Dec. 17, 1940. W. H. STILES 2,225,512

FOLDING LEG FURNITURE AND MECHANICAL MOVEMENT THEREFOR

Filed Aug. 19, 1938

Fig. 1

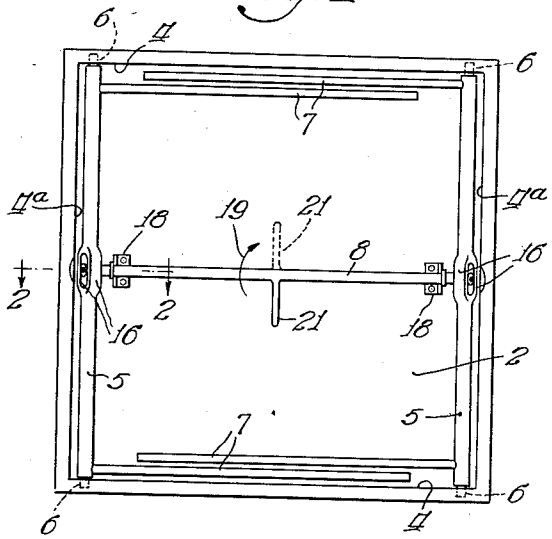


Fig. 6

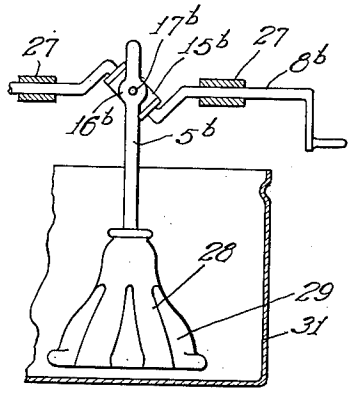


Fig. 2

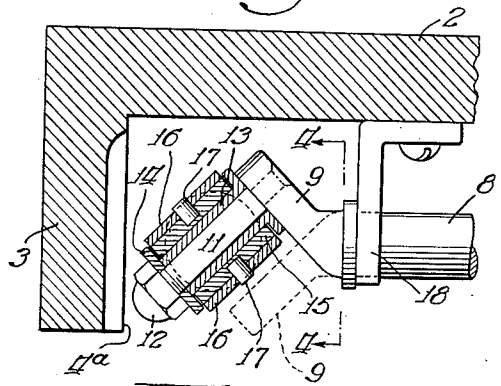


Fig. 4

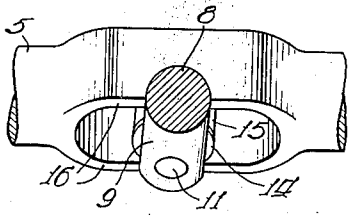


Fig. 3

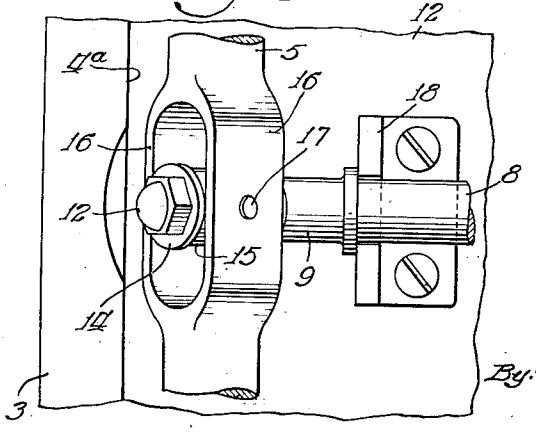
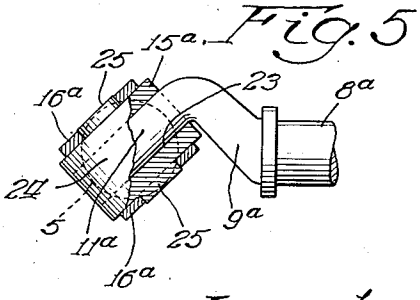


Fig. 5



Inventor:
Wesley H. Stiles
By: Zabel, Carlson, Gritzbaugh and Wells
Attys.

Patented Dec. 17, 1940 2,225,512

UNITED STATES PATENT OFFICE

2,225,512

FOLDING LEG FURNITURE AND MECHANICAL MOVEMENT THEREFOR

Wesley H. Stiles, Sandwich, Ill., assignor of five-twelfths to Vivian S. Ide, Springfield, Ill.

Application August 19, 1938, Serial No. 225,681

3 Claims. (Cl. 311—85)

My invention relates to improvements in folding leg furniture and mechanical movement therefor.

An object of my invention is to provide an improvement in folding leg furniture, such as card tables and the like, wherein all the supporting legs may be simultaneously moved from folded or inoperative position into unfolded or operative position, or vice versa, upon manipulation of a single operating lever through a comparatively short path of movement.

Another object is to provide in an improved folding leg table or the like, a simple and wholly automatic means rigidly to lock the legs when unfolded and disposed in operative position, against reverse movement.

A further object is to provide a novel mechanical movement, such as may be used in folding leg furniture, wherein rotary movement of one element about one axis may be translated into oscillatory movement of a second element upon another axis.

A still further object is to provide, in a mechanical movement for translating rotary movement to oscillatory movement, a torque multiplying function, thus to enable the movement to be incorporated in a mechanical device without other torque multiplying means for requirement as high as a ratio of two to one.

Other objects, the advantages and uses of the invention will become apparent after reading the following specification and claims, and after consideration of the drawing forming a part of this specification, wherein:

Fig. 1 is a bottom plan view of a folding leg table constructed in accordance with my invention;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view of the parts indicated in Fig. 2;

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary view, similar to Fig. 2, of a modified embodiment of my invention; and

Fig. 6 is a schematic view illustrating another use of the mechanical movement employed in the folding leg table of Figs. 1 to 5 inclusive.

With reference to Figs. 1 to 4 inclusive, I have illustrated therein one embodiment of my invention as applied to a folding leg table, such as a card table.

The table top 2 may be of conventional form having a narrow apron 3, as usually provided in tables of this type. Two of the inner and oppositely disposed walls 4 of the apron 3 serve as a support for the folding leg assembly.

This assembly may include a pair of rigid rods 5, either of solid or tubular form, oscillatably mounted at their opposite ends upon the walls 4 in any desirable manner, such as by integral trunnions 6. The rods 5 are preferably disposed as close to the walls 4a of the apron 3 as operation of the leg folding mechanism hereinafter described, will permit. Table legs 7 are rigidly fixed, one at each end of the rods 5, so that each rod supports a pair of table legs, one adjacent each corner of the table top 2. As shown in Fig. 1, one pair of the legs 7 may be mounted on its supporting rod 5 at a lesser distance apart than the legs of the remaining pair, thus to enable all four legs to lie in a common plane parallel to the table top 2 when in their inoperative position, as shown in Fig. 1. The legs 7, like the rods 5, may be either solid or tubular as requirements dictate, and may be rigidly fastened to the rods 5 as by welding.

It will be apparent from the foregoing that rotary movement of the rods 5 through arcs of 90° from the position assumed in Fig. 1 will cause all four of the legs 7 to move into operative or unfolded position with each leg extending perpendicular to its adjacent corner portion of the table top 2.

Means for simultaneously so rotating the rods 5, and for returning them to the positions of Fig. 1, may comprise an operating shaft 8 extending transversely of the under side of the table top between the rods 5, and adapted for oscillation on an axis perpendicular to the axis of the rods 5. In the drawing, I have shown the shaft 8 at substantially the mid-point of the table top, but if desirable, it may, of course, be disposed along any axis drawn perpendicularly to and intercepting the axes of the rods 5. Each end of the shaft 8 is formed with an arm 9 extending endwise therefrom at an angle of 45° from the axis of the shaft, as shown in Fig. 2, both arms 9 lying in a common plane and extending laterally relative to the shaft in the same general direction.

Each of the arms 9 carries adjacent its outer end a pin 11 extending perpendicular to the arm, and hence at an angle of 45° to the shaft 8, the pins 11, arms 9 and shaft 8 all lying in a common plane. The pins 11 and arms 9 are of such length and so related relative to the shaft 8 and rods 5, that the mid-point of each pin 11 intercepts the axis of one of the rods 5. Each of the pins 11 may

have secured thereto, as by a threaded cap screw 12, a bearing bushing and cooperating washer 13 and 14 respectively, as shown, upon which a roller sleeve 15 is rotatably mounted and restrained against longitudinal displacement.

The rods 5, at those portions in register with the crank arms provided by the elements 9, 11 and 15, are slotted transversely therethrough to provide parallel and spaced apart webs 16 between which the roller sleeves 15 lie. A pair of pins 17, one for each web 16, serve to provide a pivotal connection between each roller sleeve 15 and the adjacent webs. The pins 17 of each pair are co-axial upon an axis intercepting the point at which the axes of the roller sleeve 15 and rod 5 likewise intersect.

Brackets 18 may be fixed to the under side of the table top for purposes of maintaining the operating shaft 8 against displacement from operative position, and to provide a reaction bearing during oscillation of the shaft.

With the parts assembled as above described, it will be apparent that 180° rotary movement of the shaft 8, in the direction of the arrow 19 of Fig. 1, will cause the rods 5 to rotate 90° from the position shown in Figs. 1 to 3 inclusive, this because of the change in position of the 45° shaft crank arms, or from the full line position shown to a position wherein the arms 9 assume the position indicated in dotted lines in Fig. 2.

In order to facilitate manual operation of the shaft 8, as when the assembly is incorporated in folding leg furniture or the like, I secure to the shaft 8, a perpendicularly extending hand grip 21 which serves the added function of limiting the oscillating movement of the shaft 8.

In the assembly of the parts, I prefer to so mount the hand grip 21 upon the shaft 8 that when the shaft is turned to extend the table legs 7 into operative position, the crank arms 9, 11 and 15 will move slightly over "dead-center," thus to render reverse movement of the operating parts impossible by force applied to the extended legs. This arrangement assures rigid disposition of the table legs at all times when the table is in use.

To fold the legs into their inoperative position, it is only necessary to manually move the hand grip 21 from its dotted line position (Fig. 1) to its full line position, whereupon all four of the legs will be caused simultaneously to move into the position assumed in Fig. 1. At each limit of operative rotary movement of the shaft 8, the hand grip 21 will engage with the bottom surface of the table top, thus accurately to maintain the proper operating limits for full leg retraction and rigid lock-up when the legs are extended.

In Fig. 5 I have shown a modified form of the mechanism ilustrated in Fig. 2, wherein the operating shaft 8*a* has formed integrally therewith both arm 9*a* and pin 11*a*. The pin 11*a* passes through a bore 23 formed diametrically through a circular block 24 which in turn is journalled upon the webs 16*a* of the rod 5, as by trunnions 25. The axis of the trunnions 25, it will be noted, intercepts the point of intersection of the axes of the shaft 8*a* and pin 11*a*. As in the case of the mechanism of Figs. 2 to 4 inclusive, rotation of the shaft 8*a* through an arc of 180° causes rotary movement of the rods 5 through an arc of 90° along an axis that is perpendicular to that of the shaft 8*a*.

Although rotation of the shaft 8 or 8*a* through a complete revolution of 360° is not permissible in the environment in which these parts are illustrated in Figs. 1 to 5 inclusive, because of their disposition upon the table structure, were such complete revolution of the shaft possible, the rods 5 would each simultaneously oscillate from their starting points through an arc of 90° and back. This translation of continuous rotary movement to oscillatory movement may be utilized for purposes such as indicated in Fig. 6.

Referring to Fig. 6, I have shown at 8*b* a drive shaft corresponding to the shaft 8 which may be supported upon bearings 27. Intermediate the length of the shaft 8*b* there is a portion thereof formed to provide a support having its longitudinal axis disposed at 45° across the axis of the shaft 8*b* upon which a bushing and washer assembly 13*b* and 14*b* may be carried to provide a mounting for the bearing sleeve 15*b*. The bearing sleeve 15*b*, like its counterpart 15 of Figs. 2 to 4 inclusive, may be pivotally connected by pins 17*b* to webs 16*b* on a driven rod 5*b*.

Mounted upon the lower end of the rod 5*b*, in the apparatus of Fig. 6, I have shown an agitator 28 having fins 29, such as may be used in a mixing machine, churn or clothes washing machine. The agitator 28 may be located below the liquid or material level line of a suitable tank 31, as shown.

In the apparatus of Fig. 6, continuous rotation of the shaft 8*b* will cause continuous oscillation of the rod 5*b* with its work member 28 through an arc of 90°, there being one complete cycle of oscillation for each complete revolution of the shaft 8*b*.

Since the travel of the shaft 8*b* during one revolution moves through a path of 360°, and the total travel of the rod 5*b* is but 180° during such one revolution, the drive thus established is of a torque multiplying nature of a ratio of two to one, thus admirably fitting the drive to such purposes as described, and in particular, as a drive for washing machine agitators.

While I have herein illustrated and described certain specific embodiments of my invention, and suggested certain uses for the mechanical movement embodied therein, such disclosure is intended for purposes of illustration only, and not for purposes of limitation.

I claim:

1. An article of furniture comprising a top, a rotatable rod beneath and parallel with said top, a leg member connected with and extending radially from said rod, trunnion bearing means upon and axially perpendicular to said rod, cylindrical bearing means on said trunnion bearing means and manipulative as a conical pendulum for oscillating said rod, and manipulation and locking means including a control shaft and a cylindrical bearing member rotatable with said shaft, said control shaft being journalled for rotation about an axis below and parallel with said top, and perpendicular to said rod, said bearing member being disposed with its axis intersecting that of the shaft at an angle of substantially 45 degrees and being further disposed in complemental journalled relation with said bearing means, said control shaft being oscillatable between critical positions spaced 180 degrees to manipulate said cylindrical bearing member for oscillating said rod between limits spaced 90 degrees, said bearing member in each of said critical positions being disposed in a plane perpendicular to said rod and hence reactive against said shaft to lock said rod against rotation, and

said leg being so positioned radially of the rod that said leg is extended perpendicularly to the top when the rod is locked at one of said 90 degree limits and is folded adjacently to said top when the rod is locked at the other of said limits.

2. An article of furniture comprising a top, a rotatable rod beneath and parallel with said top, a leg member connected with and extending radially from said rod, a connecting member connected with said rod for pivotal movement about an axis intersecting and perpendicular to the principal axis of said rod and projecting radially from the rod at an angle of substantially 45 degrees with respect to the disposition of the leg member radially of said rod, and oscillatable manipulation and locking crank means operably connected with the projecting portion of said connecting member, said crank means being oscillatable about an axis normal to the rod axis between limits spaced 180 degrees to manipulate said connecting member for oscillatively displacing said rod between limits spaced 90 degrees, said leg being so disposed radially of the rod that at one of said oscillative limits thereof the leg is folded adjacently to said top and that at the other of said limits the leg is extended perpendicularly to said top, means preventing axial displacement of said crank means, and said crank means being disposed within a plane perpendicular to said rod when at either of said 180 degree limits to react against said axial displacement preventing means and thus lock said leg in either the extended or folded position.

3. An article of furniture comprising a top, a rotatable rod beneath and parallel with said top, a leg member connected with and extending radially from said rod, a connecting member projecting radially from said rod and having a connection therewith for accommodating simple pivotal movement of said member about an axis traversing such connection at an angle of 90 degrees to said rod, said connecting member being operable through such connection for oscillating said rod pursuant to manipulation of said member by oscillatively moving a projecting portion thereof within an arcuate path disposed within a plane parallel with said rod, a manipulation and locking member reversibly movable between limits to manipulate said connecting member for oscillatively displacing said rod between limits spaced substantially 90 degrees, and anchorage means for said manipulation and locking member, said leg being so disposed radially of the rod that at one of said limits the leg is folded adjacently to the table top and that at the other of said limits the leg is extended perpendicularly to said top, and said manipulation and locking means being disposed in line with said connecting member and said anchorage means substantially within a plane normal to said rod when said rod is at either of its said limits of oscillative movement whereby to cooperate with said connecting member in locking said rod against rotation while reacting against said anchorage means.

WESLEY H. STILES.