

May 10, 1938.

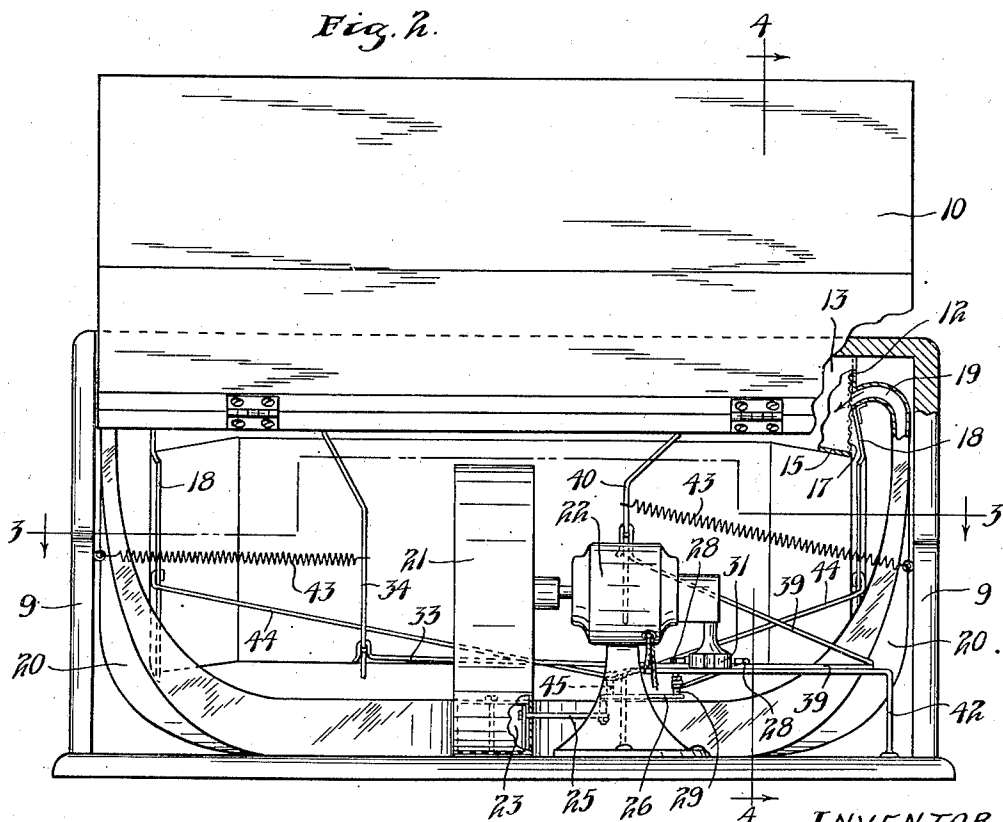
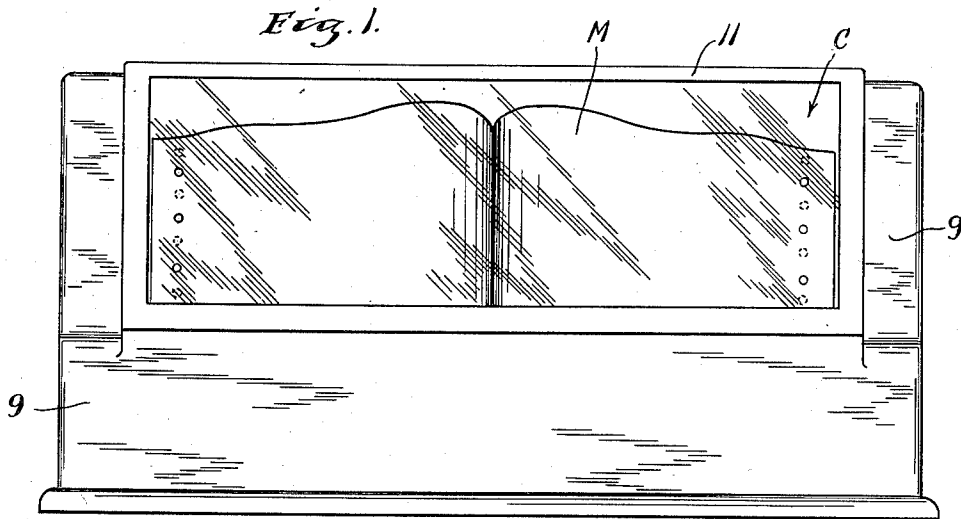
LE ROY H. IRELAND

2,117,249

DISPLAY DEVICE

Filed March 13, 1937

3 Sheets-Sheet 1



4 INVENTOR.
LEROY H. IRELAND.
BY HIS ATTORNEYS.
Williamson & Williamson

May 10, 1938.

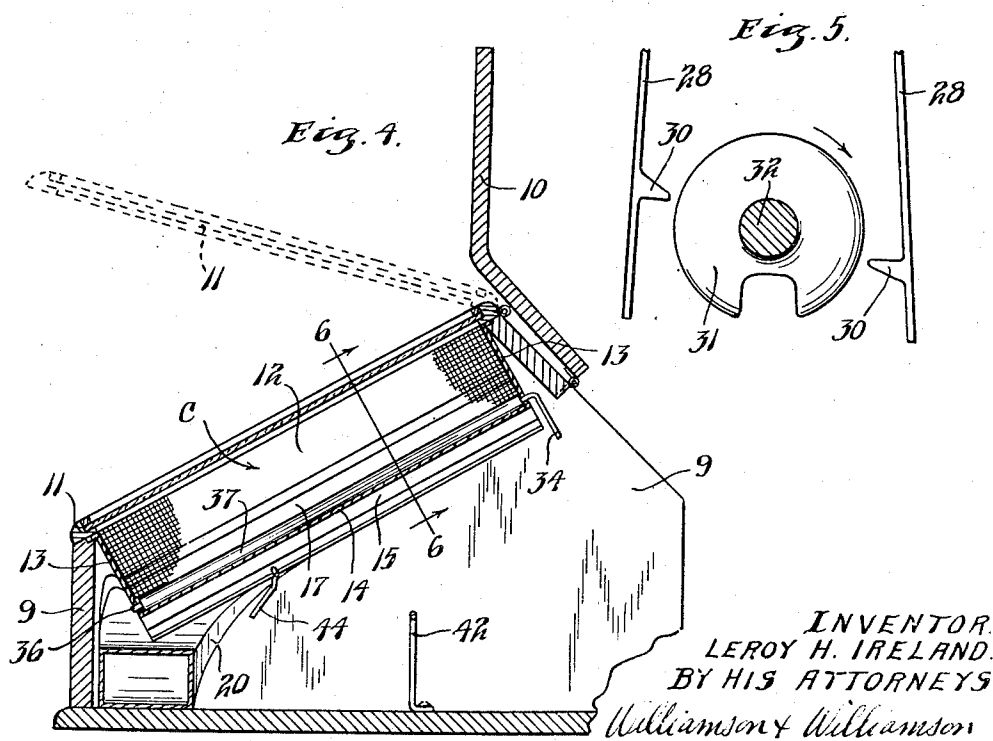
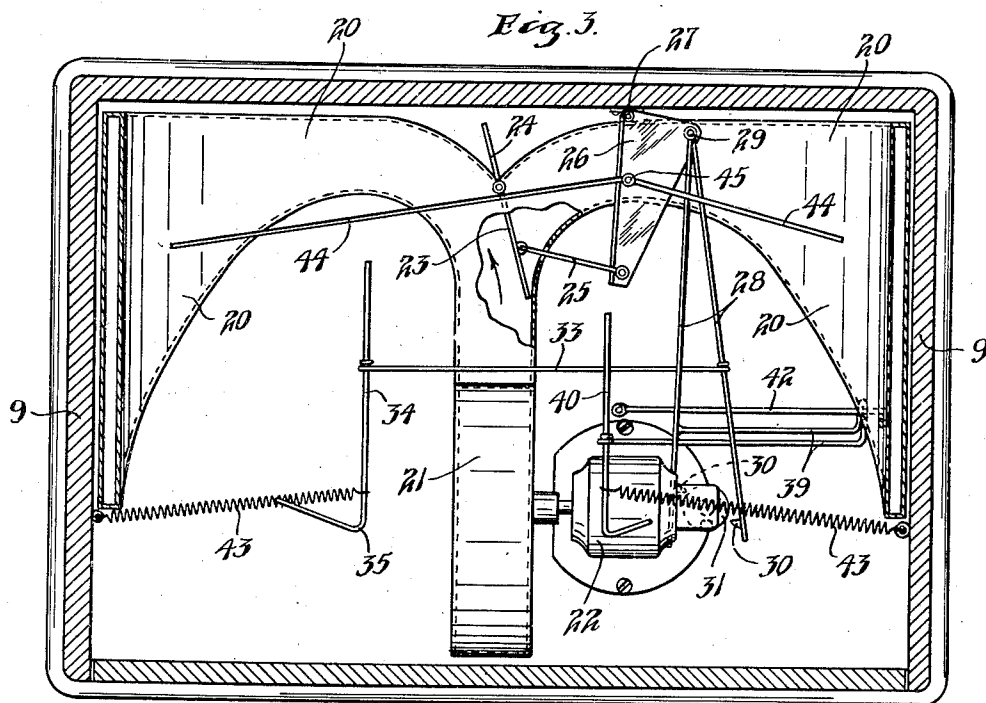
LE ROY H. IRELAND

2,117,249

DISPLAY DEVICE

Filed March 13, 1937

3 Sheets-Sheet 2



INVENTOR.
LEROY H. IRELAND.
BY HIS ATTORNEYS.

Williamson & Williamson

May 10, 1938.

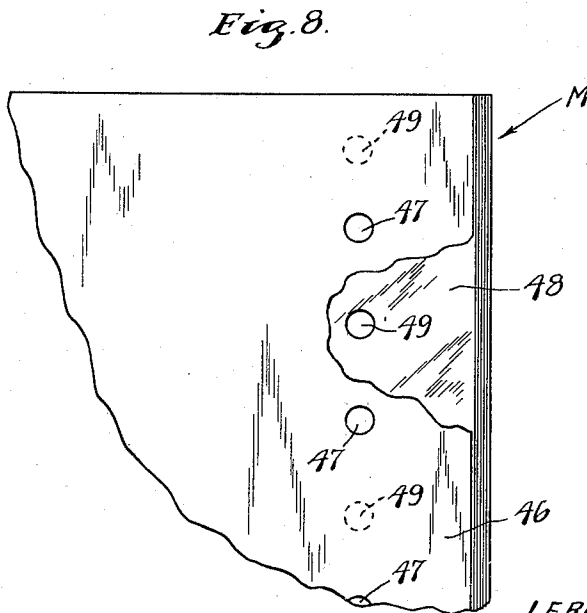
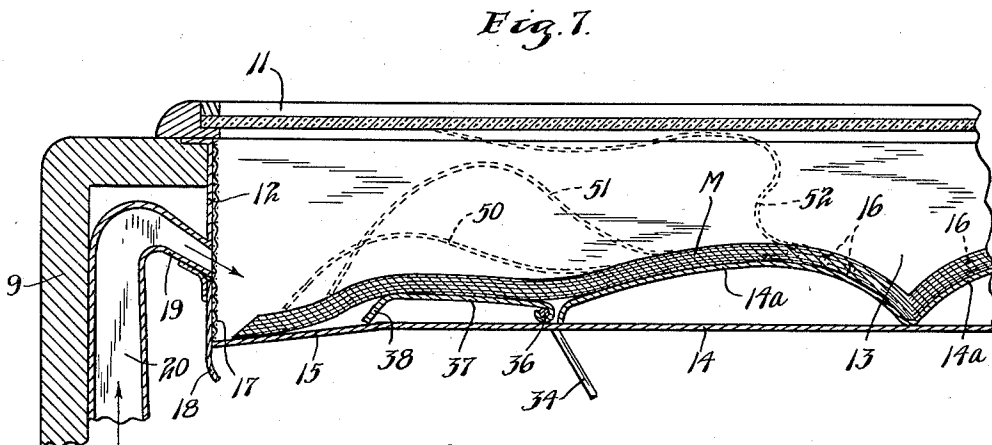
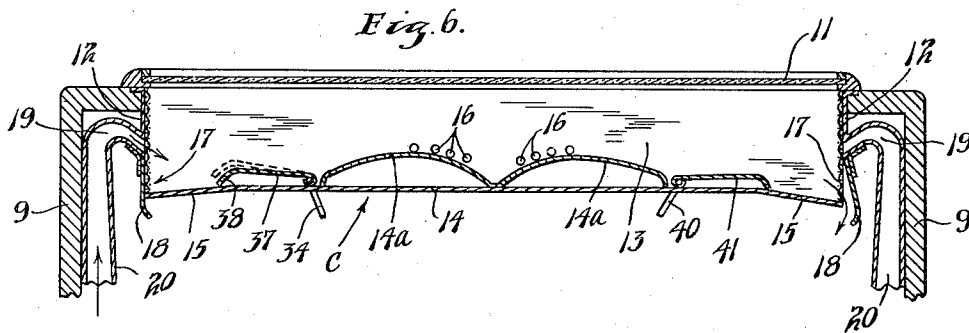
LE ROY H. IRELAND

2,117,249

DISPLAY DEVICE

Filed March 13, 1937

3 Sheets-Sheet 3



INVENTOR.
LEROY H. IRELAND
BY HIS ATTORNEYS.
Williamson & Williamson

UNITED STATES PATENT OFFICE

2,117,249

DISPLAY DEVICE

Le Roy H. Ireland, Minneapolis, Minn.

Application March 13, 1937, Serial No. 130,645

27 Claims. (Cl. 40—104)

This invention relates to display devices and processes whereby the matter appearing on successive pages of magazines, books or bound sheets of paper may be successively viewed.

5 It is an object of the present invention to provide a device which will successively turn the pages of a magazine one page at a time to permit the printing, illustrative or other matter thereon to be viewed.

10 Another object is to provide such a device which will allow for a time interval to intervene between the turning of successive pages and to permit of predetermining this time interval.

15 It is a further object to provide means for reversing the turning of the pages after all the pages have been turned once in the same direction thereby permitting continuous operation of the device.

20 Another object is to provide a novel display method whereby the foregoing and other objects may be attained.

Still another object is to provide a novel magazine structure which can be used with my apparatus and in carrying out my display method.

25 The objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the various views, and in which,

Fig. 1 is a view in front elevation of the apparatus;

Fig. 2 is a view in rear elevation of the same with the casing opened;

35 Fig. 3 is a section taken on the line 3—3 of Fig. 2;

Fig. 4 is a section taken on the line 4—4 of Fig. 2;

40 Fig. 5 is an enlarged detail of a part of the control mechanism;

Fig. 6 is a section taken on the line 6—6 of Fig. 4;

Fig. 7 is an enlarged fragmentary view of the elements shown in Fig. 6; and

45 Fig. 8 is a fragmentary section of a magazine structure that may be used with my invention.

Referring to the drawings in more detail, there is illustrated a cabinet structure 9 which is provided at its rear with a hinged door 10 and on its sloping front portion with a glazed hinged door member 11. Suspended in the opening covered by the door 11 is a casing C composed of ends 12 and sides 13. These are mounted around and secured to a bottom plate 14, which is provided with sloping end sections 15. The side walls 13

are provided near their central portions with a plurality of openings 16.

As best shown in Fig. 7, the end walls 12 extend downwardly to approximately the center of the height of said end wall area in the form of a solid sheet. The lower half of each end wall area constitutes a screened opening 17 which may be closed by a hinged damper 18. This damper covers all of the open portion of the end wall except for the narrow elongated inlet 19 which communicates with the interior of the casing C immediately above the damper 18.

The inlet 19 forms the end of an air conduit 20 which curves downwardly and toward the center of the bottom of the cabinet 9. It will be noted that this construction is duplicated at both ends of the device. The two branches of the conduit 20 merge and connect with a blower 21 which is operated by an electric motor 22. Pivotally mounted at the point where the air conduit 20 forks to form the two branches, is a damper 23 which extends outside of the conduit at one end to provide an indicator 24. This damper is connected by a link 25 to one end of a bell crank lever 26, the latter being pivotally secured at 27 to the forward wall of the casing 9.

A V-shaped control arm 28 is pivotally mounted to the bell crank lever 26 at the point 29 and diverges outwardly with its spaced ends carrying tooth members 30. These tooth members are positioned oppositely, as shown in Fig. 5, and on either side of a rotary cam member 31 which is fixed to a shaft 32 connected by suitable gearing to the main shaft of the motor 22.

Secured to one of the arms of the V-shaped lever 28 is a rod 33 connecting said arm with a swingable lever 34. The lever 34 is bent upwardly and diagonally at 35 and at its upper end is again bent over and secured at 36 with one side of a reversing vane 37. As shown in Figs. 6 and 7, the reversing vane 37 is spaced from the bottom 14 of the casing C and extends over to the sloping end section 15 of said bottom 14. The edge of the vane 37 is turned downwardly, as shown at 38. The opposite arm of the lever 28 is connected by means of the bent rod 39 to a lever 40 which is similar to the lever 34 and connected to a vane 41 similar to the vane 37 and positioned at the opposite end of the casing C. The bent connecting rod 39 is adapted for sliding movement on a horizontally positioned supporting bar 42. A pair of counter-balancing springs 43 extend from points on the end walls of the cabinet 9 and are connected at their opposite ends to the levers 34 and 40, for a purpose to be described later.

The dampers 18 are connected by means of the damper rods 44 to a common point 45 on the bell crank lever 26, and are so connected that when one damper is open the other damper will be closed.

A magazine M having specially prepared pages is used with my display device. The magazine M consists of a plurality of sheets of paper or other sheet material bound together in any suitable manner after the manner of a pamphlet, book or the like, so that pages are formed which can be turned about the binding. In the particular form shown, the magazine M is divided into pages by a solid binding midway between the side edges of the pages but it will be readily appreciated that a loose leaf binding or any other suitable type of binding could be employed for the purpose. Perforations are formed in the various pages adjacent their free side edges. The top page 46 is shown with perforations 47 and the page 48 immediately therebeneath is provided with perforations 49 which are offset lengthwise of the page from the perforations or apertures in the uppermost page 46. It is important that the perforations be staggered or out of alinement in adjacent pages throughout the magazine M. The shape of the various perforations 27 and 48 is capable of wide variance and the size, number and location of these perforations are subject to considerable variation. The size, number, type and position of the particular perforations provided depend very largely upon the size and weight of the particular page and the rapidity of turning movement of pages that is desired, as will be brought out later.

Attention should be called to the fact that a double arched member 14a is secured to the bottom 14 of casing C to lie between the two vanes 37 and 41.

When it is desired to operate the device, a magazine M, the pages of which have been properly perforated as described, is placed within the casing C to rest as upon the right hand arch of the double arched member 14a and the right hand vane 41. Before insertion, the magazine is closed up with the binding located adjacent the center or valley of the double arched member 14a. To insert the magazine in the casing C, the glazed hinged door 11 is raised and after the magazine has been put in place the door is closed. The motor 22 driving fan 21 is then set in operation whereupon, assuming that the damper 24 is swung to the right as shown in Fig. 3, air will be delivered from the fan 21 through the left hand branch of the conduit 23 to be directed into casing C in a downward and inward direction from the left hand inlet 19. This air impinges against the left hand or swinging edge of the vane 37 which will at this time be exposed and, as best shown in Fig. 6, the air stream will cause the vane to be lifted upwardly from the full line position there shown to the dotted line position there shown, the vane being of light weight to permit of this movement when no part of the magazine M is resting thereon. The left hand spring 43 partially counterbalances the weight of the vane 37 and the lever 35 so as to readily permit of movement of the vane. The air entering the casing C from the left hand inlet 19 having struck the vane 37 will carry completely across the casing to exhaust therefrom through the screened opening 17 at the right end of the casing, the right hand damper 18 being always open when the damper 23 is swung to the right. Of course air exhausting from the casing C passes into the fan

chamber of the cabinet 9 and is recirculated by the fan 21.

As the left hand vane 37 lifts to the dotted position shown in Fig. 6 the action of the vane imparts movement to the lever 35 and rod 33 thereby swinging V-shaped control lever 28 to the left. This will cause the toothed member 30 on the right arm of lever 28 to be thrown to such a position that as the cam 31 rotates under influence of the motor 22, this toothed member is engaged by the notch in the cam with a resulting pull on the lever 28, bell crank 26 and the levers connected thereto. The bell crank 26 will then be swung to the left on its pivot 27 and the link 25 will swing the air flow damper 23 to the left to deflect the air from the fan into the right hand branch of air conduit 23. As the bell crank 26 swings to the left the left hand rod 44 will open the left hand damper 18 therefore closing left hand screened opening 17, while the right hand rod 44 will close the right hand damper 18 controlling the right hand screened opening 17. Air is then directed into the casing C from the right fork of the air conduit 23 through the right hand opening 19, and exhausts from the casing through the left hand screened opening 17. The air upon entering the casing C will be directed against the right edge portions of the pages of the magazine M and causing the pages to be turned to the left one at a time.

The movement of a page of the magazine M as it is turned is best shown in Fig. 7. In this particular view, the air stream is shown entering the casing C from the left inlet 19, it being assumed that damper 23 is swung to the right, left hand damper 18 is closed and right hand damper 18 is opened. The air admitted to the casing from the left opening 19 first strikes the upper left hand page of the magazine on the portion thereof wherein the perforations of that page are located. Most of the air is deflected from the top of the page across the casing C to exhaust from the right hand screened opening 17. Some of the air, however, due to its angle of projection from inlet 19, strikes edges of the page formed by the right sides of the perforations and exerts slight force on the uppermost page tending to push the page in the direction of air flow. This force is supplemented somewhat by the air stream striking almost invisible slight irregularities of the page. A portion of the air works into the perforations against the page immediately underlying the left top page tending to force down the portions of the underlying page immediately below the perforations of the uppermost page. The air working into the perforations of the uppermost page gradually spreads slightly between the two pages to impart a raising force against the bottom of the uppermost page and a downward holding force to the immediately underlying page. The curvature of the pages as viewed in full lines Fig. 7 at the area where the air first strikes the uppermost page assists in producing this raising force against the under side of the uppermost page adjacent the perforations. The uppermost page accordingly begins to slowly bulge upwardly near its left edge and, as this bulging movement continues, more air works through the perforations to exert pressure upwardly against more area of the under surface of the uppermost page and downwardly against more area of the upper surface of the next underlying page to produce an increasing bulge in the left hand portion of the uppermost page. The uppermost page slowly raises or bulges up-

wardly to take approximately the position shown in dotted lines Fig. 7 and designated by the numeral 53. Of course during this time period such printed or illustrative matter as may appear on the upper surface of the uppermost left hand page and of course the upper surface of the uppermost right hand page of the magazine can be viewed by an observer through the glass of the door 11.

10 The uppermost left hand page having slowly reached the position 53 will more rapidly rise to the position 51 shown in dotted lines Fig. 7. In the position 51 it will be noted that the edge of the uppermost page has slid considerably to the right of its original position. While air continues to work through the perforations of the uppermost page to exert upward force on the under side of the uppermost page and downward force on the immediately underlying page, air admitted through the inlet opening 19 and working against the bulged up portion of the uppermost page exerts rapidly increasing force tending to swing the page to the right, or, in other words, turn the page. Eventually, the face edge of the uppermost page flies up against the glass of the door 11 to approximately the position indicated by the dotted lines 52 and the page is then subjected to practically the full force of the air stream and is very rapidly swung to the right of the central binding to drop onto the right hand page which has been last previously turned. The air that would otherwise be trapped at the right of the magazine binding between the page being turned and the page which has just previously been turned may escape readily through the openings 15 to permit the page being turned to lie closely and smoothly against its predecessor in full contact therewith, thus leaving the right hand portion of the magazine in proper neat position to permit of the reverse turning of the pages during later operation of the device.

More apertures 16 are provided in the front side wall 13 of the casing C than in the rear side wall because the magazine rests in the casing at an inclined angle relative to the horizontal. Due to the weight of the magazine and its natural tendency to slide against the front side wall 13 of the casing C, there is greater friction between the bottom edges of the magazine pages and the front side wall 13 than between the top edges of the magazine pages and the rear side wall 13. By the provision of the greater number of apertures in the front side wall 13, more air can escape through these apertures than through the fewer number of apertures in the rear side wall 13, and the retarding frictional force on the bottom edges of the magazine pages is thus overcome.

Attention should be called to the fact that the apertures of the left page underlying the page being turned are not exposed to the direct action of the air stream until after the page being turned has bulged up to approximately the position 51, shown in Fig. 7. The staggering of apertures in successive pages prevents the air from working through the apertures of more than one page at a time until the free edge of the page being turned has been slid considerably to the right. When the position 51 is reached, the remainder of the turning moving of the page being turned is quite rapid so that the action of the air blast on the underlying page never has progressed far enough to raise the underlying page to an appreciable extent until the page being turned has been completely turned. Also the air working through the perforations of the page being

turned forces the underlying page down to ensure the complete turning of the overlying page before the underlying page can be turned. It is absolutely impossible for two pages of the magazine to be turned at the same time unless this should be intended. If, for any reason, it should be desired to turn two or more pages at a time this could, of course, be accomplished by producing similar aligned apertures in the particular pages that it was desired to turn together.

Of course, the pages will be successively turned one at a time in one direction until all the pages have been turned. When this has been accomplished, a reversal of the direction of the air stream is brought about automatically, as generally previously described, by the rising movement of the particular vane 33 or 41 exposed, whereupon the pages will be successively turned in the opposite direction. The apparatus thus continues in operation first turning the magazine pages in one direction and then in the opposite direction.

The interval of time that elapses between the turning of one page and the turning of a succeeding page of a magazine may be accurately controlled by varying the size, number, type or positions of the apertures of the different pages. The size, type, thickness and quality of the paper or other sheet material forming the magazine used has a great deal to do with the rapidity of turning movement of the pages. The weight of a particular page has much to do with the rapidity of turning movement of that particular page. The amount of ink on the different similar sized pages produces differences in the weight of pages formed from similar paper stock. Accordingly the apertures in an individual page are cut and provided in proper number, type and position to ensure the desired time period of exposure of that page to view through the glass door 11, before the page is turned. As the apertures are increased in size and in number and as the apertures are located more in line with the direction of the initial impingement of the air stream against the page, the more rapidly will the page be turned and conversely.

In the particular embodiment of the device shown, the force of the air acting against one of the vanes 37 or 41 is insufficient to permit such a vane as it rises to directly swing the damper 24 and the two dampers 18. Thence the motor acting through the cam 31 is employed for this purpose. It will, of course, be appreciated that other mechanical structure can be readily provided for accomplishing this same end.

I have described the construction of my apparatus as well as the method of perforating the pages of a magazine or similar article to be displayed. It may be possible, however, to similarly display a magazine with other apparatus. For that reason, I desire also to protect the various novel steps of the method of displaying magazines and the like which includes forming perforations adjacent the edges of the pages of the magazine in the manner described above, placing the magazine upon a support, directing a stream of air against perforated portions of the pages of one side of the magazine to cause the pages to turn over one at a time in one direction, and controlling the time interval between the turning of successive pages, and then directing a current of air against perforated portions of the pages at the other side of the magazine to cause the pages to turn over one at a time in opposite direction.

When the word "magazine" is used throughout the specification and claims, it is to be given a broad interpretation. It is intended to include books, pamphlets, bound advertising, display sheets, newspapers, etc.; in other words, any kind of arrangement of sheets which are bound or anchored together so that the individual pages can be turned.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts and in the various steps in the method disclosed, without departing from the scope of the invention.

What is claimed is:—

1. A display device for use with magazines and the like having perforated pages, comprising a supporting member for said magazine, and means for directing a stream of air against the perforated portions of the pages of the magazine, whereby the pages will be turned singly.

2. A display device for magazines and the like comprising a casing, a magazine supporting element in said casing, means for directing an air stream into said casing and against the pages of the magazine, and means permitting the exhaust of said air stream from said casing.

3. A display device for magazines and the like comprising a casing, a magazine supporting element in said casing, means for setting up a stream of air, means for directing said air stream into said casing at one end and against the pages of a magazine, means permitting the exhaust of air at the opposite end of said casing, and means for reversing the direction of said stream through said casing.

4. In combination with a magazine whose pages have means for entrapping moving air, a magazine support, and means for directing an air stream from above the magazine against said pages and said air entrapping means to turn said pages singly and successively in one direction.

5. In combination with a magazine whose pages have means for entrapping moving air, a magazine support, means for setting up an air stream, and means for directing said stream against said pages, said air entrapping means being adapted to divert and entrap a portion of said air stream between the uppermost page and the next succeeding page.

6. In combination with a magazine whose pages include means for entrapping moving air, means for creating diametrically flowing streams of air, and means for supporting said magazine, said air entrapping means being positioned in the line of flow of said streams.

7. The structure set forth in claim 6, and means positioned beneath the bottom or cover page of said magazine for periodically controlling said air streams.

8. The structure set forth in claim 6, and means positioned beneath the bottom or cover page of said magazine and periodically influenced by said air streams for effecting alternation of said streams.

9. A display device for magazines and the like comprising a casing having ends and sides, a supporting member for said magazine, a blower, a conduit from said blower adapted to direct air from one end of said casing to the edges of the pages of said magazine, and means at the opposite end of the casing for permitting the exhaust of air therefrom.

10. The structure set forth in claim 9, wherein the sides of said casing are provided with aux-

iliary air exhaust apertures to permit escape of air between a turned page and the page immediately below the same.

11. The structure set forth in claim 9, wherein the sides of the casing are provided with auxiliary air exhaust apertures adjacent the centers of said sides, said casing being at an angle to the horizontal and there being a greater number of said auxiliary openings in the lower of said sides.

12. The structure set forth in claim 9, wherein the sides of the casing are provided with auxiliary air exhaust apertures adjacent the centers of said sides, said casing being at an angle to the horizontal and there being a greater number of said auxiliary openings in the lower of said sides, and means for causing an overflow in an opposite direction through said casing.

13. A display device for magazines and the like comprising a casing, a magazine supporting element in said casing, a blower, a forked conduit leading from said blower to opposite ends of said casing, a damper in said conduit for alternately directing air into the forks of said conduit, and means operable by the flow of air for periodically changing the flow of air from one fork of said conduit to the other.

14. A magazine and the like for use with air blast magazine display devices comprising a group of bound pages having apertures therethrough adjacent their edges, said apertures being adapted to direct flowing currents of air between the pages of said magazine, and the apertures of one page being offset relative to the apertures in pages next adjacent thereto.

15. A magazine and the like for use with air blast magazine display devices, comprising a group of bound pages having apertures therethrough, the apertures of one page being offset from the apertures of the pages next adjacent thereto.

16. A method of displaying magazines and the like which includes providing the magazine with means for entrapping moving air, and directing a stream of air from above the pages against the pages and air entrapping means.

17. A method of displaying magazines and the like which includes perforating the pages of the magazine, directing a stream of air against perforated portions of successive uppermost pages of the magazine to turn the pages one at a time and varying the size and quantity of the perforations of individual pages to regulate the period of exposure of the individual uppermost pages before being turned.

18. A method of displaying magazines and the like which includes perforating the pages of the magazine in consecutive offset relation, the size and quantity of the openings being governed by the weight of the page, and directing an air stream against said pages to cause them to turn singly, the size and quantity of openings creating a predetermined time period between the turning of said pages.

19. A method of displaying magazines and the like which includes perforating the pages of the magazine, and directing a stream of air from above the pages against the perforated portions of said pages to cause them to turn.

20. A method of displaying magazines and the like which includes perforating the pages of the magazine with the perforations of one page in offset relation to perforations of next adjacent pages, and directing a stream of air against the perforations of the successive uppermost pages.

21. A display device for use with magazines and

the like having perforated pages, the perforations of which are staggered on successive pages and the perforations of which are located adjacent the side edges of the pages, said device comprising means for supporting a magazine in open condition and means for directing a continuous stream of air from above the pages against the side edge perforated portions of successive uppermost pages at one side of the magazine binding.

22. A display device for use with magazines and the like having perforated pages, the perforations of said pages being successively staggered, comprising a casing, means for supporting a magazine in open condition in said casing and means for continuously blowing air into said casing against the perforated portions of the uppermost pages of the section of the magazine at one side of the binding thereof until all the pages of that section have been turned and means permitting the exhaust of air from said casing.

23. The structure defined in claim 22, and means permitting ready release of entrapped air between each page after it has been turned and the page that has immediately previously been turned.

24. A display method which consists in perforating the pages of a magazine in alternate

staggered relation, supporting the magazine, holding down by air blast the pages underlying the uppermost page of the magazine at one side of the binding thereof while raising and turning by the same air blast the uppermost page at the same side of the binding, the air blast being directed from above the magazine against the perforated portions of the uppermost page at the said side of the binding.

25. A method of displaying magazines and the like which consists in perforating the pages of the magazine in consecutive offset relation and continuously blowing air against the perforated portions of uppermost pages at one side of the binding of the magazine until all pages at that side of the binding are turned.

26. The method defined in claim 25, and thereafter continuously blowing air against the perforated portion of the uppermost pages at the other side of the binding until all pages at the said other side of the binding are turned and thereafter repeating the blowing cycles.

27. The method defined in claim 25, wherein the air is blown from above the magazine against the perforations of the uppermost pages.

LE ROY H. IRELAND.