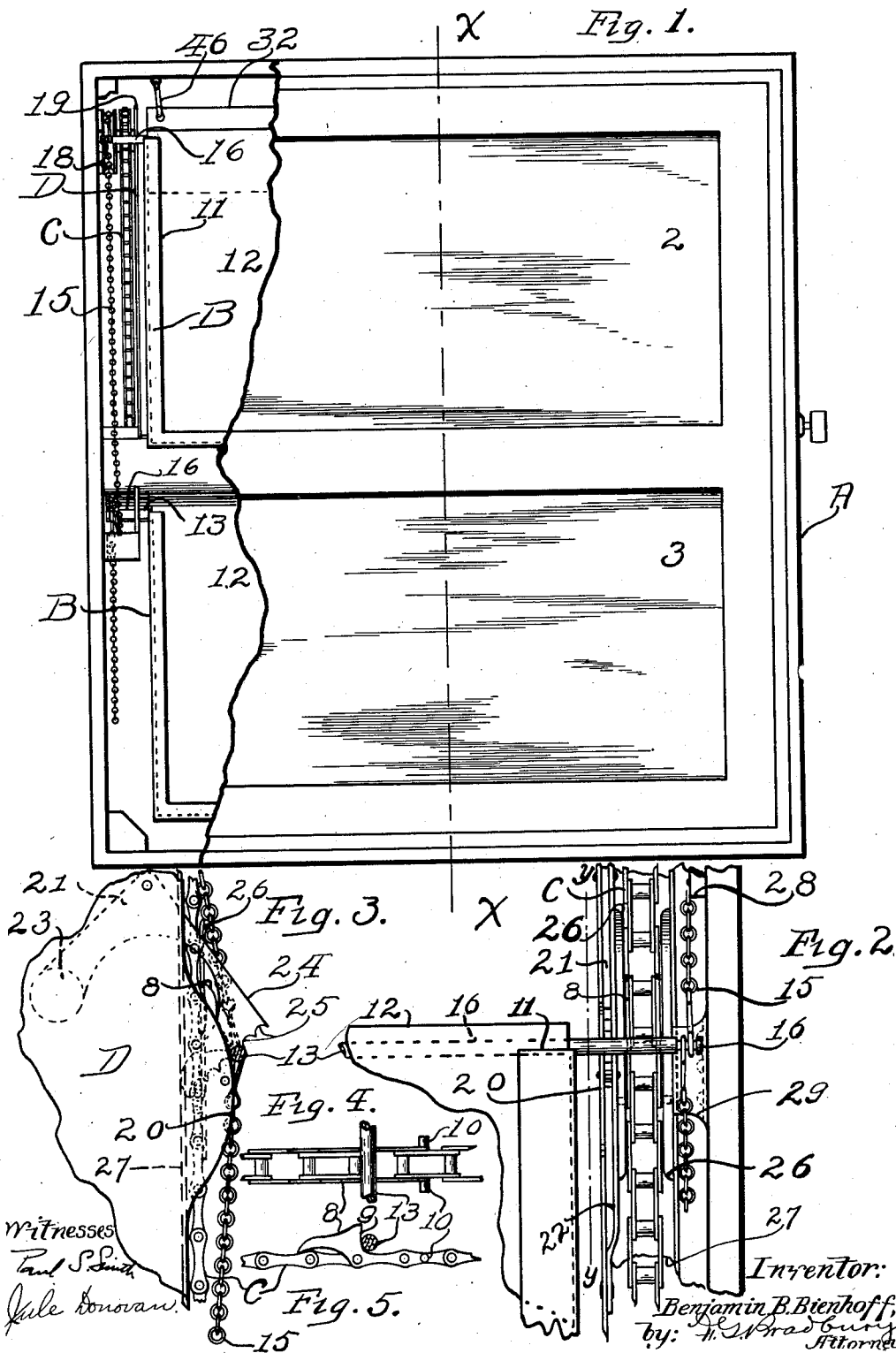


Patented Dec. 17, 1912.

3 SHEETS—SHEET 1.

1,047,904.



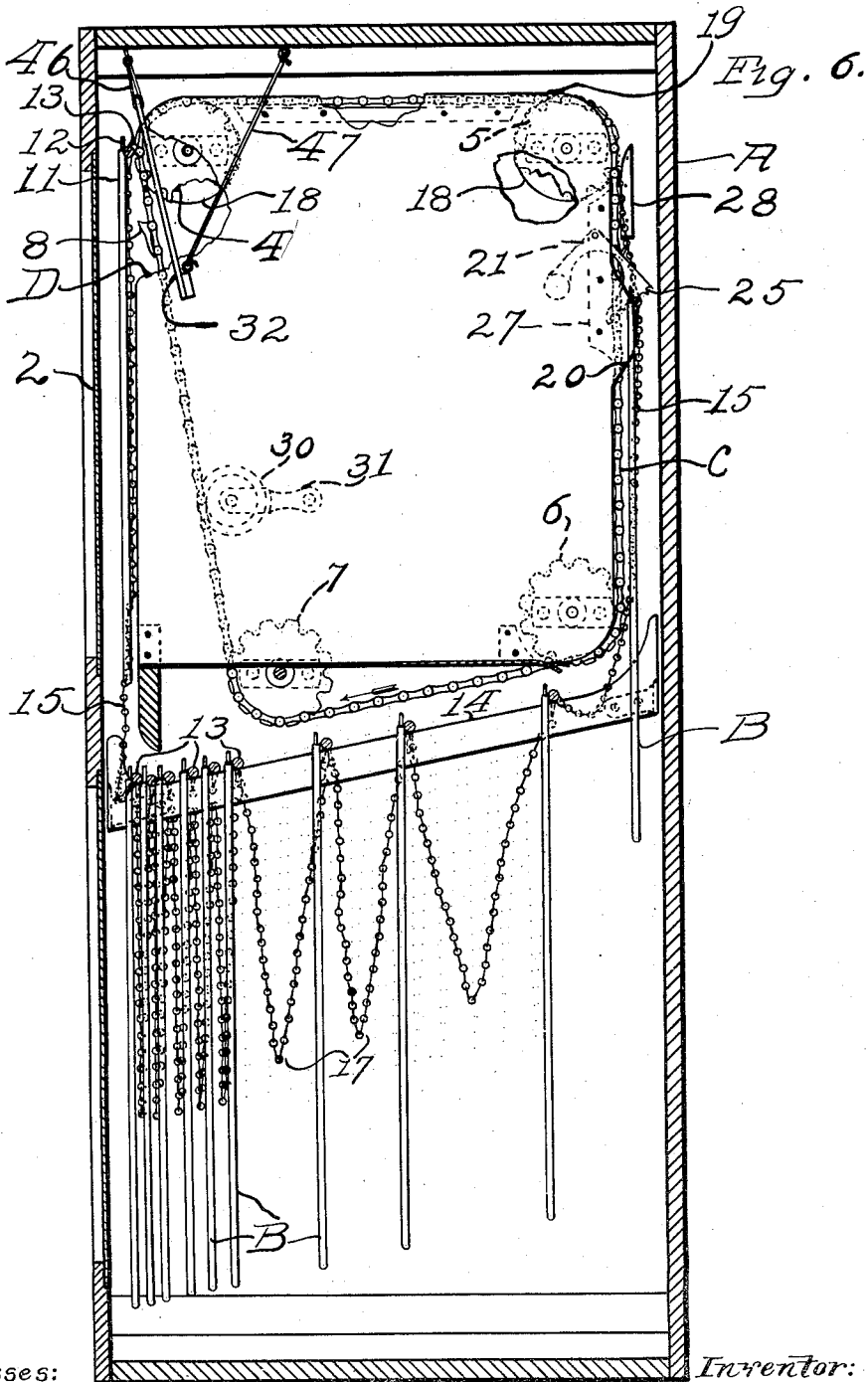
B. B. BIENHOFF.
DISPLAY APPARATUS.

APPLICATION FILED AUG. 18, 1910.

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3 SHEETS-SHEET 2.

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Witnesses:

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Jule Donovan.

Inventor:

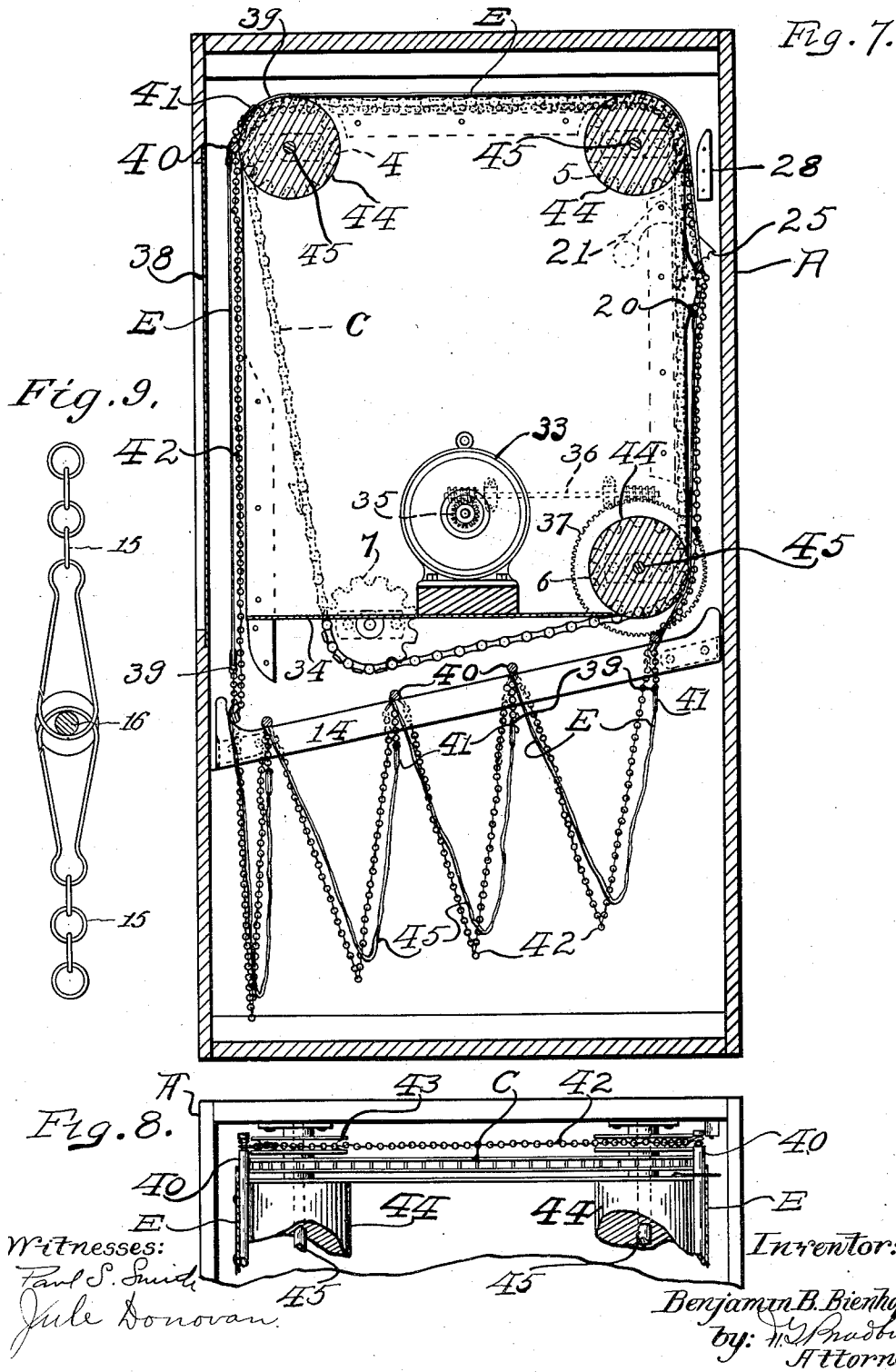
Benjamin B. Bienhoff,
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UNITED STATES PATENT OFFICE.

BENJAMIN B. BIENHOFF, OF ST. PAUL, MINNESOTA.

DISPLAY APPARATUS.

1,047,904.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed August 18, 1910. Serial No. 577,806.

To all whom it may concern:

Be it known that I, BENJAMIN B. BIENHOFF, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Display Apparatus, of which the following is a specification.

My invention relates to improvements in display apparatus and utilizes a continuously moving operating belt to secure the presentation of a succession of display surfaces, each of which remains stationary for a time and is succeeded by another while the first is moved from view or shown in a new position.

The principal object of my invention is to secure a simple, efficient means of engaging and disengaging the operating belt with the succession of display carriers, together with a mechanism to hold the displays stationary when disengaged.

In the drawings with which I have illustrated my invention and which form part of my specification, Figure 1 is a front elevation of my device showing a casing A with two display carriers B in the successive positions of one carrier; Fig. 2 is an enlarged detail of the disengaging or tripping mechanism; Fig. 3 is a section on the line Y—Y, Fig. 2; Figs. 4 and 5 are enlarged details of the flight together with its guide heads on the operating belt C; Fig. 6 is a section on the line X—X, Fig. 1, drawn to a larger scale; Fig. 7 is an alternative construction in which flexible display carriers are used instead of non flexible displays; Fig. 8 is a fragmentary plan of the operating mechanism of Fig. 7, and Fig. 9 is an enlarged detail showing an end view of the rod 13, chains 15 and the snaps which serve to attach these chains to the rod.

In the above drawings a rectangular casing A is shown, having glazed apertures 2 and 3 in which it may be convenient to house my device, although I wish it understood that the housing is not an essential feature of my invention and may be modified to fit it for different uses and surroundings, or may even be entirely dispensed with. Within the casing A is a metal frame D supporting the working parts of my device. At each side is an operating belt or chain C mounted on sprockets 4, 5, 6, and 7 which in my construction are journaled on the walls of the frame D. The chain is preferably of the

flat link belt kind. On each belt is mounted a dog or flight 8 so arranged that it presents a face 9 normal to the surface of the belt in the direction of travel, and carries two lateral guide heads 10 in advance of the face 9. The belt C is operated by any suitable power which drives the sprocket 7 on each side of the casing.

The display carrier illustrated in Figs. 1 to 6 inclusive, consists of a fold 11 of metal forming three sides of a rectangle and open on the fourth side to admit a card display 12 and attached to a rod 13 which extends across the width of the casing and the face of the operating chains so that it may be engaged by both flights 8. I wish it understood that this construction is not essential and that any method of supporting non folding material is its equivalent. In its normal position, the ends of the rod 13 form gudgeons which rest on a slide 14 at each side of the casing, below the sprockets 6 and 7, sloping toward the front of the casing at such a pitch that the metal rods 13 normally slide forward as far as possible, and having an upward curve at each end to serve as a guide to the rods. A number of rods 13 carrying dependent display supports, normally rest on the slides 14, the display at the front being visible at the aperture 3 in the front of the casing.

Each display carrier B is attached parallelly to its successor by a pair of light spacing chains or cords 15 connecting the ends 16 of the rods 13. The attachment to the ends of the rods is pivotal allowing the rotation of the rods, so that the displays hang vertical at all times. The ends of the rods 13 are formed with a groove in which are received spring snaps on the ends of the spacing chains 15, thus allowing free movement and easy detachment of the chains for the purpose of increasing or decreasing the number of display supports. When the rods 13 rest close together on the slides 14, the chains 15 form loops 17 hanging down at the ends of the display carriers B. The length of the spacing chains 15 is such that successive display carriers B will clear each other and appear at the apertures 2 and 3 in the casing A. From the top of the aperture 2 the chains 15 extend across the top of the casing and down its back connecting to the display carriers B on the slides 14. At the top of the casing the chains 15 are carried by loose sheaves 18 concentric with

the sprockets 4 and 5 which assist in spacing the rods 13 longitudinally. The flights 8 are adapted to engage the ends of the rods 13 as they hang at the top of the aperture 2 and carry them across the top of the casing resting upon the tops of the sides of the frame which at this point form slides 19 that take the weight of the display from the operating chains, thus reducing the friction on the sprockets and permitting smooth operation. The slides 19 are slightly above the chains C and raise the rods 13 clear of the sprockets and chain while the displays are stationary.

At the back of the frame are located the displacing guides 20 and the automatic latches 21. The displacing guides 20 are formed upon the edge of the frame D at this point and extend from a point inside of the plane of the outer face of the operating chains C to a point outside the plane of travel of the extremity of the flights 8 and have a comparatively short edge or face in the form of an arc. As the chains move forward carrying the flights 8 in engagement with a rod 13, the ends of said rod come in contact with the displacing guide and are gradually forced toward the back of the casing and out of engagement with the flights 8 on the two chains C. The automatic latches 21 are pivoted between the frame D and the supports 22 which are attached to the frame. The latch has the form of a bell crank with a weighted arm 23 and an engaging arm 24 which carries a series of notches 25 fitted to engage the end portion of the rods 13 when they have passed below the latch 21 and prevent any return or rising of the rods. The descending rods press the engaging arms 24 forward, but at the moment the rods 13 are thrown out of engagement with the flights 8 by the displacing guide 20, the latch 21 is released and the weighted arm 23 forces the engaging arm backward so that some one of the notches 25 is in engagement with the rod 13 as soon as it has cleared the flight 8 and stopped its downward movement. The guide 20 and latch 21 are so located that a rod 13 is tripped at the instant its successor fills the aperture 2. The weight of the descending rod and its display is counterbalanced by the display supports hanging in the front of the machine before the apertures 2 and 3, thus preventing any further downward movement of a disengaged rod until the flights 8 engage the rod 13 carrying the display at the aperture 2. The succession of displays B is thus locked from movement in either direction until the operating belts C again act by means of the flights 8.

In order to make the tripping action of the guides 20 effective, it is necessary to prevent the rotation of the flights 8 which could take place through the buckling of the

chain at this point, as this would result in releasing the two ends of the rods 13 at different moments and in different positions and consequently throwing the displays B out of alinement. The buckling of the chain is prevented by guide grooves 26 the sides of which engage the guide heads 10 on the flight. A flat guard 27 lies inside the chain and a guide 28 is formed outside of the ends of the rods 13, holding them against the chain and pressing the chain back against the guard 27, thus insuring the entrance of the guide heads 10 of the flights 8 on the chain, into the guide grooves 26. An additional guard 29 extends inside the rod 13 and the chains C at the highest point of the displacing guide holding the chain clear of the guides and preventing slack chain from catching.

When the flights 8 engage the rod 13 of the display B which occupies the aperture 2, the tension on the chains 15 connecting this display to the one preceding it, is relieved and, the preceding display drops by gravity down the back of the machine until it reaches the slides 14.

To maintain the tension of the belts C, an idler 30 is provided, mounted upon a pivoted frame 31 the weight of which serves to tighten the belt. A blind 32 is supported by flexible straps 46 and 47 from the casing in the front of the machine at the top of the aperture 2. This blind serves to hide the interior of the casing while the display travels from aperture 3 to aperture 2 and is pushed out of the way by the display at aperture 2 as it travels back from view.

In operating my device a series of the display carriers B rest upon the slides 14. These carriers slide forward by their own weight until they reach the curved guide at the end of the slide. In this position the front display is visible at the aperture 3. A similar display is presented at the aperture 2 in the upper part of the casing being held there by the spacing chains 15 which pass over the sheaves 18 to the bar 13 of the preceding display carrier which is held by the latches 2 and the displacing guides 20, out of engagement with the operating chains C. As the operating chains continue to move, the flights 8 approach the sprockets 4 where they come into engagement with the bar 13 of the display presented at the aperture 2. This bar 13 now rises on to the slides 19 and moves across the top of the casing past the sprockets 5 until it reaches the displacing guide 20. During this movement the display attached to the rod 13 travels across the body of the apparatus in a vertical position and as the bar 13 approaches the displacing guide, the display travels downward behind the sprocket 5. At the same time, the display presented at the aperture 3, being connected to its predecessor

by the spacing chains 15, rises to the position previously occupied by its predecessor at the aperture 2, which position it gains at the moment that its predecessor is thrown out of engagement with the flights 8 by the displacing guide 20.

The operation of the disengaging mechanism begins as the rod 13 approaches the displacing guide 20. At this point it is pressed down against the chain by the guard 29 which maintains the chain in such a position that the guide heads 10 of the flights 8 will enter the guide grooves 26. The guide grooves 26 hold the flights in a vertical position with their faces 9 normal to the line of travel of the belt C. The grooves are so placed that the guide heads are engaged by them at the moment the bar 13 resting against the faces 9 of the flights, comes into contact with the displacing guides 20. These guides force the bar 13 outward upon the faces of the flights until it clears their outer extremities. The engaging arm of the latch 21 which has been forced forward by the descending rod 13, is freed by the outward movement of the rod on the face of the flight and swings backward engaging the rod with some one of the notches 25. In this way the rod 13, carrying its display and balanced by the displays B presented at the apertures 2 and 3, is locked against any backward movement at the instant it clears the extremities of the flights.

In the alternative constructions illustrated in Figs. 7 and 8, the principal features are identical with those illustrated in the preceding views. The operating belts C are represented as driven by the sprocket 6 by means of the motor 33 mounted upon the casing 34 and connected to the sprocket by gears 35, a worm shaft 36 and worm wheel 37, the latter being concentric with the sprocket 6. This apparatus is especially adapted to the use of flexible displays E and the illustration in Fig. 7 shows a casing 34 with a single aperture 38 before which the displays E are successively presented. As those displays are likely to be of large dimensions, their full length extension in a vertical position would require a great height of apparatus with a waste of space below the display aperture. To obviate this difficulty the bottoms 39 of the displays themselves, or the flexible supports carrying them, may be attached to the rods 40 carrying the succeeding display. The attachment to the rod of the succeeding display is loose so that no tension is given the display by the operating chains C, the weighted bar 41 at the bottom causing the display to hang smooth in front of the aperture 38. The weight of the succeeding displays is carried by the spacing chains 42 similar to the chains 15 used in the previous construction. These chains are carried by sheaves 43

as before but the display itself instead of maintaining its vertical position throughout its entire route is carried across the top of the casing in the form of a broad belt upon rollers 44 loosely journaled upon shafts 45 which also carry the sprockets 4 and 5 and sheaves 43. In this way the movement of the operating chains C upon the sprockets does not revolve the rollers 44 carrying the flexible display E, and these rollers revolve only when the display is being carried forward by the flights 8 upon the operating chains C engaging the end of the rods 40 supporting the displays.

If desired the rollers 44 may be made to revolve with the sheaves 43 which carry the spacing chains 42. This construction would assist materially in carrying long heavy displays across the top of the frame.

The operation of the displacing guide and latch are identical in both structures and the slides 14 carrying the rods have exactly the same form and function. However, when the displays are supported on these slides the flexible material of the displays instead of falling vertically from its supporting rods falls in the form of a loop 45 attached at its end to adjacent successive rods 40 resting upon the slides. The use of this construction with flexible displays carried over the top of the frame, permits the use of the interior of the frame for other purposes including housing of the small motor to operate the mechanism and means for illuminating display transparencies on the supports, an adaptation which may be readily understood without illustration.

It is evident that the number of displays in either the preferred or alternative construction may be increased or diminished over the number illustrated without changing in any way the operation of the device. This change may be made at any time by detaching the chains 15 from a rod 13 in the preferred construction, or by detaching chains 42 and display E from a rod 40 in the alternative construction.

In accordance with the patent statutes I have described the principles of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof but I desire to have it understood that the construction shown is only illustrative and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. In display apparatus having a frame and a moving belt thereon, associated with display carriers, flights on said belt adapted to engage successive carriers, a displacing guide on said frame adapted to

displace said carriers from engagement with said flights, guide heads on said flights, short guide grooves for said heads associated with said displacing guide and adapted to hold said belt and flights in a normal position during the displacement of the carriers by said displacing guide.

2. In a tripping device for disengaging movable carriers from flights upon an operating belt in display apparatus, a lateral guide head on each of said flights, a fixed displacing guide adapted to force said carriers away from said operating belt at a certain point in its operation, a grooved frame in connection with said displacing guide adapted to receive the guide heads of successive flights whereby the flights are held in a normal position during the action of the displacing guide.

3. In display apparatus, a supporting frame, display carriers mounted thereon, spacing chains connecting said display carriers and forming therewith a slack belt operable on said frame, operating means mounted on said frame and adapted to engage said carriers successively to operate a succeeding carrier during the engagement of its predecessor, means for disengaging said carrier and operating means and means for locking said belt from backward movement when said carriers are not in engagement with said operating means.

4. Display apparatus, comprising, in combination, a supporting frame, a belt mounted thereon, display carriers associated with said belt, a lock for said carriers, automatic means for engaging said carriers with said belt, a connection between successive carriers adapted to operate a succeeding carrier during the engagement of its predecessor, automatic means for detaching said engaged carriers from said belt and connecting them successively with said lock, whereby they may be held against movement until the engagement of the succeeding carrier with the belt.

5. In automatic display apparatus, an operating belt, a flight on said belt having a guide head, a series of displays connected to form an endless belt, rods on said displays adapted to be engaged by said flight in its movement, a displacing guide adapted to force a display rod engaged by said flight out of engagement therewith and a short grooved guide in connection with said dis-

placing guide adapted to engage the guide head of a flight during the action of the displacing guide to make that action positive.

6. In a display apparatus, a supporting frame having a display opening, a belt mounted thereon having a flight, means for actuating said belt, a succession of display carriers adapted to be moved singly behind said display opening by said belt and to be engaged by said flight, a flexible connection between successive carriers adapted to operate a succeeding carrier during the engagement of its predecessor, a support extending away from the upper portion of said display opening on which said display carriers are adapted to run while being moved by said belt, whereby the weight of a display over said opening tends to return its predecessor, automatic means for disengaging said preceding display from the flight on said belt, and means for engaging said preceding display when disengaged from said flight to hold the display which is over said opening, stationary.

7. In a display apparatus, a supporting frame having a display opening, a belt mounted thereon having a flight, means for actuating said belt, a succession of display carriers adapted to be moved singly behind said display opening by said belt and to be engaged by said flight, a flexible connection between successive carriers adapted to operate a succeeding carrier during the engagement of its predecessor, a support extending away from the upper portion of said display opening on which said display carriers are adapted to run while being moved by said belt, whereby the weight of a display over said opening tends to return its predecessor, a guide in the path of said displays adapted to disengage a display preceding the one over said opening from the flight on said belt, and a pivoted latch weighted to cause engagement with said preceding display to hold a succeeding display stationary over said opening and adapted to allow said succeeding display to sweep past said latch and into engagement therewith.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

BENJAMIN B. BIENHOFF

Witnesses:

PAUL S. SMITH,
JULE DONOVAN.