United States Patent

[11] 3,634,797

[72] Inventor **Dori Burkholter**
Wibichstrasse 80, Zurich, Switzerland

[21] Appl. No. **44,675**
[22] Filed **June 9, 1970**
[45] Patented **Jan. 11, 1972**
[32] Priority **June 12, 1969**
[33] **Switzerland**
[31] **9117/69**

[54] **DATA SUPPORT DEVICE**
11 Claims, 3 Drawing Figs.

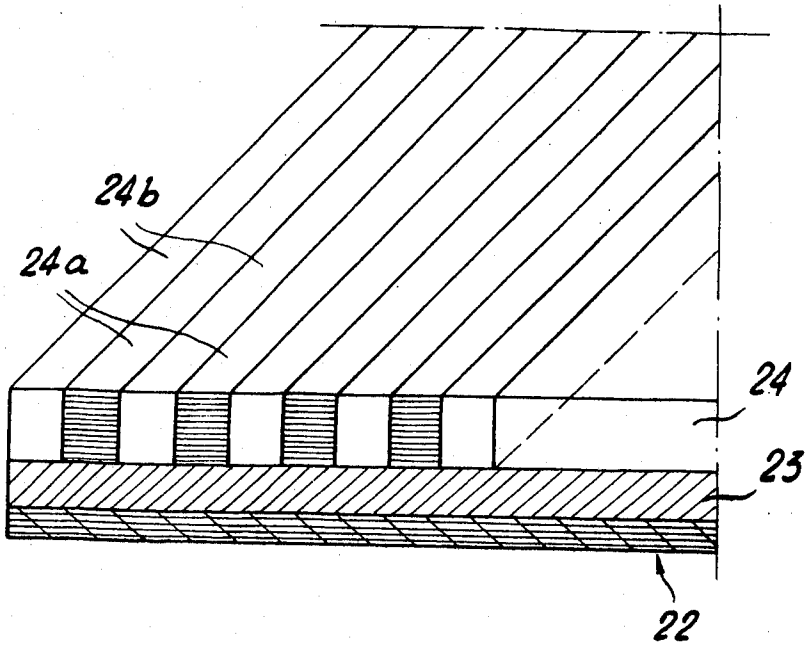
[52] **U.S. Cl.** ..... **335/302,** 235/61.12 M
[51] **Int. Cl.** **H01f 7/02**
[50] **Field of Search** ..... 335/285, 286, 302, 303, 296; 340/174 PM; 235/61.114, 61.12 M

[56] **References Cited**
UNITED STATES PATENTS

2,557,022	6/1951	Wolowitz	235/61.12 M
2,958,019	10/1960	Scholten et al.	335/285
3,215,903	11/1965	Barney	235/61.114
3,254,859	6/1966	Reisch	335/303
3,455,770	7/1969	Dahl, Jr.	235/61.12 M
3,488,615	1/1970	Yando	335/285

Primary Examiner—Harold Broome
Attorney—McGlew and Toren

ABSTRACT: On a backing support a data carrier adheres magnetically, wherein one of said two members comprises a foil carrying a layer permanently magnetized in pattern of strips of alternately differing polarity. The foil may have two coating layers on its face either one of which can function as a data carrier or backing support. The magnetizable layer may contain ferrite powder in an organic binder.



PATENTED JAN 1 1 1972

3,634,797

Fig. 1

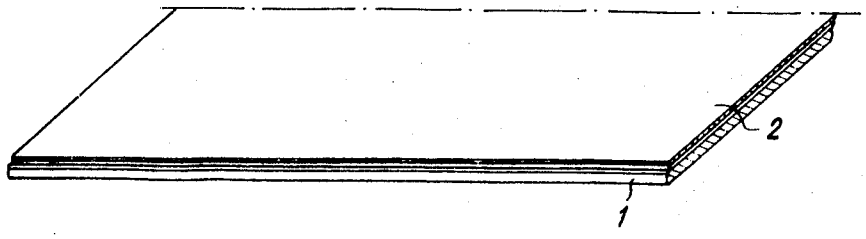
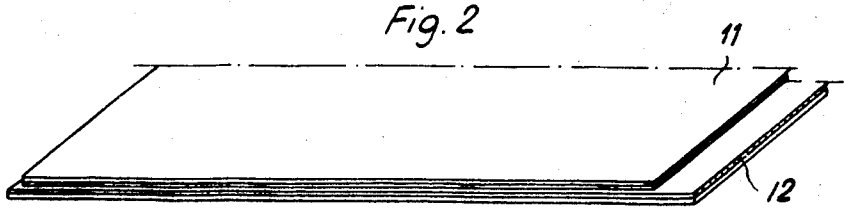


Fig. 2



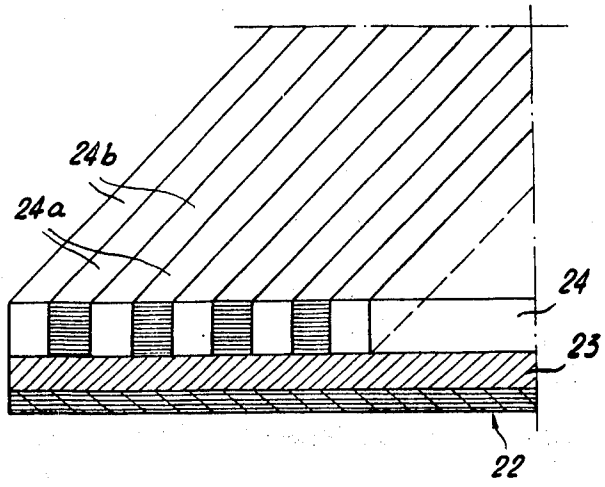


Fig. 3

INVENTOR.
DORI BURKHOLTER
BY McGlew & Toren
ATTORNEYS

DATA SUPPORT DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to data support devices comprising a backing support and a data carrier arranged to adhere magnetically thereto. Such carriers for data such as drawings, typed texts, tables, indicator signals and so on, are primarily used where the data or information to be represented or, for example, copied, frequently has to be replaced completely or in part. The backing support consists usually of a relatively thick plate or mat which is provided in any desired manner with permanent magnets, while the data carrier (usually paper) has a layer of a soft magnetic material, usually a coating of soft iron. The magnetic adhesion necessary for such a case necessitates relatively strong permanent magnets; moreover, the soft iron part of the coating must be efficiently protected against rust, e.g., by being mixed in with a suitable binder, which implies on the one hand, a relatively thick layer of coating, and on the other hand a relatively large amount of magnetically ineffective material in the layer of coating. Where a large quantity of binder has been added, this necessarily implies that the coating surface must in practice be very smooth so that there is very little friction between the backing support and the coating so that for efficient adhesion (i.e., no slip of the foil when the backing support is fixed), an appropriately large magnetic force must be produced by the permanent magnets of the backing support. It has already been proposed to remedy this fault by manufacturing the coating at least partly from a permanently magnetic material, e.g., from stainless steel or iron oxide, instead of from a soft magnetic material, the magnetic effect of this coating being kept considerably smaller than that of the backing support. At the same time, corrosion of the coating can be avoided and the use of a hydrous binder for the foil or coating, as well as the production of a relatively coarse surface is possible; the magnetic adherence of the foil or coating is, however, mostly unsatisfactory.

It is an object of the invention not only to avoid or minimize these disadvantages of known devices but also considerably to extend the areas of use of such a device.

To this end, the invention consists in that one of the two members of the device comprises a foil of any suitable material, one face of which carries a plurality of coatings or layers applied thereto, viz a first layer or coating immediately adhering thereto, and to which in turn is adhered a second coating or layer made from a material that is permanently magnetized in a pattern of strips, said second coating or layer comprising a plurality of spaced permanently magnetized strips of alternately differing polarity, separated by unmagnetized strips.

The thus coated foils may be used as the backing support and may be made to be considerably more flexible, thinner and lighter than the hitherto usual plates or mats. The individual magnetic strips of the said second coating or layer applied to the lower layer of magnetizable material, provide a very good magnetic adhesion to the data carrier, even where the coating layer is very thin and of the order of a few tenths of a millimeter, the data carrier itself consisting, at least partly, of a magnetizable material, and also keeps the backing support in vertically fixed relation thereto without appreciable slip.

Alternatively, the coated foil itself may be used as the data carrier which, due to its permanent magnetization, can adhere to a sheet metal backing support; the backing support may, in this case, also be a foil or sheet coated with iron foil or with iron dust.

BRIEF DESCRIPTION OF THE DRAWING

Some embodiments of a device according to the invention will now be described with reference to the accompanying drawings by way of example, and in which:

FIG. 1 shows diagrammatically a first embodiment where the back support is a metal sheet, the data carrier is a coated foil,

FIG. 2 shows diagrammatically a second embodiment where the backing support is a permanently magnetically coated foil and the data carrier is a similarly coated foil, and

FIG. 3 shows diagrammatically and to a larger scale, a foil with two layers or coatings on one face thereof, which can be used either as the data carrier or as the backing support.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, in FIG. 1, 1 is a sheet metal backing support made of a magnetizable material to which a data carrier 2 made in the form of a permanently magnetized coated foil, magnetically adheres.

In the embodiment according to FIG. 2 the backing support is shown at 12 and is a permanent magnetized coated foil to which a foil 11 coated with magnetizable material, and serving as a data carrier, magnetically adheres.

The foil 2 or 12 used in the one case as the data carrier, and in the other as the backing support, is diagrammatically shown in detail in FIG. 3 and generally designated at 22. This foil 22, only one face of which is coated, advantageously consists of paper; it could, however, for example, also be a synthetic plastic or metal foil, or may consist of textile, asbestos or glass fibers or metal wire or be composed as felt, tissue or net. A first coating or layer 23 made from a magnetizable material is applied to the foil 22, and this material may, for example, be iron or nickel; the coating 23 may consist of an adhered metal foil, or may comprise a suitable metal powder combined with a binding material. A second coating or layer 24 is applied to the first coating or layer 23. The upper coating or layer 24 consists of a permanently magnetized pulverulent material combined with a suitable binding means. Steel, a steel alloy or a ferrite material are suitable magnetized materials. This upper coating or layer 24 is magnetized with a pattern of strips, a nonmagnetized strip 24*b* of at least an approximately equal width being interposed between two successive magnetized strips 24*a*. It has been found that the best results are achieved when the thickness of the upper coating or layer 24 is approximately equal to or somewhat greater than the width of the strips 24*a* and 24*b*. Since the total thickness of the foil is to be as small as possible (approximately between 0.5 and 0.8 mm.) this results in a very narrow magnetized strip; it has, however, been found that good results were also obtained, when the strip width amounts to two to four times the thickness of the coating. Magnetization is carried out in such a manner that successive magnetic strips 24*a* have different polarities. The magnetic forces thus attainable on the upper face of the layer 24 are sufficiently strong to guarantee, in the two cases shown in FIGS. 1 and 2, a safe magnetically adhesive connection between the two members of the device.

The permanently magnetizable material of the upper layer 24 can be distributed over the whole foil surface regularly in the binder used. The individual strips 24*a*, 24*b* differ then, in that they are either magnetic or not. In manufacturing the layer 24, the strips 24*a* may be magnetized before the binder of this layer has not set completely. The magnetizing magnets thereby have the effect that at least one part of the magnetizable powder from the coating parts 24*b* diffuses in the coating parts 24*a* so that after magnetization and complete setting of the binder, a corresponding concentration of the powder in the permanently magnetized strips 24*a* can be ascertained by corresponding decrease in the concentration of pulverulent material in the nonmagnetized strips 24*b*. In using directive ferrite as a pulverulent material for the layer 24 magnetization can result therefore directly before the end of the setting of the binder (e.g., a synthetic material hardened by polymerization) so that the ferrite particles (individual small magnets) align themselves in the N-S direction, but can no longer diffuse within the layer. The ferrite distribution in the layer then remains regular over the entire area of the foil. Insertion of the permanently magnetizable pulverulent material can be also attained independently of the amount of the binder of the upper layer by scattering the powder on the magnets of the mag-

netizing device where they become magnetized and then the foil, with the binder thereon but not yet set, is pressed on to the pole of the magnetizing device and the magnetic field is retained until the binder, in which the powder now adheres corresponding to the magnetizing pattern, is completely set. Advantageously, the foil has an oblong format as is usual with typing paper. The magnetization pattern of the upper layer of relatively slight permeability can be made in either transverse or longitudinal sequences.

It will be apparent that the layers on the foil may be produced by means of any known coating method such as pouring, spreading, spraying, galvanic insuflation or electrostatic precipitation.

A mixture suitable for producing a magnetizable layer may contain, for example, 100 parts polyvinyl-acetate, 100 parts ethyl acetate, 5 parts dimethyldibutyl-phthalate and 205 parts ferrous oxide, Fe_2O_3 (ferrite). Usually the following composition of the mixture given in percentages has proved advantageous: 31 percent acetate dispersion, 2.5 percent dispersion means, 14.5 percent ferrite, 12.5 percent water, 1.5 percent foaming means and 38 percent thickener. In this way, an upper layer of the necessary superficial coarseness and thickness (0.3 to 0.6 mm.) can be produced which can be permanently magnetized efficiently with a narrow strip pattern (dimensions between 0.5 and 2.5 mm.), a light and flexible foil which can be used either as the backing support or as the data carrier of a total thickness of between 0.5 and 0.8 mm. being obtained.

One embodiment of a method of manufacturing a paper foil coated with magnetizable material will now be described:

A coating machine having a drying tunnel about 20 meters in length is used for the coating process. The ready-mixed coating substance is soft and can be applied with a doctor blade uniformly over the paper. A Syntosil or Artosil (Trademarks) paper reinforced with nylon threads is used as a support for the substance, 120 g. per $m.^2$, 125 cm. wide. The paper thus coated, passes through the drying tunnel at a speed of approximately 6 meters per minute, heated to a maximum 60° C.

The coating of the paper is repeated until a layer having a maximum thickness of 0.55 mm. is rigidly secured to the paper. The paper itself has a thickness of 0.13 to 0.15 mm. A maximum of five coats should be sufficient.

As a coating substance there is used a barium-ferrite 5.5 Fe_2, 0_3, BaO. The coating substance consists in its application on the paper of the following composition: 300 g. of the substance will comprise 200 g.: barium-ferrite, 33 g. binder (carrier): Impranil CHW (Trademark), and 67 g. solvent: ethyl acetate. The product is calendered after coating and cut into strips approximately 30 cm. in width and 10 meters in length. When finally coated the weight per m^2 amounts to 1.4 g.

The paper is finally magnetized by a magnetizing apparatus suitable for this relatively thin coated paper. Both the coating thickness and the pole pitch of the magnetizing coil correspond to the predetermined data for maximum adherence of the paper to a ferromagnetic backing; layer thickness as aforementioned 0.5 mm. pole pitch 2 mm. measured from the north and south axes.

The finished product can be written on with any conventional writing instruments (pen, pencil, felt-tipped pen, etc.).

Any printing desired should be effected before magnetization, since offset or book printing machines generally have some interfering ferromagnetic components and the magnetized paper would thus adhere thereto. If magnetization must be carried out before printing, then aluminum or any other nonmagnetic alloy must be used for the pertinent components of the printing machine.

What is claimed is:

1. A data support device comprising in combination:
   a. a backing support member, and
   b. a data carrying member arranged to adhere magnetically to said backing member wherein one of said two members comprises a foil, one face of which carries a plurality of coating layers applied to said face, said layers comprising
      i. a first coating layer immediately adhering to said face, and
      ii. a second coating immediately adhering to said first coating layer and made from a material that is permanently magnetized in a pattern of strips, said second coating layer comprising a plurality of magnetized strips consisting of spaced permanently magnetized strips of alternately differing polarity, separated by unmagnetized strips.

2. The device claimed in claim 1, further characterized in that said second coating layer comprises ferrite powder combined uniformly with a binder.

3. The device claimed in claim 1, further characterized in that said second coating layer comprises concentrated ferrite powder in the permanently magnetized strips.

4. The device claimed in claim 2, further characterized in that said second coating layer comprises a binder into which ferrite powder has been pressed in the desired magnetization pattern which is rectangular and wherein the permanently magnetized strips in said second coating layer extend parallel to one of tow adjacent sides of the rectangle.

5. The device claimed in claim 3, further characterized in that said foil is rectangular, and the permanently magnetized strips in said second coating layer extend parallel to one of two adjacent sides of the rectangle.

6. The device claimed in claim 1, further characterized in that said first coating layer comprises a member selected from the group consisting of iron, steel and nickel.

7. The device claimed in claim 1, further characterized in that said foil consists of a member selected from the group consisting of textile material, synthetic material, asbestos, glass and metal.

8. The device claimed in claim 7, further characterized in that said foil is a member selected from the group consisting of felt, tissue and net.

9. The device claimed in claim 1, further characterized in that the binder for said second coating layer is a synthetic material.

10. The device claimed in claim 1, further characterized in that said first coating layer comprises a member selected from the group consisting of iron, steel and nickel, and said foil consists of a member selected from the group consisting of paper, textile material, synthetic material, asbestos, glass and metal.

11. The device claimed in claim 10, further characterized in that said second coating layer comprises a binder into which ferrite powder has been pressed in the desired magnetization pattern which is rectangular and wherein the permanently magnetized strips in said second coating layer extend parallel to one of two adjacent sides of the rectangle.

* * * * *