

Dec. 16, 1969 **TEIJI HIGUCHI** **3,484,831**
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SWINGING PARTS OF VARIOUS FURNITURE AND APPLIANCES
Filed Dec. 20, 1968 2 Sheets-Sheet 1

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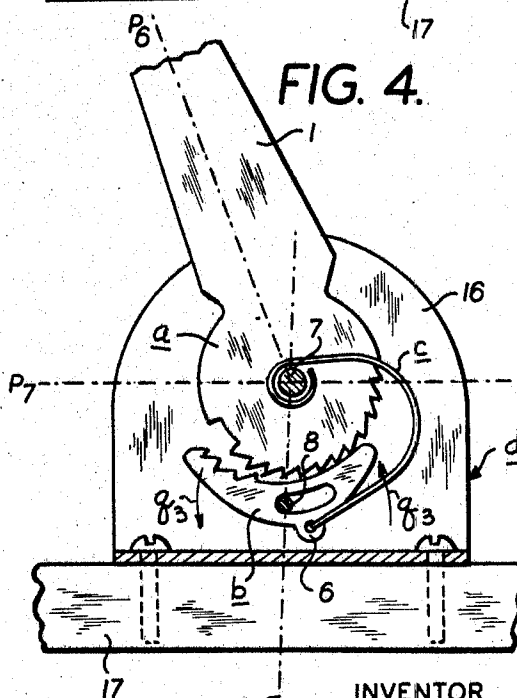
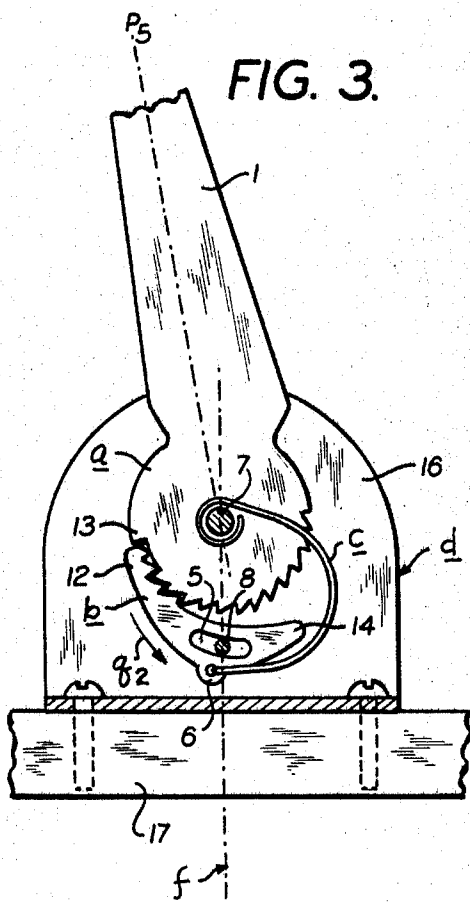
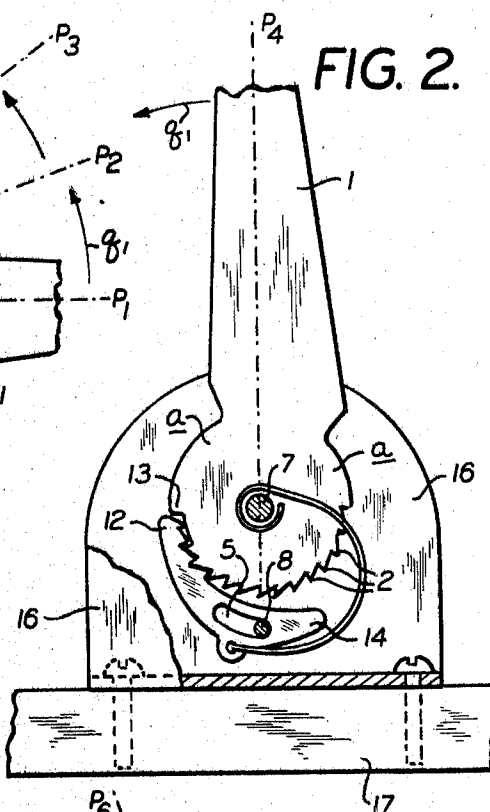
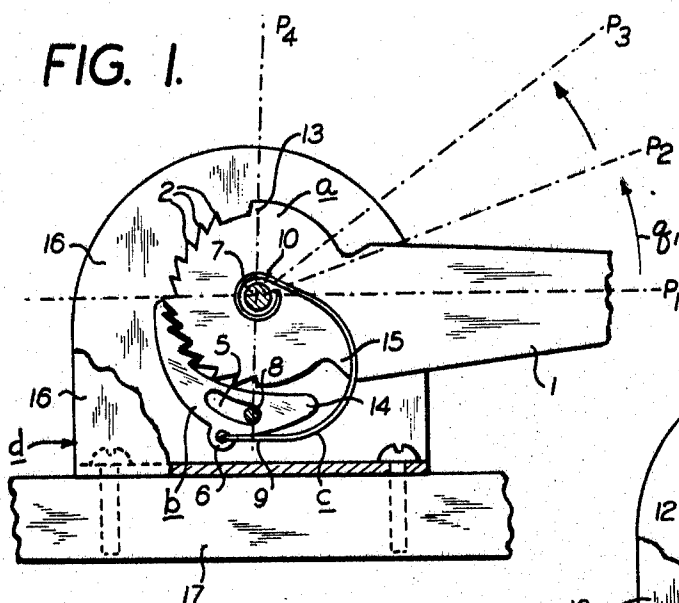
TEIJI HIGUCHI

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Dec. 16, 1969
 DEVICE
 SWING
 Filed Dec. 20, 1968

DEVICE FOR REGULATING THE ANGLE OF INCLINATION OF THE
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2 Sheets-Sheet 2

FIG. 5.

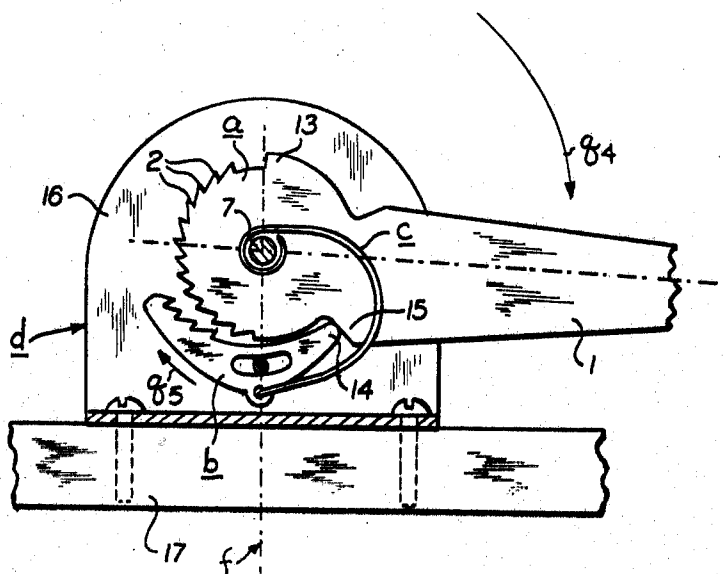


FIG. 7.

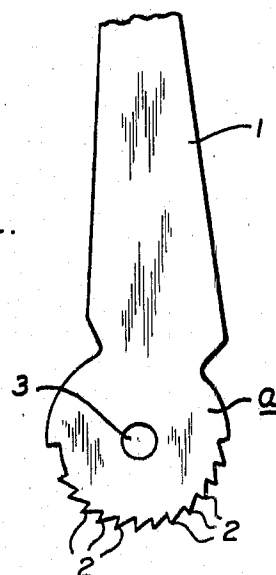


FIG. 6.

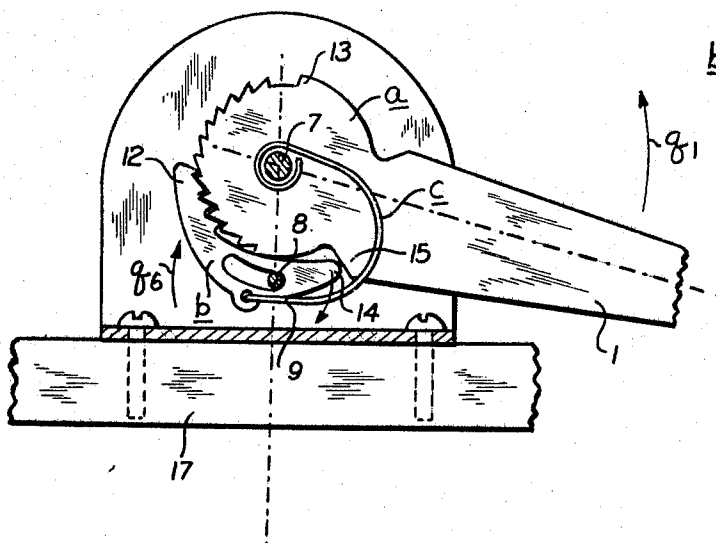
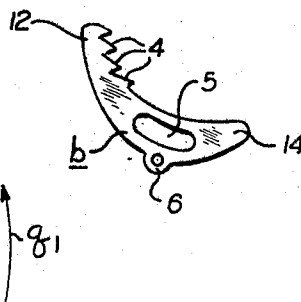


FIG. 8.



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3,484,831

DEVICE FOR REGULATING THE ANGLE OF INCLINATION OF THE SWINGING PARTS OF VARIOUS FURNITURE AND APPLIANCES

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43/83,459

Int. Cl. B25g 3/38; F16c 11/00; F16l 27/00
U.S. Cl. 287-14

1 Claim

ABSTRACT OF THE DISCLOSURE

A device for regulating the angle of inclination of the swinging parts of various furniture and appliances comprising a swinging rod, one end of which is adapted to be mounted on a fulcrum and is provided with a ratchet member formed between two protuberances, and a crescent-shaped pawl adapted to face its concave brim to addendum circle of said ratchet member leaving a slight space in between. One of the two protuberances is adapted to engage with one end of the crescent-shaped pawl, while the other of the two protuberances with the other end of the crescent-shaped pawl. At least one catch is formed close to one terminal end of the concave brim of the crescent-shaped pawl and is adapted to interlock with teeth of the ratchet member, permitting the ratchet member to rotate only in the direction of the opposite terminal end of the concave brim of the crescent-shaped pawl. A bean-shaped hole, into which a fixed cylindrical pin is fitted, is formed in substantially middle portion of the crescent-shaped pawl substantially concentrically with the concave brim of the crescent-shaped pawl. A constant pull is given by some means at substantially middle point of the convex rim of the crescent-shaped pawl toward the center of the ratchet member.

The present invention relates to a device for regulating the angle of inclination of the swinging parts of various furniture and appliances, e.g., the back of a sofa bed, a lounge, a hammock chair or a headchair, in general, and to a device for regulating the angle of inclination of the swinging parts of various furniture and appliances operated by only pulling or pushing the swinging parts themselves without requiring anything like a control lever, control switch or control wheel, in particular.

It is the object of the present invention to provide a device for regulating the angle of inclination of the swinging parts of various furniture and appliances comprising a ratchet gearing in which a crescent-shaped pawl is caused to be engaged with or disengaged from the ratchet member of a swinging rod by the swinging motion of the swinging rod itself.

With the said object in view which will become apparent from the following detailed description, the present invention will be more clearly understood in connection with the accompanying drawing, in which:

FIG. 1 shows a device according to the present invention in which the swinging rod is set in parallel with the surface of the stationary part of an appliance or a piece of furniture;

FIG. 2 shows the same device as shown in FIG. 1 in which the swinging rod is set perpendicularly to the said surface;

FIG. 3 illustrates an operation of the said device in which the crescent-shaped pawl is being shifted backwards;

FIG. 4 illustrates another operation of the said device

2

in which the ratchet member is disengaged from the crescent-shaped pawl;

FIG. 5 illustrates still another operation of the said device in which the crescent-shaped pawl is being pushed forwards;

FIG. 6 illustrates yet still another operation of the said device in which the crescent-shaped pawl and the ratchet member engage each other again;

FIG. 7 shows a swinging rod according to the present invention, having a ratchet member at its lowermost edge; and

FIG. 8 shows a crescent-shaped pawl according to the present invention.

Referring now to the drawing, and more particularly to FIG. 1, a device in accordance with the present invention includes a swinging rod 1 which may constitute a portion of the frame of the swinging part of an appliance or a piece of furniture or which may be fixed to a suitable portion of the said frame.

The swinging rod 1 has a ratchet member *a* at its one end which is not joined to or combined with the said frame. A central hole 3 (FIG. 7) is provided in the ratchet member *a*. Into the hole 3 is inserted a shaft 7, the both ends of which are respectively secured to opposite side walls 16 of a covering case *d*. Thus the shaft 7 permits the swinging rod 1 to be installed so as to swing about the shaft 7 as its fulcrum. The covering case *d* is fixed to a suitable portion on the surface of the stationary part 17 of an appliance or a piece of furniture.

Substantially semicircularly arranged teeth 2 of the ratchet member *a* begin by leaving some space between the first tooth of them and a fetlock-joint-shaped protuberance 15, while they terminate short of a small protuberance 13.

A crescent-shaped pawl *b* is provided in such a manner that its concave brim faces to the ratchet member *a*. Several catches 4 (FIG. 8), adapted to interlock with the teeth 2, are formed close to a front terminal end 12 of the crescent-shaped pawl *b*. In the substantially middle portion of the crescent-shaped pawl *b* is a bean-shaped hole 5 formed substantially concentrically with the concave brim of the crescent-shaped pawl *b*. A cylindrical pin 8, the both ends of which are respectively secured to the opposite side walls 16 in like wise with the shaft 7, is fitted into the bean-shaped hole 5, permitting the crescent-shaped pawl *b* to be installed so as to be shifted forwards and backwards.

A U-shaped spring *c* is provided, having a lower end 9 which is bent sideways substantially in an L-shape and which is inserted into a spring clamping hole 6 provided substantially at the middle point of the convex rim of the crescent-shaped pawl *b*. On the other hand, the U-shaped spring *c* has an upper end 10 which is bent into a small ring so that it can be rotatably mounted on the shaft 7. The U-shaped spring *c* is so adapted that, when the center of the spring clamping hole 6 does not lie on a plane *f* (FIGS. 3 and 4) that links the axis of the shaft 7 with that of the pin 8, the U-shaped spring *c* works to press either the front terminal end 12 or a rear terminal end 14 of the crescent-shaped pawl *b* against the periphery of the ratchet member *a*.

For example, if the swinging rod 1 is in the position indicated by a broken line *p*₁, it can be easily put in swinging motion in the direction indicated by an arrow *q*₁. As a certain one of the teeth 2 is successively clasped by each of the catches 4, the swinging rod 1 will be successively switched to each of the positions indicated by broken lines *p*₂ and *p*₃, and each of the switched conditions of the swinging rod 1 will be easily recognized by means of the clicking sounds heard by the operator. In reverse, even if the force is applied to the swinging rod

1 in the direction opposite to the arrow q_1 , i.e., in the direction indicated by an arrow q_4 (FIG. 5), the swinging rod 1 will not pivot in that direction since the catches 4 of the crescent-shaped pawl b hold back the ratchet member a .

Referring now again to the drawing, and more particularly to FIGS. 2 to 6, the small protuberance 13 comes in touch with the front terminal end 12 of the crescent-shaped pawl b when the swinging rod 1 comes to a predetermined position, e.g., to the position indicated by a broken line p_4 . Further pushing force applied to the swinging rod 1 in the direction indicated by the arrow q_1 will cause the crescent-shaped pawl b to be shifted backwards, i.e., in the direction indicated by an arrow q_2 . When the center of the spring clasping hole 6 has gone through the plane f , the force of the U-shaped spring c will cause the crescent-shaped pawl b to swing about the pin 8 as its fulcrum in the direction indicated by an arrow q_3 . Consequently, the teeth 2 will be disengaged from the catches 4. Inasmuch as the ratchet member a has been released from the crescent-shaped pawl b , the swinging rod 1 can now be further pushed until it comes to a position indicated by a broken line p_7 . If the swinging rod 1 is in the position p_7 , it indicates that an appliance or a piece of furniture is in a state of having been folded.

In order to let the crescent-shaped pawl b and the ratchet member a engage each other again, the swinging rod 1 should be put in swinging motion about the shaft 7 as its fulcrum in the direction indicated by the arrow q_4 to the extent that the fetlock-joint-shaped protuberance 15 does not only come in touch with the rear terminal end 14 of the crescent-shaped pawl b but also the said protuberance 15 pushes the said end 14 forwards. The crescent-shaped pawl b will then be pushed in the direction indicated by an arrow q_5 and, when the center of the spring clasping hole 6 has gone through the plane f , the force of the U-shaped spring c will cause the crescent-shaped pawl b to swing about the pin 8 as its fulcrum in the direction indicated by an arrow q_6 . In consequence, the crescent-shaped pawl b and the ratchet member a will engage each other again. Process of successively switching the swinging rod 1 to each of the position indicated by broken lines p_1 , p_2 , p_3 and so forth can now be set out again.

Thus the multistage regulation of the angle of inclination of the swinging parts of various furniture and appliances can be easily and freely performed notwithstanding the fact that the entire structure of the present invention is so simplified and made compact.

While I have disclosed only one embodiment of the

present invention, it is to be understood that this one has been given by way of example only and not in a limiting sense.

I claim:

1. A device for regulating the angle of inclination of the swinging parts of various furniture and appliances, comprising:

a swinging rod,

one end of said swinging rod adapted to be mounted on a fulcrum and provided with a ratchet member formed between two protuberances,

a crescent-shaped pawl adapted to face its concave brim to addendum circle of said ratchet member leaving a slight space in between,

one of said two protuberances adapted to engage with one end of said crescent-shaped pawl,

the other of said two protuberances adapted to engage with the other end of said crescent-shaped pawl,

at least one catch formed close to one terminal end of said concave brim of said crescent-shaped pawl and adapted to interlock with teeth of said ratchet member, permitting said ratchet member to rotate only in the direction of opposite terminal end thereof,

a bean-shaped hole formed in substantially middle portion of said crescent-shaped pawl substantially concentrically with said concave brim of said crescent-shaped pawl,

a cylindrical pin secured to the stationary part of an appliance or a piece of furniture and fitted into said bean-shaped hole, and

means for giving a constant pull at substantially middle point of convex rim of said crescent-shaped pawl toward the center of said ratchet member.

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Italy.

DAVID J. WILLIAMOWSKY, Primary Examiner

W. L. SHEDD, Assistant Examiner

U.S. Cl. X.R.

297—356

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,484,831 Dated December 16, 1969

Inventor(s) Teiji Higuchi

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading of the patent specification, line 5,
for "Ikuni-ku, Osaka, Japan"
read -- Ikuno-ku, Osaka, Japan --

SIGNED AND
SEALED
MAY 5 1970

(SEAL)

Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents