

MAGNETIC LOCK CLOSURE

The present invention relates generally to a lock closure for articles having two integral but separable parts such as portable bags, handbags, etc., and more particularly to such lock closure using the magnetic attraction for coupling those two parts together.

There are various types and kinds of magnetic lock closure devices that use the attraction of a magnet, thereby keeping the articles such as handbags or coats in their closed conditions.

Those magnetic lock closure devices have different constructions depending upon their particular usages. Among others, one typical construction which is well known includes an annular permanent magnet having a central bore through it. Another typical construction includes a disk-like permanent magnet. The annular permanent magnet may provide its lines of magnetic force or magnetic flux centered through the bore. The other disk-like permanent magnet may provide its lines of magnetic force or magnet flux centered on one side thereof. In either case, it is known that the strong locking or coupling action may be obtained. Thus, they are used in a number of applications. For example, they are shown and

described in the Japanese design patent No. 5110639.

The prior art constructions that have been mentioned above are designed to provide their centered lines of magnetic force or magnetic flux consist of one part formed by a permanent magnet and which provides its attractive force and the other part usually formed by any suitable magnetically attracted material such as soft iron and which is attracted by the permanent magnet and is removably attached to the magnet. In those applications in which this type of construction is used with an article such as a bag and the like, the one part formed by the permanent magnet is usually rigidly mounted to one part of such article such as its body while the other part formed by the soft iron is usually rigidly mounted to the counterpart of the article such as a flap.

More specifically and typically, the attracting part of the above construction includes a disk-like plate of ferromagnetic material and an annular permanent magnet mounted on the disk-like plate. The disk-like plate and permanent magnet are combined together into a single unit, which is completely enclosed with a nonmagnetic cover. That is, the inner peripheral, upper surface and outer peripheral portions of the permanent magnet are totally covered. The ferromagnetic disk-like plate has a rod at its center which extends upwardly into the central bore through the permanent magnet until it reaches up to half the way of the central bore. The rod is made of a ferromagnetic material. As such, the lines of magnetic force from one pole or N pole of the permanent magnet may enter the rod which contacts that pole, and the most part of the lines of magnetic force or magnetic flux may be centered on the rod, flowing through it toward the side of the opposite polarity or S pole of the magnet. The magnetically-attracted part of the construction consists of a similar disk-like plate of ferromagnetic material which engages the other

side or S-pole side of the permanent magnet. The disk-like plate also has a rod at its center which extends upwardly into the central bore through the permanent magnet until it reaches half the way and abuts against the first-mentioned rod on the side of the permanent magnet. Thus, the most part of the magnetic flux is also centered on the second-mentioned rod.

When the conventional magnetic lock closure device is used in those or other applications, there is often a problem that may occur when the two parts of the device are to be coupled together. When the part of the device that is magnetically attracted by the other part is to be attached to the other part, an attempt is usually or always made to search for the central bore of the permanent magnet so that the rod on the attracted part can register with the central bore. This attempt is usually made by blind touch rather than visually, and is accompanied by making that rod slide on and about the nonmagnetic cover until the central bore can be located. Sometimes, several such attempts may be made until the rod can be aligned with and engage the central bore successfully. During this sliding motion, the rod is receiving the magnetic attraction of the permanent magnet as well as a small amount of magnetic attraction by the cover even if it is nonmagnetic. Thus, the rod is attracted toward the surface of the cover during the sliding motion, which may cause scratches on the surface. Those scratches will be more as more such attempts are made. For example, the articles such as bags etc. carrying the devices are presented on display at a shop, and prospective customers usually try to check to see if a particular article will meet their respective needs. In determining an article of their choice, then, they usually attempt to see how well the device can work. In so doing, scratches may occur as described above, and the article will lose its commercial value. More opportunities of causing such scratches may occur as more prospective

customers are involved.

Each of the attracting part and attracted part of the device has a fastening part formed like a pair of legs which allows the respective part to be fixed to the corresponding part of the bag, such as the body or flap. The use of this fastening part makes the portion of the body or flap where it is mounted thicker. For the flap, which is visible from the outside, the appearance of the article as a whole may be affected by the presence of the thicker portion.

The present invention provides a magnetic lock closure device comprising first means for providing the magnetic attracting action and second means for being magnetically attracted by the first means, the first means comprising a first disk-like plate of ferromagnetic material and an annular permanent magnet of uniform thickness having a central bore and placed on the first plate, the first plate having a first ferromagnetic rod at the center extending part-way into the central bore of the permanent magnet, and the second means comprising a second disk-like plate of ferromagnetic material having a second ferromagnetic rod at the center extending part-way into the central bore of the permanent magnet when the first and second means are coupled together, wherein the first means further includes: an annular ferromagnetic member having an inner surface in contact with the annular permanent magnet and having a central bore connected to the central bore of the permanent magnet and having a thickness which increases outwardly from the central bore of the annular ferromagnetic member only to the periphery of the permanent magnet to form a concave outer surface remote from the permanent magnet; first fastening means firmly held by a first base portion of the first rod extending through the first plate; and nonmagnetic means for enveloping the periphery of the

first plate, the periphery of the annular permanent magnet, and the periphery and the concave outer surface of the annular ferromagnetic member; and wherein: the second plate has an outwardly protruded surface on one side thereof and a depressed surface on the other side, the outwardly protruded surface being complementary in shape to and adapted to engage the non-magnetic means covering the concave outer surface of the annular ferromagnetic member on the annular permanent magnet when the first and second means are coupled together; and the second rod extends from the outwardly protruded surface of the second plate and includes a second base portion extending through the second plate and firmly holding second fastening means.

It should be understood that the concave outer surface of the ferromagnetic annular member may be a straight surface or curved surface.

When an attempt is made to couple the magnetically attracting part (first means) and magnetically attracted part (second means) together, this may be accomplished simply by placing the latter upon the former. As the magnetically attracting part having the concavely formed surface serves as a guide, the magnetically attracted part having the convexly formed surface may be guided toward the central bore of the permanent magnet along the concavely formed surface, without any blind-touch attempt to search for the central bore. It may be appreciated that the two parts can be coupled together successfully with the minimum effort, or with the minimum amount of sliding motion. Any possible damage or scratches that may result from the sliding motion can be minimized.

In one embodiment the first or second fastening means is a fastening member comprising a pair of legs extending from a transverse portion firmly held by the first or second base portion.

It may also be appreciated that the fastening member having the pair of legs on the magnetically attracted part may be accommodated within the depressed side of the disk-like plate, which can effectively reduce the thickness of the fastening member that would otherwise be produced when it is fixed to the corresponding part of a particular article such as a bag.

Preferred features and advantages of the present invention may be understood from the following description of several specific preferred embodiments thereof with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of the elements comprising the device according to one preferred embodiment of the present invention;

Fig. 2 is a sectional view of the embodiment shown in Fig. 1;

Fig. 3 is a sectional view of the magnetically attracted part of the device, illustrating how the component elements are assembled together;

Fig. 4 is a sectional view of the corresponding magnetically attracted part of a typical conventional device, illustrating how those component elements are assembled as compared with the device of the present invention;

Fig. 5 is a section view of a variation of the fastening member provided for the device in the preceding embodiment;

Fig. 6 is a sectional view of the variation in Fig. 5, illustrating how it is fastened to the corresponding part or flap of an article such as a bag ;

Fig. 7 is a sectional view of another variation of the fastening member; and

Fig. 8 is a section view of the variation in Fig. 7. illustrating how it is fastened to the corresponding part or flap of an article such as a bag.

Referring to the accompanying drawings. one typical embodiment of the present invention is now described.

In Figs. 1 and 2. there is a magnetic lock closure device which consists essentially of a magnetically attracting part or first part 1 and a magnetically attracted part or second part 2. The first part 1 includes a disk-like plate 3 made of any suitable ferromagnetic material, an annular permanent magnet 4 placed on the disk-like plate 3 and having a central bore extending through it, and an annular member 5 made of any suitable ferromagnetic material and having a funnel-like shape having an outwardly enlarged portion and a narrow portion. The disk-like plate 3, permanent magnet 4 and annular member 5 are combined together into a single unit, which is completely enclosed in a nonmagnetic cover 6. The nonmagnetic cover 6 encloses the unit in the manner that it covers the inner peripheral wall of the bore through the permanent magnet 4 down to half the way of the bore, and covers the upper side and outer peripheral side of the annular member 5 and the outer peripheral sides of the permanent magnet 4 and disk-like plate 3. The cover 6 has a plurality of lugs 7, 7 spaced at regular intervals and extending inwardly from the bottom side thereof. Those lugs 7, 7 engage the bottom side of the disk-like plate 3, thereby securing the cover 6 to the assembly unit. The disk-like plate 3 has a rod 8 of any suitable ferromagnetic material extending upwardly into half the way of the bore through the permanent magnet 4, as

viewed in Fig. 2. The rod 8 has a base portion 9 extending downwardly through the disk-like plate 3 as viewed in Fig. 2. A fastening member 10 is firmly held by the base portion 9 of the rod 8 which is rivetted to the disk-like plate 3. The fastening member 10 includes a transverse part and a pair of legs.

The magnetically attracted part or second part 2 includes a disk-like plate 11 having an outwardly protruded surface on one side (lower side) and a depressed surface on the other side (upper side). The disk-like plate 11 has a rod 12 of any suitable ferromagnetic material extending downwardly as viewed in Fig. 2. The rod 12 has the length sufficient to allow it to enter half the way into the bore through the permanent magnet and meet the counterpart rod 8 on the first part 1 when the first and second parts are to be coupled together. Similarly to the rod 8, the rod 12 has a base portion 13 extending upwardly through the disk-like plate 11 as viewed in Fig. 2. A fastening member 14 is firmly held by the base portion 13 of the rod 12 which is rivetted to the disk-like plate 11. The fastening member 14 includes a transverse part and a pair of legs. Specifically, iron or soft iron may be used as a suitable ferromagnetic material for the disk-like plates 3, 11 and the annular member 5, and brass may be used as a suitable nonmagnetic material for the cover 6.

The device of the invention that has been described may be used with an article such as a bag, as is the case with the conventional prior art device. In this case, the magnetically attracting part or first part 1 may be attached to the body of the bag, and the magnetically attracted part or second part 2 may be attached to the flap of the bag. This attachment may be accomplished by inserting the pair of legs of the fastening member 10 or 14 into the corresponding part of the bag and then

folding the legs as shown.

When the first and second parts 1 and 2 are to be coupled together, the second part 2 is first brought closer to the first part 1. Then, the rod 12 on the second part 2 is made to contact any area on the funnel-shaped surface which is enveloped by the cover 6, and is then guided along the inwardly inclined surface directly toward the center bore through the permanent magnet 4. Thus, the rod 12 is accepted by the bore, entering the bore until it engages the rod 8 on the first part 1. This means that the first and second parts can be coupled together under the action of the magnetic attraction, as the rod 12 can be guided toward the center bore immediately upon contact with the funnel-shaped surface. This eliminates the attempt to search for the center bore that would otherwise causes scratches on the cover 6 due to the sliding action of the rod 12.

Referring next to Fig. 3, it is shown that the second part 2 is fastened to the flap 15 of the bag. In the example shown, the flap 15 consists of two layers of sheets of cloth or leather, for example, such as the outer layer 15a and inner layer 15b. The fastening member 14 has its pair of legs passed through the inner layer 15b and folded over it.

For the conventional device shown in Fig. 4, the outer layer 15a is usually raised outwardly by those folds, while for the device of the present invention, the folds may be accommodated within the depressed side of the disk-like plate 11. Thus, the outer layer 15a will not be raised outwardly by the folds.

Figs. 5 through 8 illustrate variations of the fastening member 14. Referring to Figs. 5 and 6, there is a first variation of the fastening member, which includes a bag-like member 16 having a round shape in plan and which is hollow inside as shown as 16a. It is firmly held by the base portion 13 of the rod 12 at the center of the depressed side of the

disk-like plate 11. In this variation, a fastening part which allows the first or second part 1 or 2 to be fastened to the corresponding part of the article is provided separately. This fastening part 17 has the equivalent function of the pair of legs in the preceding embodiment, except that it has a bulb portion that can engage the member 16 and an annular plate portion that can be secured to the inner layer 15b. The member 16 and fastening part 17 thus combined can be accommodated within the depressed side of the disk-like plate 11 as described in the preceding embodiment.

Referring to Figs. 7 and 8, there is another variation which includes a fastening member 18 having a round shape in plan and having a marginal edge 18a curled inwardly. Similarly to the preceding embodiment and variation, the fastening member 18 is firmly held by the base portion 13 of the rod 12 at the center of the depressed side of the disk-like plate 11. A fastening part 20 is provided separately which has spear-headed members 19, 19 extending downwardly as viewed in Fig. 7 which can engage the marginal edge 18a of the fastening member 18 through the inner layer 15b. Specifically, the fastening member 18 and fastening part 20 can be combined by curling the spear-headed members 19, 19 inside the curled marginal edge 18a of the fastening member 18. The fastening member 18 and fastening part 20 thus combined can be accommodated within the depressed side of the disk-like plate 11 as shown in Fig. 8.

Having been described in detail, the device according to the present invention advantageously minimizes any possible damages or scratches that may occur against the nonmagnetic cover which encloses the magnetically attracting part. It also advantageously eliminates or reduces substantially the thickness that may be produced by securing the fastening member to the corresponding part of an article such as bags, handbags.

etc. As a result, such articles can retain their good appearance and commercial value as goods. It is no longer necessary to attempt to search for the center bore when the two parts of the device are to be coupled together. Since the rod on the magnetically attracted part can be guided along the inclined surface of the magnetically attracting part toward its center bore. This effectively helps reduce the amount of scratches.

Although the present invention has been described by referring to the particular preferred embodiments thereof, it should be understood that various changes and modifications may be made without departing from the scope of the CLAIMS.

Claims:

1. A magnetic lock closure device comprising first means for providing the magnetic attracting action and second means for being magnetically attracted by the first means, the first means comprising a first disk-like plate of ferromagnetic material and an annular permanent magnet of uniform thickness having a central bore and placed on the first plate, the first plate having a first ferromagnetic rod at the center extending part-way into the central bore of the permanent magnet, and the second means comprising a second disk-like plate of ferromagnetic material having a second ferromagnetic rod at the center extending part-way into the central bore of the permanent magnet when the first and second means are coupled together, wherein the first means further includes:

an annular ferromagnetic member having an inner surface in contact with the annular permanent magnet and having a central bore connected to the central bore of the permanent magnet and having a thickness which increases outwardly from the central bore of the annular ferromagnetic member only to the periphery of the permanent magnet to form a concave outer surface remote from the permanent magnet;

first fastening means firmly held by a first base portion of the first rod extending through the first plate; and

nonmagnetic means for enveloping the periphery of the first plate, the periphery of the annular permanent magnet, and the periphery and the concave outer surface of the annular ferromagnetic member;

and wherein:

the second plate has an outwardly protruded surface on one side thereof and a depressed surface on the other side, the outwardly protruded surface being complementary in shape to and adapted to engage the



non-magnetic means covering the concave outer surface of the annular ferromagnetic member on the annular permanent magnet when the first and second means are coupled together; and

the second rod extends from the outwardly protruded surface of the second plate and includes a second base portion extending through the second plate and firmly holding second fastening means.

2. A device as claimed in claim 1, wherein the concave outer surface of the annular ferromagnetic member is a straight or curved surface.

3. A device as claimed in claim 1 or 2, wherein the first or second fastening means comprises a pair of legs extending from a transverse portion firmly held by the first or second base portion.

4. A device as claimed in claim 1 or 2, wherein the first or second fastening means comprises a hollow bag-like member firmly held by the first or second base portion and a fastening member adapted to be accepted by the hollow member.

5. A device as claimed in claim 1 or 2, wherein the first or second fastening means comprises a member having an annular marginal edge and being firmly held by the first or second base portion and a fastening member



having a plurality of spear-headed members extending therefrom and being adapted to engage the annular marginal edge.

6. A magnetic lock closure device substantially as described with reference to, and as shown in, Figures 1 to 3, Figures 5 and 6, or Figure 7 and 8 of the accompanying drawings.



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