United States Patent [19]

Kroes

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[54] **PAGE TURNING DEVICE**

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[52] **U.S. Cl.** ..... **40/104 A**

[51] **Int. Cl.** **G09f 11/00**

[58] **Field of Search** ..... 40/104 R, 104 A, 35; 84/486, 500, 503

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Assistant Examiner—J. W. Wolff
Attorney, Agent, or Firm—Cushman, Darby and Cushman

[57] **ABSTRACT**

A page turning device for mechanically turning the pages of a book comprising holding means for holding the book, a suction mouth for lifting the page, which suction mouth is so positioned that the plane of its open end encloses an acute angle with the part of the page remote from the hinge line of the book so as to effect a better separation of the lifted page and the subjacent one and a transparant disc having a cutout, the trailing boundary edge of which is rotated between the lifted page and the book, takes the page along and turns it completely.

4 Claims, 8 Drawing Figures

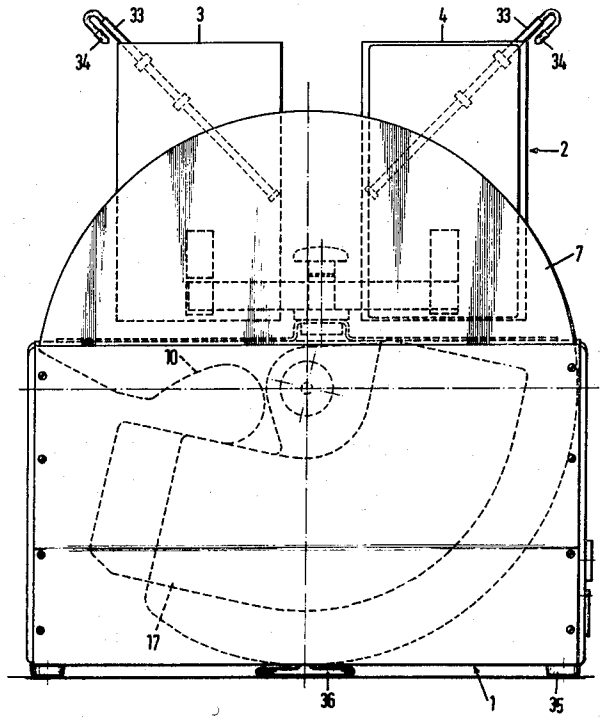


FIG. 1

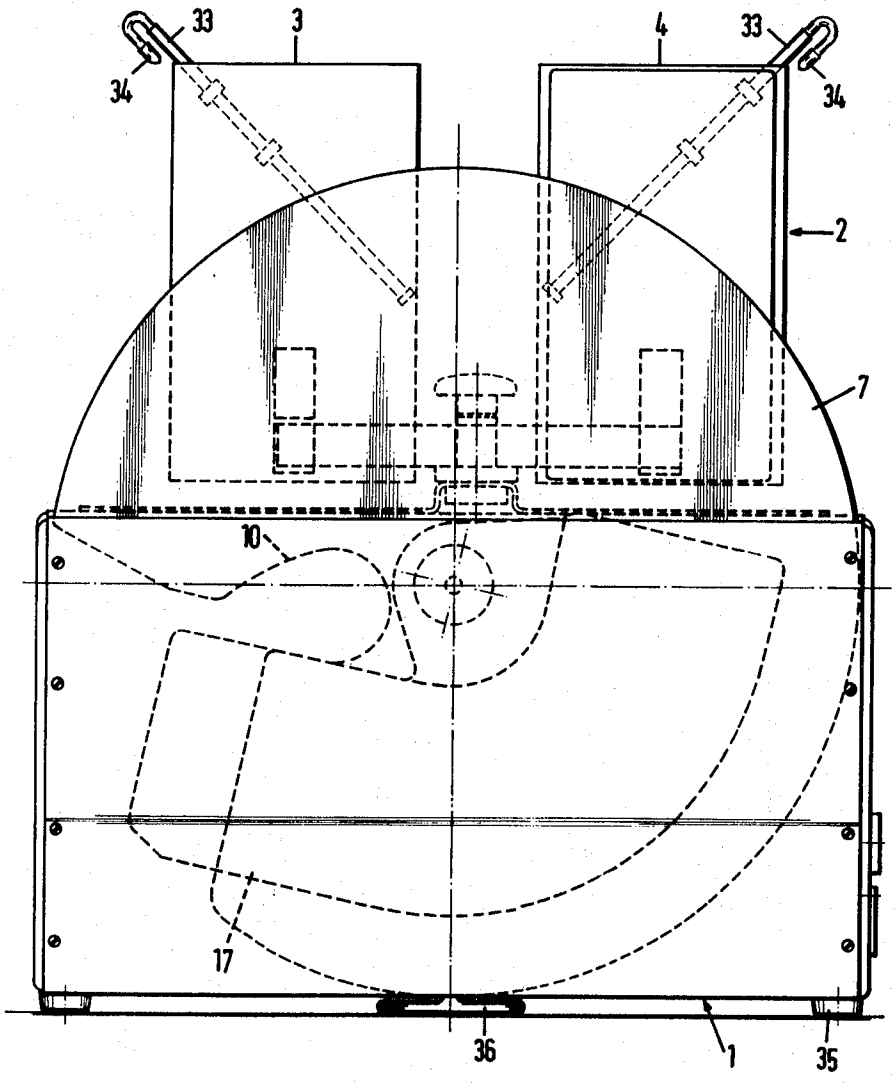


FIG. 2

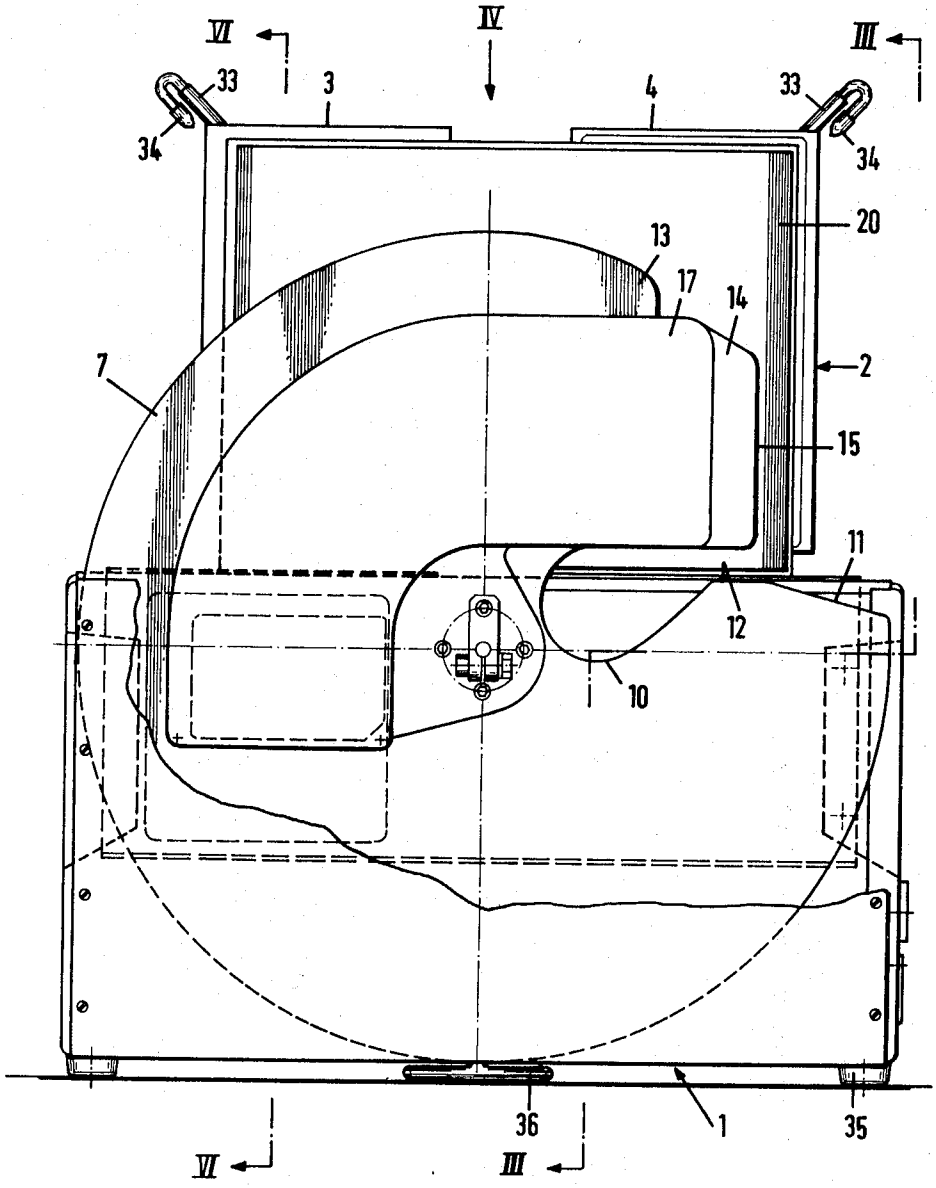
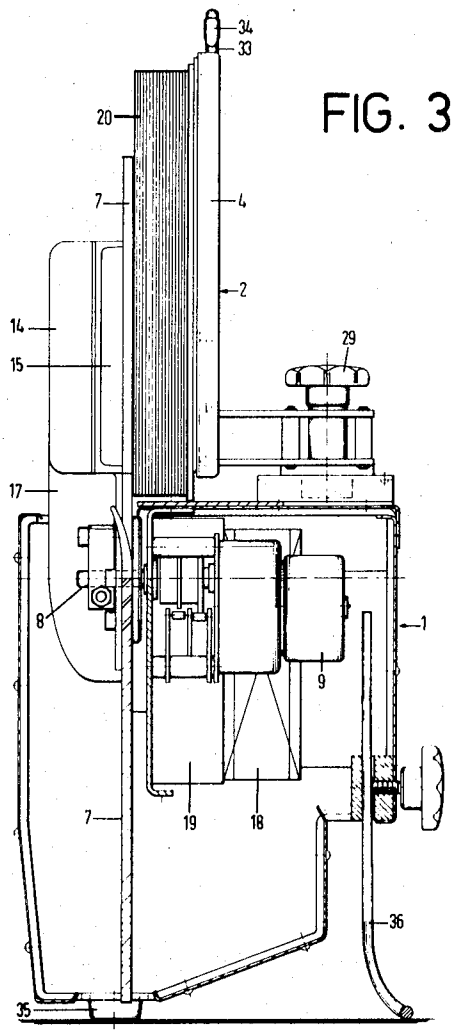


FIG. 3



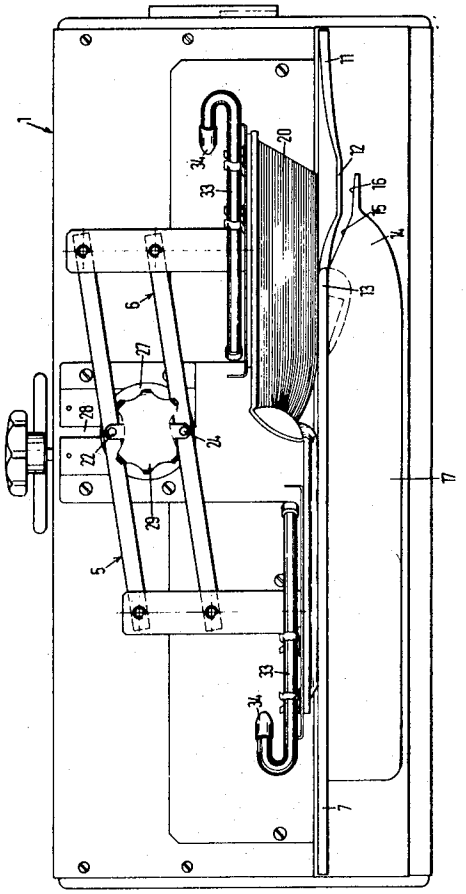


FIG. 4

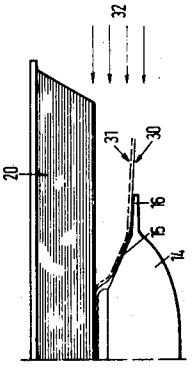


FIG. 5

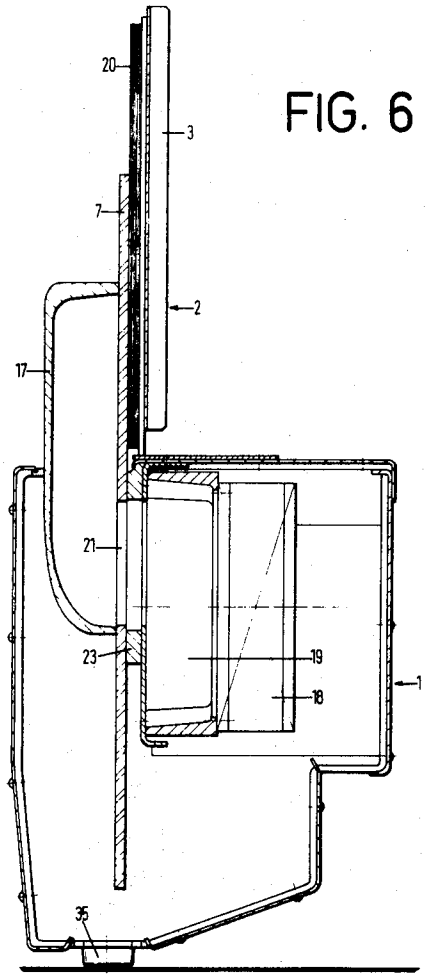


FIG. 6

FIG. 7

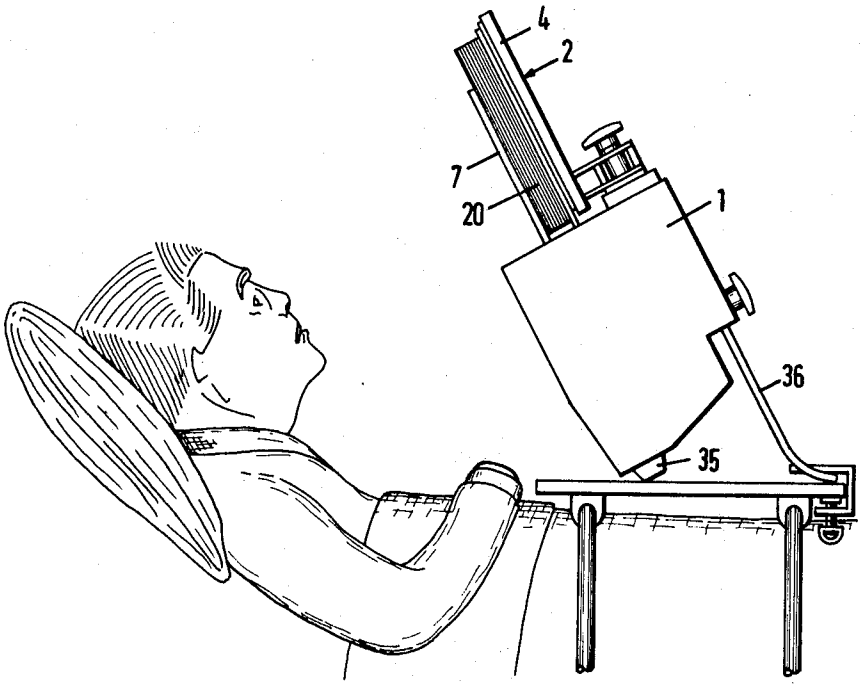
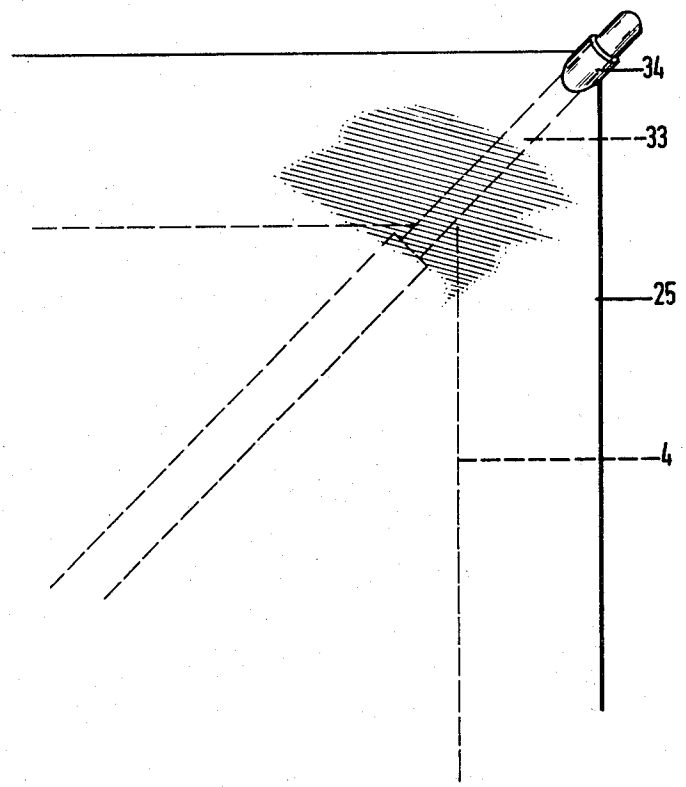


FIG.8



PAGE TURNING DEVICE

The invention relates to a page turning device for mechanically turning a page of a book or of any other collection of leaves fastened together along a hinge line, which device comprises holding means for holding the book, movable seizing means for seizing the page to be turned and for lifting it at least in part with respect to the subjacent page, a transparent plate overlying the surface of the open book and rotatably suspended from the device, which plate comprises a sector-shaped cut-out, the trailing boundary edge of which can move between the lifted page and the subjacent page during rotation, and take the lifted page along and turn it completely upon further rotation of the disc, as known from a publication of the "Stichting Technische Voorlichting ten behoeve van Lichamelijk Gehandicapten," published in the periodical "Instelling en Management" II, (1970) no. 8, page 3. This known page turning device has a seizing means a sharply pointed arm pushing up the page to be turned so that at least part thereof is lifted with respect to the subjacent page, after which the transparent plate, as described above, takes the page along and turns it completely. When a page is lifted in this way it often happens that not only the page in question, but the subjacent page is pushed up and lifted, so that the rotating disc will turn two pages instead of one page. Furthermore the sharp point damages the paper of the page, so that after repeated use the point will stick through the damaged part of the page.

The invention aims at avoiding these drawbacks by applying as seizing means a suction mouth having an intake, which, seen in the page-lifting position, is so positioned that the plane of its open end enclosed an acute angle with the part of the page remote from the hinge line. As a result of the inclined position of the suction mouth intake with respect to the page to be turned, the part of the page remote from the hinge line of the pages is lifted in an S-form. In case the subjacent page tends to follow the first page in adopting the S-form, these pages will inevitably slide relatively to each other so that the second page becomes detached from the first and subsequently falls back. This effect is improved, because the air that flows to the suction mouth also flows between the two pages, even if the outer edges of the first and the second page are or become spaced the slightest distance apart, so that a better separation of the two pages is effected. After the suction mouth has lifted the page, the transparent plate is rotated and moves with its, seen in the direction of rotation, trailing boundary edge under the lifted page and turns it completely upon further rotation. The transparent plate, which may be manufactured from polymethylmethacrylate, can be driven by a motor through reduction gearing. The way in which the device is electrically energized and its circuitry for instance, the way in which the movement of the plate is controlled, will not be further discussed, since this can be devised by the skilled designer and furthermore does not constitute part of the invention.

For sucking air through the suction mouth an axial flow fan having its own driving motor can be employed.

The invention will be further elucidated with reference to the drawings. One embodiment will be described, by way of example, with reference to the accompanying drawings. Further details will become apparent as the description proceeds.

In the drawings,

FIG. 1 is a front view of the page turning device according to the invention without a book, the transparent plate being in the reading position;

FIG. 2 is a front view of the page turning device with a book, the transparent disc and the suction mouth being in the page-lifting position;

FIG. 3 is a side view or cross-section on the line III—III of FIG. 2, a book being placed in the device;

FIG. 4 is a top view according to arrow IV in FIG. 2;

FIG. 5 shows a schematic picture of the suction mouth and a page lifted by this suction mouth;

FIG. 6 illustrates a cross-section on the line VI—VI of FIG. 2;

FIG. 7 is a schematic side view of a special service position of the page turning apparatus;

FIG. 8 is a detail of an additional support.

FIG. 1 shows a frame 1 with an upper structure 2 carrying two support plates 3 and 4 against which the back of a book 20 (see FIGS. 2, 3) can rest. With its front the book is pressed against the transparent disc 7 suspended from a rotatable shaft 8 in the frame 1. The support plates 3 and 4 are movably suspended from a common parallel rod arrangement 5, 6 which is connected through fixed pivots 22 and 24 to a slide 27, which can be moved in a slot 28 towards and away from the book 20. The slide 27 can be adjusted and fixed in the slot 28 with the aid of an adjusting knob 29. Once the position of the slide 27 has been adapted to the thickness of the book or magazine, the symmetrical rocking movement of the parallel rod arrangement 5, 6 ensures that every time after a page has been turned one support plate is advanced a distance equal to the thickness of one page and the other support plate is moved back a distance equal to thickness of a page with respect to the transparent disc 7.

The disc 7 is manufactured from a transparent material, for instance, polymethylmethacrylate, so that the text of a book 20 arranged behind it can easily be read.

The disc 7 comprises a recess 10, the boundary edge 11 of which comprises a projection 12, which projection is, in addition, bent upwardly with respect to the plane of the drawing in FIG. 2 (see also FIG. 4). The function of the projecting and bent portion 11, 12 will be further explained in detail.

Near the other boundary edge 13 of recess 10 a suction mouth 14 is provided connected with the disc 7, the plane of the intake 15 of said suction mouth (FIGS. 3, 4) enclosing an acute angle with the plane of the pages of the book. Provided at the edge of the intake 15 is a guide flange 16 bent slightly towards the plane of the pages of the book.

The suction mouth 14 is connected to a suction pump 18 (FIG. 6) with a suction pipe 19 by means of a tubular pipe 17, one wall of which is formed by the disc 7 itself. The suction pipe 19 and the pipe 17 communicate in the position shown in FIGS. 2, 3 and 6, and that through the slot 21 in the disc 7 passing along the opening 23 of the pipe 17.

The frame 1 has two feet 35, for instance, resilient plastic caps and a height-adjustable leg 36 arranged at the back of the device, so that it can be fixed in a reading position suitable to the patient.

The page turning device according to the invention operates as follows: When the user wishes to have a page turned, he operates the motor **9** with a switch (not shown), which has to be adapted to the physical capabilities of the handicapped or rehabilitating patient, so that the disc **7,** from the position as shown in FIG. **1,** rotates to the position as shown in FIG. **2** in which the disc 7 is stopped automatically by a limit cam arranged on the disc shaft to actuate during an angle of disc rotation a switch thereby breaking the circuit of motor **9** and closing the circuit of the axial flow fan. At this time air is being sucked through intake **15** so that the page **30** is lifted (FIGS. **4** and **5**) against the intake **15.** Since the plane of the intake **15** is inclined with respect to the plane of the page, the lifted page assumes an S-form (FIG. **5**), so that the second page **31** which may have followed the first page **30** is separated from said page **30.** Furthermore the air flowing to the suction mouth **14,** approximately in the direction of the arrows **32,** which is also guided by the guide plate **16,** is directed to the front edges of the pages **30** and **31.** In this way an additional force is exerted on the pages, which separates them, so that the page **31** falls back. The user, who sees at that moment that the page to be turned has assumed the correct position, operates the hand switch once again thereby closing a parallel circuit of motor **9,** upon which the disc **7** is rotated by the motor and the bent lip **12** moves between the non-lifted pages and the lifted page 30, after which page 30 is taken along by the rotating disc **7** and turned to the side of the book resting on support plate **3.** The disc **7** rotates until the position shown in FIG. **1** is reached after which the motor is automatically stopped.

The dis 7 preferably has such a diameter that it can also support the book opposite its center of gravity, so that the device can also be arranged somewhat inclined with the open book facing downward without the book leaving its position. In this way a half-lying patient (see FIG. 7) can also read the text.

The device according to the invention lends intself particularly well for holding books of widely varying sizes, both as regards length, width and thickness.

It may be necessary, however, when large, relatively thin magazines are placed in the device, to give an additional support to the upper corners of the pages. According to the invention, a telescopic rod **33** is provided at the back of the book supporting means, for that purpose which rod can be arranged (FIG. **8**) with its hooked end **34** around the corner areas of a thin magazine **25.** It has been found that when a page is turned, it sledes freely from the hook **34,** while on the other hand the page is properly held in position by rod **33** during the reading period. This also holds good for use in an inclined position, as described above.

The page turning device according to the invention is not limited to the embodiment described. It can also be constructed in such a way that the pages are turned from left to right instead of from right to left. Furthermore it is possible to construct a device with two suction mouths **15** and an adapted disc **7,** so that the device can turn the pages both from right to left and from left to right. Instead of the rocker construction **5, 6, 22, 24,** pads having a wide range of resiliency can be applied.

I claim:

1. A book page turning device comprising: holding means for holding an open book in a position such that the open pages lie generally in a given plane; a transparent disc positioned such that a portion of one of its surfaces abuts the open pages of an open book held by the holding means; means for rotating the disc about its axis in a direction corresponding to the direction in which it is desired to turn a page, said disc having a cut-out exhibiting a leading boundary edge and a trailing boundary edge with respect to the direction of rotation; a suction pipe rotatable with the disc and having a mouth opening located near said boundary edge; means for applying suction to the suction pipe so that air is drawn into the mouth opening, said mouth opening being inclined with respect to the plane of the open pages of a book held by the holding means and facing in a direction opposite the direction of rotation of the disc so that upon partial rotation of the disc and the suction tube over an open page the latter is lifted and contoured into engagement with the inclined mouth opening and is raised away from the underlying pages thereby permitting the trailing edge of the disc to move between the lifted page and the subjacent page and turn the lifted page upon further rotation of the disc.

2. A page turning device as in claim **1** wherein the suction pipe is formed between a portion of the surface of the disc and a wall which engages that surface.

3. A page turning device as in claim **1** wherein the holding means and the disc are so positioned that the center of gravity of a book held by the holding means lies between the disc and the holding means.

4. A page turning device as in claim **1** wherein the suction pipe includes a guide plate which is generally parallel to the disc and which extends in a generally radial direction with respect to the axis of rotation of the disc from the edge of the mouth opening which is remote from the page being turned.

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