June 1, 1965 A. D. BOBROW 3,186,052

MAGNETIC CONNECTOR

Filed Feb. 1, 1962 2 Sheets-Sheet 1

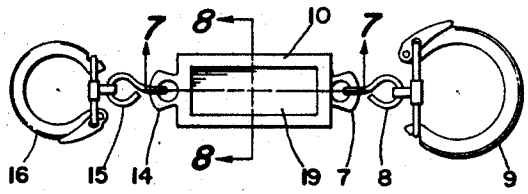


Fig. 1

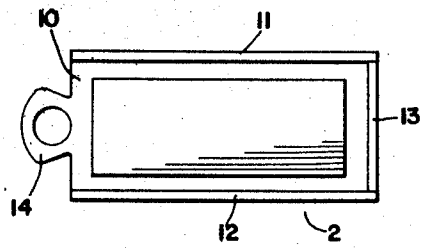


Fig. 5

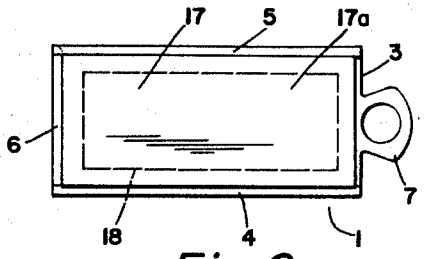


Fig. 6

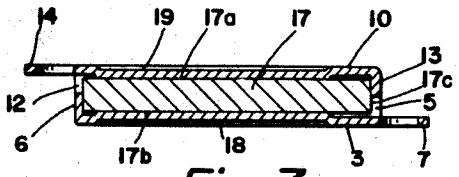


Fig. 7

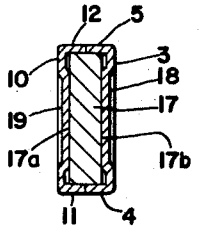


Fig. 8

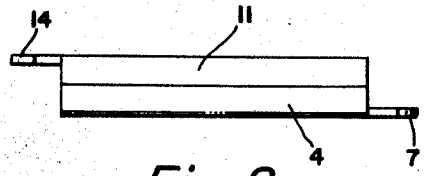


Fig. 2

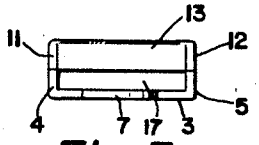


Fig. 3

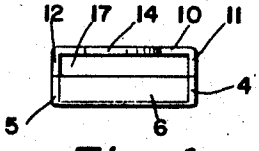


Fig. 4

INVENTOR.
ABRAHAM D. BOBROW
BY
Isler & Ornstein
ATTORNEYS

June 1, 1965 A. D. BOBROW 3,186,052

MAGNETIC CONNECTOR

Filed Feb. 1, 1962 2 Sheets-Sheet 2

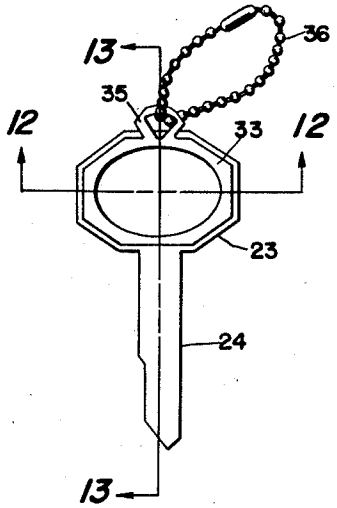


Fig. 9

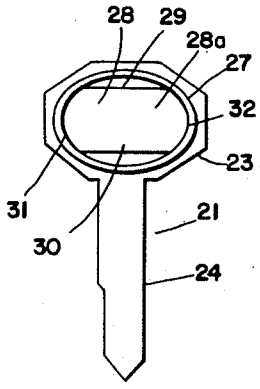


Fig. 10

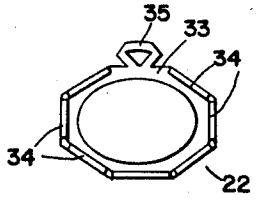


Fig. 11

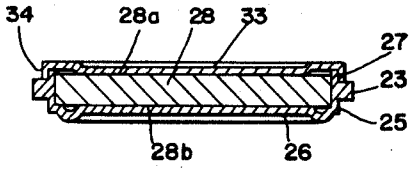


Fig. 12

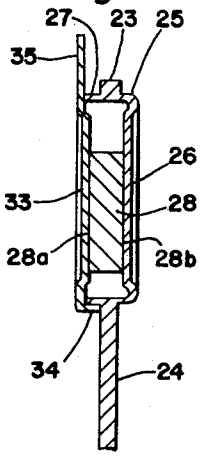


Fig. 13

INVENTOR.
ABRAHAM D. BOBROW
BY
Isler & Ornstein
ATTORNEYS

United States Patent Office 3,186,052 Patented June 1, 1965

3,186,052

MAGNETIC CONNECTOR

Abraham D. Bobrow, Rego Park, N.Y., assignor to Cole National Corporation, Cleveland, Ohio, a corporation of Ohio

Filed Feb. 1, 1962, Ser. No. 170,416
2 Claims. (Cl. 24—201)

This invention relates generally to separable magnetic connectors for keys and the like, but has reference more particularly to connectors of this type which are removable from each other by a pivotal movement between parts of the connector.

It has heretofore been proposed to provide a separable two-part magnetic connector, in which the parts are separable from each other by a pull along an axis which is normal or perpendicular to the general plane of the magnet, so that the two parts of the connector can be separated from each other too easily, particularly in cases where the magnet is not too strong. If the magnet is too strong, separation of the parts from each other by a pull along an axis which is normal or perpendicular to the general plane of the magnet becomes difficult.

The present invention has as its primary object the provision of a separable magnetic connector of the character described, in which separation of the parts from each other is effected by a pivotal movement between the parts, and which movement can be effected easily, even in cases where the magnet is relatively strong.

Another object of the invention is to provide a separable magnetic connector of the character described, in which separation of the parts from each other by a direct pull of one part relatively to the other is inhibited mechanically, so that the parts cannot become separated easily from each other, even in cases where the magnet is relatively weak.

A further object of the invention is to provide a separable magnetic connector of the character described, in which the magnet itself lies in a generally flat plane through which what would normally be a line of pull to separate the keys passes longitudinally, so that an attempt to separate the keys by such a pull is resisted by the resistance to shear which is thus provided as well as by the magnetic attraction between the parts. Additional insurance against easy separation of the keys by such a pull is thus afforded.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

FIG. 1 is a top plan view of a separable magnetic connector embodying the invention;

FIG. 2 is a front elevational view of the magnetic connector, with the key holding elements removed;

FIG. 3 is an end elevational view of the connector, as viewed from the right end of FIG. 2;

FIG. 4 is an end elevational view of the connector, as viewed from the left end of FIG. 2;

FIG. 5 is a plan view of the bottom face of the upper part of the connector;

FIG. 6 is a top plan view of the lower part of the connector;

FIG. 7 is a cross-sectional view, taken on the lines 7—7 of FIG. 1;

FIG. 8 is a cross-sectional view, taken on the line 8—8 of FIG. 1;

FIG. 9 is a top plan view of a modification of the separable magnetic connector embodying the invention;

FIG. 10 is a plan view of the upper face of the lower portion of the connector;

FIG. 11 is a plan view of the bottom face of the upper portion of the connector;

FIG. 12 is a cross-sectional view, taken on the line 12—12 of FIG. 9, and

FIG. 13 is a fragmentary cross-sectional view, taken on the line 13—13 of FIG. 9.

Referring more particularly to FIGS. 1 to 8 inclusive of the drawings, the separable connector for key holders will be seen to comprise two stampings, generally designated by reference numerals **1** and **2**, these stampings being preferably made of steel.

The stamping **1** comprises a base or bottom **3**, of generally flat rectangular form, provided at its long edges with upstanding parallel flanges **4** and **5**, which are perpendicular to the base **3** and extend the entire length of such edges, and provided at one of its short edges with an upstanding flange **6**, which is also perpendicular to the base **3** and the upper edge of which is coplanar with the upper edges of the flanges **4** and **5**. The other short edge of the base or bottom **3** has formed integrally therewith an ear or loop **7**, which is disposed in the same plane as the base **3**.

Pivotally secured to the ear or loop **7** is a chain element or jump ring **8**, to which a conventional keyring **9** is pivotally secured.

The stamping **2** is similar in all respects to the stamping **1**, and comprises a base or bottom **10**, of generally flat rectangular form, provided at its long edges with upstanding parallel flanges **11** and **12**, which are perpendicular to the base **10** and extend the entire length of such edges, and provided at one of its short edges with an upstanding flange **13**, which is also perpendicular to the base **10** and the upper edge of which is coplanar with the upper edges of the flanges **11** and **12**. The other short edge of the base or bottom **10** has formed integrally therewith an ear or loop **14**, which is disposed in the same plane as the base **10**.

Pivotally secured to the ear or loop **14** is a chain element or jump ring **15**, to which a conventional keyring **16** is pivotally secured.

In the assembly of the parts, as shown in FIG. 1, the flange **13** is disposed at the end of the connector remote from that at which the flange **6** is disposed, and the ear or loop **14** is similarly disposed at the end of the connector remote from that at which the loop **7** is disposed.

It will be further noted that in the assembly of the parts, the flanges **11** and **12** are substantially coplanar with the flanges **4** and **5** respectively and are substantially in contiguity with the latter (see FIG. 8).

Disposed within the stamping **1** is a magnet **17**, which is in the form of a thin flat rectangular magnet, which is cemented to the base **3**, and extends to the flanges **4**, **5** and **6**, but terminates just short of the other end of the base.

The magnet **17** is a permanent magnet, and may be of the ceramic type, such as of the barium ferrite type, or may be a metallic magnet of the alnico type. The magnet is of uniform thickness and projects out of the stamping **1** to an extent such that when the parts of the connector are assembled, the projecting portion of the magnet extends into the stamping **2** and substantially completely fills the space between the flanges **11** and **12**.

The magnet **17** is magnetized in a manner such that the flat faces of the magnet or portions adjacent these faces are of opposite polarity. Assuming that the exposed face **17*a*** of the magnet is the south pole of the magnet, and the face **17*b*** of the magnet which is cemented to the base **3** is the north pole of the magnet, the magnetic flux travels through the stamping **1** and induces therefore a north polarity along the upper edges of the flanges **4** and **5**. When the stamping **2** is assembled with or con-

nected to the stamping 1, the magnetic flux from the south pole of the magnet 17 induces a south polarity along the upper edges of the flanges 11 and 12, and as a result, the flanges 11 and 12 are attracted to the flanges 4 and 5 with considerable force, effectively maintaining the stampings in assembled relation.

It will be noted that the keyrings 9 and 15 are essentially in the same flat plane as the stampings 1 and 2, so that any attempt to separate the stampings by a pull on the keyrings 9 and 15 is mechanically resisted by the engagement of the flange 13 of the stamping 2 with the adjacent end 17c of the magnet 17.

In order to separate the stampings 1 and 2 from each other, for the purpose of separating the keyrings from each other, the loops 7 and 14 are grasped by the fingers of the two hands of the person desiring to separate the keyrings, and these loops are moved in opposite directions from each other, these directions being substantially normal to the general flat plane of the stampings. This causes the upper edge of one or the other of the flanges 4 and 5 to act as a fulcrum against which the upper edge of one of the adjacent flanges 11 or 12 bears and in this manner, the two stampings can be readily separated from each other by a pivotal movement of one stamping relatively to the other. When one of the stampings has been moved about 45 degrees relatively to the other, the slight magnetic attraction at the fulcrum is insufficient to prevent the stampings from then being completely separated from each other with relative ease.

Due to the relatively large area of the bases 3 and 10, the outer faces of these bases may be indented by a stamping process to provide recesses 18 and 19 for the insertion of a decorative emblem, a foil, a monogram initial, advertising copy, or any other suitable insert.

It will be apparent from the foregoing description that separation of the parts from each other can be effected easily, irrespective of the strength of the magnet, that separation of the parts from each other by a direct pull of one part relatively to the other is inhibited mechanically, so that the parts cannot become separated easily from each other even in cases where the magnet is relatively weak, and that the magnet itself lies in a generally flat plane through which what would normally be a line of pull to separate the parts passes longitudinally, whereby additional insurance against easy separation of the keys is provided.

Although a form of the separable connector has been shown and described which is of generally rectangular conformation, it will be understood that the principles of the invention may be incorporated in connectors of other forms or shapes, as for example, oval shape or circular shape.

In FIGS. 9 to 13 inclusive of the drawings, a modification of the invention is illustrated, in which the connector also consists of two parts, generally designated by reference numerals 21 and 22.

The part 21 comprises a member in the form of a key blank, having a head portion 23, of any desired conformation, and a shank or stem 24 extending therefrom. The head 23 has a recess or cup 25 provided with a bottom 26. In this case, the head 23 is of polygonal configuration, and the cup 25 of oval-shaped configuration, but it is to be understood that these shapes may be varied, as desired.

The head 23 is further provided with an upstanding flange 27, also of oval-shaped configuration, which is generally coplanar with the side wall of the cup 25.

Disposed within the head 25 is a magnet 28, which is in the form of a thin flat magnet having parallel edges 29 and 30 and arcuate ends 31 and 32 which lie in contiguity with the inner faces of the ends of the cup 25.

The magnet 28 is a permanent magnet, and may be of the ceramic type, such as of the barium ferrite type, or may be a metallic magnet of the alnico type. The magnet is of uniform thickness and its exposed upper face

28a is disposed just below the plane of the upper edge of the flange 27, the lower face 28b of the magnet being cemented to the bottom 26 of the cup 25.

The part 22 comprises a stamping having a base 33, and flanges 34, which, in the assembly of the parts 21 and 22, as shown in FIGS. 9, 12 and 13, extend to the upper face of the head 23, and embrace the flange 27.

The part 22 is further provided with a loop or ear 35, which extends from and is coplanar with the base 33, and to which a keychain 36, for holding an additional key (not shown) may be removably secured.

The magnet 28 is magnetized in a manner such that the flat faces 28a and 28b or portions adjacent these faces are of opposite polarity. Assuming that the exposed face 28a of the magnet is the south pole of the magnet, and the face 28b of the magnet is the north pole of the magnet, the magnetic flux travels through the bottom 26 and induces therefore a north polarity in the head 23 and along the upper edges of the flange 27. When the stamping 22 is assembled with or connected to the part 21, in the manner shown in FIGS. 9, 12 and 13, the magnetic flux from the south pole of the magnet 28 induces a south polarity in the flanges 34, and as a result, the flanges 34 are attracted to the head 23 with considerable force, effectively maintaining the stampings in assembled relation.

It will be noted that the shank 24 and the ring 36 are essentially in the same flat plane as the magnet, so that any attempt to separate these parts by a pull on the shank and ring is mechanically resisted by the engagement of the flanges 34 of the stamping 22 with the flange 27 of the part 21.

In order to separate the parts 21 and 22 from each other, for the purpose of separating the keyring 36 from the part 21, the loop 35 and shank 24 are grasped by the fingers of the two hands of the person desiring to effect such separation, and the part 22 is pivotally moved relatively to the part 21, using the head 23 as a fulcrum, and in this manner the two stampings can be readily separated from each other by a pivotal movement of one stamping relatively to the other. When the stamping 22 has been moved about 45 degrees relatively to the head 23, the slight magnetic attraction at the fulcrum is insufficient to prevent the stamping 22 from being completely separated from the head 23 with relative ease.

Here, again, due to the relatively large area of the bases 26 and 33, these bases may be indented by a stamping process to provide recesses, as shown (oval-shaped in this case), for the insertion of a decorative emblem, a foil, a monogram initial, advertising copy, or any other suitable insert. By indenting the base 33 in the manner shown in FIG. 12, the indentation is disposed in contact with the face 28a of the magnet 28.

Although the magnet 28 is shown as an elongated piece, which does not fill the entire recess or cup 25, it may, if desired, be made coextensive in area and shape with such recess or cup, so as to entirely fill the latter, or, if desired, the magnet may be made slightly smaller in overall dimensions than the recess or cup, so as to leave a small space between the periphery of the magnet and the inner wall of the cup 25. If the magnet is thus made slightly smaller in overall dimensions than the recess or cup, the side walls of the recess do not tend to short circuit the magnetic flux circuit, as hereinbefore described, and maximum flow of lines of force exist through the steel walls of the cup, thereby resulting in maximum attraction between the flange 27 and the cover part 22. The magnet 17 may also be made slightly smaller in overall dimensions than the space provided by the flanges 4, 5 and 6, so that these flanges do not tend to short circuit the magnetic flux circuit, and maximum attraction between the parts 1 and 2 is provided.

The magnets which have been described may also be made from a rubber base compound, which can be die cut easily into the forms and shapes illustrated.

It is to be understood that the forms of my invention, herewith shown and described, are to be taken as preferred examples of the same, and that various changes may be made in the shape, size and arrangement of parts thereof, without departing from the spirit of the invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A separatble connector for joining two parts comprising in combination, two metal stampings of substantially rectangular, identical size and shape, each of said stampings including a base portion having inner and outer generally planar faces, a discontinuous flange upstanding from the inner face along the major portion of the periphery thereof, and being interrupted at a portion thereof by an ear means coplanar with the base and extending outwardly therefrom and adapted for attachment to a part to be joined, a magnetic plate having a thickness equal to twice the flange depth, attached to the base of one of said stampings and substantially filling the cavity formed between the inner faces of the bases of said stampings when same are disposed in contiguous superposed relationship with respect to one another with said flanges disposed in edge abutting relationship and said ear means extending outwardly in opposite directions from the respective bases, said flanges being in engagement with the peripheral edge of said magnet to prevent lateral shifting of the stampings with respect to each other, said ear means defining further an opening means in conjunction with said flanges, whereby, when a twisting couple is applied thereto,

the portion of the respective flanges disposed generally at a right angle to the ears will act as a fulcrum permitting pivoted separation of the remaining portion of the flanges so that said stampings may be disengaged from the edge of said magnet and separated by further pulling forces.

2. A separable connector as set forth in claim 1, wherein the base portions of each stamping are provided with central planar portions offset with respect to the remaining marginal portions thereof inwardly toward the inner face to provide an indicia receiving recess in the outer face thereof.

References Cited by the Examiner

UNITED STATES PATENTS

1,055,453	3/13	Durnan	40—1.5
1,694,639	12/28	Brown.	
2,654,929	10/53	Feibelman	24—201.2
2,975,497	3/61	Budreck	24—201.2
3,027,617	4/62	Gray	24—201.2
3,086,268	4/63	Chaffin	24—201.2

FOREIGN PATENTS

999,770	2/52	France.
605,196	5/60	Italy.

DONLEY J. STOCKING, *Primary Examiner.*

ABRAHAM G. STONE, *Examiner.*