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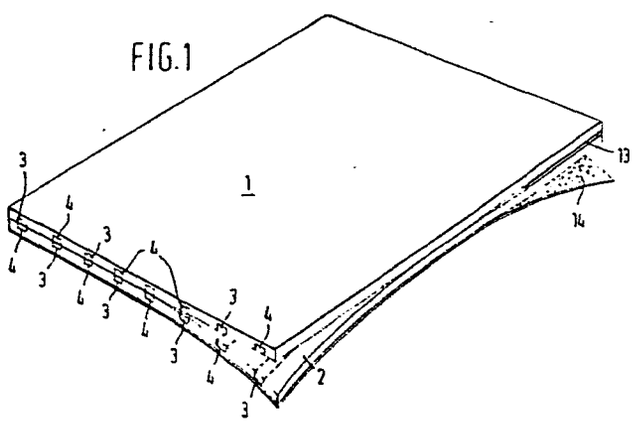
(54) **A flexible magnetic clamp.**

(57) Magnetic clamping device comprising in its basic embodiment two rectangular panels (1, 2) of flexible foil material, each having narrow strips (3, 4) of magnetic material embedded therein, the strips (3, 4) in each panel having alternately opposite polarities, the panels (1, 2) being locally attached to each other, such as along one of their edges, so that said strips (3, 4) extend substantially at right angles to said edge and so that with one of the panels (1, 2) lying flat on top of the other panel (1, 2) each strip (3, 4) of one panel (1, 2) lies directly opposite to a strip (3, 4) of the other panel (1, 2) having an opposite polarity.

FIG.1



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A flexible magnetic clamp.

The present invention relates to a magnetic clamp having clamping faces, each including a flexible synthetic plastics foil panel with embedded parallel strips of magnetic material, said strips having alternating polarities, and said panels being interconnected for movement between an open position and a clamping position in such a manner that in the clamping position, opposite strips of magnetic material have opposite polarities.

Such a clamp is described in US patent 4,258,493 and comprises a flexible backing band to which the panels with embedded magnetic strips are secured in spaced relationship. For closing the clamp, the intermediate portion of the backing band is bent to a U-shape for opposing the two panels, thereby enclosing an object to be fixed. The mutual magnetic attraction of the two panels will then ensure sufficient surface pressure on the clamped object so as to prevent the object from slipping out of the clamp to an extent sufficient for normal use.

The clamping effect of such a flexible magnetic clamp is relatively substantial, since, in contrast to non-flexible mechanical clamps, the clamping force is not exerted on the panels by a separate force-applying means, such as a spring, but the clamping force is produced in the material proper, and this throughout the entire surface of the two panels.

With a mechanical clamp of the above described type, surface irregularities in the clamp or in the object to be clamped will cause the clamping forces to be distributed unevenly over the surface clamped and mostly to be concentrated in projecting parts. With a clamp whose clamping faces include flexible magnetic panels, the panels can in principle conform to surface irregularities of a clamped object and bed during on the object with their entire surface.

A drawback of the device disclosed in US patent 4,258,493 is that it is always necessary to take care that the panels lie in the proper relative opposite positions. Even a slight relative displacement transverse to the longitudinal direction of the magnetized strips, which is possible owing to the flexibility of the backing band, may cause magnetized strips of equal polarity to become opposed, so that the clamping faces repel instead of attract each other. Another drawback of the use of a backing band is that no optimum use can be made of the flexibility of the synthetic plastics foil panels, for, if only because of its greater thickness, the assembly of panel and backing band is less flexible than a flexible panel alone.

It is an object of the present invention to avoid these drawbacks going with the prior art magnetic clamp.

To this end, the foil panels of the clamp according

to the present invention have a fixed relative position by being locally attached to each other. No use is made of a backing band. The foil panels proper form the clamping faces of the clamp and can be provided at their distal sides directly with a print and/or an adhesive layer for attachment of the clamp to a wall and the like.

According to the present invention, the flexible magnetic clamp may comprise two substantially equally large foil panels fixed along one edge relatively to one another, the strips of magnetized material extending substantially at right angles to the fixed edge. With such a clamp, even if, due to clamping of a thick object, the panels should be shifted relatively to each other in the direction of the clamped edge, the strips of opposite polarities will always remain opposite each other.

Since in the clamp according to the present invention, the panels are locally interconnected, the clamp has a paperclip effect, i.e. when either panel is lifted the interspace tapers in the direction of the fixed edge, so that the edge of an object pushed into the clamp can already be clamped in the narrow portion. When the opened clamp is released the bent portions will move towards each other initially exclusively under the influence of the resiliency inherent in the synthetic plastics material until the facing sides of the panels have approached each other so closely that the respective magnetic fields influence each other, thereby closing

the clamp visibly faster.

Because the clamps according to the present invention may be very thin, i.e. in the order of 1.5 mm, and be made self-adhesive in a simple manner and moreover are resistant to moisture and corrosion, they are excellently suitable for fixing temporarily, even on uneven surfaces, various paper articles, such as memorandums, drafts, window bills, posters, notices and the like in shops, stores, offices, motor-cars, caravans and the like.

Depending on the thickness and the weight of the articles to be attached, clamps may be made in various foil thicknesses, thicker foils being adapted to contain more magnetizable material, and hence to exert a greater clamping force per unit of surface area.

In order to create the conditions for an optimum parallelism of the clamping faces and hence an optimum use of the mutual magnetic attraction, according to the present invention the two panels constituting the clamp may be locally fixed relatively to each other, thereby enclosing an abutment forming a contacting edge, said abutment having a thickness in the order of that of the material for which the clamp is designed. The abutment moreover facilitates the positioning of an article in such a clamp.

A particular application of the present invention is a map or chart holder comprising a lower panel and a flexible, transparent upper panel connected at one

edge by a clamp according to the present invention and being each provided at the opposite edge with coacting bands of flexible foil with embedded strips of magnetized material, the polarities alternating in the successive strips.

A leaf-shaped article, such as a map or sea chart, can be interposed between the panels and since the alternating polarities of the opposite strips of magnetized material prevent any shift of the upper panel relatively to the lower panel, the transparent upper panel is always retained in tight condition over the map. The upper panel may consist of material on which can be written, such as polycarbonate or transparent polystyrene in matted design, allowing notes to be made and positions to be indicated on a clamped map or chart without the risk of navigation errors as a result of a shift of the map or chart underneath the upper panel.

Some embodiments of the flexible magnetic clamp according to the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 shows a magnetic clamp composed of two magnetic foil panels 1 and 2 fixed relatively to each other in an edge zone, with an abutment 13 being interposed between them. At the bottom there is provided an adhesive layer, not shown in Fig. 1, which is protected by a temporary coating 14.

Panels 1, 2 are made of a flexible synthetic plastics material, e.g. modified polyethylene, and have embedded therein, at an interspace of e.g. 2 mm, strips 3, 4 of magnetizable material such as barium ferrite or strontium ferrite.

The strips are magnetized so that in the facing surfaces of the panels 1, 2, the magnet strips in each surface are alternately north and south poles and the panels are relatively positioned in such a manner that directly opposed strips have different polarities. In other words, starting from the assumption that each strip 3 manifests itself in the surface as a north pole and each strip 4 as a south pole, each strip 3 of the panel 2 is opposed to a magnetic strip 4 in the panel 1 and vice versa.

The visible surface of the clamp may be coated with a vinyl layer in any color desired and may, at choice be provided with text or representations.

The abutment 13 may be formed by an adhesive layer whose thickness is chosen to suit the contemplated use of the clamp, i.e. in the order of the thickness of the material to be clamped therein, so that when the material is clamped between them, the panels 1, 2 extend as much as possible in mutually parallel relationship, ensuring an optimum clamping effect.

Fig. 2 shows a map or chart holder having a rigid lower panel 5 and a flexible upper panel 6. Panels

5, 6 are hinged together at one of their edges and in the position shown, two opposite edges are provided with magnetic foil bands 7, 8 and 9,10, respectively.

A clamped sheet 11, e.g. a map, is pushed between panels 5, 6 into abutment with the hinging edge between strips 9, 10 and when the panel 6 is closed over the panel 5, the map 11 is affixed at two edges, while also the flexible panel 6 is kept tight on the rigid panel 5.

Fig. 2 does not show the magnetized strips in the bands 7-10. It is observed that the strips need not necessarily extend at right angles to the hinge. It is necessary though that they extend in mutually parallel relationship per panel or band, and that the strips of coacting panels in closed clamping position lie directly opposite each other and have opposite magnetic polarities.

CLAIMS

1. A magnetic clamp having clamping faces each including a flexible synthetic plastics foil panel having embedded therein parallel strips of magnetic material, said strips having alternately opposite polarities and the panels being interconnected for movement between an open position and a clamping position in such a manner that in the clamping position opposite strips of magnetic material have opposite polarities, characterized in that the foil panels have a fixed relative position being locally attached to each other.

2. A magnetic clamp according to claim 1, characterized in that the flexible magnetic clamp comprises two substantially equally large foil panels fixed along one edge relatively to one another, the strips of magnetized material extending substantially at right angles to the fixed edge.

3. A magnetic clamp according to claim 2, characterized in that the two panels constituting a clamp are locally fixed relatively to each other, thereby enclosing an abutment forming a contacting edge, said abutment having a thickness in the order of that of the material to be clamped for which the clamp is designed.

4. A map holder comprising a lower panel and a flexible, transparent upper panel connected at one edge by a clamp according to any one of the preceding claims,

each panel being provided at the opposite edge with coacting bands of flexible foil with embedded strips of magnetized material, the polarities alternating in the successive strips.

FIG.1

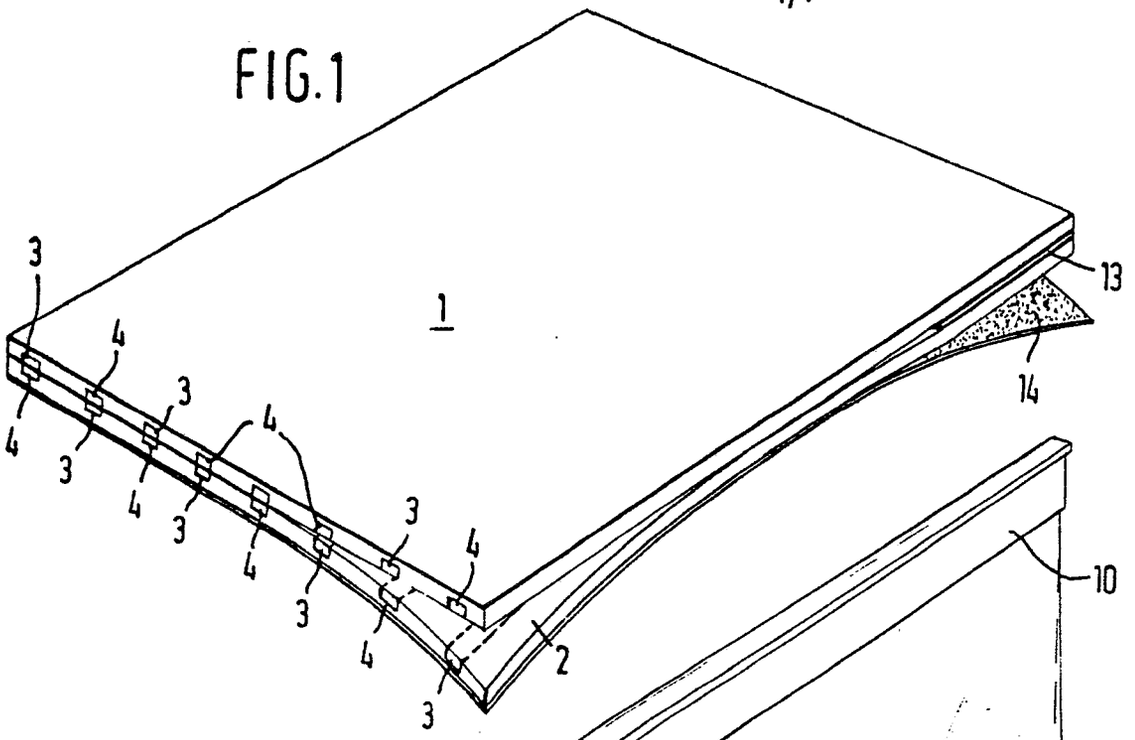

FIG.2