Sept. 13, 1932. F. A. HERBERT 1,877,314

CYCLIC LIMIT MECHANISM

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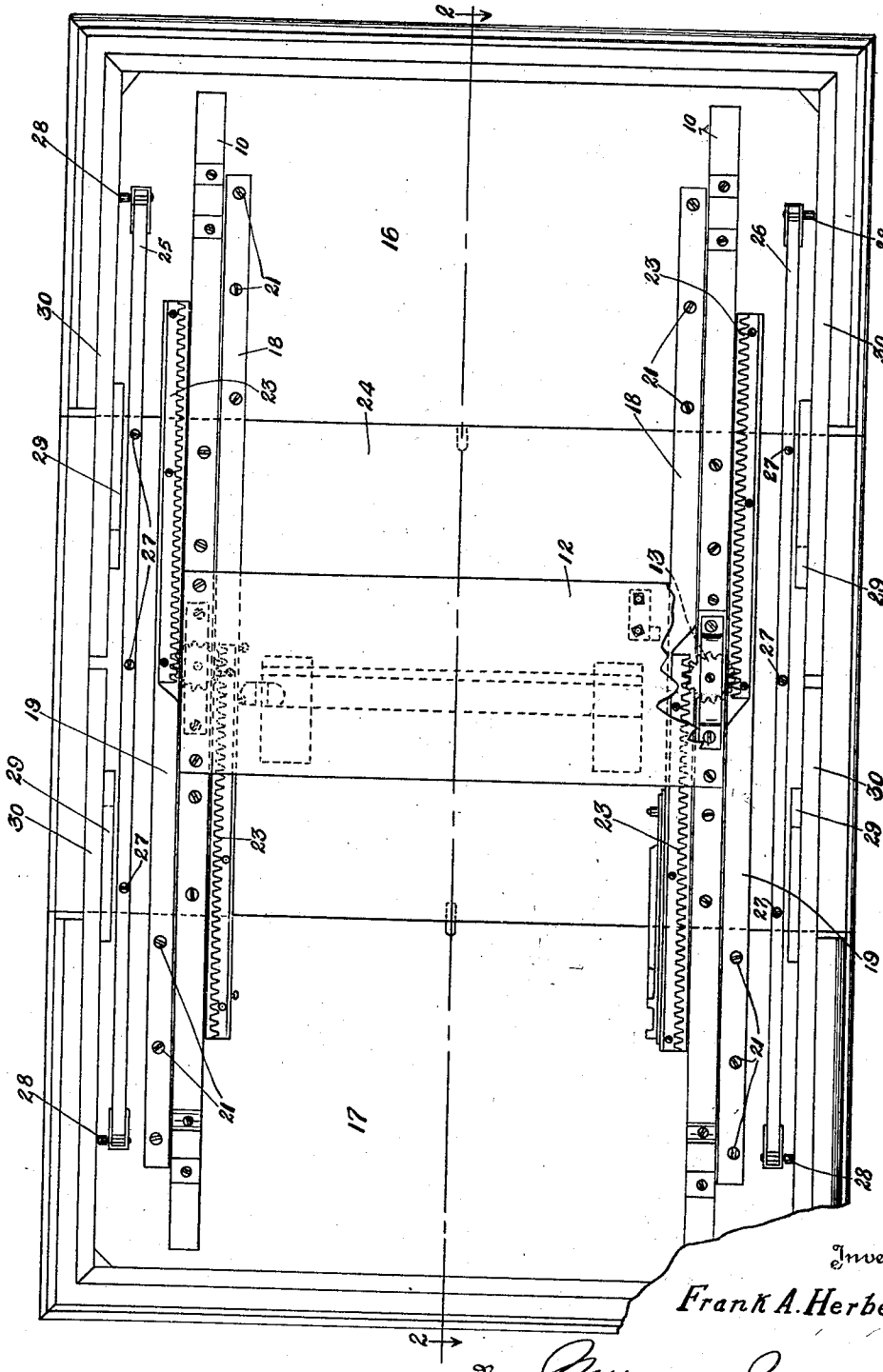


Fig. 1.

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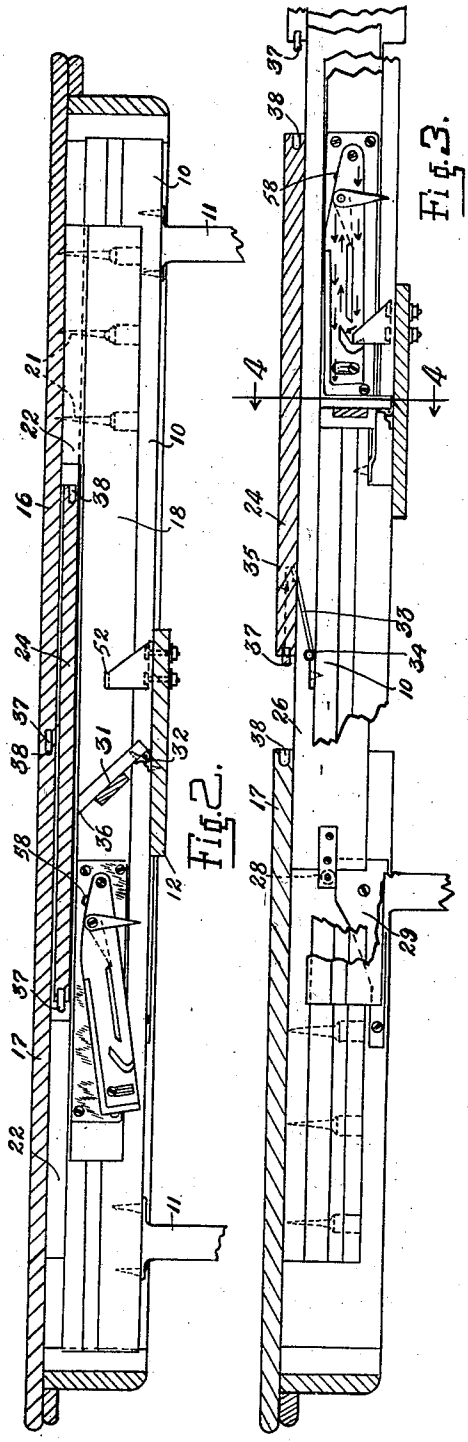


Fig. 2.

Fig. 3.

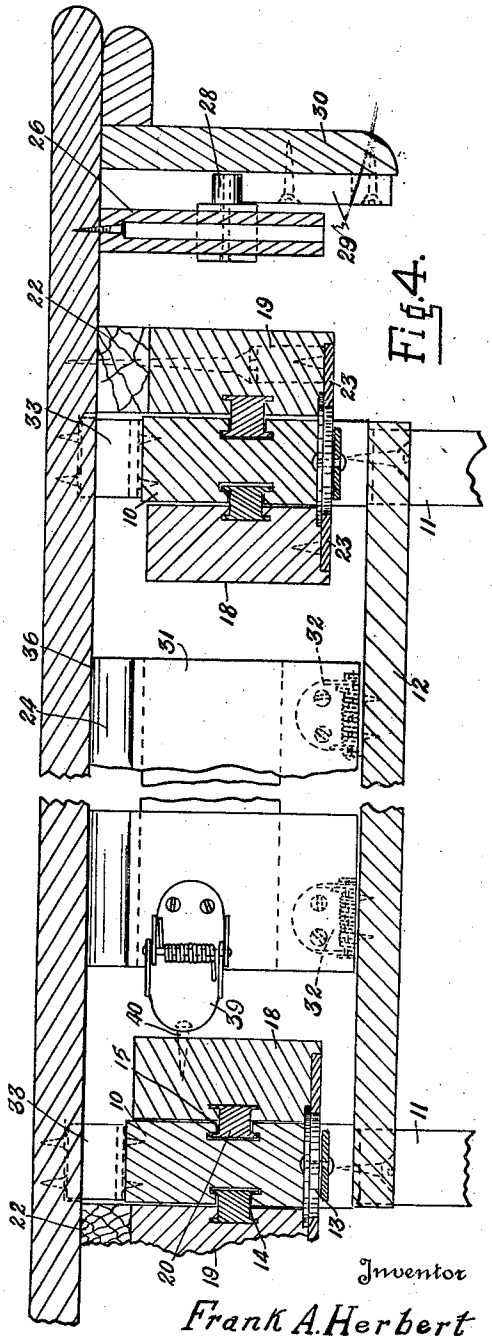


Fig. 4.

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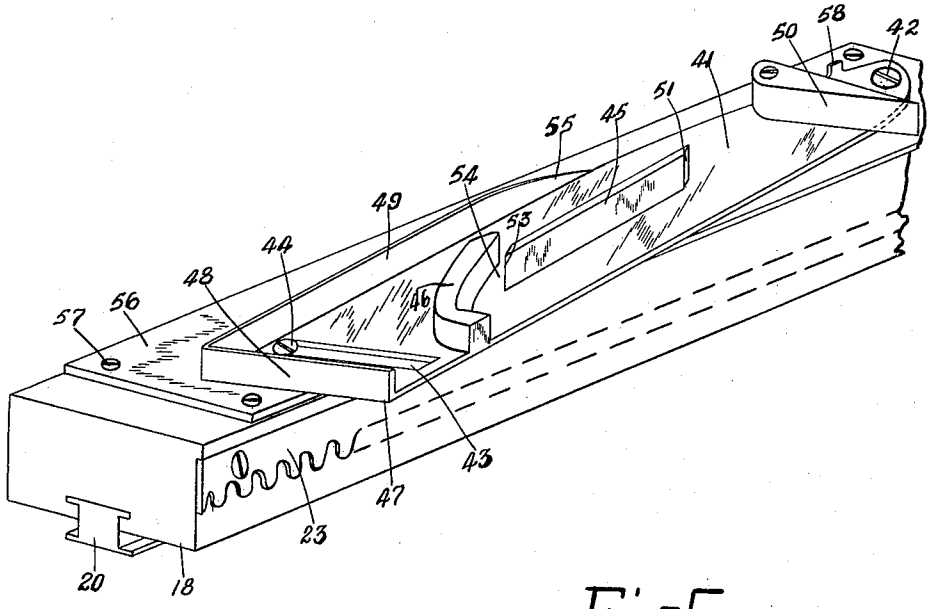


Fig. 5.

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UNITED STATES PATENT OFFICE

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CYCLIC LIMIT MECHANISM

Application filed May 28, 1930. Serial No. 456,461.

The present invention relates to a cyclic multiple limit mechanism and is especially adapted to use with an extension table of the automatic leaf shifting type.

An object of the invention is to provide a control means for a pair of oppositely reciprocating members whereby such members may first be pulled apart and halted at a primary limit, then retracted partially and then pulled apart to a second limit and then retracted to the initial position for repetition of the same cycle of operations.

The device of the invention accomplishes these and other objects by the means described herein and disclosed in the accompanying drawings, in which:

Fig. 1 is a bottom plan view of an extension table embodying a device of the invention, part being broken away.

Fig. 2 is a view taken on line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 2 but showing the table in its first opening position with the device of the invention limiting said opening movement.

Fig. 4 is an enlarged fragmental view taken on line 4—4 of Fig. 3.

Fig. 5 is an enlarged perspective view of the device of the invention mounted upon a fragment of the table shown in Fig. 1.

In describing the useful application of the device of the present invention an automatic leaf shifting extension table is used as an example, the invention being however not limited to this specific use as will be readily appreciated.

The automatic leaf shifting table will be briefly described so that a clear idea of a typical cycle of operations of the limit stop will be had. The table structure comprises generally a frame structure which carries a pair of shiftable table sections and an extension leaf all having certain predetermined relative movements, which when precisely carried out, separate the table sections, raise the normally submerged leaf to the plane of the table sections and then join the leaf and sections; and by a subsequent series of operations separate the table section from the leaf, submerge the leaf and then join the sections over the submerged leaf. Without a means such as is provided by the present invention these operations require care and skill and failure to properly execute any of the necessary movements requires the operator to begin all over again.

Referring to the drawings the table consists of a frame comprising spaced bars 10 which carry the legs 11 and which are connected together by a cross board 12. There are two identical structures associated with the members 10 so that a description of one will serve for both. The frame and legs support the table structure and they do not move in spreading the table to enlarged position. Each member 10 carries a freely rotatable gear 13 and has slide grooves 14 and 15 in its opposite sides. A splined or reciprocating slidable connection to the two table top sections 16 and 17 is had by the slides 18 and 19 respectively, which carry keys 20 disposed in the grooves 14 and 15. Slide 18 is secured to top section 16 and slide 19 is secured to top section 17, by any means such as screws 21 being used to mount the slides and spacers 22 to the underside of the top sections. Each of the slides 18 and 19 have racks 23 secured to their bottoms for engagement with gears 13. The top sections thus move uniformly in opposite directions relative to the frame structure and are guided in the grooves by the slides.

An extension leaf 24 normally rests beneath the overhanging and meeting portions of the top sections and is so mounted and arranged that when the top sections 16 and 17 are pulled apart a given distance, the extension leaf 24 is raised bodily to the plane of the top sections which may then be pushed together to form an enlarged table top with the leaf 24 between them. The means whereby this is accomplished comprise bars 25 and 26 disposed close to the ends of the leaf 24 and is secured thereto by screws 27. An offset roller 28 projects outwardly adjacent each end of bars 25 and 26 and cooperates with a raising and lowering cam 29 mounted on the flanges 30 of the top sections. A spring urged hingedly mounted lifting member 31 is secured by spring hinges 32 and normally urges the extension leaf 24 upwardly and as-

sists the cam and rollers 29—28 when they come into play. As a stabilizer a strip of rigid material 33 has a hinged connection at 34 with the frame 10 and at 35 within a shallow recess in the bottom face of extension leaf 24. The lifting member 31 thus pushes the extension leaf 24 up when the table sections are separated at predetermined distance and the edge 36 of the then perpendicular member 31 holds the extension at the proper level so that dowels 37 and holes 38 on the top section and extension will mate when the top sections are pushed together.

In order to retire the extension 24 to its submerged position as in Fig. 2, the top sections 16 and 17 are now spread apart to a greater distance than before in order to have spring hinge leaf 39 on member 31 permit a stud 40 (see Fig. 4) to first turn the leaf and pass beyond it so that upon movement of the top sections toward each other the stud will abut leaf 39 which can not be moved in the opposite direction. The force applied to the top sections now causes the stud to bodily depress member 31 and relieve the extension which now descends gradually under the influence of rollers 28 on cams 29 and the top sections are then pushed into abutment.

The structural details just set forth form no part of the present invention which is concerned with a control or cyclic progressive limit mechanism for a series of manual movements necessary to properly operate a device such as the previously described table without the exercise of any particular care on the part of the operator.

Attention is now directed to Fig. 5 wherein the cyclic progressive limit stop is shown arranged for successive movement of the table top sections at two different limits which are vital to the operativeness of the previously described mechanism. The stop mechanism of the present invention consists essentially of a plate 41 pivoted adjacent one end at 42 to raise and lower in a vertical plane (see Fig. 2) within limits defined by a slot 43 and a fixed pin 44. Extending from the exposed face of the plate is a cam track 45, and a curved stop 46 spaced from and curved about and over the track 45. At the end 47 of the plate is an end stop 48 which continues along the top edge of the plate to form a track 49 which overhangs the stop 46 and the major portion of track 45. A gravity actuated gate track 50 is pivoted on plate 41 for movement from its normally pendant position to contact the tapered end 51 of track 45 to provide a continuous track section against which a lug such as 52, (see Figs. 2 and 3) fixed on cross board 12, may ride, thereby lifting the plate 41 bodily and, as the plate is moved with the slide 18, disposing lug 52 beneath track 45. Continued relative movement causes the lug 52 to pass beyond the end 53 of track 45 whereupon the lug engages the stop 46. This stop is necessary to allow the lifting member 31 to raise the extension leaf 24 to the positions shown in Fig. 4. At this time the top sections are separated for a distance somewhat greater than the width of the leaf 24 so that the sections must be pushed together to close them against the edges of leaf 24. This effects short movement of the frame and slides so that the lug 52 on the frame rides along the under curved face of stop 46 and out of the way or passage 54 between the stop 46 and end 53 of track 45 whereupon the plate 41 drops bodily about its pivotal mounting 42 until the track 49 engages it. At this time the table has the extension leaf 24 in an operative position.

When the leaf 24 is to be submerged and the table again reduced to its original length, the top sections are merely pulled apart again, this time for a greater distance than before, so that the leaf retiring mechanism may operate. The top sections are merely pulled apart until the lug 52 riding beneath track 49 engages the stop 48. Then the sections are pushed together allowing the lug 52 to ride back beneath track 49 to the end 55 when plate 41 drops by gravity to its limit and the lug 52 strikes gate track 50 and swings it aside until the parts assume the position shown in Fig. 2, when the table is completely closed. At this time the device is conditioned to repeat the cycle of operations.

It is to be noted that the device of the invention, because of its convenient position in a vertical position in the practical embodiment shown, may employ the force of gravity. Other forces, e. g. spring force, may be resorted to in order to normally dispose the parts in the position shown in Fig. 2, if it should be found desirable to dispose the plate 41 horizontally. In most instances it is desirable to use a metal mounting base 56 to carry the plate 41 and gate track 50 and simply fasten the base, as by screws 57, to a convenient surface. When mounted in this way the device withstands hard usage without loosening or displacement.

The device of the invention may be made in various sizes and the spacing between stops 46 and 48 and gate track 50 will be understood to be varied according to the difference between the progressive limits of movement of the reciprocating or movable members to be controlled thereby. A lug or stop 58 may be provided on the plate 41 in order to prevent the gate track 50 from turning completely around on its pivotal mounting.

What is claimed is:

1. The combination with a pair of members having relative reciprocating movement of a cyclic limit mechanism comprising a pivoted plate having spaced stops thereon, a track portion connecting with one of the stops, a track portion adjacent and in non-continuous relation to the other of said stops,

a gate track movable to a position of continuity with the last mentioned track portion, said mechanism being mounted on one of the reciprocating members and a lug on the other of said members and extending into the path of said stops.

2. A cyclic progressive limit stop mechanism comprising a pivotally supported plate, spaced stop members on one face of the plate, a track section continuous with one of the stops and overhanging the other of said stops, a second track section on the plate discontinuous with the second mentioned stop, a gate track mounted for movement over the plate to and from substantial continuity with said second track section, means limiting pivotal movement of the plate and a lug mounted in fixed relation for engaging said stops.

3. In a device of the class described the combination of a plate mounted for limited pivotal movement upon a given sliding member, a lug fixedly mounted on a second nonmoving member, a gate track member mounted on the plate in the path of said lug and movable thereby, a track portion on the plate, limiting movement of said gate in one direction and adapted to form a continuous track with said gate, a stop adjacent one end of said track and spaced therefrom to form a way through which the lug may move from the bottom face of the track to a position above said track, and a second track portion on the plate overhanging said first track and extending beyond the track and stop and having a turned portion constituting a second stop.

4. The combination with a pair of relatively reciprocable members of a cyclic progressive stop mechanism comprising a plate pivoted to one of the members for limited movement thereon, a pair of spaced stops on said plate, a track portion connected with one of said stops, a second track section disposed adjacent but disconnected from the other of said stops, a pivoted track member movable to provide at times a continuation of the second track section and a lug upon the second member, the plate being movable with its associated member to engage the lug to swing the pivoted track member to permit the lug to ride beneath the second track to the second stop, then, upon retraction of the plate causing the lug to circumvent the second stop and engage the first track and its associated stop.

5. The combination with a pair of relatively reciprocable members of a lug on one of said members and means on the other of said members comprising a pivoted plate with spaced stops and fixed and movable track sections for cooperating with the lug to control the limits of reciprocation of the members so that the members may move a given distance only, then upon partial retraction be moved to a greater distance and then retracted to original position for a similar cycle of movements.

6. In combination a lug, a base member movable relative to the lug, a plate pivoted thereon and having a transverse slot, a pin in the base extending into the slot for limiting pivotal movement of the plate, and means on the plate comprising a plurality of spaced stops and track sections whereby the plate may successively be halted by each of said stops as they engage the lug and then returned to its initial position.

7. The combination with an extension table having an extension leaf arranged to be raised to and lowered from operative position by mechanism operated by predetermined opening and closing movements relative to a table supporting frame, of means comprising a lug on the supporting frame and a cyclic progressive limit mechanism mounted on a relatively reciprocable portion of the table and comprising a shiftable plate, spaced stops on the plate and fixed and movable cam track sections on the plate for cooperation with the lug.

8. In a device of the class described the combination of a shiftable plate, a movable cam track section thereon, a pair of spaced track sections one of which may connect with said movable section, a primary stop curved about an end of one of said track sections and spaced therefrom and a final stop connected to the other of said track sections, and a lug fixed adjacent the shiftable plate and cooperating with said tracks and stops to effect a multiple of limits of reciprocation of the shiftable plate.

In testimony whereof, I have hereunto subscribed my name this 7th day of May, 1930.

FRANK A. HERBERT.