

- [54] **MAGNETIC DISPLAY BOARD SYMBOLS**
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- [51] Int. Cl..... **B44f 7/00**
- [58] Field of Search ..... **161/18; 35/7 A, 53; 46/234, 236; 40/106.45, 142 A**

3,122,684 2/1964 Genin ..... 40/142 A  
 3,189,981 6/1965 Genin et al. .... 40/142 A

**FOREIGN PATENTS OR APPLICATIONS**

842,480 7/1960 Great Britain ..... 35/7 A

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[57] **ABSTRACT**

A magnetic display board article comprises a thin, planar laminate of a ferrous, magnetically attractable particle layer sandwiched between rigid plastic or paper layers. The article is preferably formed as a multiple symbol-containing sheet and may have scored, die-cut patterns therein and printed matter within each symbol pattern following the score outline. Each symbol pattern is manually removable along the scored edges to separate it from the sheet.

**11 Claims, 2 Drawing Figures**

- [56] **References Cited**
- UNITED STATES PATENTS**
- 2,002,077 5/1935 Darling et al. .... 161/18 UX

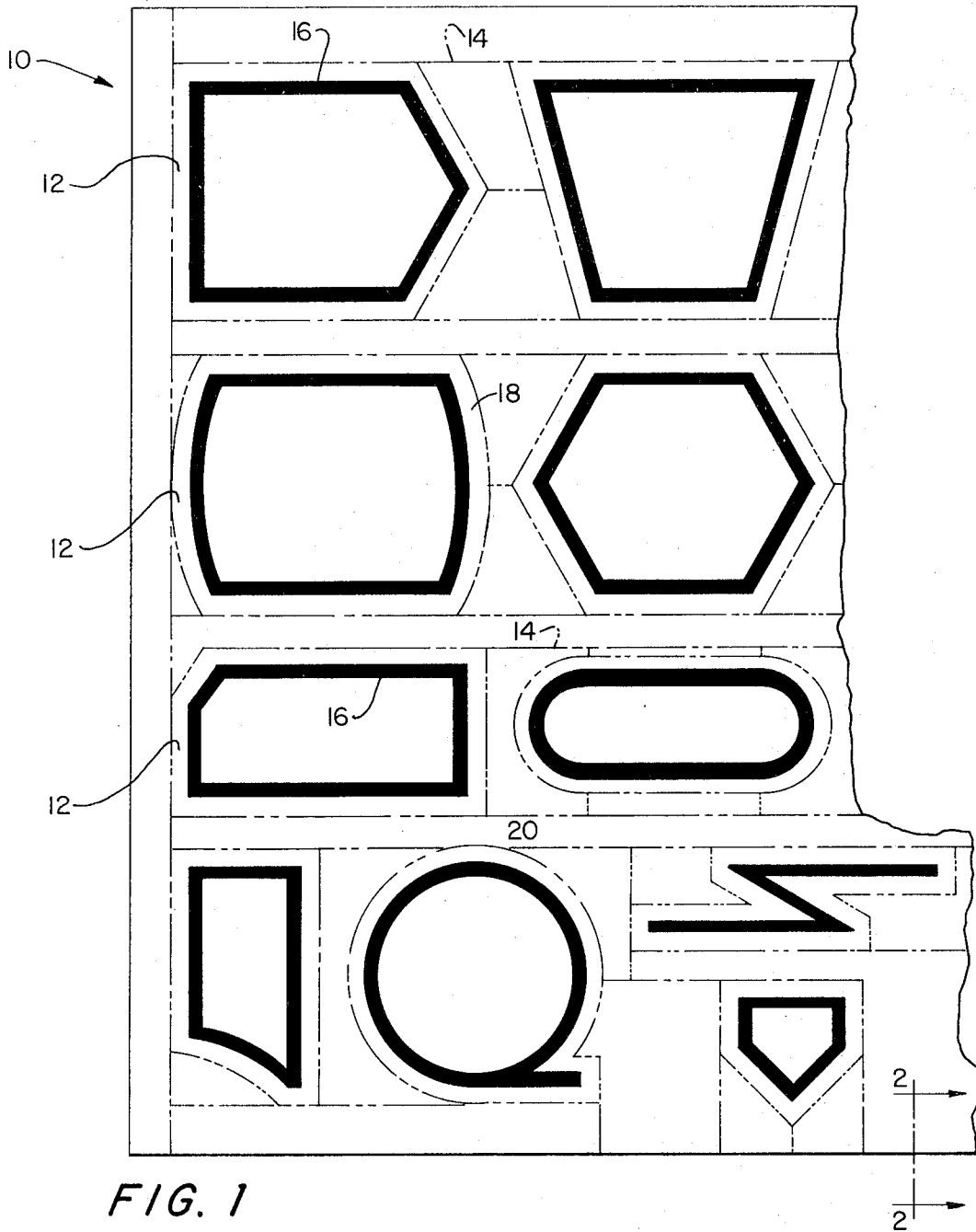


FIG. 1

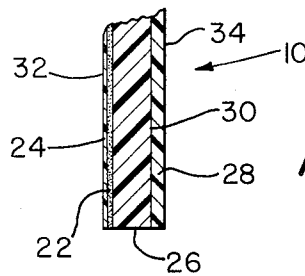


FIG. 2

## MAGNETIC DISPLAY BOARD SYMBOLS

## BACKGROUND OF THE INVENTION

The present invention relates to visual display devices in general and more particularly concerns magnetic display board symbols of rugged construction for long use with little degradation that are relatively inexpensive and easy to fabricate.

It is an important object of the present invention to provide magnetically attractable symbol forming articles which are resistant to degradation in the course of long term usage.

It is a further object of the invention to provide such articles which are easy to fabricate, consistent with the foregoing object.

It is a further object of the invention to provide such articles which are economical consistent with one or both of the preceding objects.

It is a further object of the invention to provide protected permanent printing in such articles consistent with one or more of the preceding objects.

It is a further object of the invention to provide in such articles a capability of temporary printing thereon consistent with one or more of the preceding objects.

It is a further object of the invention to provide a safe article of the class described consistent with one or more of the preceding objects.

It is a further object of the invention to provide conveniently handleable articles of the class described consistent with one or more of the preceding objects.

It is a further object of the invention to provide subdivisible or discrete articles of the class described, with or without printed matter thereon consistent with one or more of the preceding objects.

It is a further object of the invention to provide compact articles of the class described consistent with one or more of the preceding objects.

## SUMMARY OF THE INVENTION

In accordance with the invention, large area sheet laminates of permanently bonded layers comprise multiple symbol-forming article components therein as distinct patterns enclosed by scoring indentations. The individual symbol forming article components can be broken out manually by bending the sheet to break through at the score line. Each symbol forming component has permanent printed lines therein conforming to the score lines to enhance recognition.

The laminate comprises a thin, planar layer of ferrous, magnetically attractable particles of one or several particle thickness sandwiched between first and second planar, nonmagnetic layers at least one of which preferably is rigid enough to make the article as a whole rigid. A first one of said nonmagnetic layers comprises the back face of the sheet. The second layer is opaque and thicker than the first layer, preferably twice as thick or more. The above-described printed matter is preferably imprinted on the face of said second layer away from the magnetic particle layer. The printed face of the second layer is overlaid with a third nonmagnetic layer which is preferably made of clear plastic and has a lesser thickness than the second layer. The second layer may be of single layer form or subdivided into multiple sublayer components. All of the

above layers and sublayers are permanently bonded to each other.

The magnetic particle layer preferably comprises iron particles in a size range of 0.016 to 0.003 inches diameter of equivalent spheres or irregular shapes. This layer has sufficient density of particles that it has substantial areal continuity through side to side contacts between particles. It has been discovered that the ferromagnetic particle layer is protected from oxidation and consequent degradation of its ferro magnetic properties by the laminate construction and that sharp cutting edges are eliminated thereby consistent with obtaining the necessary magnetic attractable properties. The laminate as a whole is resistant to delamination.

These and other objects, features and advantages of the invention are described below in the following detailed description of preferred embodiments of the invention taken in connection with the accompanying drawing in which

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a plan view of a portion of a laminate sheet containing multiple symbol forming components therein; and

FIG. 2 is a sectional view of a thickness of such sheet viewed as indicated by arrows 2—2 in FIG. 1.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawing and more particularly FIG. 1 thereof, there is shown a rigid sheet 10 comprising a number of distinct symbol forming patterns 12 which are defined by score lines 14. The sheet can be broken apart manually by bending so that the individual components 12 are separated at the score lines 14. Each component has a printed pattern 16 therein corresponding to the score line 14 outline. The pattern is spaced from the score line to define a B-pattern border 18 in the component. Buffer zones 20 are provided between adjacent components so that no score line is at a common such component defining edges of both components.

The sheet 10 is of large area form, at least one half inch by one half inch in length and width dimensions thereof and preferably in excess of 6 inches by 6 inches and may be of the order of 48 inches by 96 inches. The laminate thickness is between 30 and 60 mils, but may exceed these limits as required.

FIG. 2 shows an enlarged sectional view of a portion of the sheet 10. The laminated sheet comprises a layer 22 of ferromagnetic iron powder particles of single particle thickness or several thicknesses which has areal continuity by side to side contact of particles in the single layer thickness thereof. The ferromagnetic particle layer is sandwiched by a first plastic layer 24 and a second plastic or paper layer 26. The third plastic layer 28 overlies the second layer 26 forming an interface 30 therebetween. The first layer 24 and the third layer 28 are preferably clear rigid vinyl sheets. The second layer 26 is preferably an opaque single vinyl sheet or a permanently bonded plurality of rigid vinyl sublayers. Other plastics may be substituted for vinyl.

A matte surface 32 is provided on layer 24 to enhance its frictional contact with a display board. The smooth surface is provided on layer 28 to allow erasable writing thereon with a grease pencil or the like. The permanent pattern defining printed matter is con-

tained at the interface 30 between layers 26 and 28 and is preferably imprinted on layer 26 or on its topmost sublayer.

A preferred fabrication process for making the laminated particle 10 is as follows.

Two 0.015 inches rigid, opaque vinyl sheets are laminated by subjecting them to heat and pressure at 120°C. or higher and at least 5 psi for at least 10 seconds to produce layer 26 as a laminate. Then one side of the so-formed laminate is printed with the patterns indicated in FIG. 1 or any other desired permanent information or representation or left blank. The other side of the laminate is sprayed with a plastic adhesive of heat reactivating type. Iron powder particles are applied thereto as a monolayer by flocking. The iron particles are then overlaid with a 0.0018 inches vinyl layer, and the vinyl layer/iron particle layer/vinyl layer is then hot pressed under the same conditions as described above in connection with bonding the sublayers of layer 26. Steel rule dies may be used to cut out the scoring patterns (FIG. 1), if scoring patterns are desired.

The iron particles are imbedded in the surface of the layer 26 by the hot pressing process, thereby allowing layer 24 to contact layer 26 for permanent bonding of the layers and encapsulation of the iron particles consistent with maintaining areal continuity of the magnetic particles by side-to-side contact of a substantial number (preferably a majority) thereof for purposes of assuring an adequate density of particles affording the necessary magnetic coercive force for attractability to a magnetic display board or device. Such attractability is further assured by using a very thin layer 24 to minimize separation of the iron particle layer from the board.

It is evident that variations can be made within the above described embodiments. For instance, the multiple sublayers of layer 26 can be made of paper instead of plastic. The individual symbol forming article components 12 (FIG. 1) can be precut rather than maintained together on a scored sheet.

The laminate can also be used as a display board, per se, in combination with symbol forming magnets.

There has been described a novel display board symbol forming article which is resistant to delamination, magnetic material oxidation in service and is simple, convenient and economical to fabricate and use. There are no sharp edges on the multiple symbol sheets or on individual symbol forming articles.

As used herein scoring includes conventional scoring or indentation or other marking forming an indicated site for cutting by punching, scissors, saw or other shear cutting means.

It is evident that those skilled in the art may now make numerous other uses and modifications of and departures from the specific embodiments described herein without departing from the inventive concepts. Consequently, the invention is to be construed as embracing each and every novel feature and novel combination of features present in or possessed by the apparatus and techniques herein disclosed and limited solely by the scope and spirit of the appended claims.

What is claimed is:

1. A magnetic display board article comprising means forming a thin planar layer of ferromagnetic particles of 0.016 to 0.003 inch diameter of one to four particle thicknesses, and means forming first and second rigid planar non-magnetic layers straddling the ferromagnetic particle layer and being permanently bonded thereto and to each other to form a permanent laminate, at least one of said first and second layers having sufficient rigidity to impart rigidity to the article as a whole wherein said article is a sheet with areal length and width dimensions of at least one-half inches by one-half inches with enclosed area scored symbol patterns in at least one face thereof.
2. A magnetic display board article in accordance with claim 1 wherein one of said nonmagnetic layers is thicker than the other.
3. A magnetic display board article in accordance with claim 2 and further comprising means forming a third nonmagnetic layer which is transparent at least in part and overlies said thicker layer and is permanently bonded thereto on the face thereof away from said particle layer, and means defining printed matter at the interface of said third layer and the thicker one of said first two non-magnetic layers.
4. A magnetic display board article in accordance with claim 3 wherein said thicker layer is subdivided into sublayers which are permanently bonded to each other.
5. A magnetic display board article in accordance with claim 2 wherein said thicker layer is subdivided into sublayers which are permanently bonded to each other.
6. A magnetic display board article in accordance with claim 1 wherein said ferromagnetic particle layer has areal continuity through particle to particle contact in the plane of the layer.
7. A magnetic display board article in accordance with claim 1 wherein the article comprises a printed pattern of discrete outlines printed thereon and surrounded by closely spaced corresponding scoring patterns.
8. A magnetic display board article in accordance with claim 1 wherein the article has cut edges, finger handling areal dimensions and shape.
9. A magnetic display board article in accordance with claim 8 wherein the article is cut around a printed linear outline of a geometric design thereon with cut edges corresponding to and closely spaced to the outline.
10. A magnetic display board article in accordance with claim 1 as a display board.
11. A magnetic display board article in accordance with claim 1 as a symbol former movable on a display board.

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