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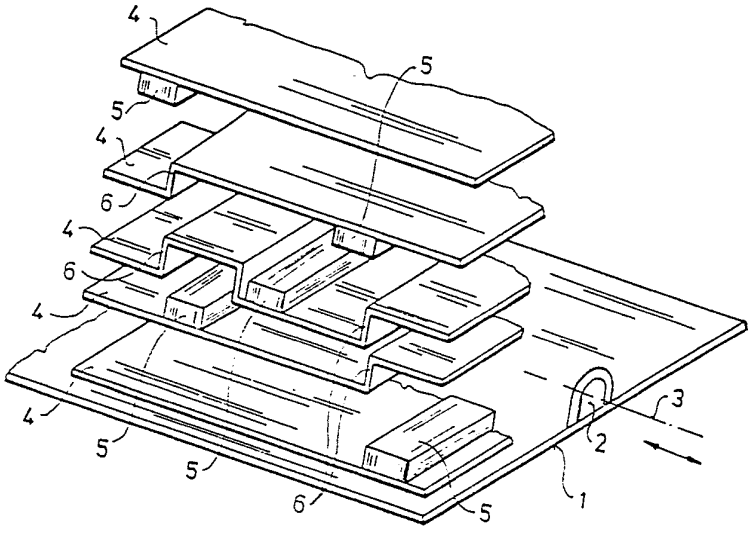

(57) Abstract

A signal display element for the display of more than two informations for signal display with electromagnetically excited tilting plates, having baseplate (1), tilting plates (4) supported in bearings on the baseplate (1) and containing parts with magnets (5), having been displaced in relation to each other in direction of the axis of rotation (3), wherein the magnetic axes of the parts of the tilting plates containing the magnets (5) run advantageously normal to the plane of the tilting plate, furtheron bipolarly excitable field coils are ordered directly or indirectly to the tilting plate (4), being well suitable for the control thereof. The essence of the invention is that the parts of the tilting plates (4) containing the magnets (5) are thicker, than the non-magnetic parts of the tilting plates (4), furtheron, the distance between the outer surfaces of the two (extreme) tilting plates, when the tilting plates (4) are accumulated and laid on each other on one side of the axis of rotation (3), being equal to the total thickness of the tilting plates, corresponds to the sum of the (total) thickness of the non-magnetic parts of the tilting plates (4), the number of which is less by one, than the number of all the tilting plates, and of the thickness of the magnet (5) of maximal thickness having been arranged on the tilting plate (4).

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SIGNAL DISPLAY ELEMENT FOR THE DISPLAY OF MORE, THAN TWO INFORMATIONS FOR SIGNAL DISPLAYS WITH ELECTRO-MAGNETICALLY EXCITED MAGNETIC TILTING PLATES

The invention relates to a signal display element for the display of more, than two informations for signal displays with electromagnetically excited magnetic tilting plates; said signal display element has a baseplate, on the base plate there are the tilting plates provided with a part containing the magnets and the tilting plates are supported in bearings on the baseplate and can be displaced in relation to each other in direction of the axis of rotation; magnetic axes of the parts of the tilting plates containing the magnets are preferably normal to the plane of the tilting plates, furtheron, bipolarly excitable field coils are ordered to the tilting plates for the control thereof.

As it is well known, signal display elements used to be applied for displaying numbers, signals and symbols, as e.g. that according to the Hungarian Patent HU-PS 157 250, having been provided with plates having a magnetic part, to be tilted by electromagnetic control

and in such a manner that as a consequence of the tilting motion one face or the other of the plates becomes visible, the plates can be tilted around a lateral edge or an edge being parallel with the lateral edge; the two surfaces of the tilting plates are carrying different informations, so e.g. they are differently coloured, while the part of the baseplate which became visible, is carrying an identical information, e.g. it has the same colour, as the surface of the tilting plate which became visible. The tilting plates are made - at least partly - of a permanent magnetic material, the magnetic axis of which is advantageously normal to the plane of the tilting plates. In such a manner two different informations can be displayed with said signal display element.

Furtheron, an element based on the principle of the previously described signal display is known, which is suitable for displaying more, than two informations, such a signal display element is specified in the Hungarian Patent HU-PS 158 828. In contrast to the earlier solution, with this solution the axes of rotation of the signal display elements are not fixedly supported in bearings, but can be moved in the inside of the U-shaped (hairpin) bearings, when guided, similarly to books resp. covers provided with exchangeable pages. With this solution a plurality of tilting plates can be arranged in an element and the number of the informations displayed, e.g. of the colours is larger by one, than the number of the tilting plates.

With both solutions thickness of the single tilting plates is determined by the necessary thickness (the necessary magnetic energy content) of the magnets arranged in the tilting plates with a magnetic axis being preferably perpendicular to the plane of the tilting plates. Accordingly, with the latter solution containing a plurality of tilting plates a field coil generating an utmost strong magnetic field is needed on the control side, because, if all the tilting plates are bearing up against each other on one side, the magnetic part of the topmost tilting plate will lie in a significant distance from the magnetic coil exciting it, furtheron, increase of the total thickness of the plates pushes apart the displaying surface of the adjacent dots in depth, as a consequence, when viewed at a larger angle of sight, this can be disturbing in respect to optics.

The aim of the invention is to develop a solution, by the aid of which the difficulties enumerated can be eliminated and simultaneously a formation can be ensured for the tilting plates, which enables the production of a signal display system for the display of more, than two informations with an optimal energy consumption.

The invention is based on the recognition, in so far as, if the thickness of the tilting plates - with the exception of the magnetic parts - is reduced to the minimum allowed by the technology, the lightest tilting plates being well suitable for to be put into

motion can be produced, on the other hand it becomes possible to form the single tilting plates in such a manner that the packet of tilting plates comprising the tilting plates should have the minimal thickness, if the non-magnetic parts are bearing up against each other.

The essence of the invention lies in that the parts of the single tilting plates containing the magnets are thicker, than the non-magnetic parts thereof, furthermore, if the tilting plates are collected on one side of the axis of rotation and laid on each other, the distance between the outer surfaces of the two (extreme) tilting plates, being equal to the total thickness of the tilting plates, represents the sum of the (total) thickness of the non-magnetic parts of the tilting plates the number of which is less by one, than the number of all the tilting plates and the total thickness of the part containing the magnet of maximal thickness arranged on one tilting plate. and the tilting plate.

The invention will be described in details by means of preferred embodiments, by the aid of the drawings enclosed, wherein

figure 1 is showing the axonometric diagrammatic view of the embodiment of the signal display element according to the invention for the display of six informations,

figure 2 is the sectional view (normal to the baseplate and parallel with the axis

of rotation) of the signal display element according to figure 1,

figure 3 is another embodiment of the signal display element according to the invention having seven tilting plates, in a sectional view being parallel with the axis of rotation and normal to the base plate,

figure 4 is a further possible embodiment of the invention having three tilting plates, in a sectional view being parallel with the axis of rotation and normal to the baseplate.

As it is to be seen in figure 1, with this embodiment of the display element the tilting plates 4 are connected to the axis 3 of rotation rotatable in the bearings 2 which are arranged on the baseplate 1. Every tilting plate 4 is provided with a part containing the magnet 5, while the other parts are not-magnetic. The magnetic axes of the magnets 5 enclose an angle with the plane of the baseplate 1, and are running preferably perpendicularly to the plane of the baseplate 1. The magnets 5 of the tilting plates 5 belonging to one signal display element are displaced in relation to each other in direction of the axis 3 of rotation in such a manner that in the direction being perpendicular to the baseplate 1 two or more magnets 5 must not cover each other. However, displacement of the magnets 5 need not follow one after the other in the tilting plates 4 being in mutual contact.

The bipolarly excitable field coils (not illustrated here) are ordered to the tilting plates 4 being suitable for the control thereof.

The parts of the tilting plates 4 containing the magnets 5 are thicker, than the parts of the tilting plates not containing the magnets 5. The parts of the tilting plates 4 not containing the magnet are connected to the parts with the magnet 5 in such a manner, that on one side of the part containing the magnets 5 they form the continuation of the surface of the tilting plate 4 confining the part containing the magnet 5, while on the other side of the part containing the magnets 5, displaced parallel with the former one, they form the continuation of the surface of the other tilting plate 4 confining the part containing the magnets 5. The extreme tilting plates 4 staying in a direct contact with the baseplate 1 form the exception, where the parts containing the magnets 5 occupy an extreme position in direction of the axis 3 of rotation. The non-magnetic parts of the tilting plates 4 are connected either only on one side to the part containing the magnet of the extreme tilting plate 4, or - as it is to be seen in figures 3 and 4 - they are connected to both sides of the parts containing the magnet 5, but in the same plane, as a continuation of the outer surface of the parts containing the magnets 5, as a consequence, the surfaces of the extreme tilting plates 4 being in contact with the baseplate 1 are planar surfaces without any staggering

in their whole extension.

From the point of view of the present sepcification those places of the tilting places 4 are considered as staggered,where the planes of the non-magnetic parts of the tilting plates 4 are displaced in planes being parallel with themselves. Such a staggering is formed not only then, if between the non-magnetic parts of the tilting plates 4 parts containing the magnets 5 are arranged, it becomes also possible to form a staggered part directly between the non-magnetic parts of the tilting plates 4. Figure 1 illustrates this case, showing a staggered part between all the three intermediate tilting plates 4.

In order to achieve that the parts of the tilting plates 4 containing the magnets 5 should not cover each other perpendicularly to the base plate 1, dimension of the parts incorporating the magnets 5 is to be chosen so, that it should be less, than the part, having been obtained by dividing the fulllength of the tilting plates in direction of the axis of rotation 3 by the number of the tilting plates 4.

The magnets 5 can be synthetic magnets on ferrite basis, which can be produced together with the synthetic non-magnetic parts by injection moulding.

By forming the proper staggering parts it can be achieved that total thickness of the tilting plates 4 contained in one signal display element should not surpass the necessary minimum. This total thickness

represents the distance between two extreme tilting plates (i.e. the outer surfaces thereof), when the tilting plates 4 are accumulated and laid on each other on one side of the axis of rotation, which corresponds- supposing the optimal case in sense of the invention - to the sum of the total thickness of the non-magnetic parts of the tilting plates 4 - the number of which is less by one, than the total number of the tilting plates - and of the thickness of a magnet 5 of maximal thickness having been arranged on a tilting plate 4 together with the tilting plate. If the display element contains but two tilting plates 4, under total thickness the total thickness of the part of one of the tilting plates 4 containing the magnet 5 and of the non-magnetic parts of the other tilting plate 4 is meant. In practice this total thickness is always larger, than the theoretical thickness, due to the surfacial unevennes and the unavoidably occuring air gaps.

According to the sectional view in figure 2 in the tilting plates 4 following each other, when advancing to the direction of the axis 3, the parts containing the magnets 5 do not follow exactly one after the other, however, the polarity of the magnets 5 following one another in direction of the axis 3 is always opposite, undependent on the fact, to which tilitng plate they belong.

Figure 3 shows a signal display element for the display of eight informations, having been provided with seven tilting plates 4. For the sake of better

comprehendibility every second tilting plate 4 is provided with a marking being different from that of the others, however, being identical with each other.

For the sake of order it should be mentioned that in a signal display element containing more, than two tilting plates 4, the parts containing the magnet 5 can follow one another in a different order of sequence, when advancing in direction to the axis of rotation 3. So e.g. wth the solution according to figure 4 having three tilting plates 4, the part containing the magnet 5 and arranged on the topmost (extreme) tilting plate 4, can transferred to the right edge of the topmost tilting plate 4, while the part of the middle tilting plate 4 containing the magnet 5 can be displaced to the centre of the middle tilting plate 4. However, it goes without saying that in this case it seems to be expedient to change the polarity in the magnets 5 arranged on the given tilting plate 4.

The invention is not at all restricted to the solution here described but it encloses all the solutions according to the claims, in particular according to the main claim.

WHAT WE CLAIM:

1. Signal display element for the display of more, than two informations for signal displays with electromagnetically excited magnetic tilting plates, having a baseplate, tilting plates supported in bearings on the baseplate and containing parts with magnets, having been displaced in relation to each other in direction of the axis of rotation, wherein the magnetic axes of the parts of the tilting plates containing the magnet run advantageously normal to the plane of the tilting plate, or at least nearly normal thereto, furtheron, bipolarly excitable field coils are ordered directly or indirectly to the tilting plate, being well suitable for the control thereof, characterized in that the parts of the tilting plates (4) containing the magnets (5) are thicker, than the non-magnetic parts of the tilting plates (4), furtheron the distance between the outer surfaces of the two (extreme) tilting plates (4), when the tilting plates (4) are accumulated and laid on each other on one side of the axis of rotation (3), being equal to the total thickness of the tilting plates (4) corresponds to the sum of the (total) thickness of the non-magnetic parts of the tilting plates (4), the number of which is less by one, than the number of the tilting plates, and of the thickness of the magnet (5) of maximal thickness having been arranged on the tilting plate (4), together with the tilting plate (4).

2. Signal display element as claimed in claim 1, characterized in that the outer surfaces of the two (extreme) tilting plates (4) being in contact with the baseplate (1) are unstaggered planer surfaces in their full extension.

3. Signal display element as claimed in claim 1 or 2, characterized in taht in case, if more, than two tilting plates (4) are contained, in the intermediate tilting plate(s) (4) a staggered part emerging from the original plane of the tilting plate(s) (4) being perpendicular to the axis of rotation (3) is formed, and on the other side of the staggered part the plane of the tilting plate (4) is parallel with the original plane of the tilting plate (4), while the distance between the two planar parts amounts to the difference between the thicknesses of the part of the tilting plate (4) containing the magnet (5) and of the non-magnetic part.

4. Signal display element as claimed in any of the claims 1 to 3, characterized in that the width of the parts of the tilting plates (4) containing the magnet (5) is less, than the part of the length of the tilting plates (4) lying in direction of the axis of rotation (3) divided by the number of the tilting plates (4).

5. Signal display element according to any of the claims 1 to 4, characterized in that the parts of the tilting plates (4) non containing magnets

(5) are made of a synthetic material.

6. Signal display element as claimed in any of the claims 1 to 5, characterized in that the parts of the tilting plates containing the magnets (5) are prepared by injection moulding as a monolithic unit.

7. Signal display element as claimed in any of the claims 1 to 6, characterized in that the parts of the tilting plates (4) containing the magnets (5) are synthetic magnets on ferrite basis.

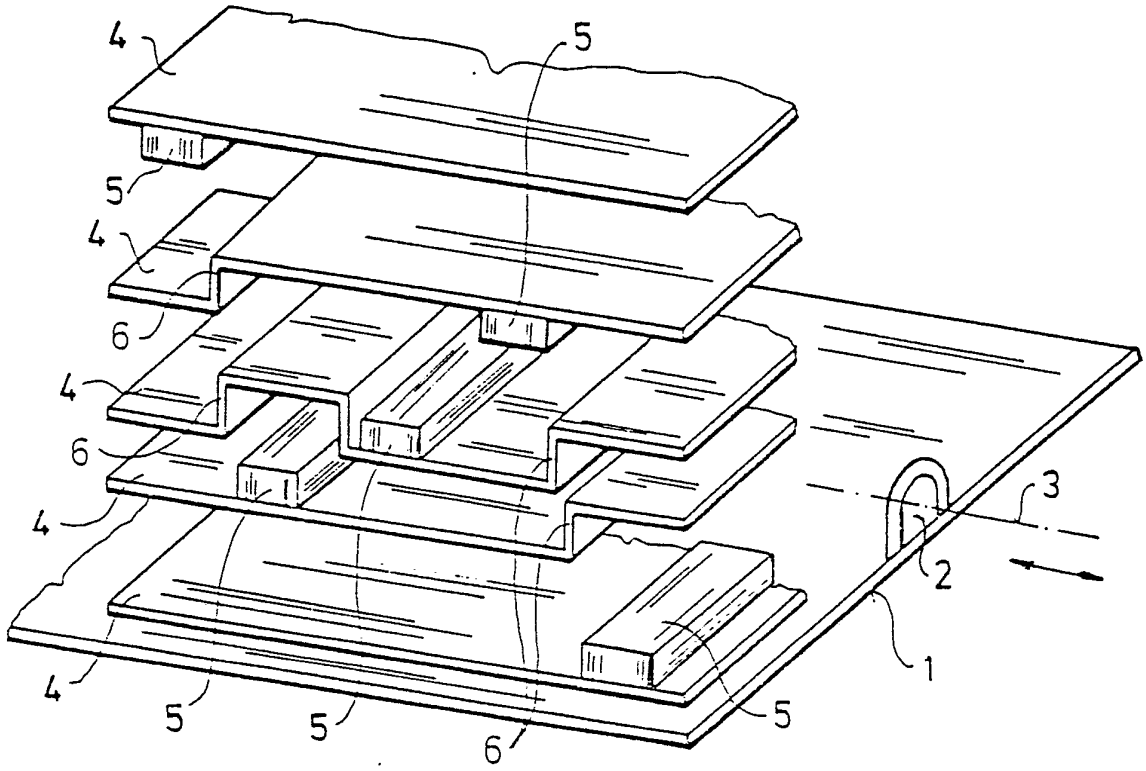

Fig.1

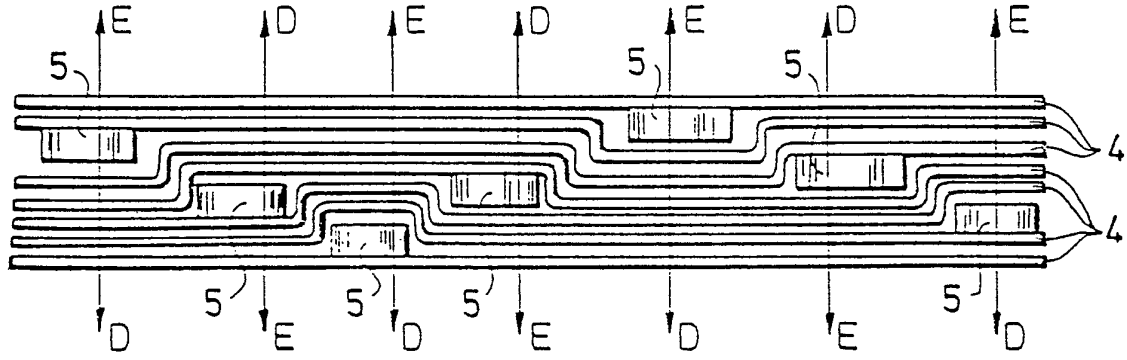

Fig.2

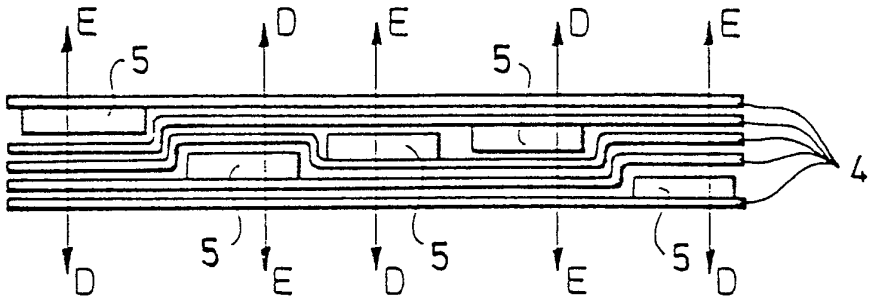

Fig. 3

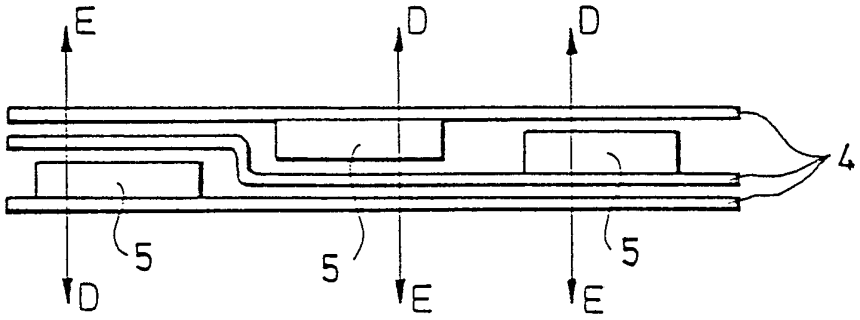

Fig. 4

INTERNATIONAL SEARCH REPORT

International Application No PCT/HU 86/00061

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: G 09 F 11/34

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
Int.Cl.[4]	G 09 F 11/00,11/02,11/06,11/10,11/30,11/34,9/40, 9/00

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	WO, A, 84/00 432 (FOK-GYEM) 02 February 1984 (02.02.84), see fig. 1.	
A	US, A, 3 991 496 (HELWIG) 16 November 1976 (16.11.76), see abstract.	
A	GB, A, 1 284 983 (AUTOPHON) 09 August 1972 (09.08.72), see fig. 8,9.	

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[10] Special categories of cited documents: [10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
11 December 1986 (11.12.86)	18 December 1986 (18.12.86)
International Searching Authority	**Signature of Authorized Officer**
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Anhang zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

Annex to the International Search Report on International Patent Application No. PCT/HU 86/00061

Annexe au rapport de recherche internationale relatif à la demande de brevet international n°.

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Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
WO-A-84/00 432	02/02/1984	AT-E - 23 230	15/11/1986
		AU-A1- 17 755/83	08/02/1984
		JP-T2-59-501 286	19/07/1984
		EP-A1- 0 113 738	25/07/1984
		EP-B1- 0 113 738	29/10/1986
US-A-3 991 496	16/11/1976	None	
GB-A-1 284 983	09/08/1972	None	