June 30, 1936. M. ROSENTHAL ET AL 2,045,804

MECHANISM FOR SELECTING PAGES AND TURNING LEAVES OF A BOOK

Filed Oct. 4, 1935 2 Sheets-Sheet 1

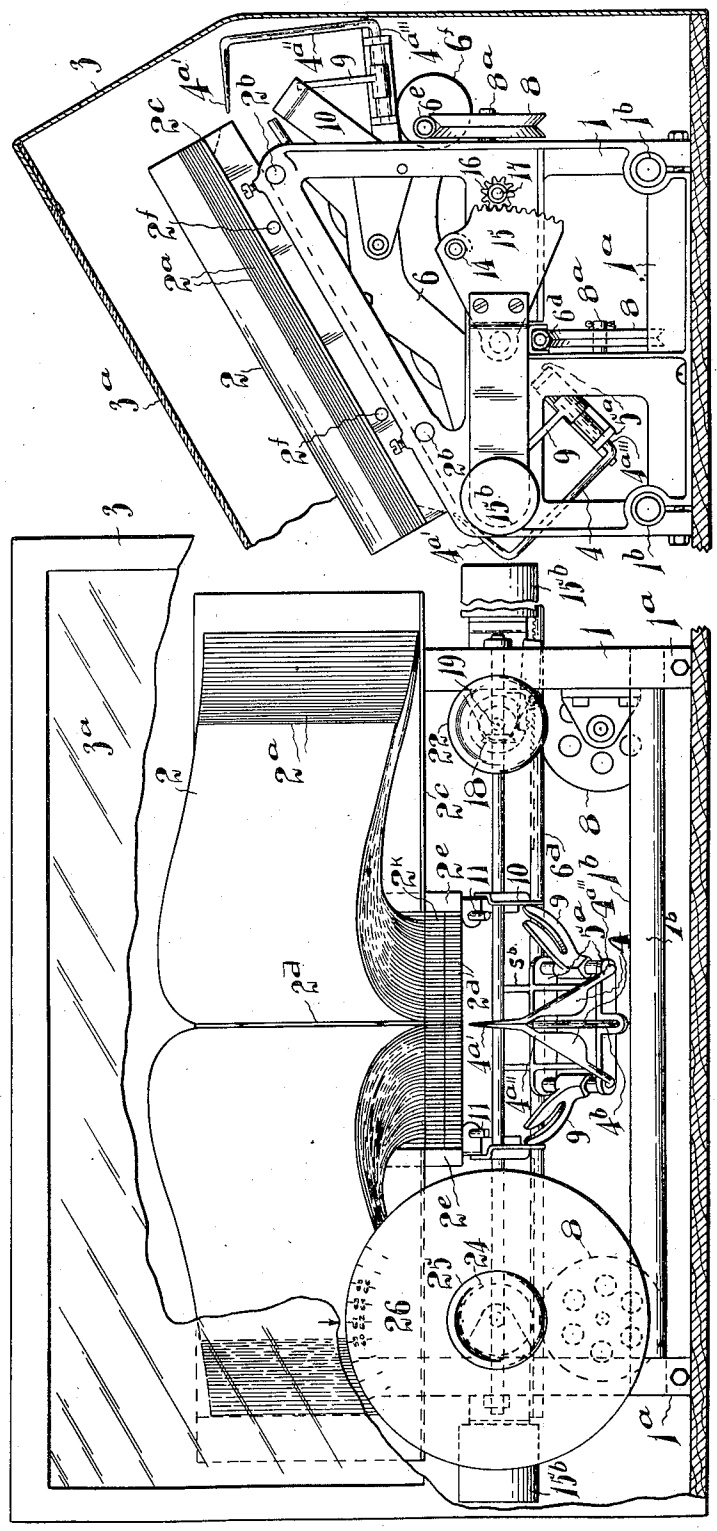


Fig. 2.

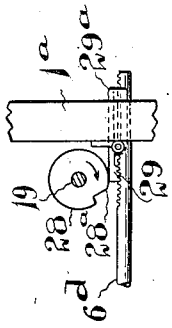


Fig. 6.

Fig. 1.

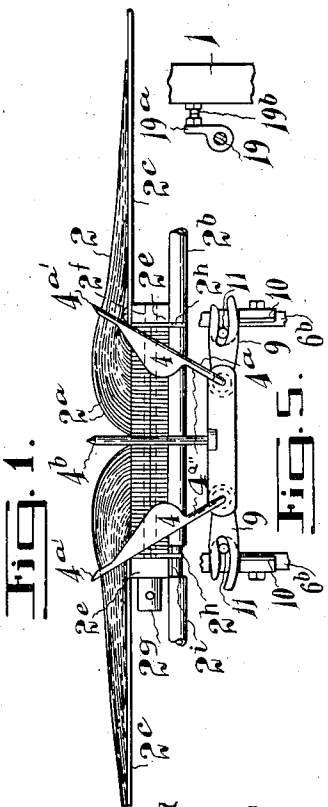


Fig. 5.

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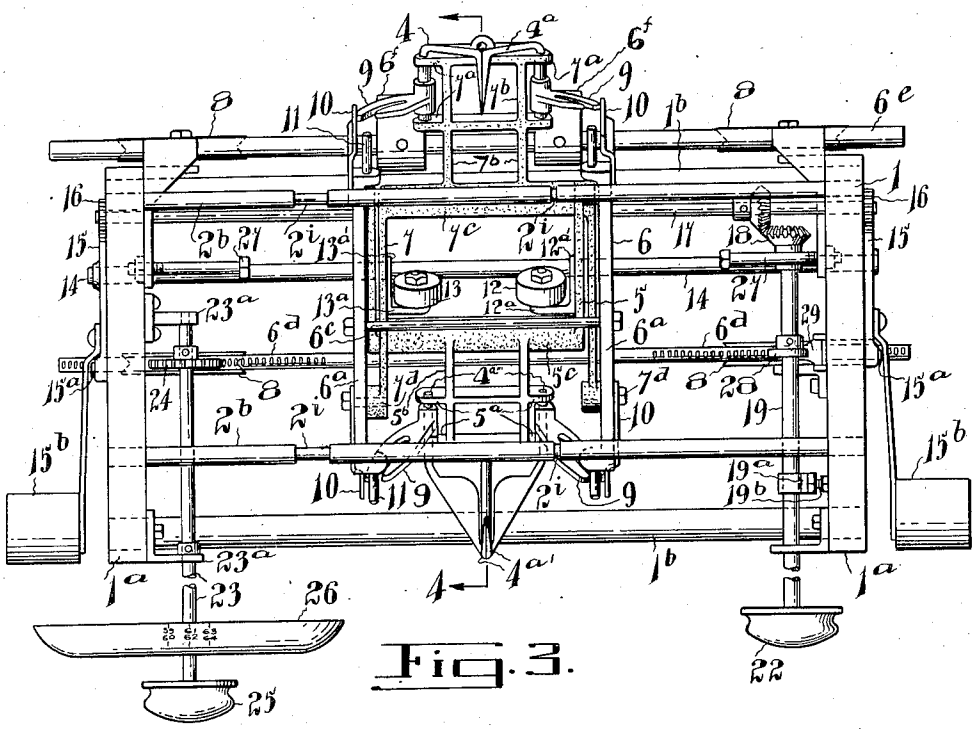


Fig. 3.

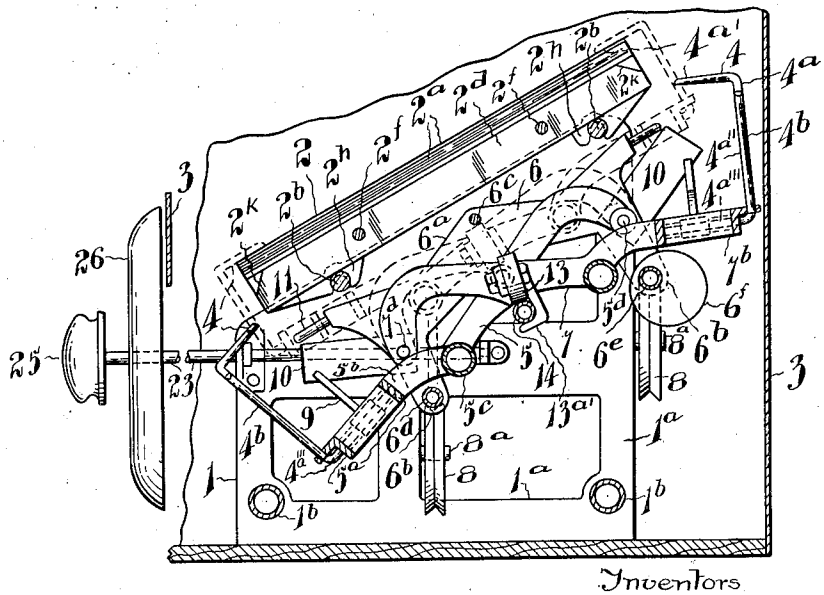


Fig. 4.

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UNITED STATES PATENT OFFICE

2,045,804

MECHANISM FOR SELECTING PAGES AND TURNING LEAVES OF A BOOK

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Application October 4, 1935, Serial No. 43,638

17 Claims. (Cl. 40—104)

This invention relates to mechanism for selecting pages and turning leaves so that any desired page of a book may be displayed, and the object of our invention is to provide mechanism of this character whereby a book may be used and the contents examined without being handled by the users thereof.

We attain our object by providing spreading means which are normally positioned beneath and spaced from the ends of the bound or otherwise secured edges of the leaves of the book. The leaves are spaced apart a sufficient distance to enable the spreading means to enter between any two adjacent leaves. The spreading means are mounted on a carriage which is movable relative to the book to position the spreading means for passage between any two adjacent leaves of the book. Means is provided to actuate the spreading means, after it has been properly positioned, to cause it to move upwardly and inwardly relative to the book and carriage and thus pass between two adjacent leaves. During this upward and inward movement, the spreading means is spread apart to engage the leaf it is desired to turn over and swing it upwardly and laterally away from the adjacent leaf to a substantially flat position, and to finally engage the upper exposed surfaces of the adjacent leaves and retain them in their opened flattened condition so that the desired page may be easily read. The book and mechanism will be mounted in a casing having at least one transparent portion so that the reading matter on the pages of the book may be read. The mechanism for shifting the carriage includes a knob, and the means for actuating the spreading means also includes a knob, each of these knobs being positioned outside of the casing for ready manipulation by the person using the book. To prevent the leaves from being damaged, means are provided for ensuring the shifting means being properly positioned before the actuating means can be operated, and for preventing the shifting means from being operated until the spreading means is in its normal inoperative position.

The constructions are hereinafter more fully described and are illustrated in the accompanying drawings in which

Fig. 1 is a front elevation of an apparatus, the casing being broken away;

Fig. 2 an end elevation of our mechanism, part of the casing being shown in cross-section;

Fig. 3 a plan view of the mechanism with book removed;

Fig. 4 a cross-section on the line 4—4 in Fig. 3, the spreader parts being shown in their normal inoperative position in full lines and in their raised operative position in dotted lines;

Fig. 5 a front elevation of the spreading means in its operative position taken at right angles to the book; and

Fig. 6 a detail of the dog for locking the shifting means from movement while the spreading means are being actuated.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

1 is a frame which is suitably shaped to support the hereinafter described parts. Preferably the frame comprises two end members 1^a which are connected together by two lower tie rods 1^b and two upper tie rods 2^b, the latter forming a support for a book 2. The book is removably secured to the rods 2^b and comprises a stiff cover 2^c formed in two parts which are spread apart to support the leaves 2^a of the open book. The leaves 2^a are removable or loose leaves, having their inner ends spaced apart by metal spacers 2^d, and compressed between two bars 2^e by means of two bolts 2^f and nuts 2^g (see Fig. 5).

Clamped between the bars 2^e and a spacing member 2^b are supports or brackets 2^h which extend below the book and have slots in their lower ends adapted to fit over reduced portions 2^i on the tie rods 2^b to support the book. One of the reduced portions 2^i is widened to provide for the expansion or contraction of the book by adding or removing pages when desired. The rear tie rod 2^b is at a higher level than the forward tie rod so the book is supported at an angle extending upwardly from front to rear. The covers 2^c are screwed to the bars 2^e.

Each page of the book will contain certain information such as the dates of birth and death of any person who has given or left money to a church or institution in which the book is kept, the amount given or left and other memoranda. The book and mechanism for opening it are enclosed in a casing 3 which has a transparent panel 3^a so that the exposed pages may be read, but the book cannot be touched by hand. In the casing will be mounted an index of the contents of the book referring to the pages thereof. The means for moving the page selecting mechanism will be calibrated to correspond with the pages of the book. From this it is obvious that anyone by operating the hereinafter described mechanism to open the book at a selected page will find the recorded information just as if the

desired page of the book were located by turning the pages by hand.

The inner edges of the leaves 2^a are slightly spaced from one another by the spacers 2^d so that spreaders 4 may pass between any adjacent leaves. Preferably two spreaders 4 are employed to pass simultaneously between the leaves at the upper and lower inner corners thereof, and each spreader comprises a pair of substantially U-shaped fingers 4^a. Each finger comprises a leaf engaging end 4^{al} which is inwardly directed towards the book, a substantially upright portion 4^{all}, and an inwardly directed shaft 4^{alll}. The shafts 4^{alll} of the lower spreader are rotatably mounted on spaced lugs 5^a on an extension 5^b from the cross bar 5^c of a U-shaped lifting arm 5 which is pivoted to the frame of a carriage 6 by pivot pins 5^d. The shafts 4^{alll} of the upper spreader 4 are rotatably mounted on spaced lugs 7^a on an extension 7^b from the cross bar 7^c of a U-shaped lifting arm 7 which is pivoted to the frame of the carriage 6 by pivot pins 7^d. A positioning pin 4^b extends upwardly substantially at right angles from each of the extensions 5^b and 7^b to a point between the upright portions 4^{all} of the fingers 4^a to position them relatively to one another. The purpose of this pin is to hold the fingers 4^a in position to accurately enter the space between the two pages. The ends 4^a of each pair of fingers are shaped to form a tapered point when they come together to facilitate their entrance between adjacent leaves.

The carriage 6 comprises two end members 6^a having depending legs 6^b. Secured to and extending between the end members 6^a is a tie rod 6^c and secured to and extending between the ends of the legs 6^b and beyond them are tubular bars 6^d and 6^e which are supported at each end by circumferentially grooved rollers 8 which are rotatably mounted on axes 8^a on the end members 1^a of the frame 1, whereby the carriage 6 may move longitudinally of the frame as hereinafter described. The carriage is weighted by weights 6^f to prevent the bars 6^d and 6^e from coming off the rollers 8.

The arms 5 and 7, as will be seen from the drawings (particularly Fig. 4) are pivoted to the legs 6^b of the carriage 6 at points adjacent the rear and front of the carriage respectively, and the legs of the said U-shaped arms 5 and 7 overlap. (See Fig. 3.)

Normally the spreaders 4 are positioned below the plane of the opened book and slightly spaced therefrom, as shown in full lines in Fig. 4, so that by swinging the arms 5 and 7 simultaneously upward on their respective pivots the fingers 4^a will be swung in an arc upwardly and toward one another, until their ends 4^{al} enter between two adjacent leaves at the edge thereof near the binding and above the spacer 2^d. The fingers 4^a of each spreader 4 are held in contact at their ends 4^{al} until they have entered between the leaves by forks 9 mounted on the parts 4^{alll} of the fingers 4^a. The forks 9 during the first part of the upward swinging movement of the spreader bear against flat resilient plates 10 secured to the ends of the carriage 6. After the ends 4^{al} have entered between the leaves, the forks engage studs 11 mounted on the carriage 6. The studs 11 enter between the prongs of the forks which are so shaped to cause the fingers 4^a to swing apart. Any leaves overlying the ends 4^{al} are thus turned over and at the limit of the movement of the fingers 4^a the ends rest on the opened leaves to hold them in their opened flattened-out position. Preferably the ends of the spacers 2^d are chamfered at 2^k to enable the fingers 4^a to pass between the leaves as closely as possible to the spacers. Each of the arms 5 and 7 is provided with a roller or other antifriction device 12 and 13 respectively. The roller 12 is mounted on a bracket 12^a on the inner leg of the arm 5 and the roller 13 is mounted on a bracket 13^a on the inner leg of the arm 7. The axes of the rollers 12 and 13 are substantially transverse to the frame 1 and the rollers are radially aligned in the same plane so they will rest and run on a rod 14 which extends longitudinally of the frame 1 and is carried by segmental gears 15 journalled on the opposite ends of the frame 1.

The spreader arms 5 and 7 are thus supported by the rollers 12 and 13 which run on the rod 14 if the carriage 6 be shifted. By rotating the segmental gears 15 in the manner hereinafter described the spreader arms 5 and 7 (and the spreaders 4) are raised. Hooks 12^{al} and 13^{al} secured to the brackets 12^a and 13^a by engagement with the underside of the rod 14 ensure the return of the arms 5 and 7 when the rod is lowered.

The segmental gears 15 are pivoted on the ends 1^a of the frame 1 by pivot pins 15^a. Pinions 16 mesh with the gears 15 and are secured to the opposite ends of a rotatable shaft 17 which extends the length of the frame and is journalled at each end in the frame ends 1^a.

The shaft 17 is rotated by a control shaft 19 extending transversely of the frame 1 and connected by bevel gearing 18 with the shaft 17. The control shaft 19 extends through the casing 3 and is provided with a knob 22 at its free end. By turning this knob in one direction of rotation, the pinions 16 are rotated to cause the segmental gears to raise the rod 14 and thus the spreaders 4. The rod 14 and thus the spreaders 4 are lowered by turning the knob in the opposite direction of rotation.

Counter weights 15^b are provided on the segmental gears 15 for counterbalancing the weight of the spreader arms and spreaders so that the spreaders may be actuated with a minimum effort and will not fall by gravity to their normal inoperative position. A projection 19^a secured to the shaft 19 is adapted to engage an adjustable stop 19^b to limit the rotation of the shaft 19 in one direction of rotation and hence the operative movement of the spreaders 4.

The means for shifting the carriage 6 is as follows. The bar 6^d which is one of the supporting rods for the carriage 6 is formed as a rack having teeth at opposite ends thereof. A transverse shaft 23 is journalled in brackets 23^a on the end of the frame 1 opposite to the spreader raising shaft 19. A pinion 24 secured to the shaft 23 meshes with the teeth at one end of the rack bar 6^d. The outer end of the shaft 23 also projects beyond the casing 3 and is provided with a knob 25 which may be turned to rotate the said shaft 23, and the pinion 24 to cause the bar 6^d (and the carriage 6) to move lengthwise of the frame on the rollers 8. A calibrated dial 26 is also secured to the shaft 23. The calibrations correspond to the pages of the book and by rotating the shaft 23 to bring the number of the selected page on the dial to a predetermined position (e. g. in register with a pointer on the cabinet) the carriage is moved by the pinion 24 and rack bar 6^b to bring the leaf spreading means 4 to the proper position for opening the book at the selected page.

Adjustable stops 27 are provided for engagement with the carriage 6 for limiting the longitudinal travel of the said carriage in accordance to the number of pages in the book.

To position the carriage and to prevent movement of the carriage while the spreading mechanism is being operated, a cam 28 is secured to the shaft 19 above the bar 6^d which at this point is transversely grooved to form a rack. Pivoted to the frame and extending between the cam 28 and the bar 6^d is a dog or pawl 29 transversely grooved or toothed on its under side. A heavy tail portion 29^a normally holds the pawl 29 out of engagement with the rack. However, as soon as the shaft 19 is turned to operate the spreading device the cam 28 engages the pawl 29 and forces it into engagement with the rack on the rod 6^d. If the spreading means 4 is not accurately in position between two leaves the teeth on the pawl will not mesh with the teeth on the rack bar 6^d and the shaft 19 will be prevented from turning until the carriage is shifted to position the spreading means properly. When the pawl does mesh with the rack then the shaft 19 may be rotated to raise the spreading means 4, but the bar 6^d is held from movement so that the carriage is locked. This prevents accidental movement of the carriage and possible tearing of the leaves of the book while they are being turned.

The cam 28 is provided with a shoulder 28^a which engages the dog to limit the rotary return movement of the shaft 19 when the shaft is turned to return the spreaders to their inoperative position.

The leaves of the book may be made of paper, parchment or other suitable material. The friction between the surfaces of all parts movable relative to one another is reduced to a minimum without the use of lubricants by making such contacting surfaces of different metals such as brass and steel or steel and iron. Preferably such brass and steel parts are chrome plated.

To open the book at the desired page the operator first turns the knob 22 as far as it will go in an anti-clockwise direction to bring the spreaders 4 into their inoperative positions fully out of engagement with the leaves of the book. The dial 26 is then turned until the number of the page on the dial is in register with a pointer on the cabinet. Care is taken to have the calibration on the dial accurately in register with the pointer. The turning of the dial has shifted the carriage and spreading means to the proper position for opening the book at the desired page. The knob 22 is then turned in a clockwise direction as far as it will go. This operates the spreaders 4 and causes the book to open at the desired page.

What we claim as our invention is:

1. Apparatus of the class described comprising means for spreading apart the leaves of a book; means for shifting the spreading means to position the latter for spreading apart any desired leaves; and means for actuating the spreading means to cause the latter to engage the predetermined leaves and spread them apart.

2. Apparatus of the class described comprising means for spreading apart the leaves of a book; means for shifting the spreading means to position the latter for spreading apart any desired leaves; means for actuating the spreading means to cause the latter to engage the predetermined leaves and spread them apart; and means for preventing the operation of the actuating means until the spreading means is properly positioned for spreading apart any of the leaves.

3. Apparatus of the class described comprising means for spreading apart the leaves of a book; means for shifting the spreading means to position the latter for spreading apart any desired leaves; means for actuating the spreading means to cause the latter to engage the predetermined leaves and spread them apart; and means operable by the actuating means for releasably locking the shifting means during the actuation of the spreading means.

4. Apparatus of the class described comprising means for spreading apart the leaves of a book; means for shifting the spreading means to position the latter for spreading apart any desired leaves; means for actuating the spreading means to cause the latter to engage the predetermined leaves and spread them apart; means for preventing actuation of the spreading means when not properly positioned, and for locking the shifting means during the actuation of the spreading means, including, a rack on the shifting means and a pawl adapted to mesh with the teeth of the rack when the spreading means is properly positioned for spreading apart any of the leaves; and means operable by the actuating means for causing the pawl to engage the teeth on the rack during the actuation of the spreading means.

5. In apparatus of the class described, means for spreading apart the leaves of a book; a carriage for carrying the spreading means; means for shifting the carriage to position the spreading means for spreading apart any desired leaves; means for raising and lowering the spreading means relative to the carriage to cause the spreading means to pass between the predetermined leaves; and means for expanding the spreading means during the raising movement thereof to cause the predetermined leaves to be spread apart.

6. In apparatus of the class described, means for spreading apart the leaves of a book comprising a pair of fingers having their ends normally adjacent one another; a support on which the fingers are pivotally mounted to swing apart; means for raising the support; and cam means for spreading the fingers apart as the support is raised.

7. In apparatus of the class described, means for spreading apart the leaves of a book comprising a pair of fingers having their ends normally adjacent one another; a support on which the fingers are pivotally mounted to swing apart; means for raising the support; a forked member on each finger; and pins engageable by the forked members for spreading the fingers apart as the support is raised.

8. In apparatus of the class described, a carriage, and means carried by the carriage for spreading apart the leaves of a book, comprising a pair of fingers having their ends normally adjacent one another, an arm swingably mounted on the carriage, said fingers being pivotally mounted at the free end of said arm and adapted to swing apart, means for swinging said arm upwardly, guide means carried by the carriage, and cams on the fingers adapted to engage the guide means to spread the fingers apart as the arm is raised.

9. In apparatus of the class described, a carriage, an arm having one end pivoted on the carriage; fingers pivotally mounted adjacent the free end of said arm; means for swinging said

arm upwardly; and means for spreading the said fingers apart when the arm is swung upwardly.

10. In apparatus of the class described, a frame; a carriage mounted on said frame and movable longitudinally thereof; means for shifting said carriage; an arm swingably mounted on the carriage; segmental gears pivoted at opposite ends of the frame; a rod carried by said segmental gears and extending longitudinally of the frame beneath said arm; pinions engaging said segmental gears; means for rotating said pinions to move the segmental gears to raise the rod, whereby the arm is raised; and leaf spreading means mounted on said arm.

11. In apparatus of the class described, a frame; carriage bars on which the frame is mounted; bearings on the frame on which the bars are mounted for longitudinal movement; a rack on one of said bars; a pinion pivotally mounted on the frame for engagement with the rack; and a shaft on the pinion rotatably mounted on the frame for rotating the pinion to move the carriage; and leaf spreading means on said carriage.

12. In apparatus of the class described, a frame; a book supported by said frame; a carriage mounted on the frame below said book and movable longitudinally of the frame; means for shifting said carriage; a pair of substantially U-shaped arms the free end of the legs of which are pivoted to the carriage at opposite sides thereof, the legs overlapping; a rod extending longitudinally of the frame beneath the said arms; means for raising said rod to raise said arms; and means on said arms for spreading the pages of the book.

13. In a device of the kind described, a frame; a book having spaced apart leaves mounted on the frame; a carriage mounted on the frame and movable longitudinally thereof; a rotatable shaft geared to the carriage for moving the same longitudinally; fingers mounted on the carriage for spreading the pages of the book; a dial on the said rotatable shaft, said dial bearing calibrations corresponding to pages in the book, whereby when the shaft is rotated to bring the calibration corresponding to a selected page opposite a fixed point the carriage will be moved to bring the page spreading fingers to a position between the selected page and the leaf adjacent thereto; and means for raising and expanding said fingers to open the book at the desired page.

14. In apparatus of the class described, means for spreading apart the leaves of a book, comprising a pair of fingers having their ends normally adjacent one another; a support on which the fingers are mounted to move apart; means for moving the fingers between the leaves of the book; and means for moving the fingers apart to engage the leaves and spread them apart.

15. In apparatus of the class described, means for spreading apart the leaves of a book, comprising a pair of fingers having their ends normally adjacent one another, a support on which the fingers are mounted to move apart; means for raising the support; and means for moving the fingers apart.

16. In apparatus of the class described, a carriage, and means carried by the carriage for spreading apart the leaves of a book, comprising a pair of fingers having their ends normally adjacent one another, an arm swingably mounted on the carriage, said fingers being mounted at the free end of said arm and adapted to move apart, guide means carried by the carriage, and cams on the fingers adapted to engage the guide means to spread the fingers apart as the arm is raised.

17. In apparatus of the class described, means for spreading apart the leaves of a book, comprising a pair of fingers having their ends normally adjacent one another; a support on which the fingers are mounted to move apart; a positioning pin on the support engageable by the fingers when in their normal position to position their ends relative to one another; means for moving the fingers between the leaves of the book; and means for moving the fingers apart to engage the leaves and spread them apart.

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