—45)

This invention relates to improvements in electric plug ejecting mechanism and, more particularly, to plug ejecting mechanism combined with a cover plate for electrical outlets.

When an electric plug is inserted into an electrical outlet, it is highly desirable that a firm physical contact be made between the prongs on the electric plug and the electrical contact members within the socket. This arrangement prevents arcing and also insures constant flow of current to the appliance or other electrical apparatus to which the plug is connected. However, it is frequently found in relation to household appliances particularly that such firm connection between the electric plug and the outlet is sufficiently strong to resist ready removal of the plug from the electrical outlet socket. Accordingly, the electric cable or conductor to which the electric plug is connected is pulled upon in order to aid in removing the plug from the socket. Such expedient however usually results in wearing and breakage of the wire conductors and, not infrequently, results in the electrical conductor being pulled from the plug.

Further, although attempts have been made to provide finger grip means upon electric plugs in order to facilitate the removal thereof from an electrical outlet, such provision adds to the cost of producing the plugs and correspondingly to the sales price of the electrical appliance. Competitive prices discourage the use of such expedients and, even where means of this type are used, it is found particularly that when ladies attempt to remove such plugs, breakage of finger nails frequently occurs.

It is the principal object of the present invention to provide a cover plate for an electrical outlet which is provided with readily operable plug ejecting means, whereby the actuation of a simple release or latch lever activates a resilient ejecting member to cause automatic and instantaneous ejection of the plug from the electrical outlet, thereby not only rendering the removal of the plug much easier than was heretofore possible but the quickness of such ejection also minimizes arcing between the prongs of the plug and the electrical contacts of the outlet.

Inasmuch as electrical fittings of this nature usually are highly competitive in price, the cost of providing an electrical outlet cover plate with means of this nature must be taken into consideration and, in order to make it possible to produce a device of this nature within a competitive price range with normal electrical outlet cover plates, the present invention provides plug ejecting means comprising a few inexpensive elements which may be retailed in separated or knocked-down condition in a package and the customer or user assemblies the components quickly and easily to produce a cover plate complete with plug ejecting means.

Still another object of the invention is to provide an electrical outlet cover plate provided with plug ejecting means which may be mounted on a conventional electrical outlet without requiring the use of any special tools or without modifying the normal outlet construction or its outlet box in any way.

One further object of the invention is to so design and arrange the details of the cover plate and plug ejecting mechanism comprising the present invention so that the same may be manufactured from relatively inexpensive material and by standard equipment such as plastic molding apparatus, metal stamping machines, and the like, and said components are capable of rapid mass production, whereby the overall cost of manufacturing the same is maintained at a minimum.

Details of the foregoing objects and of the invention, as well as other objects thereof, are set forth in the following specification and illustrated in the accompanying drawing comprising a part thereof.

In the drawing:

Fig. 1 is a perspective, partly exploded view of an electrical outlet cover plate having electric plug ejecting mechanism combined therewith in accordance with the principles of the invention, part of the cover plate being broken away to illustrate certain details of the construction.

Fig. 2 is a longitudinal vertical section of the cover plate and electric plug ejecting assembly, said view also illustrating in full lines a pair of electric plugs positioned in operative relationship with the cover plate, while in broken lines, said plugs are shown in ejected relationship therefrom. Said view also illustrates in full lines the normal latching position of the latching mechanism, while in broken lines, said latching member is shown in alternate unlatching positions.

Referring to the drawing, a cover plate **10** having a conventional outline is provided with a pair of outlet openings **12** and a central aperture **14** which receives a conventional attaching screw **16**. Hence, it will be seen that the cover plate **10** may be attached to a conventional electric outlet by conventional means such as the screw **16**. Further, while the present illustration includes a pair of outlet openings **12**, it is to be understood that the present invention is not to be restricted to the use of a pair of such openings or a pair of plug ejecting means, to be described, inasmuch as the principles of the invention readily are adaptable to a cover plate for a single electrical outlet.

The cover plate **10** lends itself to being molded readily from synthetic resin or plastic material in conventional molding dies, the dies of course being provided with suitable cavities to form the desired bosses, ribs, and other details required in the preferred construction of the present invention as will be brought out in detail hereinafter.

The cover plate **10** is provided, preferably adjacent opposite ends thereof, with a pair of bosses **18**, each of these being provided with a recess **20** extending thereinto preferably in a direction transverse to the plane of the cover plate **10**. The recesses **20** also preferably extend entirely through the bosses and the cover plate **10** as is clear from Fig. 2.

The recesses **20** receive one leg **22** of a substantially U-shaped portion **24** formed on one end of an ejecting member **26** preferably comprising a leaf spring which also has a substantially flat ejecting blade portion **28**. Further, the extremity of the leg **22** preferably is bent outwardly slightly as clearly shown in Figs. 1 and 2 so as to somewhat catch against the inner surface of the cover plate **10** as clearly show in Fig. 2 and thereby, in addition to the legs **22** frictionally engaging the recesses **20**, insuring against accidental separation of the ejecting members **26** from the bosses **18**.

As will be seen from both of the figures, the so-called inner ends of the ejecting members **26** are disposed adjacent the central portion of the cover plate **10** but preferably are slightly spaced from each other in order to accommodate a latch member **30** therebetween. Further, the width of the ejecting members **26** is such that they readily are received between the prongs **32** of a conven-

tional electric plug **34** attached to the end of an electrical conductor or cable **36**. When an electric plug **34** is connected to an electrical outlet, not shown, by projecting the prongs **32** into the outlet openings therefor, no short circuiting between the prongs will be caused by the preferably metallic ejecting member **26** due to the fact that the plug **34** is made from insulating material such as synthetic resin, rubber, or the like, and the conventional distance between the prongs **32** is highly adequate to permit a relatively narrow flat ejecting means such as the blade portion **28** to be positioned between the prongs in amply spaced relationship thereto, and also may be coated with flexible insulation material.

The normal configuration of the ejecting members **26** is such that when they are mounted in the recesses **20**, the ejecting blade portions **28** will be disposed at an acute angle to the outer surface of the cover plate **10** as shown in broken lines in Fig. 2. This is the position in which the blade portions **28** of said ejecting members are disposed when the plug **34** first engages the same upon the plug being connected to the electrical outlet. Further, the engagement of the prongs **32** with the receiving openings of the outlet will center the plug automatically relative to the blade portion **28** of the ejecting member whereby when the prongs **32** make electrical contact with the elements within the socket, the blade portion **28** will readily be spaced between the prongs. Complete insertion of the plug prongs **32** into the electrical outlet will effect movement of the blade portions **28** from the broken line positions shown in Fig. 2 to the full line positions shown in said figure.

When the plug **34** has been fully connected to the electrical outlet, not shown, the resilient strength of the ejecting member **26** is such that it automatically will restore the blade portion **28** from the full line position to the broken line ejecting position shown in Fig. 2 unless means are provided to hold the ejecting member latched in the full line position thereof. Accordingly, the present invention provides a latch member **30** which preferably is pivotally supported centrally of the opposite ends of cover plate **10** for purposes of simultaneously latching both of the ejecting members **26**, yet the details of the latch are such, as will be described, that either of the ejecting members may be unlatched from restrained or latched position, selectively, to cause ejection of one or the other of the electrical plugs which may be connected to the sockets.

Referring particularly to Fig. 1, it will be seen that the latch member **30** is of such nature that it readily may be molded from synthetic resin by customary means. The opposite sides **38** thereof taper inwardly and downwardly relative to each other for purposes of facilitating the assembly thereof with the other components of the apparatus. Also, the upper ends of said sides **38** terminate in notches **40**. The opposite surfaces of latch **30** also terminate at their lower ends in oppositely and outwardly directed cam surfaces **42**, the upper edges of said cam surfaces **42** meeting and forming the lower outline of a central opening **44**. Said opening permits clearance through which the inner end of the blade portions **28** of the ejecting members may move when the latch **30** is tilted to unlatching position for releasing said blade portions. The upper end of the latch **30** also is provided with a handle member **46** which is of sufficient size that it readily may be engaged either by the fingers of the user or, if the outlet is positioned adjacent the floor for example, the handle member **46** may be engaged by the toe of the shoe of an operator to effect release of the plug from the electrical outlet.

The latch **30** is pivotally connected to the cover plate **10** by means of a pair of similar projecting ribs **48** which are molded integrally with the cover plate **10**. The opposite surfaces of the ribs **48** preferably are provided with elongated parallel recesses **50** which extend inwardly from said opposite surfaces. The inner ends

of the ribs **48** are spaced apart as is obvious from Fig. 1 for purposes of receiving the latch **30** therebetween.

Combination resilient pivotal members and latch-restoring means **52** are disposed between the ribs **48** and the opposite sides of the latch **30**. The pivot means **52**, in top plan view, are H-shaped as is clearly seen from Fig. 1 and said means may be made from any suitable type of resilient material such as rubber, soft synthetic resin, or the like. The projections on the pivot means **52** respectively are disposed within the recesses **50** in projecting ribs **48** and the opposite ends of the pivot means **52** are received within the notches **40** on opposite sides of the latch **30**.

In assembling the latch, the pivot means **52**, and the projecting ribs **48**, the pivot means **52** preferably are first mounted in position on the ribs **48** within the recesses **50**, one of the means **52** being shown mounted in operative position in Fig. 1. When both of said pivot means **52** are so mounted, the tapered sides **38** of latch **30** may be slidably projected downwardly from the top of cover plate **10** between the previously mounted members **52** until said members are compressed and finally snapped into the notches **40** of latch **30**. The assembly is then completed. The ejecting member **26** then may be connected to the cover plate **10** by inserting the legs **22** of the ejecting members within the recesses **20** to the full extent of the legs **22**, whereupon the inner ends of said legs will snap over the inner surfaces of cover plate **10** as shown in Fig. 2. When so assembled, the blade portions **28** of the ejecting members **26** will be disposed in the broken line positions shown in Fig. 2 and the latch **30** will be in the full line position shown in vertical sectional view in Fig. 2. It will be understood that the pivotal axis of the latch **30** will be transversely through the notches **40** and parallel to the plane of the cover plate **10**. Said axis therefore will be intermediately of the handle member **46** and the cam surfaces **42** which define the sides of the latching portion of the latch **30**, the bottom surface of the latch **30** actually comprising the latching surface thereof which is engaged by the inner ends of the ejecting members **26**.

Assuming the assembled arrangement of the ejecting members **26**, latch **30**, and cover plate **10** to be as shown in Fig. 2 with the ejecting members disposed in the raised or broken line positions, the assembly then is in position to be engaged by one or more electric plugs **34**. When a plug **34** is moved to the operative position thereof shown in Fig. 2, it automatically will depress the blade portion **28** of ejecting member **26** to the full line position and, when the inner end of ejecting member **26** is moved into engagement with the cam surface **42** of latch **30**, it will cam the lower end of the latch in a direction to permit the inner end of ejecting member **26** to be disposed beneath the bottom surface of latch **30**, whereupon the resilience of pivot means **52** automatically will restore the latch from the dotted line position thereof shown in Fig. 2 to the full line or latching position thereof shown in said figure. When a second plug **34** is inserted in the other electrical outlet, it also will depress the ejecting member **26** on the other end of the cover plate **10** and when the inner end of said ejecting member engages its cam surface **42** on latch **30**, such action will cause the cam end of latch **30** to be moved away from the inner end of the second ejecting member **26** and actually in further engagement with the previously latched inner end of the other ejecting member **26**. However, following the complete insertion of the second plug **34**, the resilent nature of the pivot means **52** will again center or restore the latch **30** to the full line position thereof shown in Fig. 2.

Either of the electrically connected plugs **34** may selectively be automatically ejected from the outlet socket receiving the same simply by pivotally moving the latch **30** in the necessary direction to disengage the inner end of the ejecting member **26** beneath said plug from engage-

ment with the lower surface of latch **30** and, when the latch **30** has been tilted sufficiently, the blade portion **28** of the ejecting member **26** instantaneously then will snap or project the plug **34** from its electrical outlet socket without requiring the user to engage the plug **34** in any way. Such releasing action of one ejecting member **26** will not release the other ejecting member in the event the plug straddling the same is still in electrical contact with its outlet socket. However, in such ejection action, the pivot means **52** automatically will restore the latch **30** substantially to its central, full line position shown in Fig. 2 and, if desired, the other plug **34** then may be ejected by tilting the latch in the opposite direction to effect disengagement of the lower end thereof from the inner end of the other ejecting member **26**.

From the foregoing, it will be seen that a simple, relatively inexpensive, and fool-proof electric plug ejecting means is provided which may be assembled if desired by the customer and readily may be installed in operative position upon any conventional electric outlet fixture and box by standard means comprising the conventional connecting screw **16**. It is only necessary to use a conventional screw driver in order to effect attachment of the plug ejecting, cover plate assembly to the outlet fixture and the details of construction of the components of the assembly are such as to prevent accidental separation of the components from each other.

While the invention has been described and illustrated in its several preferred embodiments, and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

We claim:

1. Electric plug ejecting means comprising an electrical receptacle cover plate having an opening to receive an electrical outlet socket, plug ejecting mechanism comprising a blade extending across said opening and arranged to project between the prongs of an electric plug and abut the end of such plug, said ejecting mechanism also including spring means normally urging said blade in ejecting direction away from said plate, and releasable latch means movably connected to said plate and engageable with one end of said blade when depressed toward said plate upon the insertion of a plug into an outlet socket within said plate opening to latch said blade in such depressed position until the latch means is moved to release said blade, whereupon said spring means causes said blade to eject said plug from said socket.

2. Electric plug ejecting means comprising an electrical receptacle cover plate having an opening to receive an electrical outlet socket, a plug ejecting member comprising a leaf spring having a flat blade portion extending across said opening and arranged to project between the prongs of an electric plug and abut the end of such plug, one end of said spring being connected to said cover plate and normally urging the flat portion of said blade in ejecting direction away from said plate, and releasable latch means movably connected to said plate and engageable with the other end of said blade when depressed toward said plate upon the insertion of a plug into an outlet socket within said plate opening to latch said blade portion in such depressed position until the latch is moved to release said blade portion, whereupon said leaf spring causes said blade portion to eject said plug from said socket.

3. Electric plug ejecting means comprising an electrical receptacle cover plate having a recess extending thereinto and an opening to receive an electrical outlet socket, a plug ejecting member comprising a leaf spring having a flat blade portion extending across said opening and arranged to project between the prongs of an electric plug and abut the end of such plug, one end of said leaf spring being bent transversely to the flat portion thereof and extending into said recess of said plate and operable normally to urge the flat portion of said blade in ejecting direction away from said plate, and releasable latch means movably connected to said plate and engageable with said other end of said blade when depressed toward said plate upon the insertion of a plug into an outlet socket within said plate opening to latch said blade portion in such depressed position until the latch is moved to release said blade portion, whereupon said leaf spring means causes said blade portion to eject said plug from said socket.

4. Electric plug ejecting means comprising an electrical receptacle cover plate having an opening to receive an electrical outlet socket, a boss projecting from one surface of said plate and having a recess extending thereinto, a plug ejecting member comprising a leaf spring having a flat blade portion and arranged to project between the prongs of an electric plug and abut the end of such plug, one end of said leaf spring being bent to provide a U-shaped portion extending transversely to said flat portion and one leg thereof being received frictionally within said recess to connect said leaf spring to said cover plate cantilever-like and normally urging the free end of said flat blade portion in ejecting direction away from said plate, and releasable latch means movably connected to said plate and engageable with said free end of said flat blade portion when depressed toward said plate upon the insertion of a plug into an outlet socket within said plate opening to latch said blade portion in such depressed position until the latch is moved to release said blade portion, whereupon said leaf spring causes said blade portion thereof to move to eject said plug from said socket.

5. Electric plug ejecting means comprising an electrical receptacle cover plate having an opening to receive an electrical outlet socket, plug ejecting mechanism comprising a blade extending across said opening and arranged to project between the prongs of an electric plug and abut the end of such plug, said ejecting mechanism also including spring means normally urging said blade in ejecting direction away from said plate, a releasable latch movably connected to said plate and engageable with one end of said blade when depressed toward said plate upon the insertion of a plug into an outlet socket within said plate opening to latch said blade in such depressed position until the latch is moved in one direction to release said blade, whereupon said spring means causes said blade to eject said plug from said socket, and means connected to said latch means and operable normally to maintain said latch in blade engaging position and restore said latch to said position after movement therefrom.

6. Electric plug ejecting means comprising an electrical receptacle cover plate having an opening to receive an electrical outlet socket, plug ejecting mechanism comprising a blade supported at one end by said plate and extending across said opening and arranged to project between the prongs of an electric plug and abut the end of such plug, said ejecting mechanism also including spring means normally urging said blade in ejecting direction away from said plate, a latch member engageable with one end of said blade when depressed toward said plate upon the insertion of a plug into an outlet socket within said plate opening to latch said blade in such depressed position until the latch member is moved in one direction to release said blade, whereupon said spring means causes said blade to eject said plug from said socket, and means pivotally connecting said latch member to said plate for movement in latching and unlatching directions, said connecting means also being operable automatically normally to restore said latch member to latching position following movement thereof to unlatching position.

7. Electric plug ejecting means comprising an electric receptacle cover plate having a pair of openings respectively adapted to receive electrical outlet sockets, substantially flat plug ejecting blades respectively extend-

ing across said openings and including spring means at one end of each blade respectively connected to said plate adjacent opposite ends thereof and normally urging the other ends of said blades in ejecting direction away from said plate, the said other ends of said blades being positioned adjacent the center of said plate, and latch means movably carried by said plate adjacent the center thereof and engageable selectively either individually or simultaneously with said other ends of both of said blades when the latter are depressed toward said plate upon the insertion of plugs into outlet sockets within said plate openings, said latch means being movable selectively in directions to release either blade to eject the plugs from said sockets while the remaining blade remains latched if depressed.

8. Electric plug ejecting means comprising an electric receptacle cover plate having a pair of openings respectively adapted to receive electrical outlet sockets, a pair of leaf spring members having substantially flat plug ejecting blade portions respectively extending across said openings, one end of each of said spring members respectively being connected to said plate adjacent opposite ends thereof and said ends of said blades normally urging the flat blade portions of said spring members in ejecting direction away from said plate, the ends of said flat blade portions being positioned adjacent the center of said plate, and latch means movably carried by said plate adjacent the center thereof and engageable selectively either individually or simultaneously with said ends of the flat blade portions of both of said spring members when the blade portions thereof are depressed toward said plate upon the insertion of plugs into outlet sockets within said plate openings, said latch means being movable selectively in directions to release the end of either blade portion to eject plugs from said sockets while the remaining blade remains latched if depressed.

9. Electric plug ejecting means comprising an electric receptacle cover plate having recessed bosses projecting from one surface respectively adjacent opposite ends thereof and said plate also having a pair of openings respectively adapted to receive electrical outlet sockets, a pair of leaf spring members having substantially flat plug ejecting blade portions respectively extending across said openings, one end of each of said spring members respectively being bent transversely thereto and received frictionally within the recesses of said bosses to connect said spring members to said plate, said bent ends of said

spring members normally urging the other ends and flat blade portions of said blades in ejecting direction away from said plate and the said other ends of said blades being positioned adjacent the center of said plate, and latch means movably carried by said plate adjacent the center thereof and engageable selectively either individually or simultaneously with said other ends of both of said blade portions when the blade portions are depressed toward said plate upon the insertion of plugs into outlet socket within said plate openings, said latch means being movable selectively in directions to release either blade portion to eject plugs from said sockets while the remaining blade portion remains latched if depressed.

10. Electric plug ejecting means comprising an electric receptacle cover plate having a pair of openings respectively adapted to receive electrical outlet sockets, a pair of leaf spring members having substantially flat plug ejecting blade portions respectively extending across said openings, one end of each of said spring members respectively being connected to said plate adjacent opposite ends thereof and said ends of said blades normally urging the other ends and flat blade portions of said spring members in ejecting direction away from said plate, the said other ends of said blades being positioned adjacent the center of said plate, a latch member movably carried by said plate adjacent the center thereof and engageable selectively either individually or simultaneously with said other ends of both of said spring members when the blade portions thereof are depressed toward said plate upon the insertion of plugs into outlet sockets within said plate openings, and means pivotally connecting said latch member to said plate for movement in latching and unlatching directions, said connecting means also including means operable automatically to restore said latch member to latching position following movement thereof to unlatching position, said latch means being pivotally movable selectively in opposite directions to release said other end of either blade and cause the spring members to eject plugs from said sockets while the remaining blade remains latched if depressed.

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