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SAFETY LOCKING DEVICE

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Filed Dec. 8, 1966, Ser. No. 600,097

Claims priority, application Canada, Dec. 21, 1965,

948,294

7 Claims. (Cl. 339—38)

This invention relates to a safety locking device. More particularly, it relates to a locking device suitable in various applications, e.g. as an electric plug, or as a cover for an electrical outlet or as a jar lid, or as a door latch. The device of the present invention requires several coordinated movements for operation and is therefore difficult for young children to operate.

It is well-known that young children tend to place pins or their fingers in electrical outlets. Similar problems exist with bottles of poisonous or medicinal materials; children tend to take the tops off these jars and place the contents in their mouths. Children additionally are apt to open doors such as cupboard doors and oven doors, and remove or destroy the contents inside.

Accordingly, it is an object of the present invention to provide a locking device requiring coordinated movements for its operation, which movements can easily be performed by an adult but which cannot easily be mastered by young children. In one embodiment of the invention, two such movements are required. In the preferred embodiment of the invention, three coordinated movements are required to lock or to unlock the device. Further objects and advantages of the invention will appear from the following disclosure, in which the embodiments shown are presented mainly for illustrative purposes, the scope of the invention being defined primarily by the appended claims.

In the drawings:

FIGURE 1 shows a sectional view of a dummy electrical plug made in accordance with the present invention;

FIGURE 2 shows the arrangement of locking arms and prongs of the device of FIGURE 1;

FIGURE 3 is a perspective view of the upper disc of the device of FIGURE 1;

FIGURE 4 is a perspective view of the middle disc of the device of FIGURE 1;

FIGURE 5 is a sectional view of a device similar to that of FIGURE 1 employed as a safety locking cap for a bottle;

FIGURE 6 is a sectional view of a device similar to that of FIGURE 1 as employed as a locking catch for a cupboard; and

FIGURE 7 is a sectional view of a simplified safety locking device.

Referring firstly to FIGURE 1 there is shown a sectional view of a dummy electrical plug 1 constructed in accordance with the present invention. FIGURE 2 illustrates the manner in which it locks into an electrical outlet. As shown in FIGURE 2, two prongs 2, normally but not necessarily of insulating material, are provided with gaps 4 therein, in which are fitted a pair of locking arms 6. The locking arms 6 are shown recessed within the gaps 4, but when the prongs 2 are inserted in an electrical wall socket (not shown) and the locking arms 2 are rotated to the position indicated in dotted lines in FIGURE 2, they will lock under the lip found in most wall sockets and will prevent the safety device 1 from being withdrawn from the wall socket. With the wall socket so protected, a child will be unable to place pins or his fingers in the socket.

Referring to FIGURE 1, the safety device 1 comprises an upper disc 8, a middle disc 10, and a lower disc 12, all of insulating material such as plastic. These three discs are mounted in line on an axle 14 with the upper disc 8

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being both rotatable and slidable on the axle 14. The middle disc 10 is prevented from pivoting on the axle 14 by means of a key or spline 16, but it is slidable on the axle 14. The lower disc 12 is firmly fixed on the axle 14.

The top of the upper disc is inset at 18. Located in this inset space 18 is a spring 20 which encircles the axle 14 and bears against a lip 22 at the top of the axle to urge the upper disc 8 downwardly toward the middle disc 10. A second spring 24 encircles the axle 14 between the middle and lower discs 10 and 12 and urges the middle disc 10 toward the upper disc 8.

The locking arms 6 extend upwardly from the prongs 2, through holes 26 in the lower disc 12 and through holes 28 in the middle disc 10, into the space between the middle and upper discs. Flanges 30 on either side of the holes 28 hold the locking arms 6 from vertical movement with respect to the middle disc 10. Above the middle disc 10, the locking arms 6 are bent radially outwardly and each terminates in a narrow loop 32, as best shown in FIGURE 4. Pins 34 set into the upper disc 8 extend downwardly through the loops 32, so that as the upper disc 8 is rotated, the locking arms will be rotated between the locking and unlocking positions shown in dotted and full lines respectively in FIGURE 2.

Each disc 10 and 12 is provided with an upper surface recessed at its edges, and each disc 8 and 10 is provided with a flanged lower surface, as shown in the drawings, in order to shield and conceal the mechanism between the discs. Interlocking means are also provided, to prevent rotation of the upper disc 8 with respect to the middle disc 10 until these two discs are separated by a predetermined distance. The interlocking means include a pair of projections or posts 36 extending from the lower surface of the flange of upper disc 8 (FIGURES 1 and 3). Two cooperating sets of holes 38 and 40 respectively (FIGURE 4) are provided in the outer edge of the upper surface of the middle disc 10. When the posts 36 are in one set of holes, e.g. holes 38, the locking arms 6 are in the unlocking position shown in full lines in FIGURE 2, and when the upper disc is rotated so that the posts 36 are located in the other set of holes 40, the locking arms 6 are in the locking position shown in dotted lines in FIGURE 2.

Commonly a third set of holes 41 will also be formed in the disc 10, providing an alternative locking position in which the lower ends of the locking arms 6 project inwardly towards each other, instead of outwardly and away from each other as shown in the dotted line position of FIGURE 2. This alternative locking position will be necessary if a wall or extension cord socket has an inner lip formed between its socket holes instead of at radially outward edges of the socket holes.

In use, the locking device 1 is plugged into an electrical socket. To lock it into position, the upper disc 8 must be rotated to turn the locking arms 6 to a locking position, but as mentioned, the upper disc cannot be rotated until it is separated axially from the middle disc 10. Therefore, middle disc 10 must be moved downwardly with one hand, and since the spring 20 will then urge the upper disc 8 downwardly also, upper disc 8 must be moved upwardly with the other hand. Alternatively, if upper disc 8 is moved upwardly, middle disc 10 will follow it due to the pressure of spring 24, so that in the result two hands are necessary to separate the two discs. Once the two discs are separated sufficiently so that posts 36 clear the holes 38, the upper disc may be rotated toward the holes 40 to turn the locking arms 6 and lock the safety device in place. During the locking procedure, as middle disc 10 is forced downwardly slightly, the locking arms 6 move downwardly with it, and then as middle disc 10 is released, the locking arms 6 move upward slightly until the bent lower ends thereof rest against the lip (not

shown) inside the wall socket. When the posts 36 are positioned over the holes 40 (as can be determined by the "feel" of the device), the upper and middle discs are permitted to move toward each other to lock against further rotation. If desired, a set of stops may be provided on the disc 10 to prevent rotation of the posts 36 past the holes 40.

Thus, three motions are required to lock the safety device. The middle disc 10 is moved down, the upper disc 8 is moved up (these two movements thus separating the upper and middle discs), and then, the upper disc 8 is rotated to turn the locking arms 6 to the locking position.

In unlocking the safety device so that it may be removed from a wall socket, the procedure is the same. The middle disc 10 is removed downwardly; the upper disc 8 is moved upwardly, and the upper disc is then rotated to move the locking arm 6 to an unlocked position as shown in full lines in FIGURE 2.

It will be realized that as the upper and middle discs are separated, the pins 34 will slide vertically (as shown in FIGURE 1) with respect to the loops 32 at the upper ends of the locking arms 6. In order to prevent disengagement of the pins from the loops, the ends of the pins may be enlarged as shown in the drawings. It will be apparent that the distance d_1 (FIGURE 1) between the enlarged end of each pin 34 and the loop 32 must be greater than the distance d_2 by which the posts 36 penetrates into the holes 38 and 40, so that the upper and middle discs may be separated axially from each other sufficiently for rotation of the upper disc.

If it is desired to use the device as a locking plug then the prongs 2 may be made of conducting material, and a pair of wires may be brought down through the axle 14 and joined to the respective prongs 2 in any convenient manner. Such a locking plug is useful for such devices as vacuum cleaners and irons, since it will not shake or pull loose under ordinary stress and vibration.

Another embodiment of the present invention is shown in FIGURE 5, which illustrates the device used as a safety cap for a bottle 42 of the type including a radially inwardly projecting top flange 44 under which the locking arms may lock. In FIGURE 5 primed reference numerals indicate parts corresponding to those of FIGURES 1 to 4. In the device 1' of FIGURE 5 the lower disc 12' includes a lower threaded flange 46 which acts as a screw-on top for the bottle 42. In the device of FIGURE 5 the upper ends of the locking arms 6' extend radially outwardly and then upwardly at 48 into narrow slots 50 in the upper disc 8'. This arrangement is an alternative to the loops 32 and pins 34 of FIGURES 1 to 4. The height of the sections 48 of the locking arms 6 is made sufficient that axial separation of the upper and middle discs will not disengage the sections 48 from the slots 50. It will be apparent that other arrangements, such as a gear at the top of the locking arms 6 and a pinion on the upper disc 8 of a height sufficient for sliding movement on the gear, would also be suitable.

In addition, in the FIGURE 5 device, the interlocking means have been moved inwardly to a position adjacent the axle 14' and comprise a pair of posts 52 mounted on the upper disc 8' and projecting into slots 54 in the middle disc 10'. The purpose of moving the interlocking means inwardly is to prevent a child from seeing the interlocking arrangement, thus making it more difficult for the child to learn how to operate the device.

It will be apparent that the device of FIGURE 5 is suitable as a cap only for material such as tablets and coarse powders, since it will not be waterproof; liquid may escape through the holes 26' provided in the lower disc 12' for the locking arms 6'. Seals could be provided for these holes if it were desired to employ the device in a bottle containing liquid. Typical liquids for

which a safety cap container would be useful are lye, liquid bleaches, cleaning fluid, paint remover, and other household chemicals.

A further embodiment of the invention, employed as a cupboard door latch, is shown in FIGURE 6. The device of FIGURE 6 is virtually identical to that of FIGURE 1 (except of course for the plug-in prongs 2) and double primed reference numerals indicate corresponding parts. In FIGURE 6 a cupboard door 56 is shown, hinged at 58 to a fixed portion 60 and closing against another fixed portion 62. An ordinary latch, for example a magnetic latch (not shown) is provided normally to hold the door 56 to the fixed portion 62, and in addition the safety locking device 1'' is provided fastened to the door 56, with the upper disc 8'' formed in the shape of a knob. The locking device 1'' has only one locking arm 6'' instead of two, since only one is required in the arrangement as shown in FIGURE 6.

A further and simplified embodiment of the invention is shown in FIGURE 7. The device of FIGURE 7 is similar to that of FIGURE 1 except that only two discs 64 and 66 are provided, with the upper disc 64 being urged toward the lower disc 66 by means of spring 67. To lock or unlock the device of FIGURE 7, it is necessary only to lift the disc 64 with respect to the disc 66 and then to rotate the disc 64 to turn the locking arms 68. Thus, if the device of FIGURE 7 is locked in a wall socket, only two coordinated movements are necessary to unlock it and these two movements may be performed with one hand. These movements may thus be mastered somewhat more easily by a young child than the movements for the device previously described, where three coordinated movements are required. In addition, the locking arms 68 have no vertical movement with respect to the lower disc 66 in the device of FIGURE 7, thus limiting the ease of use of this device. However, in some situations, such as for use as a cupboard latch, the FIGURE 7 device will prove useful for guarding against intrusion by very young children.

I claim:

1. A safety locking device comprising:

- (a) a first disc and a second disc,
- (b) means mounting said discs in line with said first disc being rotatable with respect to said second disc and said first disc being movable toward said second disc,
- (c) means biasing said discs towards each other,
- (d) interlocking means preventing rotation of said first disc relative to said second disc until said discs are separated by a predetermined distance,
- (e) and a locking arm extending through said second disc and rotatable between a locking position and an unlocking position, said locking arm including means located between said first and second discs and actuated by rotation of said first disc relative to said second disc to rotate said locking arm between said locking and unlocking positions.

2. A device according to claim 1 including:

- (f) a third disc mounted in line with said first and second discs with said second disc between said first and third discs and said first disc rotatable relative to said second and third discs, said second disc being substantially non-rotatable with respect to said third disc, and said first and second discs being movable toward each other and toward said third disc,
- (g) said locking arm extending through said second and third discs, said locking arm being actuated by rotation of said first disc relative to said second and third discs to rotate said locking arm between said locking and unlocking positions.

3. A device according to claim 2 wherein said means (b) includes axle means mounting said three discs in line with said second disc between said first and third discs and said first disc rotatable relative to said axle means, said second and third discs being non-rotatable

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relative to said axle means, and said first and second discs being slidable along said axle means towards each other and towards said third disc,

- (h) a flange extending from said first disc toward said second disc and shielding the space between said first and second discs, 5
- (i) a flange extending from said second disc toward said third disc and shielding the space between said second and third discs, 10
- (j) said means (c) including spring means biasing said first disc toward said second disc and spring means biasing said second disc toward said first disc, 15
- (k) said locking arm extending from the space between said first and second discs axially through said second and third discs, said locking arm including an actuating portion at its end between said first and second discs, said actuating portion extending transversely to the axis of said locking arm, said locking arm further including a locking portion at its other end extending transversely to the axis of said locking arm, said locking arm being fixed for sliding movement with said second disc along said axle means and thereby being bodily movable axially relative to said first and third discs, 20
- (l) said first disc including actuating means acting on said actuating portion of said locking arm upon rotation of said first disc to rotate said locking arm between locking and unlocking positions. 25
4. A device according to claim 3 wherein said interlocking means include post means projecting from one of said first and second discs, and cooperating slot means on the other of said first and second discs, said post means projecting into said slot means by said predeter-

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mined distance when said safety locking device is in either of said locking or unlocking positions.

5. A device according to claim 4 wherein said post means and said slot means are located adjacent said axle means to reduce their observability by a user of said device.

6. A device according to claim 2 wherein said discs are of insulating material and said third disc includes a pair of prongs projecting therefrom in a direction away from said first and second discs, for insertion into an electrical outlet, each prong including a recess at the end thereof adjacent said third disc, said device including two of said locking arms, one locking arm projecting into each of said recesses.

7. A device according to claim 2 and adapted to constitute a safety locking top for a container of the type including a threaded top and a radially inwardly directed top flange, said third disc including a threaded flange adapted to cooperate with the threaded top of said container and screw thereon, said device further including a pair of said locking arms for locking under said top flange.

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