

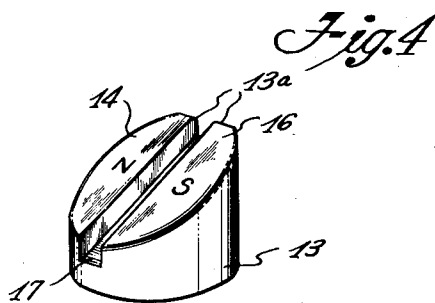
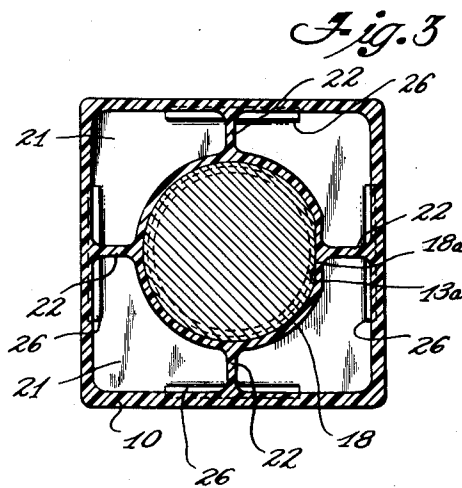
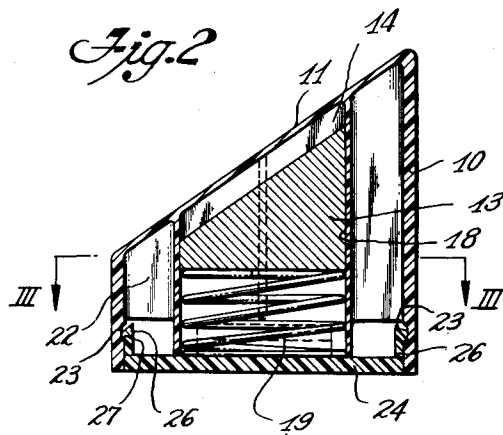
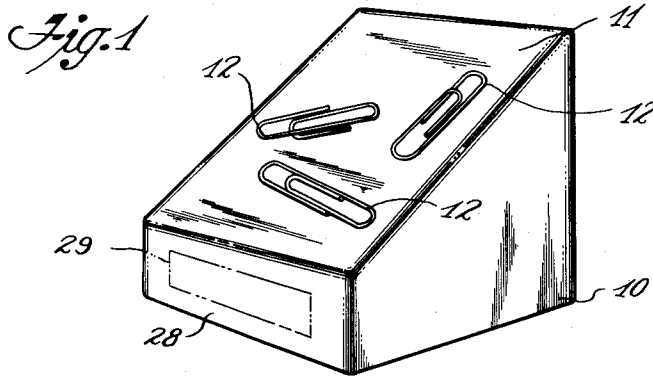
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MAGNETIC RETAINER

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MAGNETIC RETAINER

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2 Claims. (Cl. 175-367)

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My invention relates to magnetic retaining devices, and has particular reference to an enclosed permanent magnet structure adapted for table or desk use for retaining paper clips or similar ferrous objects.

While permanent magnets have been used as retainers for various objects, these magnetic structures have been of awkward shape and size and difficult to clean. Accordingly magnetic dust and scraps that adhere to the magnet have made them unsightly in appearance. Additionally, carbon steel magnets tend to rust, and unless plated or otherwise protected, they soon become displeasing to the eye. These and various other factors have accordingly hindered the widespread use of permanent magnet structures as desk accessories for retaining paper clips, etc.

My invention incorporates the provision of a non-magnetic case or box in which a permanent magnet may be disposed. This structure permits the box to have a utilitarian and pleasing outline while the magnet concealed therein may be designed strictly from an engineering standpoint regardless of outline or shape. The box structure may be smoothly contoured so that magnetic dust and scraps may be easily removed by a simple wiping action. Further, corrosion of the magnet itself will not affect either the operation or the appearance of the entire retaining device.

It is therefore an object of my invention to provide a permanent magnet retainer wherein a permanent magnet may be disposed within a box of non-magnetic material having a pleasing shape and outline.

Another object of my invention is to provide a plastic housing of any desired color or outline in which a permanent magnet may be disposed so that ferrous objects may be retained upon the outer surfaces of the housing.

A further object of my invention is to provide a magnetic retainer suitable for use on desks, work tables, etc., wherein a thin-walled housing of non-magnetic material may have a magnet disposed therein and pressed against one thin wall thereof by a spring.

Still another object of my invention is to provide a paper clip retainer suitable for use on desks wherein a powerful permanent magnet may be disposed underneath a suitably inclined surface that makes the removal of paper clips therefrom convenient and which is also suited for receiving paper clips.

Other objects and advantages of my invention will be apparent in the following description and

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claims, considered together with the accompanying drawings, in which

Fig. 1 is a perspective view of a presently preferred embodiment of my invention showing a housing upon which ferrous objects such as paper clips may be retained;

Fig. 2 is a vertical sectional view through the structure of Fig. 1 showing the formation of the housing and the disposition of a permanent magnet therein;

Fig. 3 is a sectional view along the line III—III of Fig. 2 showing the sectional construction of the housing; and

Fig. 4 is a perspective view of a presently preferred form of permanent magnet for use in the housing structure of Figs. 1, 2, and 3.

Referring to the drawings, a housing 10 may have any suitable outline. For example, it may be generally square in section and may have an upper surface 11 thereof inclined so as to present a readily accessible surface for the retention of paper clips 12 and other objects when the entire housing 10 is disposed upon a desk or other work surface. The housing 10 may be formed of any suitable non-magnetic material, and I have found that organic plastics are well adapted as a structural material for my housing and may be readily formed in any desired shape by molding. Various other materials could be used, however, as will be appreciated by those skilled in the art. For example, wood, glass, stone, or other substantially non-magnetic material may be used.

A magnet 13 may be disposed within the housing 10, and it will be noted particularly with reference to Fig. 4 that the magnet may have two poles 14 and 16 formed by slotting the general cylindrical shape of the magnet as at 17. The magnet 13 may be made of any suitable material, and at present I prefer to use the high permeability materials such as alloys of aluminum, cobalt, nickel, and iron, although any type of permanent magnet material would operate satisfactorily. The magnet 13 may be so polarized as to form opposite poles on poles 14 and 16 so that a strong magnetic flux may be present in the air gap between them, attracting to the magnet ferrous objects and other magnetic objects.

Referring to Figs. 2 and 3, it will be noted that the magnet 13 may be disposed within a well 18 formed centrally within the housing 10. Further, it will be noted, particularly with respect to Fig. 3, that the well 18 may be straight at one portion 18a that may be contacted by a flat 13a on the magnet 13. This flat 13a in cooperation with the straight portion 18a of the well serves to align the

magnet 13 within the well so that its poles 14 and 16 will be accurately aligned with the inclined surface 11 of the housing so that the magnet will be snugly pressed against the underside of the inclined surface 11. This thereby positions the magnet so as to get the least possible dimension between the poles 14 and 16 of the magnet and the outer portions of the surface 11. A coil spring 19 may be employed to urge the magnet 13 upwardly so as to maintain this close contact with the underside of the surface 11.

The illustrated housing 10 contemplates the use of a molding of organic plastic material, and accordingly to reduce the bulk of this material various hollows 21 may be provided within the housing separated by webs 22 that connect the wall of the well 18 to the outer shell of the housing 10. As best illustrated in Fig. 2, it will be noted that the webs 22 do not extend toward the bottom of the housing 10, but terminate at some distance therefrom, and that generally horizontal notches 23 may be formed on the interior of the outer side walls of the housing 10. These notches 23 provide a fastening action in combination with a bottom plate 24 which may have upwardly projecting ears 26 provided with protruding portions 27 that fit within the grooves 23. It will be noted, particularly with respect to Fig. 3, that these upwardly projecting ears 26 extend for only a portion of the length of each side wall, and accordingly may be made quite flexible. For this reason the bottom plate 24 may be molded as a single member and may be forced inwardly into the bottom of the housing 10, which will cause the ears 26 to elastically deflect inwardly. Upon reaching the position shown in Fig. 2, the ears will snap outwardly, permitting the projecting portions 27 of the ears to fit within the grooves 23 and thereby lock the bottom plate 24 in position, which also retains the spring 19 and the magnet 13 within the housing. If desired, a gluing action may also be utilized to retain the ears in position.

From a production standpoint, it is very important that the underside of the inclined surface 11 be formed with extreme accuracy so as to eliminate any air space between it and the magnet 13. Likewise the magnet 13 must be accurately formed so that its inclined poles 14 and 16 will accurately align themselves with the inclined surface 11. Accordingly the magnet 13 may have the poles ground to an extremely fine tolerance, and the edges of the poles may be rounded to conform with the interior radius of the ends of the well 18, which latter radius is desirable in molding practice.

The illustrated embodiment of my invention has been successfully manufactured, and I have found the following materials and dimensions are satisfactory for a desk type of paper clip retainer. This illustrative example is not to be construed as a limitation of my invention, but is furnished only for those desiring a detailed embodiment. The housing 10 may be formed of a suitable thermoplastic organic plastic such as cellulose acetate, although other thermoplastics and thermosetting plastics may be utilized. For example, in the thermoplastic field the methyl methacrylates and polystyrenes could be used, and in the thermosetting class phenol formaldehydes, phenol furfuryl, and the urea formaldehyde compounds could be used. I have found that nickel-iron or iron-nickel-aluminum alloys are suitable for permanent magnet purposes, and the spring 19 may be an ordinary steel or phosphor bronze spring. The base of the housing 10 may be roughly $2\frac{1}{2}$ "

square, and the high side may be $2\frac{1}{2}$ " high, while the low side may be $\frac{7}{8}$ " high. I have satisfactorily utilized a thickness of approximately $5/100$ " for the inclined surface 11. The bottom plate 24 may be of the same type of plastic material as the housing 10, or may be of different materials where higher degrees of elasticity are required. In actual practice I find it convenient to apply names or advertising material to the small vertical face 28 of the housing 10, as illustrated by the outline 29. The housing 10 may be of any desired color, and where this housing is molded, the colors may be a part of the molded material.

In operation, the retainer may be placed upon any suitable work surface such as a desk, and as paper clips or other magnetic objects are handled, they may be tossed toward the retainer, and if they should strike any portion of the inclined surface 11 they will be instantly retained by the powerful magnetic field. This magnetic field may be established between the poles 14 and 16 and will penetrate the non-magnetic surface 11 so as to occupy a considerable portion of the air space immediately above the inclined surface 11. Any reasonable number of magnetic objects may be retained in this manner, and as a practical matter as much as one box of ordinary paper clips may be retained with no difficulty. When it is desired to use a paper clip or other magnetic object, the user has merely to grasp one from the pile of objects adhering to the retainer and remove it therefrom. There is no difficulty in locating a paper clip or other magnetic objects inasmuch as they are always readily available due to the disposition of the inclined surface 11.

The use of a spring to force the magnet upwardly against the underside of the surface against which it is disposed not only results in an inexpensive construction, but allows for liberal manufacturing tolerances and also preserves the life of the entire retainer due to the shock absorbing effect present for the heavy magnet 13 in the event that the retainer should be accidentally dropped. It is obvious to those skilled in the art, however, that various modifications could be made in the presently preferred embodiment illustrated without departing from the true spirit and scope of my invention. For example, the spring 19 could be eliminated and solid supports could be used for the magnet. Also, as indicated, the housing 10 could be made of any suitable material, and might even include the non-magnetic metals such as aluminum. The specific shape of the housing 10 is not a vital factor, although I have found that the use of the inclined surface 11 greatly facilitates use upon desks wherein the inclined surface may face the user. The bottom plate 24 may be secured by means other than the snap fasteners shown, as is quite obvious, and screws or any other type of fastener could be employed. Also, the bottom could be formed as a simple plate and glued to the housing by use of a plastic glue or by fusion by using a plastic solvent. Also, while the retainer has been described for use with paper clips on a desk top, it is obvious that it could be easily employed, for example, to hold hairpins, thumb tacks, or may be usefully employed in assembly operations in factories where the retention of magnetic objects is desired.

From the foregoing remarks it is obvious that I do not limit my invention to the specific structure illustrated and described, nor do I limit myself in any way other than by the terms of the following claims.

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I claim:

1. A desk type magnetic retainer for paper clips and the like comprising a housing of non-magnetic material having a well therein with one portion of the well straight and having one end of the well closed at an acute angle to the axis of the well, a permanent magnet adapted to fit within the well and having one side thereof flattened to correspond with the straight portion of the well and having poles thereof aligned to fit against the end wall of the well, whereby the poles of the magnet will be aligned with the inclined well wall, and means for retaining the magnet within the well.

2. A desk type paper clip retainer comprising a hollow molded plastic housing having a generally rectangular outline with an upper surface thereof inclined, a well formed within the housing and having one portion thereof flat, a generally cylindrical magnet disposed within the well having a flattened portion cooperating with the straight portion of the well and having poles inclined to fit the underside of the inclined surface

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of the housing, a compression spring disposed below the magnet for urging it upwardly against the underside of the inclined surface, a bottom plate disposed within the housing and having upwardly projecting ears with protruding portions, and grooves formed in the interior of the side walls of the housing to receive the protruding portion of the ears, whereby the bottom plate will be retained within the housing due to the elastic action of the ears in forcing the projections of the ears within the grooves.

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