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"IMPROVEMENTS IN OR RELATING TO MAGNETIC CLASPS"

The present invention relates to a magnet clasp, for instance of the type having a stationary part incorporating a permanent magnet having a central hole for receiving a movable part constituted by a plug, wherein
5 the movable part can make a close and tight contact with the stationary part only when it correctly fits the central hole of the stationary part.

Hitherto, various types of magnet clasps have been proposed and known. In these known magnet clasps
10 the magnetic attracting force produced by the magnetic force of the permanent magnet is developed over the entire surface of the stationary part, not only in the central part of the stationary part. Therefore, the movable part of the clasp is attracted by the stationary
15 part even when it is not correctly positioned on the stationary part, i.e. even when the plug is placed on the surface of the peripheral portion of the stationary member. This makes it difficult to correctly and smoothly fit the plug in the central hole of the
20 stationary member. For fitting the plug into the central hole, it is necessary to slide the plug on the surface of the stationary member from the peripheral portion to the central portion while the plug is being magnetically attracted by the stationary member, so that
25 the surface of the stationary member is scratched and

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damaged, causing deterioration in the appearance thereof.

The present invention provides a magnetic clasp comprising a first part and a second part, the first part comprising a housing covered by a non-magnetic
5 cover which has an opening therein and a magnet provided with a magnetic circuit including a permanent magnet within the housing and a flux gap disposed within the housing below the cover opening, the second part having a plug of ferromagnetic material arranged to enter the
10 cover opening to permit magnetic clasping, the external surface of the cover around the opening being sufficiently remote from the magnetic circuit to ensure that no substantial magnetic force acts on the plug when it is in contact with the said external surface and is
15 not received by the cover opening.

In a preferred embodiment the magnet clasp comprises a stationary part and a movable part, the stationary part including: the permanent magnet; a ferromagnetic plate secured to the lower surface of the permanent

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magnet; a ferromagnetic plate secured to the upper surface of the permanent magnet; an annular ferromagnetic plate secured to the upper surface of the permanent magnet; a ferromagnetic pillar mounted on a middle portion of the lower ferromagnetic plate and extending upright therefrom, the ferromagnetic pillar extending through a central hole of the permanent magnet and of the upper ferromagnetic plate with a slight annular gap between the ferromagnetic pillar and the inner peripheral surface of the central hole, the ferromagnetic pillar having an upper end surface flush with the surface of the ferromagnetic plate; and a case made of a non-magnetic material as well as the cover.

15 The invention will be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a front elevational sectional view of a stationary part of a magnet clasp constituting a first preferred embodiment of the invention.

Figure 2 is a front elevational sectional view of a movable part of the magnet clasp constituting the first preferred embodiment of the invention;

Figure 3 is a plan view of the stationary part of Figure 1;

5 Figure 4 is a schematic front elevational sectional view of the magnet clasp in use;

Figure 5 is a plan view of the stationary part of a magnet clasp constituting another embodiment of the invention;

10 Figure 6 is a plan view of the movable part of the magnet clasp having the stationary part shown in Figure 5;

Figure 7 is a schematic front elevational view showing the magnetic clasp of the embodiment shown in
15 Figure 5 in which the stationary part and the movable part are held by each other;

Figure 8 is a schematic front elevational view of the magnetic clasp shown in Figure 7 in use; and

20 Figures 9 and 10 are schematic front elevational sectional view of further embodiments of the invention.

Referring to the drawings, particularly to Figures 1, 3 and 4, a magnet clasp constituting an embodiment of the invention has a stationary part generally designated at A and constituted by an annular
25 permanent magnet 1, a circular iron plate 2, an annular iron plate 3, an iron pillar 4, a cylindrical case 5

with a bottom and made of brass which is a non-magnetic material, and an annular cover 6 which is also made of brass.

The iron plate 2 and the iron plate 3 are secured to the lower side and the upper side of the magnet 1, respectively. The iron pillar 4 mounted on the central portion of the iron plate 2 extends through a central hole 1a of the magnet 1 with a slight annular gap formed between the inner peripheral surface of the central hole 1a and the outer peripheral surface of the iron pillar 4.

The portion of the stationary part A other than the central hole 6a is covered by the case 5 and the cover 6. The stationary part A thus assembled is attached to the body 11 of a leather craft work such as a hangbag.

The magnet clasp also has a movable part B attached, for example, to a cover portion 10 of the leather craftwork and constituted by a plug 7 made of a ferromagnetic iron, a disc member 8 made of iron, brass or a plastics, and an attaching member 9, as shown in Figures 2 and 4.

The annular iron plate 3 has a surface which is flush with the upper end surface of the iron pillar 4. The annular cover 6 has a certain thickness and the central hole 6a thereof is aligned with the central holes 1a, 3a. Therefore, when the movable part B and the stationary part A take correct positional relationship

with the attaching disc 8 contacting the upper surface of the cover 6, the plug 7 is received by the central hole 6a with its lower end contacting the upper end surface of the iron pillar 4 and the inner peripheral edge of the upper surface of the iron plate 3 so as to form a magnetic path. As a result, the lower face of the disc 8 of the movable part B is held in close contact with the plate 3 and the pillar 4 by the magnetic attracting force so that the cover 10 of the hand bag is magnetically held in contact with the body 11 of the handbag.

Since the annular magnet 1 is wholly covered by the cover 6 and the cylindrical case 5 made of non-magnetic brass, no substantial magnetic path is formed at portions or areas other than at the holes 1a, 6a. The magnetic attracting force is only effective in the holes 1a, 6a, so that the iron plug 7 is never attracted by the peripheral portion of the stationary part A around the central hole 6a of the cover 6. In consequence, undesirable sliding of the plug 7 on the surface of the cover 6 under application of the magnetic force is avoided, thus preventing scratching or damaging of the surface of the cover 6. Thus, the stationary part A and the movable part B can perform, in combination, a perfect clasping function without being accompanied by the aforesaid problems of the prior art.

Figures 5, 6, 7 and 8 disclose a magnet clasp constituting another embodiment of the invention. In

this embodiment, the stationary part C has a cylindrical case 21 with a bottom and made of a non-magnetic material, a permanent magnet 22, two ferromagnetic semicircular pillars 23, 23 and a funnel-shaped cap 26. The movable
5 part D is constituted by a disc 27 made of a non-magnetic material, a plug 28 made of iron which is a ferromagnetic material and an attaching member 29.

In this embodiment, the attracting force produced by the permanent magnet 22 acts locally only around
10 the opening of the case 21. Therefore, the plug 28 is made of iron which is a ferromagnetic material and an attaching member 29.

In this embodiment, the attracting force produced by the permanent magnet 22 acts locally only
15 around the opening of the case 21. Therefore, the plug 28 is not attracted when it is merely placed on the tapered surface of the funnel-shaped cap 26 secured to the body 32 of the leather craft work and, accordingly, it can lightly move on the tapered surface without
20 damaging it. As the plug 28 is guided by the tapered surface of the cap to the central hole 26a, the attracting force comes into effect for the first time to make the lower face of the plug 28 closely contact the upper faces of the semicylindrical pillars 23, 23. In
25 consequence, the stationary part C and the movable part D, which are secured to the body and the cover of the leather craftwork, cooperate with each other to perform

the desired clasping function.

Figure 9 shows still another embodiment of the invention in which the stationary part E has a funnel-shaped cap 34 made of a non-magnetic material, a case 5 35, a laterally orientated permanent magnet 36, ferromagnetic plates 37, 37a and an upright member 39. The movable member D of the same construction as that of the preceding embodiment can fit in the central hole of the case 35.

10 Figure 10 shows a further embodiment of the invention in which the upright member 39 in the embodiment shown in Figure 9 is substituted by an auxiliary pole 38 of the ferromagnetic member and vertically secured to the ferromagnetic plate 37a. This stationary part 15 has a lower opening engageable with the movable part D of the same construction as that of the embodiment shown in Figure 9. The arrangement shown in Figure 10 is advantageous in that the decrease of the absorbing force due to saturation of magnetism is avoided because 20 the auxiliary magnetic pole 39 can have a sufficiently large cross-sectional area. It is, therefore, possible to obtain a higher attracting and fixing force between the stationary part F and the movable part D.

In the magnet clasps heretofore described, the 25 movable part is strongly attracted by the stationary part only when it is fitted in the opening thereof. In other words, no substantial magnetic attracting force

is applied to the movable part when placed on a portion of the stationary part other than the central hole or opening. Therefore, undesirable damaging of the surface of the stationary part, which is inevitable in the prior art due to the magnetic attraction between the stationary part and the movable part, is avoided to ensure and preserve the good appearance of the surface of the stationary part.

Needless to say, the stationary part, permanent magnet, and the movable part can have any desired shapes other than those described in the specification and illustrated in the drawings.

Other changes and modifications are possible without departing from the scope of the invention which is limited solely by the appended claims.



CLAIMS:

1. A magnetic clasp comprising a first part and a second part, the first part comprising a housing covered by a non-magnetic cover which has an opening therein and a magnet provided with a magnetic circuit including a permanent magnet within the housing and a flux gap disposed within the housing below the cover opening, the second part having a plug of ferromagnetic material arranged to enter the cover opening to permit magnetic claspings, the external surface of the cover around the opening being sufficiently remote from the magnetic circuit to ensure that no substantial magnetic force acts on the plug when it is in contact with the said external surface and is not received by the cover opening.
2. A magnetic clasp as claimed in claim 1, in which the external surface of the cover around the opening is defined by a cover wall spaced from the magnetic circuit.
3. A magnetic clasp as claimed in claim 1 or 2, in which the external surface of the cover around the opening is funnel-shaped.
4. A magnetic clasp as claimed in claim 3, in which the external surface of the second part around the plug is shaped so as to match the funnel-shaped cover surface.



5. A magnetic clasp as claimed in any of claims 1 to 4,
in which the magnetic circuit is enclosed by a non-magnetic case
and the cover.

6. A magnetic clasp as claimed in any of claims 1 to 5,
5 in which the magnetic circuit comprises an annular permanent
magnet in contact with a lower ferromagnetic plate and an annular
upper ferromagnetic plate, the magnet and the upper plate
defining a central hole in register with the cover opening,
and a ferromagnetic pillar mounted on the lower plate and
10 extending up through the central holes with a gap all round.

7. A magnetic clasp as claimed in claim 6, in which the
upper end of the pillar is flush with the upper surface of the
upper plate.

8. A magnetic clasp as claimed in any of claims 1 to 5,
15 in which the magnetic circuit includes a pair of semicylindrical
ferromagnetic pillars in contact with opposite sides of the
permanent magnet and extending above it.

9. A magnetic clasp as claimed in any of claims 1 to 5,
in which the magnetic circuit includes an upper and a lower
20 ferromagnetic plate between which the permanent magnet is
mounted, the plates extending laterally beyond the magnet and
the lower plate being provided with an upright member or auxiliary
magnetic pole which, together with the upper plate, defines the
flux gap.



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10. A magnetic clasp substantially as described with reference to, and as shown in, Figures 1 to 4, Figures 5 to 8, Figure 9, or Figure 10 of the accompanying drawings.
