AUTOMATIC BOOK LEAF TURNING MACHINE

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This invention relates to automatic machines for turning the leaves of books, such as the advertising or display books sometimes placed in shop windows, which automatically turn the leaves of the book one by one, slowly, in the well-known manner.

Generally stated, the object of the invention is to provide a novel construction and arrangement whereby the leaves of the book are turned, one by one, successively in one direction, and whereby all of the leaves are then simultaneously turned back in the opposite direction, after all of the leaves have been turned successively in the first direction, so that the successive turning of the leaves always commences at the front of the book.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and the desirability of an automatic book leaf turning mechanism or machine of this particular character.

To the foregoing and other useful ends, the invention consists in matters hereinafter set forth and claimed in the accompanying drawings in which—

Fig. 1 is a side elevation of an automatic book leaf turning machine embodying the principles of the invention.

Fig. 2 is a front elevation of the machine shown in Fig. 1, looking in the direction indicated by the arrow at the upper right hand corner of the drawing.

Fig. 3 is a horizontal transverse section on line 3—3 in Fig. 1 of the drawings.

Fig. 4 is a horizontal section on line 4—4 in Fig. 1 of the drawings.

Fig. 5 is a detail fragmentary sectional view showing the construction of the so-called book.

As thus illustrated, the book leaves 1 are each double and formed with a loop at their outer edges, while the other edge portions are clamped between the angle irons 2 on the support 3, and are held in place by nails or pins 4 inserted in the manner shown. The wires 5 are inserted in the loops of the leaves, as shown, at their outer ends, and their inner ends are rigid with the cams 6 mounted on the shaft or wire or axis member 7 in the manner shown. Back of the shaft 7 a shaft 8 is suitably mounted on the body frame of the machine and upon this shaft is a cylinder 9 which carries a set of radial pins or fingers 10 to be engaged by the actuator 11, and which carries the staggered or irregularly arranged pins 12, arranged spirally, as shown, each pin 12 being disposed in position to engage one of the cams 6, and when this happens the cam is rotated and its wire 5 is swung about the axis of the cam and one leaf of the book is turned over to the left, the leaves being turned successively from the front of the book toward the back thereof.

A horizontally disposed shaft 13 is provided with a worm 14 which engages the worm wheel 15, the latter being on the shaft 16 which carries the actuator 11 previously mentioned, whereby for every rotation of the shaft 16 the actuator 11 strikes one of the fingers or pins 10, there being twelve of these pins 10 arranged equidistant, and there being eleven of the wires 5 and, consequently, eleven leaves for the book, and hence eleven of the pins 12 previously mentioned.

Now when the leaves have all been turned over to the left, it is desirable that they may then be returned simultaneously to the right, so that the machine may start over again. For this purpose a segment 17 is mounted on the shaft 8, and has a rigid arm 18 upon which an extension arm 19 is movably mounted, the arm 19 being pivoted at 20 and having a lost motion connection 21 to permit slight rocking motion about this pivot, subject to the action of the spring 22 as shown, this spring holding the parts normally in the position shown in Fig. 3 of the drawings. The cylinder 9 is provided with a cam portion 23 disposed in position to strike the end portion 24 of a bell crank lever 25 which is pivoted on the machine body or frame at 26, and which has its other arm 27 disposed in position to engage the arm 19 previously mentioned. The actuator 28 is rigid with the actuator 11, and diametrically opposed thereto, and normally this actuator 28 passes the outer end of the arm 19, as shown in Fig. 3 of the drawings. However, when the cam portion 23 strikes the cam portion 24, the arm 19 is then forced into the position shown in Fig. 4 of the drawings and this brings the outer end of the arm 19 into the path of the actuator 28, as shown in Fig. 4, with the result that the arm 19 and the rack 17 are rotated a distance about the axis of the shaft 8, thus swinging the member 29 from the lefthand side over to the righthand side, and thus carrying all of the wires 5 over to the righthand side of the machine, thereby restoring all of the leaves to the righthand side of the book. This,
it will be seen, is because when all of the leaves have been turned over to the right, the wires 5 then rest against the member 29 which is rigid with the gear wheel 30 that engages the rack 17, so that actuation of the rack 17 by the actuator 28, in the manner stated, serves to automatically restore all of the book leaves to the righthand side of the book, looking in the direction shown in Fig. 2 of the drawings. A spring 31 may be applied to the rack 17 to restore the member 19 to the position shown in Fig. 3 of the drawings, as soon as the actuator 28 slips off from the end of the arm 19, thus automatically restoring the mechanism to the condition shown in Fig. 3 of the drawings. When the leaves are thus all turned to the right, the wires 3 and the leaves then rest against the stationary member 32, and at such time the member 29 rests normally against the stationary member 33 of the frame or body of the machine.

The power for operating the shaft 13 may be of any suitable or desired character. For example, the wheel or pulley 34 shown in Fig. 1 can be rotated by any suitable power to rotate said shaft. This shaft, when continuously rotated, causes the machine to automatically turn the leaves successively to the left, looking at the machine and book in the direction of Fig. 2 of the drawings, and as soon as the leaves have all been turned over to the left-hand side, they are then automatically and simultaneously returned to the righthand side of the book, in the manner shown.

Thus an automatic book leaf turning machine is provided which is operative to turn the leaves in a natural manner, beginning at the front of the book and turning the leaves successively, and until they have all been turned over to the left. The machine is then operative to instantly and simultaneously return all of the leaves to the right, or to the back of the book, so to speak, and when this has been done the machine is then operative to automatically again turn the leaves successively in the desired manner. Therefore, the automatic turning of the leaves, successively, from the front of the book toward the back, is an operation that alternates with the automatic turning of the leaves simultaneously to the right to restore them to the position in which the leaves are superposed one upon another, just as they would be in an ordinary book when the reader starts to read the book. This series of successive leaf turning operations is completed before the leaves are turned backward, of course, so that the machine has as many leaf turning operations as there are leaves to be turned, in one direction, and in this way the complete leaf turning operations alternate with the leaf restoring operations. Each complete leaf turning operation to the left is made up of as many successive operations as there are leaves, but each leaf restoring operation consists of only one operation for all of the leaf turning wires in unison, to the right, instead of turning the leaves back one by one or successively.

The leaves of the book, it will be seen, are flexible, desirable so, inasmuch as they are held tightly between the angle irons 2 at the back of the book. The turning of the leaves exposes to view both surfaces or pages of each leaf and the speed or rapidity with which the leaves are turned will depend, of course, upon the speed of rotation of the shaft 16, for the complete rotation of this shaft is necessary for the turning of each leaf. If this shaft 16 is turned over slowly, as by the worm gear mechanisms 14 and 15, it follows that the leaves will be turned over slowly, but this can be timed in any suitable or desired manner, by proportioning the gearing and other parts, as will be readily understood.

Preferably, the book occupies an inclined position, as shown in the drawings, and the axes of the cylinder 9 and the shaft 7 are inclined accordingly, whereby the machine may be placed in a store window with the book in an inclined position to be easily viewed by people outside.

But while the invention is especially adapted for advertising and display purposes, it will be readily understood that the machine can be used for turning the leaves of any book under other circumstances and for any suitable or desired purpose without departing from the spirit of the invention, and the invention is not limited to the exact construction shown and described, or to any particular use thereof.

It will be seen that the element 29 restores all of the members 5 to normal position, simultaneously, and that this element 29 is then restored to its normal position before again starting the turning of the leaves singly, thereby to permit said members and the instrumentalities for actuating them to again cause the successive turning of the leaves to display the pages thereof.

Without disclaiming anything, and without prejudice to any novelty disclosed, what I claim as my invention is:

1. In a book leaf turning machine, the combination of members for engaging and turning the leaves, instrumentalities having means for converting continuous rotary motion into intermittent rotary motion for causing said members to automatically turn the leaves forward one by one or successively in one direction, an element for causing actuation of all of said members in unison, in the other direction, after all of the leaves have been turned in said one direction, and devices automatically to cause the actuation
of said element at the proper time, to turn all of the leaves back, together with means operative automatically to cause the restoration of said element and said devices to normal condition, after the said restoration of all the leaves, and before again starting the turning of the leaves singly, thereby to permit said members and said instrumentalities to again cause the successive turning of the leaves to display the pages thereof.

2. A structure as specified in claim 1, said members comprising wires bent to engage the outer portions of the leaves, and said instrumentalities comprising cams rigid with said wires, rotatable about a common axis, and including also fingers disposed in position to engage said cams successively, said fingers being rotatable about an axis parallel with said axis of the cams.

3. A structure as specified in claim 1, the leaves of the book being held together at the back of the book, the leaves being flexible to permit the turning thereof, and the outer portions of the leaves being double and forming loops in which said members are inserted.

4. A structure as specified in claim 1, said leaves having loop portions at their outer edges, and said members being inserted in these loop portions, and the leaves being flexible.

5. A structure as specified in claim 1, said devices for causing restoration of said element, comprising a rotary actuator, an arm normally out of the path of said actuator, and cam means for automatically moving said arm into the path of said actuator and causing said elements to operate by said arm to actuate said element.

6. A structure as specified in claim 1, said instrumentalities comprising cams rigid with said members, rotatable about a common axis, and including also fingers arranged radially and spirally about an axis parallel with the axis of said cams, each finger being in line with a different cam.

7. In a book leaf turning machine, in cooperative combination, swinging members for engaging the leaves to turn them singly in one direction, and instrumentalities for causing the actuation of said members, the leaves of the book being held together at the back of the book, the leaves being flexible to permit the turning thereof, and the outer portions of the leaves being double and forming loops in which said members are inserted.

8. In a book leaf turning machine, in cooperative combination, swinging members for engaging the leaves to turn them singly in one direction, and instrumentalities for causing the actuation of said members, said leaves having loop portions at their outer edges, and said members being inserted in these loop portions, and the leaves being flexible.

9. In a book leaf turning machine, in combination, a plurality of swinging members for engaging the leaves of the book, to turn them singly in one direction, mounted to swing about a common axis, a rotary element having its axis parallel with the axis of said members, fingers on said rotary element, arranged spirally thereof, so that each finger is opposite one of said members, the fingers thereby arranged to actuate said members successively when said element is rotated, and continuously operating mechanism having means for automatically causing intermittent rotation of said element.

10. A structure as specified in claim 9, said mechanism comprising another set of radial fingers on said element, disposed in one and the same plane, and comprising continuous rotary motion means for successively engaging these last mentioned fingers to rotate said element and first mentioned fingers intermittently.

11. A structure as specified in claim 9, in combination with instrumentalities controlled automatically by portions of said mechanism to simultaneously turn all of the leaves back to normal position, after they have all been turned singly forward.

12. In a book leaf turning machine, the combination of members for engaging the leaves, instrumentalities for causing said members to turn the leaves one by one or successively in one direction, an element for causing actuation of all of said members in unison, in the other direction, after all of the leaves have been turned in said one direction, and means automatically to cause the restoration of said element and said means to normal condition, after the said restoration of all the leaves, thereby to permit said members and said instrumentalities to again cause the successive turning of the leaves to display the pages thereof, said members comprising wires bent to engage the outer portions of the leaves, and said instrumentalities comprising cams rigid with said wires, rotatable about a common axis, and including also fingers disposed in position to engage said cams successively, said fingers being rotatable about an axis parallel with said axis of the cams.

Specification signed this 10th day of August, 1926.

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