July 6, 1965 L. K. STUPELL ETAL 3,192,747

MAGNETIC KEY HOLDER

Filed June 14, 1962

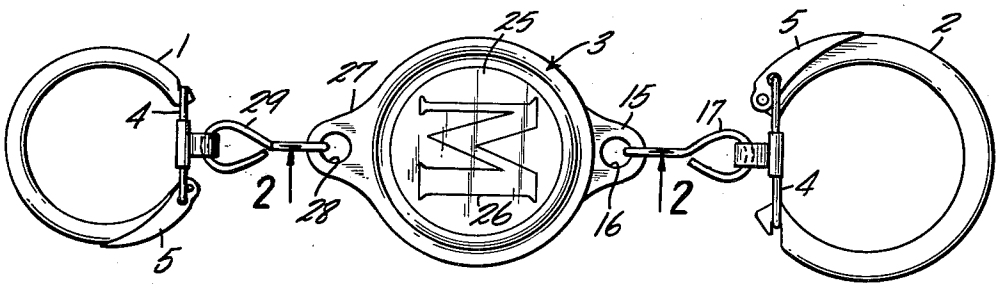


FIG. 1.

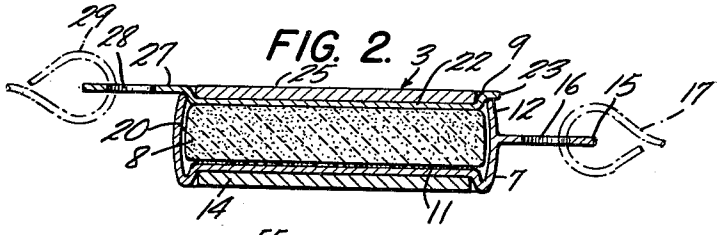


FIG. 2.

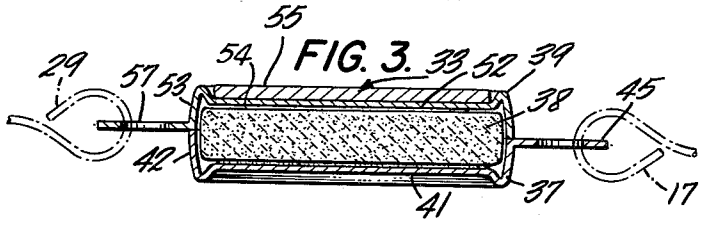


FIG. 3.

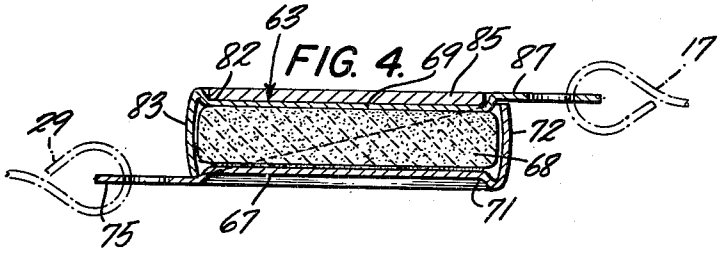


FIG. 4.

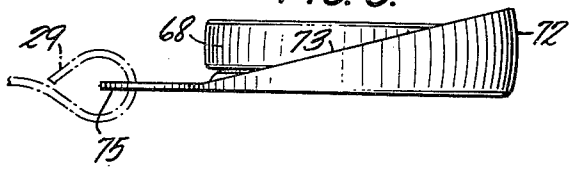


FIG. 5.

United States Patent Office 3,192,747 Patented July 6, 1965

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MAGNETIC KEY HOLDER

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Filed June 14, 1962, Ser. No. 202,549
2 Claims. (Cl. 70—456)

The present invention relates to key holders and similar articles.

It is frequently desirable to have a holder for a plurality of keys with provision for readily detaching or separating one or more of the keys from the others. For example, if the keys include a house key, office key, car ignition key, and car trunk key, it may be desirable to separate the ignition key in order to leave it with the car when parked in a public garage or public place. It is an object of the present invention to provide an improved key holder of this kind.

In accordance with the invention, there are provided two key-holding means which are herein illustrated as key rings and are separably interconnected with one another by a combined magnetic and mechanical action. One or more keys are held on each of the key rings. The magnetic-mechanical connector in accordance with the invention has the advantage of providing a substantial positive connection to prevent the two key rings from being accidentally pulled apart, while on the other hand affording easy separation when it is desired to disconnect the two key rings.

The objects and advantages of the invention will appear more fully from the following description and claims in conjunction with the accompanying drawings which illustrate by way of example preferred embodiments of the invention. In the drawings:

FIGURE 1 is a plan view of a key holder in accordance with the present invention;

FIGURE 2 is a partial cross section taken approximately on the line 2—2 in FIGURE 1;

FIGURE 3 is a cross section similar to FIGURE 2, but showing another form of connector, and

FIGURES 4 and 5 are a section and side view of another form of connector.

The key holder illustrated by way of example of FIGURES 1 and 2 comprises a key ring 1, a second key ring 2 and a magnetic-mechanical connector 3, separably joining the two key rings. Each of the key rings is provided with a link 4 which can be opened by means of a toggle lever 5 in known manner to permit keys to be put on or removed from the respective key ring.

The magnetic-mechanical connector 3 is shown as comprising a cup 7, a disk-shaped magnet 8 secured in the cup and a cover 9. The cup 7 and cover 9 are formed of magnetic permeable material, which for convenience is herein referred to as steel, and may be formed from sheet material by a suitable stamping process.

The cup member 7 has a substantially flat bottom portion 11 and an upstanding continuous peripheral rim 12. As shown in FIGURE 1, the cup is of substantially circular shape. The rim 12 as viewed in cross section (FIG. 2) is convexly curved so that the cup is somewhat barrel-shaped. The diameter of the cup is larger than the depth, for example, three to five times as great so that the cup is relatively shallow. The bottom of the cup is recessed to receive an ornamental disk 14, the outer surface of which is substantially flush with the lower edge of the rim 12. The disk 14 is suitably held in place, for example, by adhesive and may be formed of metal, plastic, leather, or other material as desired. Preferably the disk is non-magnetic. The outer face of the disk 14 may be suitably engraved, embossed, painted, printed or otherwise embellished to provide an ornamental appearance. For example, an initial, trademark, symbol or other device may be provided on the disk 14.

The cup member 7 is provided with means for attachment to one of the key rings. The attachment shown, comprises an ear or tab 15 which is integral with or secured to the rim portion 12 and projects laterally or radially from the cup. The ear 15 is shown as being located approximately midway between the top and bottom of rim 12, but may be higher or lower as desired, for example, adjacent the upper edge. It is formed with an aperture 16 to receive a link 17 for connection with the key ring 2. As seen in FIGURE 1, the ear 15 is of curved outline to blend into the circular shape of the cup.

The magnet 8 is a permanent magnet formed, for example, of a barium ferrite material which is electrically non-conductive and has a high coercive force, a low remanence and high permeability. The magnet is of a shape to fit inside the cup 7 and is shown in the form of a disk or tablet having substantially flat upper and lower surfaces and a peripheral surface which, in radial cross section, is convexly curved and has rounded corners. The diameter of the magnet is slightly less than the inside diameter of the cup 7 so as to provide an annular space 20 between the outer periphery of the magnet and the inner periphery of the cup. The magnet is secured in position in the cup, for example, by a central rivet (not shown) or by an adhesive bond between the lower face of the magnet and the inner face of the bottom 11 of the cup. The height or the thickness of the magnet is less than the depth of the cup 7 so that the upper face of the magnet lies below a plane defined by the upper edge of the rim 12. The magnet 8 is magnetized so that its upper and lower faces are of opposite polarity. The cup 7 comprises a pole piece for the magnet.

The cover 9 has a recessed central portion 22 which extends down into the cup 7 and a radially extending peripheral rim portion 23 which rests on the upper edge of the rim 12 when the cover extends into the cup and engages the upper face of the magnet 8. The central portion 22 of the cover 9 fits freely into the cup 7 so as to move freely into and out of the cup, but is shaped to engage the upper edge portion of the peripheral wall or rim 12 so as to hold the cover against movement radially or laterally of the cup. The cover 9, being of magnetically permeable material, acts as an armature for the magnet 12 and is attracted toward the magnet and toward the cup 7. The recessed central portion of the cover is adapted to receive an ornamental disk 25 which, like the disk 14, may be formed of any suitable material and may be embellished with any suitable design or decoration. As illustrated by way of example in FIGURE 1, the disk 25 bears an initial 26. An ear or tab 27 projects laterally from the cover and is preferably integral therewith. The ear 27 is similar in shape to the ear 15 of the cup and is provided with a hole 28 to receive a link 29 connecting the key ring 1 with the cover 9. When the cover and cup are assembled as shown in FIGURES 1 and 2, the ears 15 and 27 are preferably diametrically opposite one another.

When the key holder, shown in FIGURES 1 and 2 is in use, one or more keys, for example the ignition key of a car, is placed on the key ring 1 while one or more additional keys, for example, the trunk key, house key and office key are placed on the larger key ring 2. When it is desired to have all of the keys together, the cover 9 is placed on the cup 7 and is held in position by the pull of the magnet 8. While the pull of the magnet is a vertical direction as viewed in FIGURE 2, it will be seen that a pull in opposite directions on the key rings 1 and 2 tends to move the cover laterally with respect to the cup. How-

ever, such movement is opposed by the mechanical interlock provided by reason of the cover fitting down into the cup. The combined action of the magnet in pulling the cover toward the cup and the mechanical interlock between the cup and cover opposing relative lateral movement, renders the connector highly resistant to forces acting in opposite directions on the key chains 1 and 2. It will be seen that such forces act substantially in a direction perpendicular to the pull of the magnet.

When it is desired to separate the two key rings, the elements of the connector 3 are readily disconnected by gripping the ears 15 and 27 and twisting them in opposite directions about an axis substantially diametrical of the cup. This twisting action serves to pry the cover and cup apart in an approximately axial direction and readily separates the cover from the cup. Alternatively, the cover and the cup can be readily separated by exerting an upward pressure on the bottom of the cup while pressing downwardly on the ears 15 and 27 or by pressing downwardly on the cover 9 while pressing upwardly on the ears 15 and 27. Here again, the cup and cover are in effect pried apart in an axial direction.

Since separation of the connector elements by pulling on the rings 1 and 2 acts perpendicular to the axis of the magnet and is resisted by the mechanical interlock between the cup and cover, it is not necessary to use a particularly strong magnet to secure a satisfactory connection. This has the advantage of reducing the size and cost, not only of the magnet, but of the entire assembly, and also makes it easier to separate the two parts of the connector when it is desired to do so. By way of example and without limitation, the connector 3 may have an overall diameter of ⅞ of an inch and overall thickness of less than ¼ of an inch.

In FIGURE 3, there is shown another form of a magnetic-mechanical connector 33 comprising a cup 37, magnet 38 and cover 39. The cup 37 and cover 39 are formed of magnetically permeable material, for example sheet steel stamped to the form shown. The cup 37 has a recessed bottom portion 41 and a peripheral wall or rim portion 42 and is similar in shape to the cup 7 of FIGURE 2 except that the rim extends upwardly a distance equal to approximately one half the thickness of the magnet 38. An apertured ear or tab 45 projects laterally from the rim portion of the cup 37 for attachment of a key ring by a suitable link 17.

The magnet 38 is substantially the same as the magnet 8 of FIGURE 2 and is similarly secured in the cup 37 with an annular space between the periphery of the magnet and the inner periphery of the rim 42. Approximately half the magnet projects upwardly beyond the upper edge of the rim.

The cover 39 has a recessed central portion 52 and a rim portion 53 which extends downwardly and engages the upper edge of the rim 42 of the cup 37. When the rim portions of the cup and cover are in engagement with one another, there is a space 54 between the upper face of the magnet and the lower face of the recessed central portion 52 of the cover. An ornamental coin or disk 55 fits into the recessed cover with its upper face substantially flush with the upper portions of the rim 53. An apertured ear or tab 57 projects laterally from the cover for attachment of a key ring by a suitable link 29. As illustrated in FIGURE 3, the cup 37 and cover 39 may be of the same configuration so that identical stampings may be used for both parts.

The operation of the connector shown in FIGURE 3 is similar to that of the connector illustrated in FIGURE 2. The magnet 38 attracts the cover so as to hold the cup and the cover in assembled relationship as shown. Engagement of the peripheral rim portion 53 of the cover with the periphery of the magnet 38 provides a mechanical interlock resisting separation of the two elements of the connector by a pull in opposite directions on the laterally projecting ears 45 and 57. However, despite the high resistance to pull in a direction perpendicular to the axis of the magnet, the two elements of the connector can be readily separated as described above by a twisting action which prys them apart in an axial direction.

The embodiment of FIGURE 3 has an advantage from point of view of manufacturing in that the cup and cover may be identical stampings, while that of FIGURE 2 has the advantage that the mechanical interlock is provided by engagement of the cover directly with the cup so that neither the magnet nor the anchoring of the magnet in the cup is subjected to mechanical stress by a pull in opposite directions on the key rings 1 and 2.

In FIGURES 4 and 5, there is shown a further form of magnetic-mechanical connector 63 comprising a cup 67, magnet 68 and cover 69. The cup 67 and cover 69 are formed of magnetically permeable material, for example, sheet steel stamped to provide the form shown. The cup 67 has a recessed bottom portion 71 and a peripheral wall or rim 72 which is curved in axial section. An apertured ear of tab 75 projects laterally from a peripheral portion of the cup for attachment of a key ring by a suitable link. At a point opposite the ear 75, the rim of the cup extends upwardly a distance greater than the thickness of the magnet 68 and hence projects above the upper face of the magnet. At the side adjacent the ear 75, the height of the rim 72 is reduced substantially to zero. The upper edge 73 of the rim thus slopes downwardly from the high portion opposite the ear to the low portion adjacent the ear as clearly shown in FIGURE 5.

The magnet 68 is substantially the same as the magnet 8 of FIGURE 2 with flat upper and lower faces and a noncylindrical peripheral edge which is curved as viewed in axial section. The magnet is suitably secured in the cup 37, for example, by adhesive. The cover 69 has a recessed central portion 82 and a rim portion 83 which extends downwardly and engages the upper edge of the rim 72 of the cup 67. An ornamental coin or disk 85 fits into the recessed cover with its upper face substantially flush with the upper portions of the rim 83. Similarly, a coin or disk may be fitted into the recessed bottom of the cup 67, if desired. An apertured ear or tab 87 projects laterally from the cover for attachment of a key ring by a suitable link 17. The lower edge of the rim portion 83 slopes downwardly—as viewed in side elevation—so as to be complemental to the upper edge of the rim portion 72 of the cup. When the cup and cover are assembled, the lower edge of the rim of the cover at a point opposite the tab 87 projects down below the lower face of the magnet 68.

The magnet 68 attacts the cover 69 so as to hold the cup and cover in assembled relationship as shown in FIGURE 4. Engagement of the peripheral rim portion of the cover with the periphery of the magnet provides a mechanical interlock resisting separation of the two elements by a pull in opposite directions on the laterally projecting ears 75 and 87. Despite the high resistance to pull in a direction perpendicular to the axis of the magnet, the two elements of the connector can be readily separated as discribed above by a twisting action which pries them apart in an axial direction. Alternatively, the cover may be rotated relative to the cup about the axis of the magnet so that the cover is cammed away from the magnet by reason of the inclined edges of the rims of the cup and cover.

If desired, the high side of the cup 67 may be provided with a notch (not shown) to receive the ear 87 of the cover. Such notch will preferably have a width slightly greater than that of the adjacent portion of the ear and a depth approximately equal to the thickness of the ear. The low side of the cover rim 83 may be similarly provided with a notch to receive the ear 75 of the cup.

The embodiment of FIGURES 4 and 5 has the advantage that the cup and cover may be of identical configuration so that the same stampings may be used for both parts. Moreover, a particularly strong mechanical

interlock is provided between the two parts by reason of the portion of the rim opposite the attaching ear having a height greater than the thickness of the magnet. This height in conjunction with the curvature as viewed in axial section of the periphery of the magnet and the rim of the cover provides a positive mechanical interlock preventing separation by a pull in opposite directions on the ears of the cup and cover.

While the circular shape of the cup, magnet and cover as illustrated in the drawings is advantageous from point of view of manufacture and also in operation of the connector, it will be understood that other shapes may be used. Likewise, other key holding means may be employed and modifications may be made in the construction within the scope of the appended claims.

What we claim and desire to secure by letters patent is:

1. A key holder comprising two interfitting elements, one of said elements comprising a shallow steel cup having a bottom, a rim, a central axis substantially perpendicular to said bottom and a disk-shaped permanent magnet secured in said cup, the other of said elements comprising a steel cover for said cup constituting an armature for said magnet, two key-holding means, means for attaching one of said key-holding means to the periphery of said cup, means for attaching the other of said key-holding means to the periphery of said cover, the points of attachment being normally opposite one another on a line approximately normal to said axis, the rim of said

cup having a height at a point opposite said point of attachment greater than the thickness of said magnet and sloping downwardly to approximately zero height adjacent said point of attachment, and said cover having a rim portion complemental to the rim of said cup when the cover and cup are in assembled position, whereby the portion of the rim of said cover opposite said point of attachment is engageable with the periphery of said magnet to provide a mechanical interlock resisting separation of said cup and cover by a pull in opposite direction on said attaching means.

2. A key holder according to claim **1**, in which the rims of said cup and cover and the peripheral edge of said magnet are convex in axial section.

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