United States Patent [19]

Amouriq

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[54] **ANIMATED SURFACE DISPLAY DEVICE**

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[30] **Foreign Application Priority Data**

June 29, 1971 France 71.23590

[52] **U.S. Cl.** **40/106.52;** 40/32

[51] **Int. Cl.** **G09f 11/21**

[58] **Field of Search** 40/32, 36, 106.51, 106.52, 40/106.53

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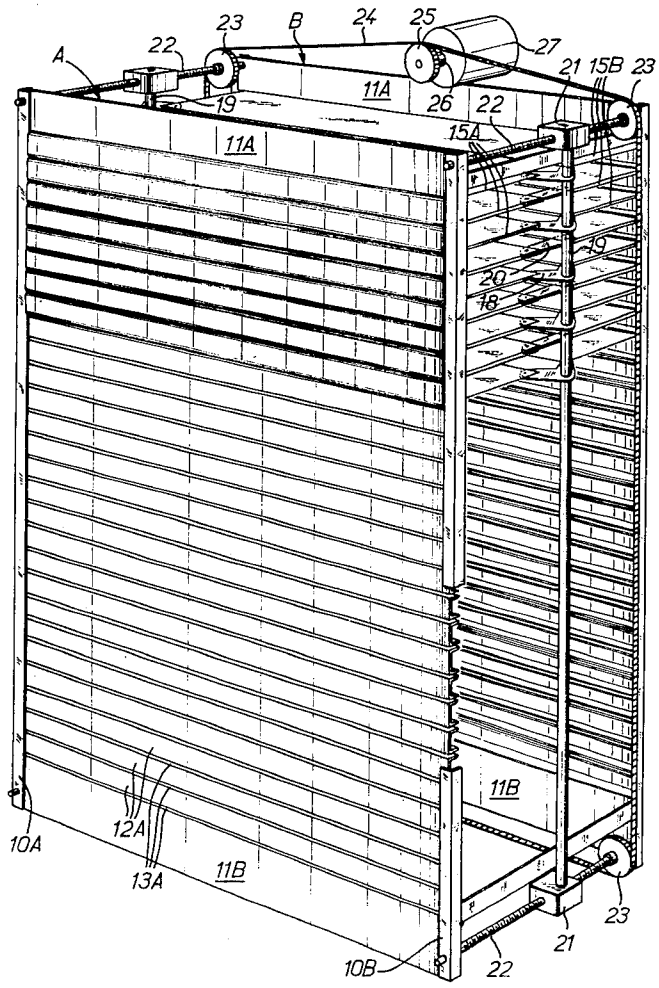
Primary Examiner—Robert W. Michell
Assistant Examiner—John F. Pitrelli
Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

The invention relates to a display device of the kind comprising at least one animated surface adapted to present a plurality of successive images, a first animated surface being formed by the juxtaposition of separate facets of a plurality of quadrangular flexible sheets passing in the shape of a U over individual guiding members disposed in the plane of said surface and thus forming two sides, said sheets being connected behind said guiding members to driving means enabling the sheets to carry out a sliding movement on their respective guiding means, said device further comprising a second animated surface parallel to the first and formed by a further plurality of guiding members and flexible sheets, said driving means being common to both pluralities of flexible sheets and being coupled to said sheets by connectors fixed to the corners of one side of each sheet, the corners of the other side of each sheet being connected to the corners of the corresponding side of the corresponding sheet of the other plurality of sheets.

Amongst many other applications, these display devices may be utilized for advertising, decorative or teaching purposes, or they may be employed in various indicator systems.

10 Claims, 16 Drawing Figures



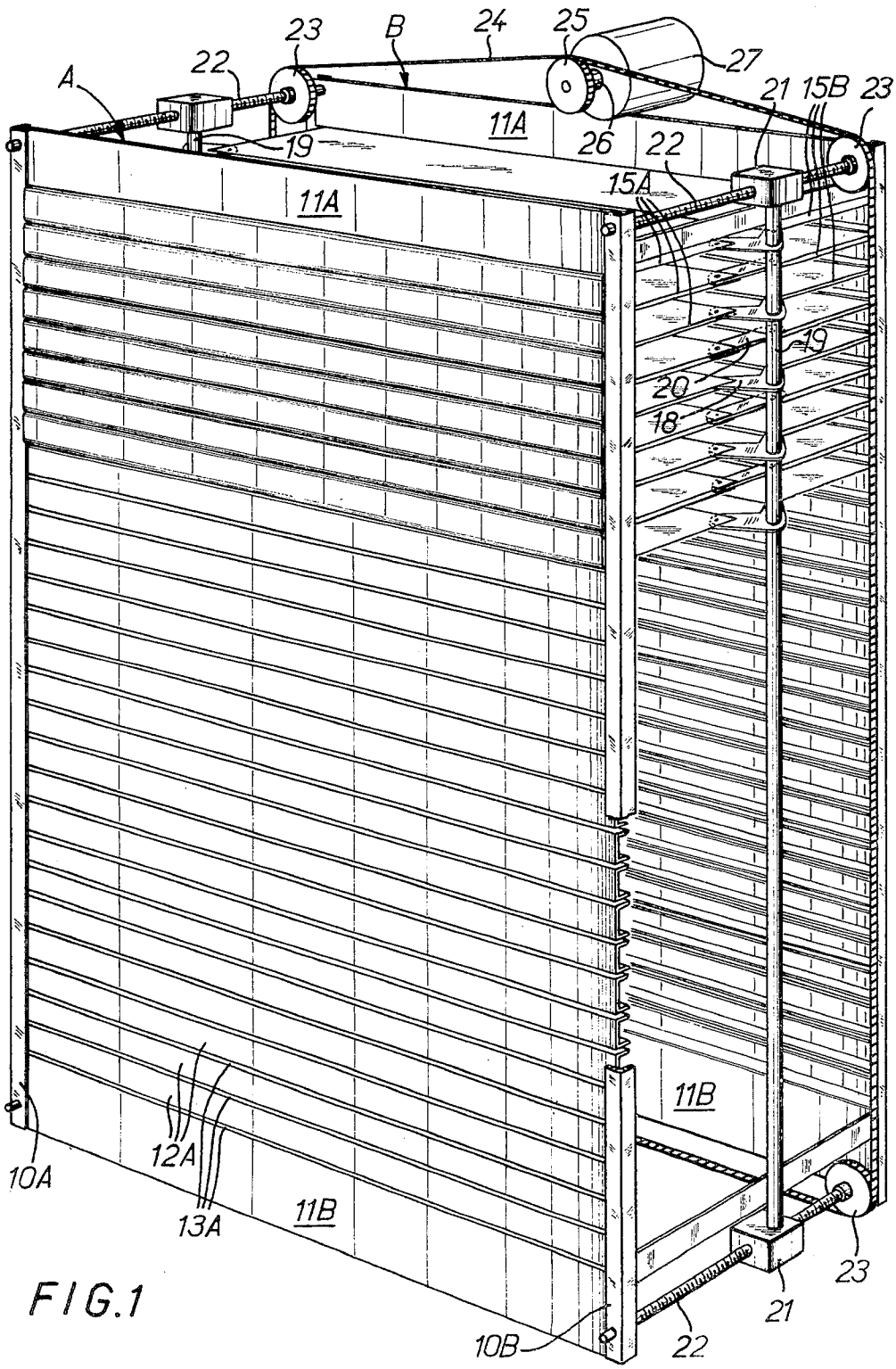

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FIG.1

FIG. 2

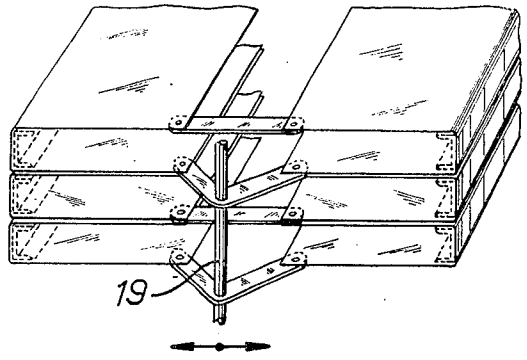


FIG. 4A

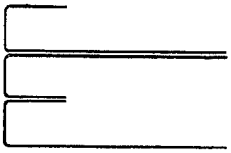


FIG. 4B

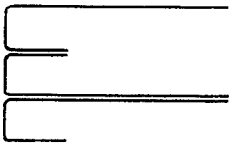


FIG. 3A

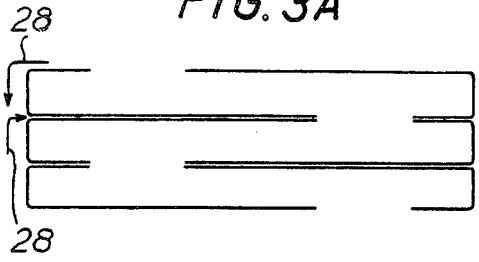


FIG. 5A

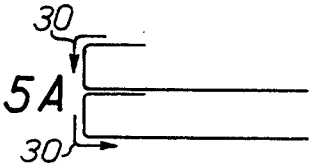


FIG. 5B

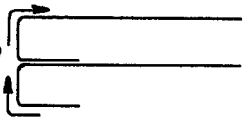


FIG. 3B

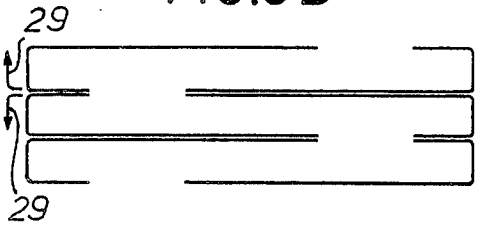


FIG. 6A

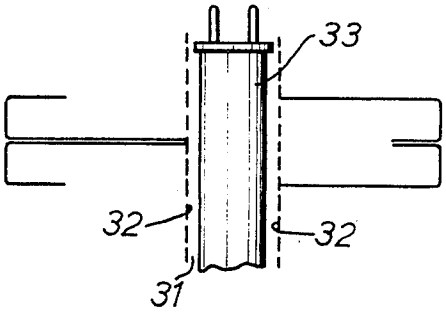


FIG. 7

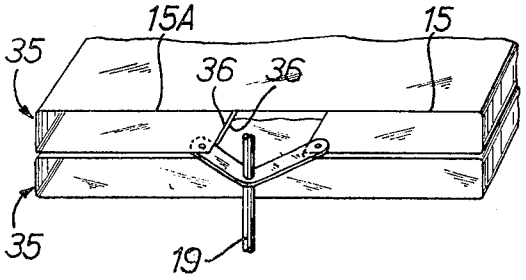


FIG. 6B

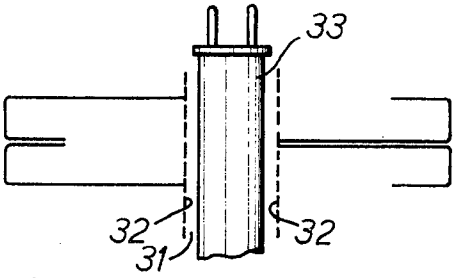


FIG. 8

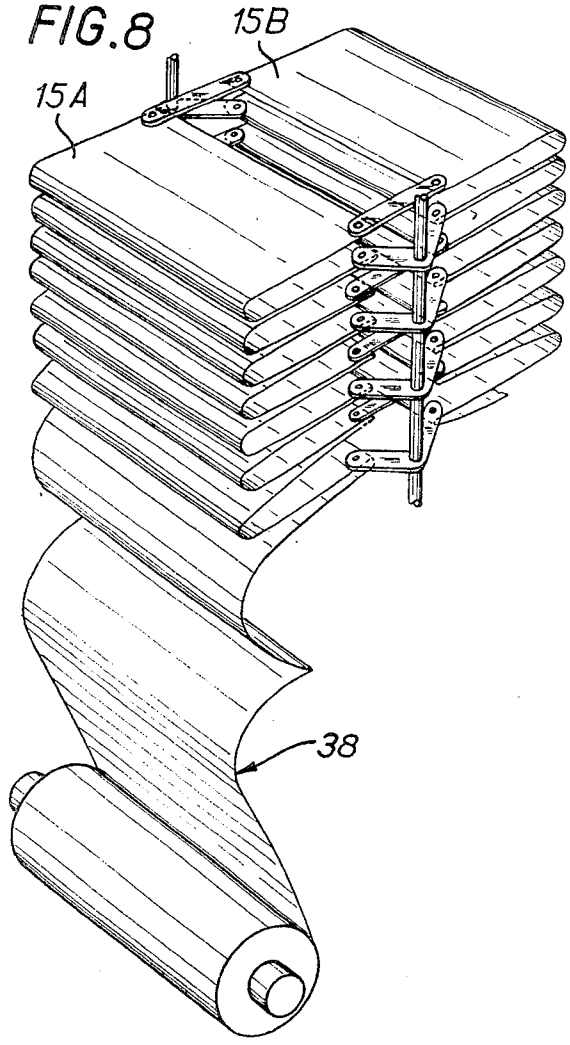


FIG. 9

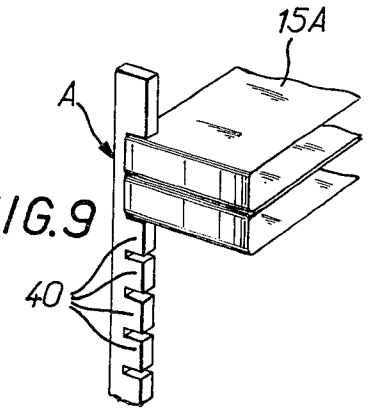


FIG. 10

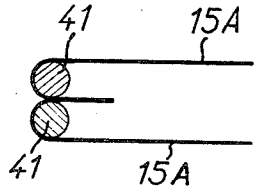


FIG. 11

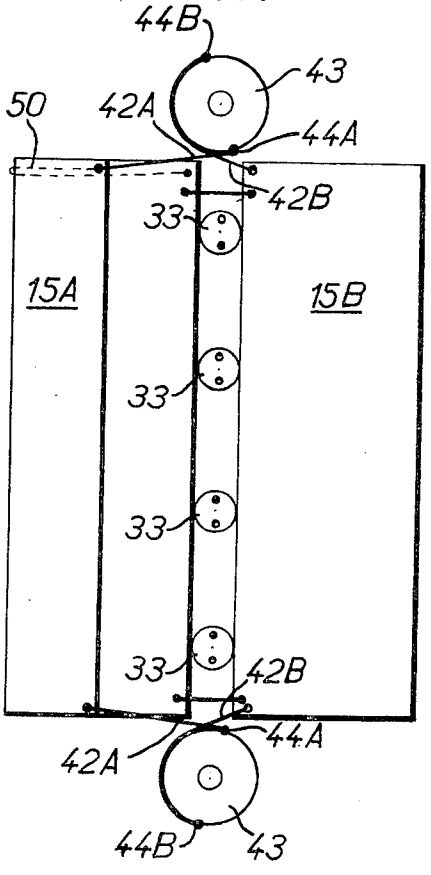
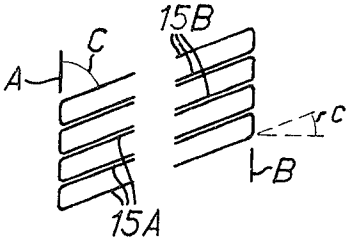


FIG. 12



ANIMATED SURFACE DISPLAY DEVICE

The present invention has for its object a device of the kind comprising at least one animated surface formed by the juxtaposition of separate facets belonging individually to separate mobile elements.

According to one aspect of the invention, these mobile elements are flexible sheets which are passed so as to form a U on individual guiding means arranged in the plane of the animated surface, and which are coupled, at the rear of these guiding means, to driving means adapted to permit them to slide on their respective guiding means.

This arrangement has the especial advantage of permitting, if desired, a very high definition of the animated pictures obtained, and an advantageous progressive transition of the successive images which can be presented.

This arrangement also possesses the advantage of facilitating an extension of the field of application of the animated surface device which is provided with it; a device of this kind may be employed equally well as an advertisement poster and as a sign, representation, indicator panel, demonstration panel, theatre scenery, display board, etc.

The characteristic features and advantages of the invention will furthermore be brought out in the description which follows below, reference being made to the accompanying diagrammatic drawings, in which:

FIG. 1 is a view in perspective with parts broken away, of an animated surface device according to the invention;

FIG. 2 is a partial view in perspective of a series of flexible sheets utilized in this device;

FIGS. 3A, 3B are diagrammatic views in side elevation of these flexible sheets, illustrating respectively the extreme positions of the sheets;

FIGS. 4A–4B, 5A–5B, 6A–6B are views respectively similar to FIGS. 3A–3B and relate to various alternative forms of construction;

FIG. 7 is a view similar to FIG. 2 and illustrates a further alternative form of construction;

FIG. 8 is a view in perspective similar to FIG. 2 and illustrates a special form of embodiment of the invention;

FIG. 9 is a partial view in perspective of an alternative form of construction of the guiding means for the flexible sheets according to the invention;

FIG. 10 is a partial view in side elevation of another alternative form of construction of the said guiding means;

FIG. 11 is a diagrammatic plan view of an alternative form of construction of the driving means associated with the flexible sheets according to the invention;

FIG. 12 is a diagrammatic view in side elevation similar to FIGS. 3A to 6B and is concerned with another alternative form of embodiment of the invention.

In accordance with the form of embodiment shown in FIGS. 1 and 2, which relate to the application of the invention to a device comprising two animated surfaces A, B, arranged parallel to each other at a distance from each other, a device of this kind comprises, for each of these animated surfaces, a frame formed by two vertical angle-irons 10A, 10B respectively, coupled together by two horizontal cross-members 11A, 11B.

These two frames belong to a single unit which will not be described in detail hereinafter, and with which may be associated a protective casing (not shown).

For convenience of description, these two frames will be respectively indicated below by the letters A and B, as will also the corresponding animated surfaces.

The angle-irons 10A, 10B of the frame A are coupled to each other in the example shown by a system of parallel sections 12A which form between them slots 13A.

A similar arrangement is adopted for the frame B.

The transverse dimension of these sections may have any desired value; however, the slots which separate them are preferably as narrow as possible.

In practice, the transverse dimension of these sections determines the fineness of definition of the animated images obtained, as will become apparent later.

By way of indication, it may be stated that for a metal frame having a side of 1 m. × 1.20 m., it is possible to fix about 100 sections having a transverse width of 1.1 cm., the intercalated slots having a width of about 1 mm.

The values given above may vary between very wide limits.

The same is true with regard to the distance between the frames A and B, which, as will be understood subsequently, determines the number of images which can be obtained on the animated surfaces A and B.

In the above numerical example, this distance apart may be of the order of 30 cm.

It will be appreciated that all these dimensions give the device according to the invention a compact structure of small overall size, which facilitates its application as a display means, both in shops and in any other place of exhibition or sale.

However this may be, according to the invention there is associated with each section 12A, 12B a mobile element formed by a quadrangular flexible sheet 15A, 15B placed in the form of a U on the corresponding sections 12A and 12B by means of the slots 13A and 13B which separates these sections. The flexible sheets thus each form two sides, one upper and the other lower, and there are two sets of flexible sheets.

The sections 12A and 12B constitute flat individual guiding means for the sheets 15A and 15B, and are arranged in the plane of the frames A and B, that is to say in the plane of the corresponding animated surfaces, these animated surfaces being thus constituted by the juxtaposition of these parts of the sheets which cover the outer surface of the corresponding sections 12A and 12B.

In the example shown in FIG. 1, the flexible sheets 15A and 15B are unfolded perpendicularly to the animated surfaces A and B, behind these latter, where they are associated with driving means.

In the example shown, these driving means associate any flexible sheet 15A of the frame A to the corresponding flexible sheet 15B of the frame B. They are provided, at the two angles of one of the sides of these sheets 15A and 15B, with oblique rigid connectors 18, common to the two flexible sheets 15A and 15B and rigidly fixed respectively to driving rods 19 which extend parallel to the angle-irons 10A and 10B of the frames A and B, on each side of these frames, and which are common to all the flexible sheets 15A and 15B.

In addition, these driving means further comprise straight connectors 20 which couple together two by

two the sheets 15A and 15B of each frame A and B to the other, at the corners of the other sides of these sheets.

These straight connectors 20 which may be rigid or elastic, are therefore arranged in an alternate manner with the oblique connectors 18, along every other side of a single sheet, the assembly being adapted to ensure sufficient tension on the sheets 15A, 15B associated in pairs from one frame A and B to the other, mainly by reason of the obliquity of the connectors 18.

The driving rods 19 are provided at their extremities with threaded blocks 21 engaged by screwing on threaded rods 22, and these rods are rotatably mounted on the frame of the device, between the frames A and B of this device.

On these threaded rods 22 are keyed pinions 23, arranged in the same plane, and over these pinions passes a common driving chain 24 which also passes over a driving pinion 25 keyed on the output shaft 26 of a motor 27 rotatable in either direction of rotation.

It will be readily understood that when the motor 27 rotates, the threaded rods 22 which are coupled to it for rotation, cause the lateral movement between the frames A and B of the driving rods 19 on which they are fixed, and therefore the sliding movement of the sheets 15A and 15B on the corresponding sections 12A and 12B.

In a manner known per se and not detailed in the drawings, the control of this motor 27 may be carried out in a continuous or discontinuous manner, preferably for a period of time corresponding to the sliding movement of a section of sheet 15A or 15B, equal to the width of the sections on which it is engaged.

In addition, with a control of this kind, there may be associated a starting switch and a reversing switch actuated at the end of travel.

FIGS. 3A and 3B illustrate the end positions of the flexible sheets 15A and 15B at the end of travel, while FIG. 2 corresponds to a central position of the driving rods 19 and therefore of the flexible sheets 15A and 15B.

In the example shown in FIGS. 1 and 2, the flexible sheets 15A and 15B of the same frame are successively coupled to each other by their free edges. Thus, in this form of embodiment, any two successive sheets associated with the same frame A and B simultaneously slide in opposite directions, as illustrated diagrammatically by the arrows 28 and 29 of FIGS. 3A and 3B, which prevents any undesirable relative friction between these flexible sheets.

According to the form of embodiment shown diagrammatically in FIGS. 4A and 4B, the flexible sheets 15 slide two by two simultaneously in opposite directions.

According to the alternative form illustrated diagrammatically in FIGS. 5A and 5B, the sheets 15 of a device with a single animated surface are all independent of each other, any two successive sheets 15 being able to slide in the same direction, as shown diagrammatically by the arrows 30 of FIGS. 5A and 5B. In an alternative form, this sliding action may also be effected in opposite directions by a suitable choice of the direction of screwing of the corresponding threaded rods 22.

FIGS. 6A and 6B illustrate an alternative form of construction, in which a free space 31, shown diagrammatically by broken lines 32, is formed between the free edges of the flexible sheets 15A and 15B of the device shown in FIG. 1, by a sliding movement of these flexible sheets limited in amplitude for that purpose, and also by an appropriate choice of their length.

This free space 31 may be advantageously utilized for housing lighting means, such as vertical tubes 33 for example, in the interior of the device according to the invention.

These lighting means enable the animated surfaces A and B to be lighted-up from the interior, the corresponding sections 12A and 12B being assumed to be for example translucent or provided with perforations which permit the passage of light.

However this may be, the device according to the invention may be utilized either with flexible sheets previously provided on their surface with printing, designs, inscriptions or other suitable images, or with virgin flexible sheets on which such designs, printing or inscriptions are applied after the sheets have been placed in position.

For this purpose, it is only necessary by means of the motor 27, or any other operating means such as a driving crank-handle which can be substituted for the motor, to slide the flexible sheets of the device step-by-step from one of their extreme positions to the other, and at each step to execute on the animated surface A or B formed conjointly by the outer portions of these flexible sheets, the drawings, painting, decoration, printing or in a more general way, the desired design.

This design may be applied in any appropriate manner, for example by serigraphy (silk screen process).

When the application of the various possible designs has been completed, the sliding movement of the sheets 15A and 15B from one of their extreme positions to the other ensures the successive presentation of these various designs or images, in a continuous manner or step-by-step, with the possibility in this case of a more or less prolonged stop on each design or image.

In the numerical example given above, that is to say for a device having a depth of about 30 cm., a front of 1 m. × 1.20 m., and sections of 1.2 cm. in width, separated by slots of 1 mm., about 20 images of various designs may be applied, in black and white or in colour, on each of the surfaces A or B of the device.

In the case where the sections have a smaller width, 2 mm. for example, a very much greater number of separate images or designs can be obtained, in practice of the order of 130.

Conversely and especially for displays intended to be seen from a distance, the width of the sections may be increased and may, for example, be greater than or equal to 4 cm., the number of different images which it is possible to show successively being reduced in consequence.

However this may be, the images produced by the device according to the invention are clearly visible at a considerable distance, even in full sunlight contrary to display devices having successive or changing animated surfaces by light projection.

In addition, the animation of the images, that is to say their successive presentation, constitutes the sole apparent movement, and this presentation is therefore very good.

The device according to the invention may be produced on a large surface at a very low cost; it is light and strong and the consumption of power necessary for its operation being small, of the order of a few multiples

of ten watts for example, it may be fed from a battery or accumulator.

The flexible sheets according to the invention which constitute the mobile image-carrier elements, may be readily interchanged in case of need, which, with their possibilities of being printed in situ by means of current printing methods, assist in an advantageous reduction of the cost price of the animated images obtained.

These flexible sheets may be of any appropriate material, simple or composite, especially of fabric, paper, synthetic material, of plastic film such as poly-tere phthalate of ethylene, polyethylene, etc., of a composite or complex product comprising a support of flexible material and a coating sheet of a fabric, paper, synthetic material or the like, and/or they may have on their surface an emulsion or a sensitive coating enabling them to receive a photographic impression directly.

In an alternative form, the designs applied on these flexible sheets may be effected by perforating the sheets.

The applications of the device according to the invention are extremely extensive.

In particular, they may be intended for advertising, decorative, or teaching purposes, or alternatively they may be employed in various indicator systems.

The list of applications given above is in no way limitative, but illustrates the large field of possibilities offered by the device according to the invention.

FIGS. 7 and 8 illustrates two particular forms of construction.

According to FIG. 7, any one of the flexible sheets 15A of the animated surface A forms a continuous assembly with the corresponding flexible sheets 15B of the animated surface B, and the assembly 25 thus constituted is integral with a similar assembly 35 in its immediate vicinity, the two assemblies being for example produced by a single continuous band suitably folded from one of its free edges 36 to the other. Thus, a flexible sheet of the animated surface A is directly coupled by itself to a flexible sheet of the animated surface B.

According to the form of embodiment shown in FIG. 8, the flexible sheets 15A associated with the animated surface A are formed by the successive folds of a single continuous band 38, and this is also the case for the flexible sheets 15B, associated with the animated surface B.

FIG. 9 illustrates an alternative form of construction, in which the guiding means associated with a flexible band 15A for example are reduced to two projections 40 provided on two opposite edges of the animated surface A at a distance from and in the extension of each other. A sheet 15A is simply engaged by its edges on these projections, of which only one can be seen in FIG. 9. Such projections may be produced for example by forming indentations on the vertical members of the frame delimiting the corresponding animated surface.

According to another alternative form shown in FIG. 10, the guiding means associated with a flexible sheet, 15A for example, are constituted by a roller 41 rotatably mounted with respect to the frame delimiting the corresponding animated surface.

In accordance with other alternative arrangements (not shown), these guiding means are slots or alternatively rods, tubes, cross-members or the like, which, as in the construction shown in FIG. 1, run over the whole corresponding dimension of the animated surface, and may be integral with the frame delimiting the said surface, if so required.

FIG. 11 is a plan view illustrating an alternative form of construction, in which the driving means for a flexible sheet 15A or 15B comprise flexible connectors 42A, 42B, coupled to the corners of a free edge of this sheet, the said connectors being passed over the rollers 43 common to all the sheets, and coupled at a point 44A, 44B to these latter. These rollers 43 are controlled in rotation by driving means, such as a motor or a manual crank-handle, as in the embodiment described with reference to FIG. 1.

It will be observed from FIG. 11 that a free space 31 has been left between the free edges of the sheets 15A and 15B, and that in this free space, a number of vertical lighting tubes 33 have been mounted.

According to a diagrammatic alternative form shown by a broken line 50 in FIG. 11, the flexible connector 42A for example is coupled, not to the nearest corner of the corresponding flexible sheet, but to the farthest corner of this latter, after a return around the flexible sheet, which increases the useful travel of the sheet. According to another alternative form (not shown), a similar result is obtained by passing the connector 42A over a return member of any kind which increases its length.

In the foregoing description, it has been assumed that the flexible sheets 15A and 15B became unfolded perpendicular to the plane of the corresponding animated surfaces.

According to an alternative form of construction shown diagrammatically in FIG. 12, the flexible sheets 15A and 15B may be oblique on the animated surfaces A and B which they form, which enables the overall dimension in depth of the device to be reduced. It will be noted that in FIG. 12, the angle C is shown as being of the order of 70° by way of example.

It will be understood that this angle C may have any other appropriate value, depending on the applications, and in particular it may be made almost zero when it is desired to produce flat elements such as card carriers, pockets or the like.

In this case, it will be appreciated that the flexible sheets are almost parallel to the animated surface.

The present invention is of course not restricted to the forms of embodiment described and illustrated, but includes any alternative form of construction.

In particular, according to various alternative forms (not shown), the sections which serve as guiding means for the flexible sheets may be fluorescent or phosphorescent, or even reflecting. For example, these sections may be hollow and can thus serve as a housing for a lighting means such as a tube or the like, at least a part of the internal surface of the said sections being light-reflecting.

Finally, according to another alternative form of construction, which has also proved advantageous, the internal space of the chassis or frame in which the flexible sheets are housed is put under a slight superatmospheric pressure, which ensures a slight inflation of these sheets and facilitates their sliding movement on their guiding means by the interposition of a film of air, this sliding movement then taking place practically without friction.

In the case of the form of embodiment shown in FIG. 9, according to which the guiding means of a sheet are reduced to two projections co-operating with the ex-

tremities of the sheet, the inflation of such a sheet gives it a better behaviour between these projections.

What I claim is:

1. A display device comprising a plurality of separate facets juxtaposed in a first plane and forming an animated surface therein, said facets belonging individually to a plurality of quadrangular flexible sheets, a first plurality of guiding means disposed in said first plane and having a width not more than about **1** centimeter and a length not less than about **1** meter, each of said flexible sheets passing over one of said guiding means in the shape of a U and thus forming two parallel sides, a second plurality of second guiding means disposed in a second plane parallel to said first plane, the two sides of each said flexible sheet being coupled to each other by flexible linking means passing over one of said second guiding means in the shape of a U, and driving means connected to said flexible sheets at the rear of their guiding means and enabling said flexible sheets to effect a sliding movement on their respective guiding means, the said driving means being coupled to said flexible sheets by a plurality of lateral connectors fixed only to the corners of one side, the end of each said side of each flexible sheet being wholly free from any connection between its two corners, whereby each said connector pulls obliquely on only the corner of a corresponding flexble sheet, thereby to achieve very high definition of the display obtained by reducing the width of said facets relative to their length.

2. A device as claimed in claim **1,** in which said guiding means for a flexible sheet comprise a fixed crossmember extending over the whole corresponding dimension of said corresponding animated surface.

3. A device as claimed in claim **2,** in which said crossmember is hollow and serves as a housing, and lighting means in said housing.

4. A device as claimed in claim **1,** in which the guiding means for a said flexible sheet are flat.

5. A device as claimed in claim **1,** in which the connectors fixed to the corners of one of the sides of a flexible sheet are rigid connectors fixed to a driving rod common to all said flexible sheets.

6. A device as claimed in claim **5,** in which the extremities of said driving rod are rigidly fixed to internally-threaded blocks engaged by screwing onto threaded rods, said threaded rods being controlled in rotation by driving means.

7. A device as claimed in claim **1,** in which lighting means are installed behind the free edges of said flexible sheets.

8. A device as claimed in claim **7,** in which the travel of each flexible sheet of an animated surface is determined in such manner as always to leave a free space between the free edges of said flexible sheet and the free edges of the flexible sheet of the other animated surface, and in which lighting means are disposed in said free space.

9. A device as claimed in claim **1,** in which said flexible sheets are arranged into a frame, the internal space of which is maintained at a slight superatmospheric pressure.

10. A display device comprising one first plurality of separate facets juxtaposed in a first plane and forming a first animated surface therein, said facets belonging individually to a first plurality of first quadrangular flexible sheets, a first plurality of first guiding means disposed in the said first plane and having a width not more than about **1** centimeter and a length not less than about **1** meter, each of said first sheets passing over one of said first guiding means in the shape of a U and thus forming two parallel sides, driving means connected to said first flexible sheets at the rear of their guiding means and enabling said first flexible sheets to effect a sliding movement on their respective guiding means, a second plurality of separate facets juxtaposed in a second plane parallel to said first plane and forming a second animated surface therein, said second facets belonging individually to a second plurality of second quadrangular flexible sheets, a second plurality of second guiding means disposed in the said second plane and having a width not more than about **1** centimeter and a length not less than about **1** meter, each of said second flexible sheets passing over one of said second guiding means in the shape of a U and thus forming two parallel sides, each flexible sheet of the said first plurality of flexible sheets being respectively associated with a sheet of the said second plurality of flexible sheets, said driving means being common to the two pluralities of flexible sheets and being coupled to said sheets by a plurality of lateral connectors fixed only to the corners of the said sheets, each said lateral connector being fixed only to a corner of one side of one first flexible sheet and only to a corner of one side of one second flexible sheet, while the corresponding corners of the other side of said first flexible sheet and of the other side of said second flexible sheet are coupled each to the other by linking means, the end of each said side of each flexible sheet being wholly free from any connection between its two corners, whereby each said connector pulls obliquely on only the corners of two corresponding flexible sheets, thereby to achieve very high definition of the display obtained by reducing the width of said facets relative to their length.

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