April 19, 1966 J. FESTA 3,246,410

MULTIPLE VISION SIGN

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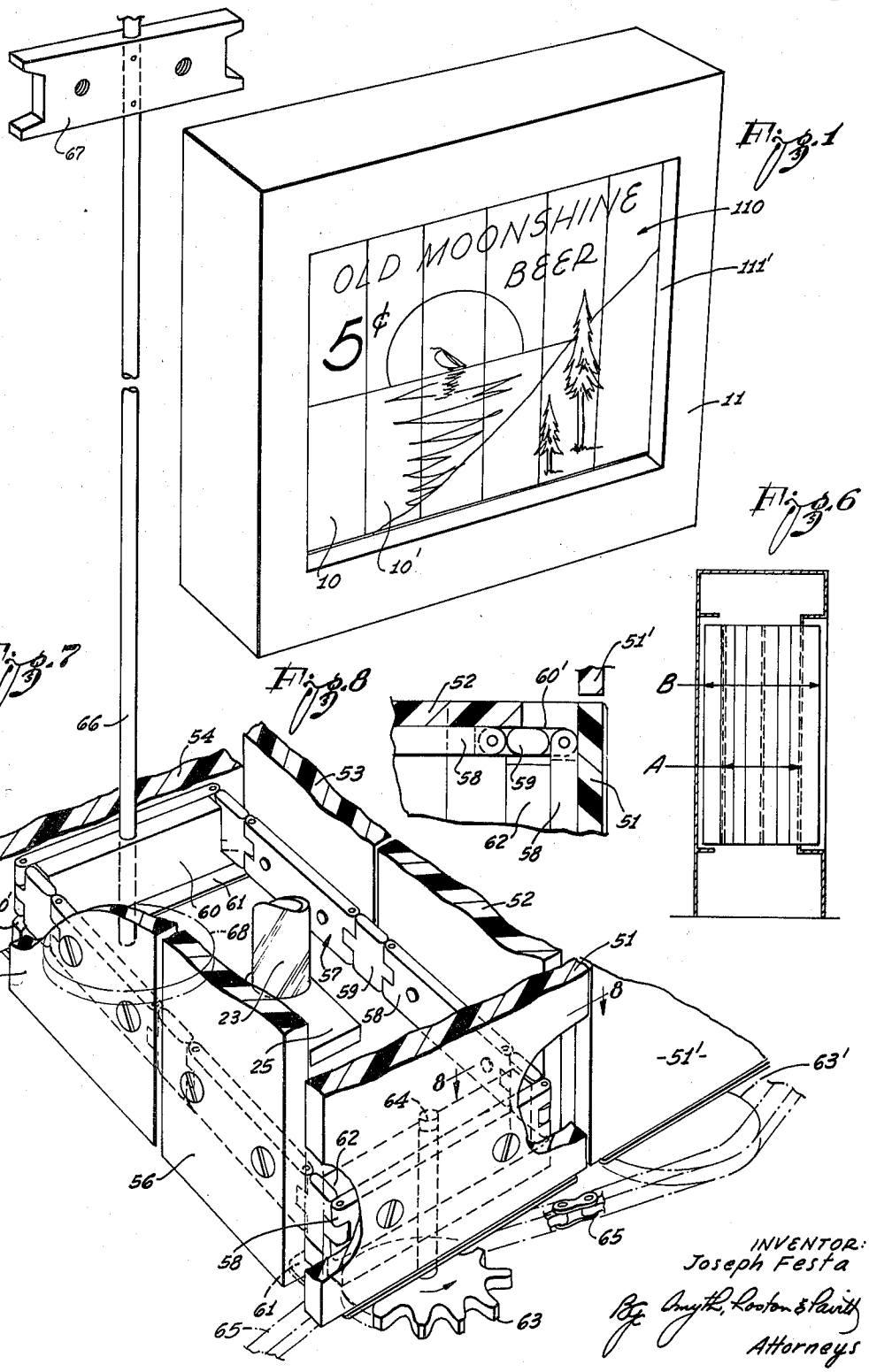


Fig. 1

Fig. 6

Fig. 7

Fig. 8

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April 19, 1966 J. FESTA 3,246,410

MULTIPLE VISION SIGN

Filed May 8, 1964 5 Sheets-Sheet 2

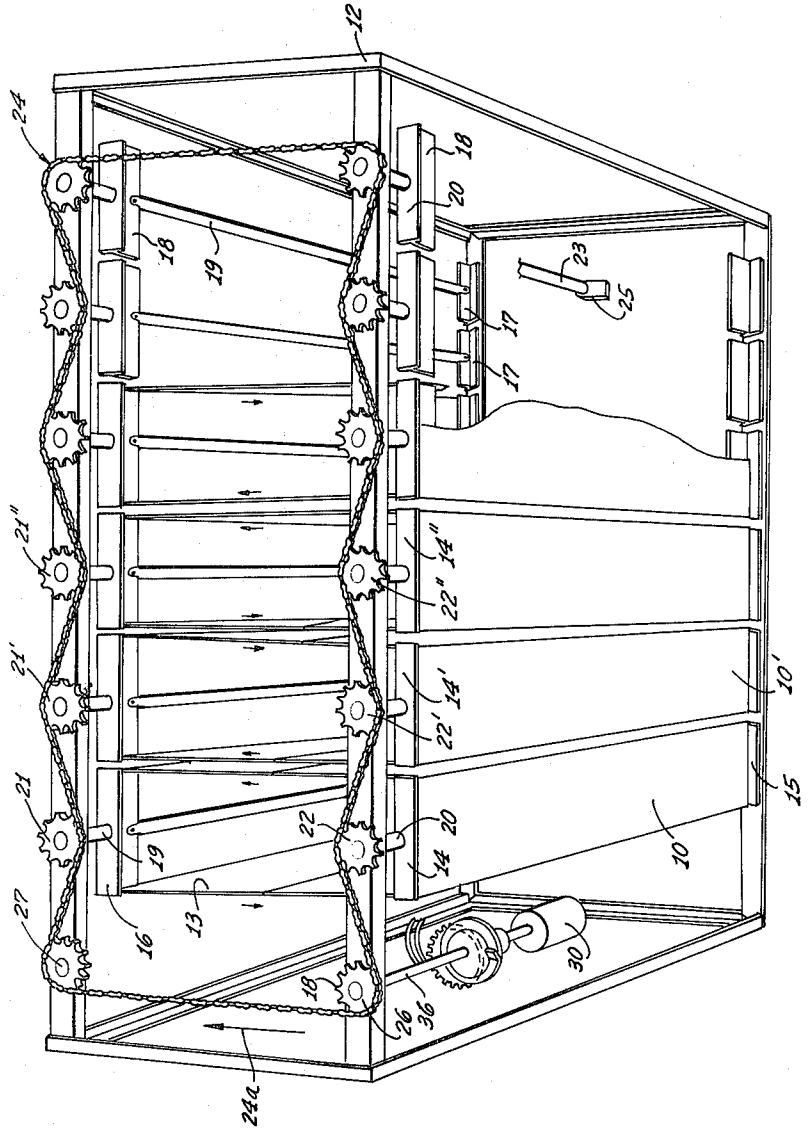


Fig. 2

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April 19, 1966 J. FESTA 3,246,410

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Filed May 8, 1964 5 Sheets-Sheet 3

Fig. 5

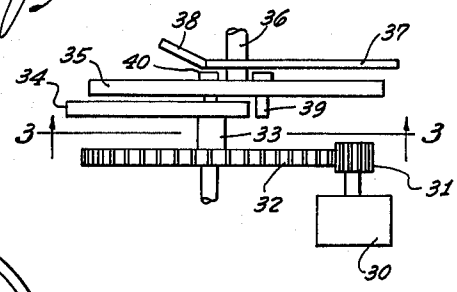


Fig. 3

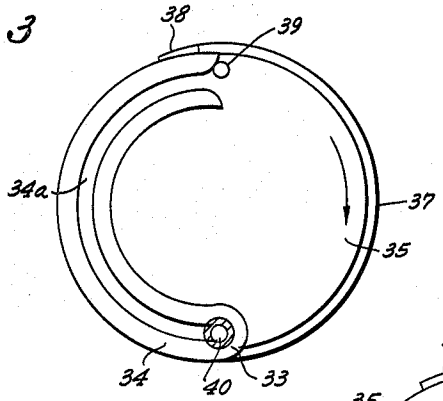
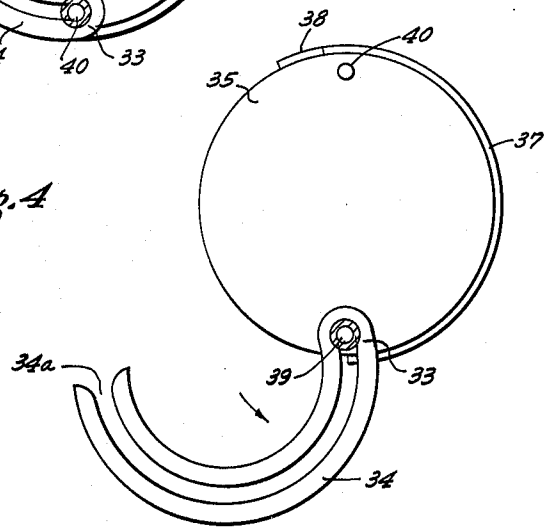


Fig. 4



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April 19, 1966 J. FESTA 3,246,410

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Filed May 8, 1964 5 Sheets-Sheet 4

Fig. 9

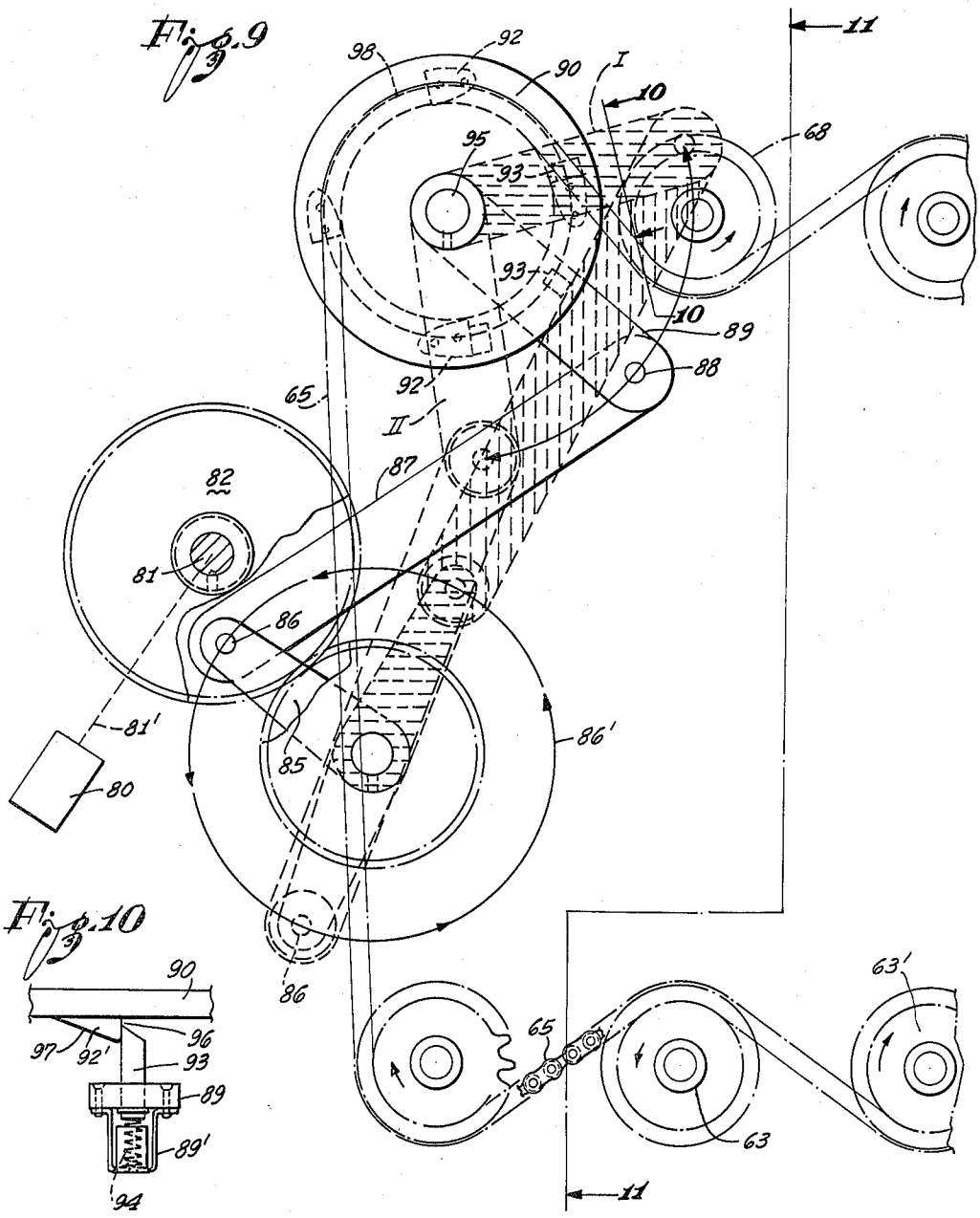


Fig. 10

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April 19, 1966 J. FESTA 3,246,410

MULTIPLE VISION SIGN

Filed May 8, 1964 5 Sheets-Sheet 5

Fig. 11

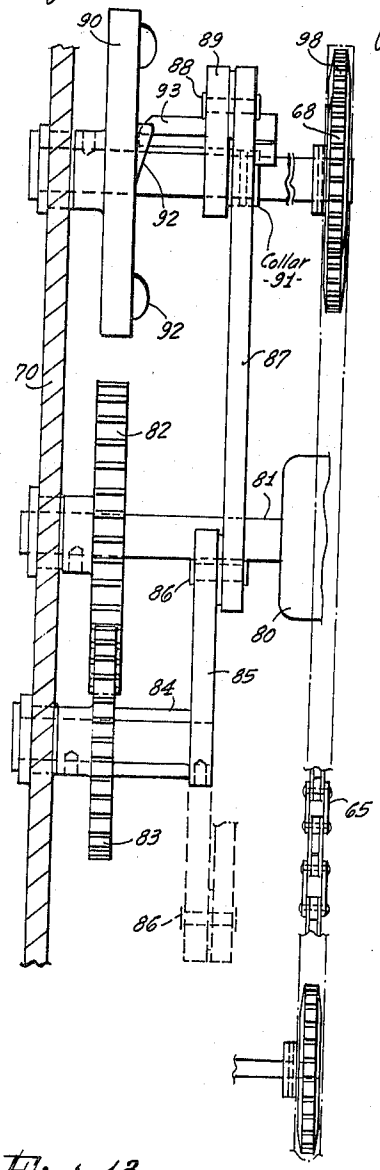


Fig. 12

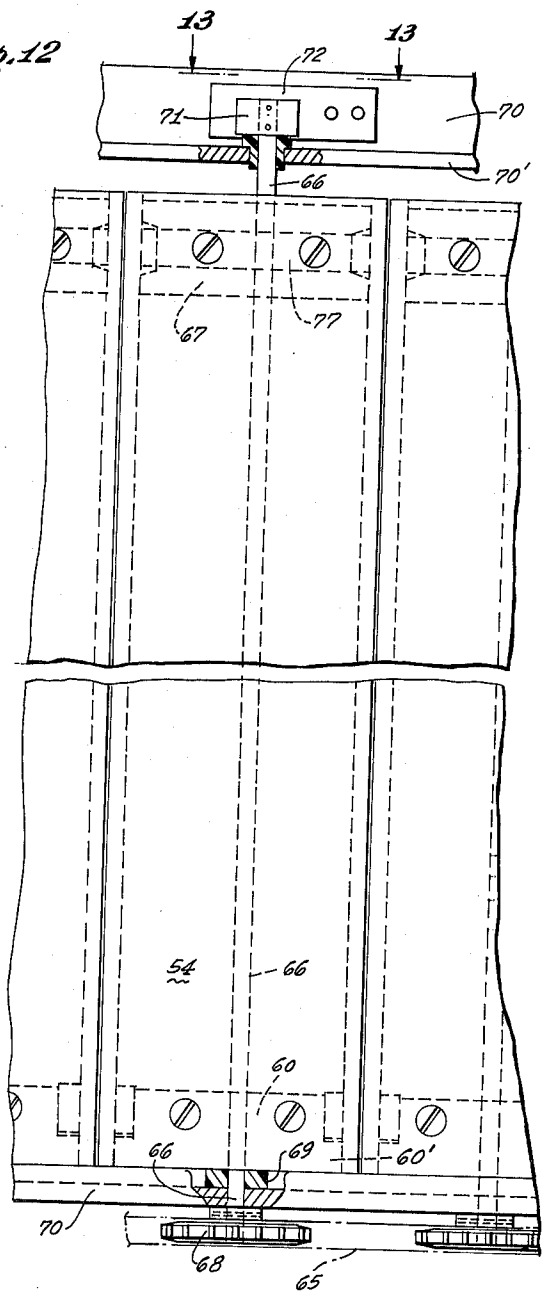
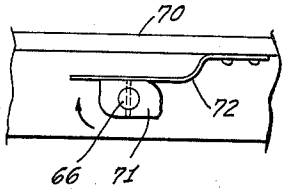


Fig. 13



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United States Patent Office 3,246,410 Patented Apr. 19, 1966

3,246,410

MULTIPLE VISION SIGN

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Filed May 8, 1964, Ser. No. 365,973
6 Claims. (Cl. 40—32)

The present invention relates to a multiple-vision design of the type in which a plurality of pictures to be displayed are divided into similar rectangular picture panels. This is a continuation-in-part application of application Serial No. 267,901, filed March 22, 1963, now abandoned.

It is an object of the present invention to provide a new and improved multiple-vision sign which permits a large number of different pictures to be shown in a predetermined sequence, and preferably with equal periods of time allotted for the viewing of each of the general pictures.

It is a feature of the present invention to assemble all the picture panels which are to be placed sequentially, one at a time, into a viewing plane and at a similar area therein so as to form an endless belt. Thus, there are provided as many endless belts, each composed of different picture segments or picture panels, as there are segments per picture. Each belt is being transported intermittently by means of a set of propellers. A propeller, for example, engages a limited rear surface portion of the panel which is momentarily positioned in the viewing plane. For picture exchange, the propeller pivots this panel out of the viewing plane. The remainder of the belt is compelled to follow this movement. After having traversed an angle of more than 90 degrees, the propeller with its respective other side engages the rear surface portion of the panel which is to be positioned next into the viewing plane. Upon such engagement, this latter panel will in fact swing into the viewing plane. Preferably, the arrangement is a symmetrical one in that every time a particular panel is in the viewing plane, another panel of the same belt is positioned in a plane which extends parallel to the viewing plane and to the rear thereof.

The endles belt, as formed by such panels, can be a self-hinged arrangement in that it is an integral belt structure creased along the border as defined between neighboring panels thereat. Alternatively, the panels may consist of individual plates which are assembled by means of a chain structure so as to form an endless belt. In this latter case, the propellers preferably do not directly engage the panels themselves, but the chain members which respectively support the panels. However, for convenience in describing the invention, the panels will always be referred to as being engageable by a propeller, even if a chain member or the like is being interpositioned.

The belt itself, i.e., the panels, is preferably made of transparent material; and in the interior space as defined by each belt, an elongated lamp is provided to illuminate each picture from the inside as it appears in the front viewing plane.

The propellers are being moved in steps by a common driving device arranged so as to impart oppositely directed movements upon neighboring belts. The picture exchange is carried out by pivoting the neighboring panels pertaining to neighboring belts into and out of the viewing plane in opposite directions.

This multiple-vision sign has a number of considerable advantages. One of these is that the basic construction permits any number of pictures to be displayed. Limitations are being set only by the environment. The multiple-vision sign will have a depth that is approximately equal to the width of half the number of panels per belt. During picture exchange, each belt is being folded and unfolded again, which provision insures that

neighboring panels and belts will not engage and scratch each other.

Means are provided to dampen any tendency to oscillate on the part of each individual belt, so that after the picture exchange each belt stops immediately, and the picture can be observed without any vibration being noticed. The propellers are additionally provided with flanges in order to insure that the several belts and panels remain in vertical alignment, so that the picture as composed of these several panels and segments is not being distorted.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed that the invention, the objects and features of the invention, and further objects, features and advantages thereof will be better understood from the foregoing description taken in connection with the accompanying drawings, in which:

FIGURE 1 illustrates in perspective view the general appearance of a multiple-vision sign that incorporates the features of the present invention;

FIGURE 2 illustrates a top view from the top and front of a frame that supports the six-belt multiple-vision sign together with its driving mechanism;

FIGURES 3 and 4 illustrate the device for controlling the step-wise movement to be imparted upon the several belts shown in FIGURE 2 and in different phases of operation thereof;

FIGURE 5 illustrates the device shown in FIGURES 3 and 4 but in side elevation;

FIGURE 6 illustrates a cross-sectional view somewhat schematically through the housing shown in FIGURE 1;

FIGURE 7 illustrates in perspective and partially broken-open view another embodiment of a panel and belt structure;

FIGURE 8 illustrates a top view of the detail shown in FIGURE 7;

FIGURE 9 illustrates somewhat schematically the view from the bottom of the stepping mechanism to be employed to drive the several belts such as are shown in FIGURE 7;

FIGURE 10 illustrates a side view of the detail of the stepping device shown in FIGURE 9;

FIGURE 11 illustrates the device shown in FIGURE 9 but in side elevation;

FIGURE 12 illustrates a rear view of several belts of the type shown in FIGURE 7; and

FIGURE 13 shows in top view the device to be employed in any of the previously described structures for damping any belt and propeller oscillation.

Proceeding now to the detailed description of the drawings, FIGURE 1 shows a perspective view of a multiple-vision sign presently displaying one particular picture. The picture is composed of six panels, such as **10** and **10'**, placed with their long sides side by side. The space in between neighboring panels is to be rather small, but sufficient to accommodate minimum space requirements in between neighboring panels—which will be developed more fully below.

The multiple-vision sign is housed in a housing **11** that may be weatherproofed. There is a window **110** as defined by a flanged rim portion **111**. The panels **10**, **10'**, etc., which are visible in the window, define a front viewing plane; and the invention presently described incorporates means to sequentially place different panels into this viewing plane, whereby the pictures visible in window **110** are exchanged accordingly.

The panels **10**, **10'**, etc., are preferably made of transparent material; and inside of housing **11**, suitable illumination means are provided, as will also be developed more

fully below. Housing 11 contains all of the elements to be described hereafter.

In FIGURE 2, there is illustrated in perspective view and in a downward direction a structure which includes such panels 10, 10', etc., as well as the mechanism with which the pictures appearing in the above-described viewing plane are being exchanged periodically. There is shown a frame 12 basically matching the configuration of housing 11 in FIGURE 1 and permitting insertion thereof into such a housing 11. There are provided altogether six endless belts such as 13, 13', 13'', etc., and each endless belt is composed of a plurality of integrally interconnected panels such as 10 or 10'.

The different panels 10 on an endless belt such as 13 constitute segments of different pictures. These picture segments are placed side by side onto a belt. The endless belts may, for example, by themselves consist of a suitable transparent plastic; and the picture panels thereon are formed by directly imprinting picture segments onto this endless belt. Or picture panels in the form of foils, also made of transparent material, are being provided first and then bonded onto such an endless belt.

One can also provide originally photosensitive layers on such an endless belt, and by a photographic process the picture panels or picture segments may be photographed next to each other onto this photosensitized endless belt. If the endless belt, for example, is made of plastic material such as polypropylene, such plastic material becomes self-hinged when creased back and forth several times at the edges of adjoining picture panels. No crease is to extend across any of the picture segments.

Each endless belt is being driven via altogether four propellers, such as, for example, 14, 15, 16, and 17. These propellers all have T-shaped cross sections, in which the stem of the T, such as 18, of each propeller directly engages the endless belt and constitutes a driving blade, whereas the crossbar portion of the T is a horizontal flange plate that vertically positions the endless belt and prevents vertical misalignment of neighboring belts and picture panels.

The propellers 14, 15, 16 and 17 together grip an endless belt and stretch same in a direction transverse to the extension of the viewing plane. Each propeller has a length equal to the width of one picture panel so that the belt is being spread horizontally. More particularly, propellers 14 and 15 each have a driving blade which, in the resting position illustrated, extends parallel to the viewing plane. The driving blades of propellers 14 and 15 respectively engage upper and lower inner surface portions of the belt in the rear of panel 10. Due to their dimensioning, these blades expose and position this panel 10 into the viewing plane. The neighboring pair of front propellers 14' and 15' positions a panel 10' of belt 13' to the side of the panel 10 and in proper alignment thereto, so as to form a composite picture.

Concurrently to the positioning of a front view panel, the rear propellers 16 and 17 (the latter not being visible) position a different panel, but of the same belt 13, into a rear plane which extends parallel to the front viewing plane.

With each subsequent turnover of the propellers, another pair of panels of the respectively associated belt is respectively placed into the vertical front and rear planes. The number of panels on each endless belt and, therefore, the number of pictures that this device is capable of displaying is, of course, determined by the length of the endless belt, which, in turn, is determined by the depth of the frame structure 12 and the depth of the housing 11. It is apparent that basically there is no restriction as to the number of pictures that can be displayed by such a device, and the only requirement is that the depth of the frame and housing and the length of such endless belts must be long enough to accommodate the desired number of pictures. The device that is described herein permits the display of six different pictures, but this is no limitation whatever as to the capabilities of the principal structure presently disclosed. The same holds true with regard to the number of endless belts used and to the number of picture panels and segments that compose each picture to be displayed. Although the device shown illustrates a six-panel structure, there is absolutely no restriction on the number of panels used, except to select a reasonable size for purposes of explanation.

It is, of course, undesirable to use too few panels per picture because in that case each panel to be moved becomes too big. On the other hand, it is undesirable to divide each picture into too many segments and panels because the vertical lines in between neighboring panels in the display plane are, to some extent, disturbing, and such a disturbance should be avoided as much as possible.

Proceeding now to the description of the moving mechanism for each endless belt, it can be seen that each of the top propellers, such as, for example, 14 and 16, is provided with a shaft such as 19 and 20, respectively, and the shafts respectively bear sprocket wheels 21 and 22. The shaft 19 may be an elongated one to interconnect the two propellers 16 and 17 at the rear portion of the multiple-vision sign, there being suitable bearings in the frame 12. The propeller 15 is strictly an idler that serves primarily for purposes of stretching and spanning the endless belt 13, as stated, and this lower front propeller is not being driven by itself but follows the movement imparted upon the endless belt 13 by the propellers 14, 16 and 17 via the blades 18 thereof.

The principal reason for not interconnecting the two propellers 14 and 15 along the front plane of vision is to be seen in that a fluorescent lamp such as 23 is provided in the interior space as defined by each endless belt. A fluorescent tube 23 illuminates, from the inside, the panel which is momentarily placed in the front viewing plane. It is, therefore, apparent that an interconnecting shaft, or any other connection, between propellers 14 and 15 would extend across the picture segment; this would obscure the vision and produce a dark vertical contrast line, which is quite disturbing.

It is an important feature of the invention that no such interconnection of the two front propellers is needed for dynamic stability of the device.

The sprocket wheels such as 21, 21', 21'', etc., along the rear, and 22, 22', and 22'', etc., along the front, and pertaining to neighboring belts and propellers, are all drivingly interconnected by a sprocket chain 24. Chain 24 is interwoven among these sprocket wheels in such a manner that, upon one particular direction of movement (see arrow 24*a*) of the chain, neighboring sprocket wheels along the front or along the rear are being driven in opposite directions. Thus, the chain 24 imparts upon neighboring endless belts oppositely directed movements (see curved arrows).

It can be seen, for example, that the sprocket wheels 21 and 22 and belt 13 are being moved in counterclockwise direction, whereas the sprocket wheels 21' and 22' and belt 13' are moved in clockwise direction; the sprocket wheels 21'' and 22'' are moved again in counterclockwise direction, etc. Assuming that such a movement is being imparted upon the chain 24, by means to be described more fully below, then each quadruplet of propellers first moves by 90 degrees and thereby flattens an endless belt until the inner space of a belt is approximately as wide as the thickness of the blades such as 18. This is not quite correct because rubberized guards, such as 25, prevent the belt from engaging the hot light bulb or tube 23. The guards 25 are, of course, wider than the thickness of the propeller blades 18. Thus, when the propellers have a position that is 90 degrees deflected from the one illustrated in FIG. 2, the belts slightly bulge at the inner center due to the guards 25. It is inadvisable to make the vanes 18 as thick as the tubes 23 because this would add needlessly to the mass to be

moved. The vanes 18 will be construed to be only as thick as necessary to offer sufficient rigidity towards any stress imparted upon them by the respective endless belt, particularly during movement. On the other hand, tube 23 will be selected to be as thick as possible and reasonable, so as to provide an even illumination of the respectively displayed front panel. It can be seen that, in the moment illustrated as well as within a range of propeller deflection of ±90 degrees, each of the blades 18 engages with one side of an inner surface portion of the endless belt. In particular, inwardly directed surfaces of the blades of propellers 14 and 15 respectively engage inwardly directed top and bottom portions of the inner surface of endless belt 13, adjacent to and in the rear of the particular panel 10 momentarily displayed in the front-view plane. Upon rotation in the direction indicated and after a 90 degree propeller movement, the respective rear side of each blade engages an inner top or bottom surface portion of the next panel of the same endless belt. The "next" panel is to be understood as defining the trailing panel with reference to the direction of intended belt movement.

Upon continued rotation, each belt is being unfolded. After a rotation by 180 degrees of each propeller, a new panel per belt has been placed into the view plane. The change-over by any endless belt from panel to panel was carried out in a direction opposite to the corresponding panel change-over carried out by the respective neighboring belt or belts. Hence, each belt is again folded and unfolded, and a rotary transport movement is thereby imparted upon such a belt; this rotary transport movement places the respective next panel or picture segment into the viewing plane. It can be seen further that during such a change-over from one picture to the next one, each belt is continuously supported by two propeller flanges 20, one in the front and one in the rear.

The chain 24 is being driven through sprocket wheel 26, which feeds the sprocket chain 24 first towards an idler 27 and from there into the rear row of sprocket wheels 21, 21', 21'', etc. and in the right direction. All sprocket gears have setscrews so that they can be synchronized to the driving sprocket 26. The sprocket 27 will be journaled in a slotted hole so as to take up any slack in the chain 24.

The chain 24 and the sprocket wheel 26 are, of course, to be moved by a timing mechanism operating in such a manner that the chain 24 and the belts are moved intermittently, and for each movement the propellers are to rotate precisely by 180 degrees. After completion of such a specific angular movement, the device is to come to a complete stop for a certain period of time permitting the viewing of the message on the picture then momentarily displayed; and after such a period of time has elapsed, again the pictures are to be exchanged, as aforedescribed, by belt movement. A stepping mechanism serving this purpose will now be described with reference to FIGURES 3, 4, and 5. However, it should be mentioned that this particular stepping device is only one possible device for stepping the chain 24. From the following description, one skilled in the art will be able to derive how known stepping devices can be adapted for equivalent operation.

The prime mover of the entire picture-changing device is a continuously running motor 30 of suitable design. The entire multiple-vision display device is designed to constitute only a very small load for this motor, so that a strong motor is really not needed and only a rather small wattage has to be supplied to this motor 30.

The motor 30 drives a pinion 31, meshing with a gear wheel 32 for suitable speed reduction. The gear wheel 32 is suitably journaled in the frame 12 by means that are conventional and do not require further explanation. A shaft 33 is centrally positioned with respect to the gear wheel 32 screwed thereto. Shaft 33 carries a sickle-shaped member 34 rotating together with the wheel 32 about the axis as defined by shaft 33. The sickle 34 has a semicircular-shaped slot 34*a* of a constant width. The average curvature of this slot 34*a* is given by the dimensions to be developed as follows.

A cam disk 35 is suspended from shaft 36. It will be recalled that shaft 36 carries the sprocket wheel 26, and this shaft 36 thus constitutes the main driving shaft for chain 24 and for the sprocket wheel assembly, as outlined and described with reference to FIGURE 2.

The disk 35 has two diametrically opposed apertures receiving pins 39 and 40. The pins each have a diameter which permits them to travel along and through the slot 34*a*. Also, the radii as measured from the axis of shaft 36 to the center of each of the pins 39 and 40 are equal among themselves and slightly larger than the radius of medium curvature of the slot 34*a*. The sickle 34 rotates continuously, since it is being driven continuously by motor 30 at a reduced speed.

During its rotation, the sickle 34 passes through the position shown in FIG. 3. In this position, the pin 39 is just about to enter the slot 34*a*. Concurrently, the pin 40 is positioned in the end of slot 34*a*. A stationary cam disk 37 urges pin 40 into slot 34*a* and against the tension of a spring (not illustrated). The stationary cam disk 37 has an approaching edge 38 which, in the position illustrated, has just completed pushing the pin 39 in a direction which is downward in FIGURE 5, so that the pin 39 enters the mouth of slot 34*a*. Pin 39 is likewise spring biased in a conventional manner.

Upon continued rotation of the sickle 34, it grips pin 39, and disk 35 is forced to follow this rotation, whereby the pin 39 slides into and along the slot 34*a*. Concurrently thereto, pin 40 is urged by its spring out of the range of the sickle 34 and of the slot 34*a*. After a 180 degree angular movement, a position is attained which is illustrated in FIGURE 4. In particular, FIGURE 4 illustrates the moment when the pin 39 has reached a position which is diametrically opposed to the position shown in FIGURE 3, and here pin 39 has reached the end of the slot 34*a*. Pin 39 together with disk 35 is now inhibited from any further rotation, so that at that point disk 35, shaft 36, sprocket wheel 26, and chain 24 all come to a complete stop.

The pin 40, in the meantime, has been sliding onto the approaching cam portion 38 and has been urged by this portion of cam disk 37 into a direction which is downward in FIGURE 5 so that pin 40 projects into the path of the mouth of the sickle 34. However, at this point the sickle is still far away from the pin 40, and during this interval the disk 35 and, therefore, the shaft 36 and the sprocket arrangement shown in FIGURE 2 remain at rest, until the mouth of the sickle slot 34*a* approaches the pin 40 and forces it to follow for another half circle to assume again the position shown in FIGURE 3.

It can readily be seen that during the rotation of disk 35 and of shaft 36, the sprocket-wheel arrangement, propellers, belts, etc., shown in FIGURE 2 are moved intermittently whenever one of the pins 39 or 40 travels along the slot 34*a*. The rotation is always exactly 180 degrees, and when the pin which is momentarily the follower pin has reached the inner end portion of slot 34*a*, it ceases to move and the disk and sprocket-wheel arrangement come to a complete stop, until the respective other pin is gripped again by the mouth of sickle 34.

For a complete revolution of sickle 34, the disk 35 is moved by 180 degrees, which movement is followed by a pause. The sprocket-wheel and belt arrangement is thus also moved by 180 degrees from step to step. Of course, the sprocket wheels 26, 27, 21, 22, etc., all have the same number of teeth, so that there is no reduction in the rotational speed as between disk 35 and the propellers 14, 15, 16, 17, etc.

Proceeding now to the description of FIGURES 6 through 13, there are shown components for a multiple-

vision sign which is of somewhat sturdier construction. This structure permits dimensions in which the visible picture area may cover several square yards. FIGURE 7 shows the structure for one endless belt respectively providing one panel at a time as a picture segment to be displayed together with neighboring segments. In this case, there are provided six completely separated transparent panels respectively denoted with reference numerals 51, 52, 53, 54, 55, and 56. These panels are rather narrow and relatively high. They may, in practice, have a width of approximately half a foot and may extend upwardly by one or two yards, or even higher if desired.

The panels 51 through 56 are interconnected by means of a chain 57 having chain members 58, each of which is a trifle shorter in length than the width of a panel. The chain members 58 are interconnected by means of relatively short links 59 so as to form an endless chain. The panels 51 through 56 are screwed to the respectively provided six chain members 58. Specifically, the outer surface of a chain member 58 is screwed so as to engage the inner surface of a panel and at the bottom thereof. There is a corresponding chain 77 (see FIGURE 12) interconnecting the top portion of the panels pertaining to the same belt.

As can be seen specifically from FIGURE 8, there is necessarily provided a certain space in between neighboring panels pertaining to the same belt, so that their pivot motions are not impeded during transport of the belt.

The transport of each such endless belt as assembled is carried out by means of propellers such as 62, 60 and 67. The propellers 60 and 62 are provided with horizontal supporting plates 61, on which the panels respectively defining a front-view plane and a rear plane are seated; in the position of the belt shown in FIGURES 7, 8 and 12, these are the panels 51 and 54.

The propellers, for example, have bosses such as 60', which support those adjoining small link members 59 which are connected to a chain member 58 supporting a panel momentarily in the front or in the rear plane. There may, of course, be provided a fourth propeller idling on top of the respective front view panel, which idler propeller would be aligned with propeller 62.

The propeller 62 has a shaft 64 driven by a sprocket wheel 63, which, in turn, is being driven by a chain 65. The chain 65 is interwoven among the several succeeding sprocket wheels, as can be seen in the somewhat schematic illustration of FIGURE 7, which shows the sprocket wheels 63 and 63' as transporting two neighboring endless belts, panel 51' being a member of this neighboring belt.

The rear propellers 60 and 67 are rigidly interconnected by means of a shaft 66, there being a washer 69 interposed between the main frame 70 and the rotating propeller 60. Propellers 60 and 62 engage, with one surface each, the inner surfaces of those chain members 58 which are respectively attached to panels and momentarily positioned in the rear plane and in the front viewing plane. The upper chain 77 is correspondingly and directly driven by the propeller 67, and the idler (not illustrated) aligns the front view panel.

Proceeding now to the description of the driving mechanism, it can be seen from FIGURES 9 and 11 that there is provided a series of sprocket wheels arranged adjacent and along the front plane. Sprocket wheels 63 and 63' pertain to this front-plane driving arrangement. FIGURE 9 shows the rear sprocket wheel 68, which is also shown in FIGURE 7, for driving the interconnected propellers 60 and 67. This sprocket wheel 68 pertains to a series of sprocket wheels arranged along the rear plane. Thus, FIGURE 9 illustrates how the particular endless belt shown in FIGURE 7 is linked to the entire device and structure.

The structure specifically shown in FIGURES 9, 10 and 11 is a stepping mechanism for moving the chain 65 in precise steps. First, of course, there is shown a prime mover 80, which is an electric motor of sufficient power, running continuously and driving a shaft 81. A first gear wheel 82 is mounted on shaft 81 for common rotation therewith. Gear wheel 82 meshes a second gear 83 for speed reduction. Gear wheel 83 centrally supports a hub 84, which, in turn, carries an arm 85. The end of arm 85 thus rotates about the common axis of hub 84 and of gear wheel 83 at a speed determined by motor 80 and by the speed-reducing ratios of gear wheels 82 and 83.

At the end of arm 85, there is provided a pivot 86 carrying one end of a linking bar 87. The other end of linking bar 87 supports a second pivot 88, to which a lever 89 is linked. The lever 89 has on its other end a collar 91, and it receives a shaft 95, on which is mounted for rotation therewith a disk 90 resembling to some extent a ratchet wheel.

The arm 89 with collar 91 can swivel about the axis of shaft 95 independently from any rotation of shaft 95 and of disk 90. There are a number of bosses or cams 92 mounted on the lower surface of the disk 90. Each such cam 92 has a steep actuating face 96 and a rather flat sliding surface 97.

The cams 92 cooperate with a ratchet pin 93, which is mounted on the lever 89 (see FIGURE 10). A small cup 89' is mounted on the lower side of lever 89 to receive a spring 94, which bears against the bottom of the cup 89'. Spring 94 serves as a resilient support for this ratchet pin 93, and it permits retraction of part of ratchet pin 93 into and through a bore in the lever 89 and into the cup 89'.

During operation, the center of the pin 86 on the first arm 85 develops a circle denoted with reference numeral 86'. The arm 85 with pivot pin 86 thereby imparts a movement on the linking bar 87, which movement can be detected from FIGURE 9 by the illustration of three different positions. One of the positions of bar 87, arm 85, or lever 89 is shown with solid lines to identify the elements 85, 87, and 89. This position is about a medium position in between two extreme or return positions. The first extreme or return position, particularly of the linkage 87 and of lever 89, is illustrated in dash line, and this return position of lever 89 specifically is identified by II. The other extreme position is illustrated by showing the arm 85 and linkage 87 with a lined hatching. This return position of line 89 is identified by I. The two corresponding extreme positions I and II of lever 89 define an angle of slightly more than 90 degrees.

During the circular movement of the pin 86 developing circle 86', the linking bar 87 imparts a rocking or swivel movement upon the lever 89. In other words, during the continuous rotation of arm 85, the lever 89 swings back and forth, thereby covering a range of about 95 degrees to 100 degrees. This angular range permits some tolerance of movement. The cams 92, however, are apart from each other by precisely 90 degrees.

It can be seen that during any clockwise pivoting of lever 89 the ratchet pin 93 engages the steep surface 96 of a cam 92 and thereby imparts a clockwise rotation upon the disk 90.

The disk 90, particularly the shaft 95, carries another sprocket wheel 98 having a diameter which is twice as large as the diameter of the sprocket wheels such as 63 and 68. Or, in other words, the sprocket wheel 98 has twice as many teeth as each of the sprocket wheels 63, 63', 68, etc., has. Thus, any angular movement of 90 degrees by the disk 90 imparts upon each of the sprocket wheels such as 63, 63' and 68, and upon all the other sprocket wheels linked to chain 65, an angular movement of exactly 180 degrees. This 180 degree movement is required to respectively place the next panel of an endless belt into the viewing plane.

It will be seen that any backward, i.e., counterclockwise movement of the arm 89 is accompanied by a standstill of disk 90; and when the ratchet pin 93 with its relatively flat back surface enters the sliding surface 97

of the next cam 92, it is retracted into the arm or lever 89, thereby compressing the spring 94. As soon as the arm 89 has moved into position I, the pin 93 disengages from cam 92, and thereupon pin 93 jumps up again. Soon the movement of arm 89 is reversed towards a clockwise direction, and thereupon the front face of pin 93 will engage the steep driving surface 96 of another cam 92. Again, the wheel 90, together with chain 65 and with all the sprocket wheels, will be moved by another step, defined by a precise movement of 90 degrees of disk 90 and of sprocket wheel 98 and corresponding to a precise 180 degree movement of each of the sprocket wheels such as 63 and 68, etc., and of each of the propellers.

Upon operation, it can therefore be seen that all of the endless belts, composed of picture panels and of connecting chains such as 57 and 77, are being transported in steps for sequentially and cyclically placing all of the panels in the viewing plane, and after six steps the picture cycle is being repeated. Each picture panel remains in the front viewing plane for a period of time corresponding to the time required for lever 89 to retract in a counterclockwise direction from position II to position I.

Particularly from FIGURES 7 and 9, one can see the significance of interweaving the chain and of moving adjoining panel belts in opposite directions. Assuming the moment has come when the lever arm 85 has pivoted arm 89 into return position II, this means that the lever arm 89 will now come to a stop; and, of course, disk 90 and all the elements drivingly connected thereto, including chain 65 and all of the sprockets and propellers, are being stopped. It is a common observation in multivision signs that the stopping of movement is actually accompanied by an oscillation of the panels around their stopping position and that the picture appears somewhat uneven and "wavy" for a short but noticeable period of time. The inventive device attenuates the noticeability of such oscillation because neighboring panels momentarily placed into the vision plane will tend to oscillate in opposite directions. Since this is true for the entire panel arrangement, the extent of noticeability is greatly reduced.

For complete suppression of this oscillation, the frame structure along the rear top is provided with a rail, such as 70', receiving through appropriate bearings the various shafts such as 66 (see FIGURE 12). There is a cam 71 provided on the top of each of such shafts, which cam 71 engages a spring 72 (see FIGURE 13). The cam 71 has two flat portions, so that during the resting and picture-viewing positions these flat portions engage the spring 72 and bias same only to a minor extent.

During rotation and panel exchange, the cam urges the spring against its resiliency and towards frame portion 70. After completion of a panel exchange, the moving device of all of the panels has been stopped, and a flat portion of the cam 71 again provides a minimum counter force to be exerted by spring 72. This prevents backlash because it retards the resilient oscillation which the heavy panel and belt structure may impart upon itself and upon the entire moving device. Such oscillations would occur in the direction shown by the double arrow in FIGURE 13. The resiliency of spring 72 dampens and materially attenuates such residual oscillation below noticeability thereof. The cam 71 has a configuration that permits a rather slow deflection of spring 72 during the first portion of a panel exchange, and the spring will deflect back rather rapidly at the moment the driving and panel arrangement stops. Thus, opposite belt movement and resilient retarding of oscillation suppress any noticeable oscillation of the picture.

Turning for the moment to FIGURE 6, it can be seen that the casing or housing 11 and particularly the window structure require the provision of a space which permits the panels such as 51 and 52, etc., to move freely. FIGURE 6 illustrates a cross section through a single endless belt and panel structure, including the housing 11, and it can be seen that in the viewing position the distance A defines the distance between the front panel positioned in the viewing plane and the rear panel in the rear plane. If, during the panel-changing movement, the various propellers such as 62, etc., have moved by 90 degrees, the belt and panel structure is to some extent folded together; and in the same cross-sectional plane, the front "fold" is apart from the rear "fold" by a distance B, which is substantially longer than the distance A by about the width of one panel. These are the requirements for the dimensions of the housing.

The device illustrated in FIGURES 7 through 13 operates in the following manner. The description of operation can best be followed from FIGURES 7 and 9.

It will be assumed that arm 85 and linkage 87 are in motion to impart a counterclockwise movement upon lever 89. During this period of time, the chain 65 and all the sprocket wheels respectively driving the several propellers are at rest. When the lever 89 approaches the extreme or return position I, the pin 93 snaps up to have its steep front face engaging the steep flank 96 of a cam 92. Upon the continued rotation of arm 85, lever 89 now reverses its movement and thereby urges this cam 92 with disk 90 to follow. Accordingly, a translatory motion is imparted upon the chain 65, and the sprocket wheels such as 63 and 68 start to rotate.

Looking now at FIGURE 7, it can be seen that, due to this counterclockwise movement of sprocket wheels 63 and 68, the propellers 62 and 60 rotate in a counterclockwise direction and out of their previous position; thereby a corresponding counterclockwise movement is imparted upon the two panels 51 and 54. In other words, the panel 51 is rotated or pivoted counterclockwise out of the rear plane.

This pivot motion of the propellers and of the front and rear panels is accompanied by a lateral shift of the two panels 52 and 53 toward the rear, and concurrently thereto the two panels 55 and 56 move toward the front. Still concurrently thereto, the distance from the panel pair 52 and 53 to the panel pair 55 and 56 is decreased. The same procedure can also be described in that, for example, the angle between panels 51 and 56 decreases from 90 degrees, whereas the angle between panels 51 and 52 increases from 90 degrees.

After an angular sweep by approximately 90 degrees or somewhat below, the propellers 62 and 60 respectively disengage from the panels 51 and 54 or, to be more precise, from the chain members 58 that support the panels 51 and 54. After a small additional angular propeller sweep or movement, the respective other sides of propellers 60 and 62 engage the rear or inner surface of panels 53 and 56 or, more precisely, of these chain members 58 which support these panels 53 and 56.

After a total angular propeller movement of 180 degrees, the panel 56 will swing into the front viewing plane and the panel 53 will swing into the rear plane.

At this point, the arm 89 has reached the return position II. The lever 89 and particularly the ratchet pin 93 thereon disengage from the cam 92, whereupon the disk 90 comes to a complete stop; so do the sprocket wheels such as 63 and 68. The propellers 60, 62, and 67 likewise come to a full stop. Any backlash due to the tendency to continue to move is being prevented by the spring and cam arrangement as shown in FIGURE 13

Now the lever 89 turns back and in a counterclockwise direction. During this period of time when the lever 89 travels from position II to position I, the panel 56 remains in the front viewing plane, to be exchanged for the panel 55 after the arm 89 has again passed through the return position I.

The invention is not limited to the embodiments described above, but all changes and modifications thereof not constituting departures from the spirit and scope of

the invention are intended to be covered by the following claims.

What is claimed is:

1. A multiple vision sign comprising:

an upper and a lower endless chain, each being composed of long and short linking members; a plurality of individual viewing panels, one each being supported by and mounted on a long linking member of the upper chain and a long linking member of the lower chain so as to form a plurality of endless belts positioned side by side and each belt having a similar plurality of said viewing panels, one panel at a time of each belt being positionable in a common viewing plane, said panels, one of each belt, when in the viewing plane together composing a picture, there being as many different pictures as there are panels per belt;

propeller means movable and disengageable from said linking members and capable of concurrently drivingly engaging the inner surface of an upper and a lower linking member supporting one of said panels when said latter panel is momentarily in said viewing plane, to first pivot said latter panel by approximately 90° and out of said viewing plane and thereafter pivot a juxtaposed panel of the same belt by 90° into said viewing plane; and

means for stopping said movable means subsequent to said two succeeding 90° pivot motions as imparted upon said two panels.

2. A multiple vision sign comprising:

a plurality of endless chains, each being composed of alternating long and short linking members; a plurality of individual viewing panels, one each being mounted on a long linking member so as to form a plurality of endless belts positioned side by side and each belt having a similar plurailty of said viewing panels, one panel at a time of each belt being positionable in a common viewing plane, said panels, one of each belt, when in the viewing plane together composing a picture, there being as many different pictures as there are panels per belt;

a first plurality of propellers capable of respectively engaging inner end surface portions of all those linking members on which are mounted panels momentarily in said viewing plane;

a second plurality of propellers capable of engaging inner end surface portions of all those linking members on which are mounted panels concurrently in a rear plane that extend parallel to said viewing plane;

sprocket wheels connected to each of said propellers;

a second chain woven between all said sprocket wheels to impart rotary motion upon each sprocket wheel with sprocket wheels driving panels juxtaposedly positioned in the same plane, in opposite directions; and

means for imparting a stepped movement upon said second chain.

3. A multiple vision sign comprising:

a plurality of endless belts, each comprising an endless chain composed of alternating long and short linking members, said long linking members each supporting a picture panel, said belts being arranged said by side so that all panels of each belt are successively positionable into a viewing plane, with the panels of said belts positioned concurrently in said viewing plane being placed side by side to define a common planar picture area;

a first plurality of propellers respectively engaging inner surface portions of linking members supporting panels momentarily positioned in said viewing plane;

a second plurality of propellers respectively engaging inner surface portions of linking members supporting panels momentarily positioned in a rear plane extending parallel to said viewing plane, each of said propellers being rotatable about an axis that permits respective pivoting of the respectively engaged panels by 90 degrees, there being four propellers per belt;

flange means integral with said propellers to support said panels during engagement therewith; and

means for positively stepwise driving at least one propeller per belt by 180 degrees and in such a direction that neighboring belts receive oppositely directed movements.

4. In a multiple vision sign in which a plurality of picture to be displayed are divided into similar rectangular transparent picture panels, the combination comprising:

an upper and a lower endless chain, each being composed of alternating long and short linking members, a long linking member of the upper chain and a long linking member of the lower chain supporting a picture panel, the picture panels on the chains are to be placed successively, one at a time, into a viewing plane so as to form an endless belt, when in viewing position one panel of said belt being positioned in said viewing plane while another panel of said belt is positioned in a rear plane that extends parallel to said viewing plane;

an elongated lamp placed in the interior space as defined by said belt;

a first and a second propeller interconnected by a common shaft and respectively engaging inner end surface portions of the two linking members supporting the rear plane panel;

a third and a fourth separately positioned propeller respectively engaging inner end surface portions of the two linking members supporting said viewing plane panel;

sprocket wheels respectively connected to said first and said third propellers;

a second chain drivingly engaging said sprocket wheels; and

means for stepwise driving said second chain.

5. A multiple vision sign comprising:

an upper and a lower endless chain, each being composed of long and short linking members; a plurality of individual viewing panels, one each being supported by and mounted on a long linking member of the upper chain and a long linking member of the lower chain so as to form a plurality of endless belts positioned side by side and each belt having a similar plurality of said viewing panels, one panel at a time of each belt being positionable in a common viewing plane, said panels, one of each belt, when in the viewing plane together composing a picture, there being as many different pictures as there are panels per belt;

a first plurality of propellers capable of respectively engaging inner surface portions of all those linking members supporting panels momentarily in said viewing plane;

a second plurality of propellers capable of engaging inner surface portions of all those linking members supporting panels concurrently in a rear plane that extends parallel to said viewing plane;

sprocket wheels connected to each of said propellers;

a second chain woven between all said sprocket wheels to impart rotary motion upon each sprocket wheel with sprocket wheels driving panels juxtaposedly positioned in the same plane, in opposite directions;

resilient means for dampening oscillation and backlash of at least one of said plurality of propellers; and

means for imparting a stepped movement upon said second chain.

6. In a multiple vision sign in which a plurality of pictures to be displayed are divided into similar rectangular picture panels, the combination comprising:

an upper and a lower endless chain, each being composed of alternating long and short linking members, a long linking member of the upper chain and a long linking member of the lower chain supporting a picture panel, the picture panels on the chains are to

be placed successively, one at a time, into a viewing plane so as to form an endless belt, when in viewing position one panel of said belt being positioned in said viewing plane while another panel of said belt is positioned in a rear plane that extends parallel to said viewing plane;

first and second interconnected propellers respectively engaging upper and lower inner surface portions of the two linking members supporting the panel that is positioned in the rear plane;

means for imparting a stepwise rotary movement of similar direction upon said first and second propellers; and

means for concurrently imparting a follower rotary movement upon the front viewing plane panel.

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