# United States Patent

**Lemery**

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## [54] RELEASABLE PAWL AND RATCHET MECHANISMS


[72] Inventor: **Jean-Paul Lemery**, Cluses, France

[73] Assignee: **Etablissements Carpano & Pons**, Cluses, France



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[30] **Foreign Application Priority Data**

July 24, 1969 France ..... 6925298

[52] **U.S. Cl.** ..... **188/82.3**, 188/82.7, 192/43.1

[51] **Int. Cl.** ..... **F16d 63/00**

[58] **Field of Search** ..... 188/82.2, 82.3, 82.7; 192/43.1, 46



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*Primary Examiner*—George E. A. Halvosa

*Attorney*—Robert E. Burns and Emmanuel J. Lobato



[57] **ABSTRACT**

A pawl is coaxially mounted on the shaft of a control button with which it is angularly interlocked but with an angular play. A spring selectively urges the pawl either towards an operative position in engagement with a ratchet or an inoperative position spaced from the ratchet, selection taking place by turning the control button. When the pawl is in operative position, the ratchet can turn in one direction which oscillates the pawl through an angle smaller than its angular play with the control button which is therefore not caused to oscillate. The shaft can be loosely mounted on a support with an elastomeric packing member to take up play and ensure fluidtightness; similarly, the pawl can be loosely mounted on the shaft so that when the pawl locks the ratchet, the pawl is pressed against a supporting surface thereby avoiding strain on the shaft.


**7 Claims, 12 Drawing Figures**

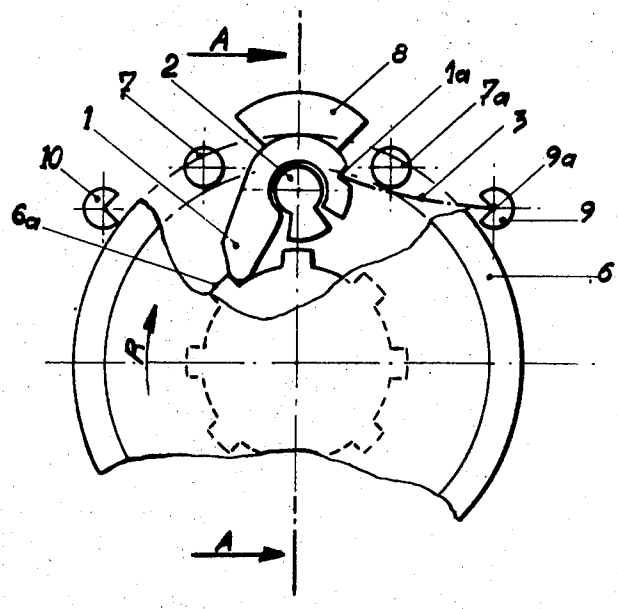

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Fig. 1

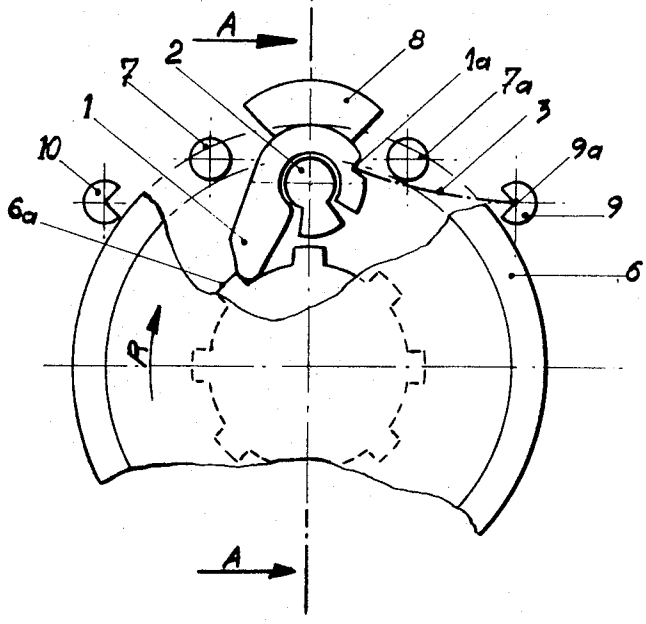



Fig. 2

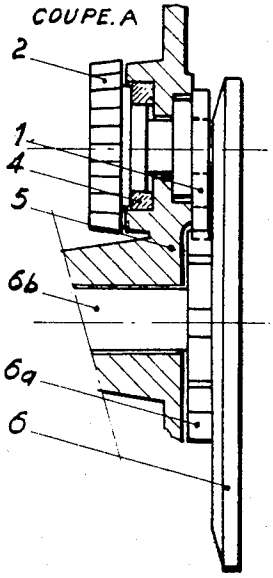



Fig 3

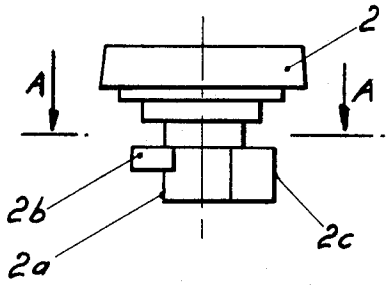



Fig. 4

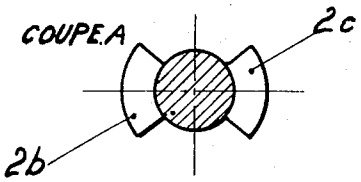



Fig. 5

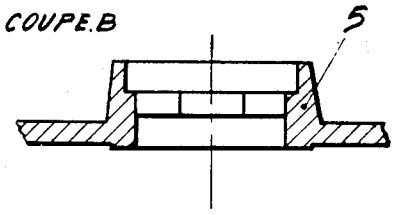



Fig. 6

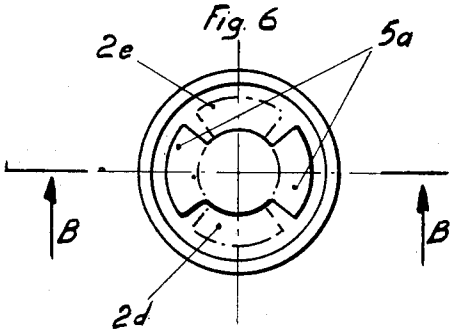


Fig. 7

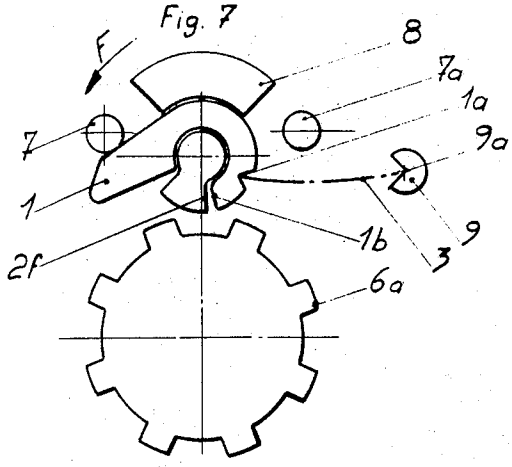



Fig. 8

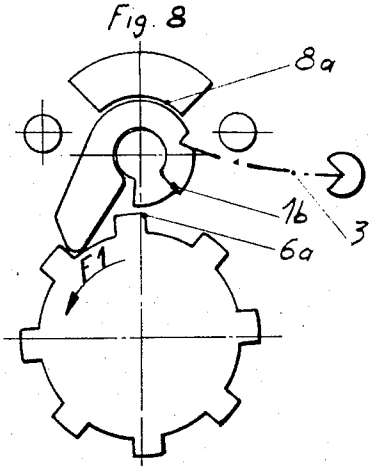



Fig. 9

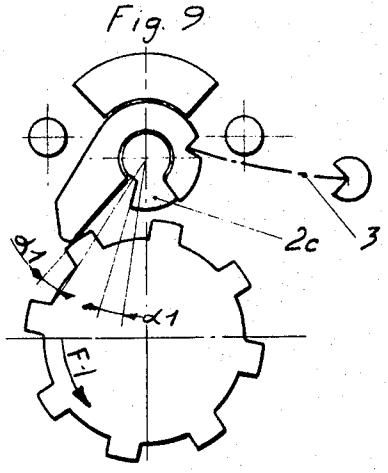



Fig 10

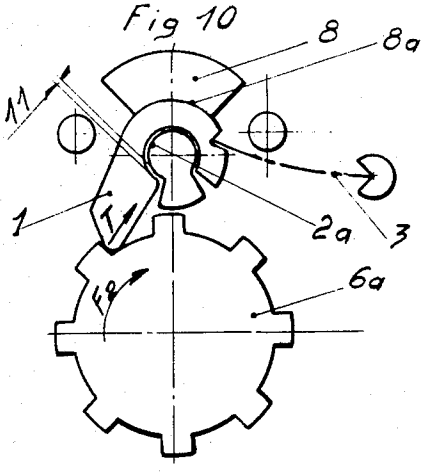



Fig. 11

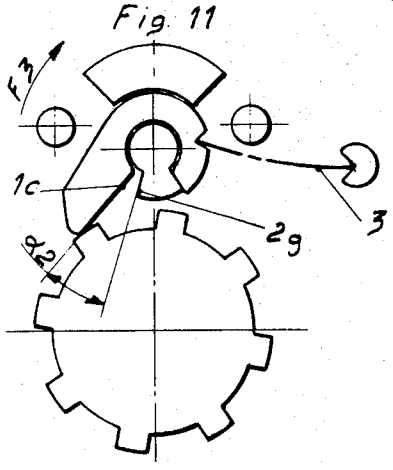
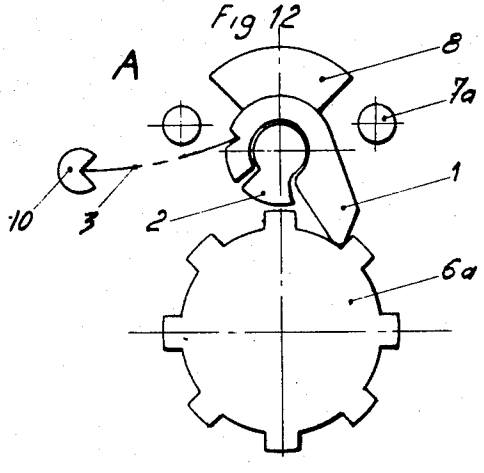



Fig 12



# RELEASABLE PAWL AND RATCHET MECHANISMS

This invention relates to pawl and ratchet mechanisms.

Releasable pawl and ratchet mechanisms are known, for example for fishing reels. The pawl, when in an operative position, allows rotation of the ratchet in only one direction but can be moved into an inoperative position, in which it allows rotation of the ratchet in both directions, by means of a control member generally fixed to the pawl and protruding outside a casing which houses the pawl and ratchet mechanism.

These devices suffer various drawbacks. The control member is caused to vibrate when the ratchet is rotated with the pawl in operative position, which is unsightly and often inconvenient. Furthermore, the control member generally requires provision of an oblong aperture in the casing so that the device is not watertight.

A certain well known type of releasable pawl and ratchet mechanism obviates these drawbacks in an efficient manner, but the device is costly. A push-button, lever, stud or other control member is located outside the casing and operates a cam which in turn can move the pawl by means of a shaft passing through the casing. However, the pawl and the control member must each have a return spring, which adds to the cost.

It is an object of the invention to provide a simple releasable pawl and ratchet device which overcomes the aforementioned drawbacks and which can be manufactured economically.

Another object of the invention is to provide a releasable pawl and ratchet device which stands up well to wear and, in particular, in which wear on the pivoting shaft of the pawl is avoided. An additional object is to provide a releasable pawl and ratchet device which can be simply dismantled, and mounted and in which the direction of rotation of the ratchet can, if desired, be reversed.

According to the invention, there is provided a releasable pawl and ratchet device comprising control means coaxially mounted with the pawl for pivoting the pawl between an operative position in engagement with the ratchet and an inoperative position spaced from the ratchet, and a spring selectively urging the pawl either towards the operative position or the inoperative position, wherein the control means and the pawl are angularly interlocked with an angular play at least as great as the angular excursion of the pawl caused by rotation of the ratchet whilst the pawl is in the operative position.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIG. 1 is a partially cut-away side view of a device according to the invention;

FIG. 2 is a cross-section along line A—A of FIG. 1;

FIG. 3 is a schematic side view of a control button for the device of FIGS. 1 and 2;

FIG. 4 is a cross-section along line A—A of FIG. 3;

FIGS. 5 and 6 are schematic views of part of the housing of the device, FIG. 5 being a cross-section along line B—B of FIG. 6; and

FIGS. 7 to 12 are schematic diagrams showing various phases of operation of the device.

The illustrated device comprises a pawl 1 mounted on a control button 2 and able to operatively engage a ratchet 6*a* which is rotatably mounted on a shaft 6*b* on a housing 5.

The control button 2 (FIGS. 3 and 4) is conceived so that it can be manufactured in one piece at low cost, for example by moulding in plastics material. Alternatively button 2 could be in metal. The button comprises two quadrant-shaped projections 2*b* and 2*c* of different thickness projecting from a shaft 2*a*. The housing 5 is provided with an aperture 5*a* (FIG. 6) shaped to allow projections 2*b* and 2*c* to freely pass therethrough so that button 2 can be mounted on the housing 5 with a knurled head portion located outside the housing and the projections 2*b* and 2*c* inside.

The pawl 1 is freely mounted with angular play (see FIG. 1) on the end of shaft 2*a* adjacent the projection 2*c* so that the pawl can be angularly moved by turning the knurled part of button 2. The pawl also has a certain diametral play, the purpose of which will be described further on.



The pawl 1 is held on button 2 by a washer 6 removably fixed to the ratchet 6*a*.

Once the pawl is mounted, the button 2 is prevented from adopting an alignment such that the projections 2*b* and 2*c* can pass through the aperture 5*a* so that the button 2 cannot unwantedly fall out of the housing 5.

Play in the mounting of button 2 is taken up by an elastic washer 4 in cellular plastics material or an elastomer which also ensures watertightness of the joint which is important, for example, when the device is incorporated in a fishing reel.

The angular movement of pawl 1 away from the ratchet 6*a* is limited by a stop 7 fixed on frame 5. A blade spring 3 (see FIGS. 7 to 12) is bowed between a notch 1*a* on the pawl 1 and a notch 9*a* in a stud 9 on the casing 5 so that the pawl is urged either towards a first position in which it abuts the stop 7 (FIG. 7) or towards a second position in which it operatively engages the ratchet 6*a* (FIG. 8); in between these two positions, the spring 3 has an unstable equilibrium position when the center of the shaft 2*a*, the notch 1*a* and the notch 1*b* are in line so that the pawl 1 can be selectively moved between the first and second positions by turning button 2.

Operation of the device will now be described with particular reference to FIGS. 7 to 11.

In the first position (FIG. 7) the pawl 1 is urged against the stop 7 by spring 3. In this position the pawl is completely disengaged from the ratchet 6*a* which is free to rotate in both directions.

When the button 2 is turned counter-clockwise (looking at FIG. 7) surface 2*f* of part 2*c* of the button engages the surface 1*b* of the pawl which is thus moved from the first to the second position (FIG. 8) in which it is operatively pressed against the ratchet 6*a* by spring 3.

With the pawl in this second position, the ratchet can rotate in the counter-clockwise direction as indicated by arrow F1 (FIG. 9). As the ratchet is rotated in direction F1 by its driving shaft 6*b*,the teeth thereof cause the pawl to intermittently oscillate through an angle $\alpha_1$, the pawl being permanently urged in the counter-clockwise direction by spring 3. The first tooth of the ratchet that lifts the pawl also causes displacement of the control button 2 through an angle $\alpha_1$ by action of the surface 1*b* of the pawl on the surface 2*f*. *Whilst the pawl is returned to its original position between two teeth 1 by action of the spring 3, the control button remains in the position of FIG. 9 during further rotation of the ratchet. It can thus be seen that during rotation of the ratchet in the direction of arrow F1, the control button will not be caused to vibrate or oscillate.*

If a force is applied to tend to turn the ratchet in the direction of arrow F2 (FIG. 10), a tooth of the ratchet transmits a stress T to the pawl. Stress T is not transmitted to the control button 2. Instead, the diametral play (schematically indicated by 11) between the pawl and shaft 2*a* allows the pawl to be moved to abut against a face 8*a* of a projection 8 on the housing 5. Therefore, however great to the force tending to turn the ratchet in the direction F2, there is no risk of shearing or causing undue wear on the button 2.

The pawl can be released from the ratchet by turning the button 2 in the direction F3, as indicated in FIG. 11.

The surface 2*g* of the button is freely turned until it comes into contact with the surface 1*c* of the pawl; at most, the button must be turned through an angle $\alpha 2$ before the surface 2*g* contacts the pawl. Then, against action of the spring 3, the button 2 is lifted until the spring has passed its point of unstable equilibrium from where the pawl is urged by the spring 3 towards the first position of FIG. 7.

THe direction of rotation of the ratchet, when the pawl is operating, can easily be reversed in the described device, as is indicated in FIG. 12. A second stop 7*a* and a second stud 10 are provided on the other side of button 8 to the stop 7 and stud 10. The pawl 1 is placed on button 2 facing in the other direction to that shown in FIG. 1 and FIGS. 7 to 11 and the spring 3 is placed between the stud 10 and notch 1*a*. The teeth of ratchet 6*a* are of rectangular shape, or any other suitable symmetrical shape, so that the pawl and ratchet device

operates in an exactly similar manner to before, apart from the allowed direction of rotation of the ratchet 6*a* when the pawl is in the operative position.

The device can be assembled and dismantled without the need for special tools and without difficulty. It is particularly suitable for use in fishing reels, but this use is given solely by way of example.

I claim

1. A releasable pawl and ratchet device comprising a pawl pivotally mounted for operative engagement with a rotatable toothed ratchet and control means rotatably mounted coaxially with the pawl for pivoting the pawl between an operative position in engagement with the ratchet and an inoperative position spaced from the ratchet, and a spring selectively urging the pawl either towards the operative position or the inoperative position, the pawl when in the operative position allowing rotation of the ratchet in one direction which causes oscillation of the pawl by the ratchet with a given angular excursion of the pawl, said control means comprising a shaft and said pawl being pivotally rotatable around said shaft, the control means and the pawl being angularly interconnected for angular movement of said pawl selectively from operative position to inoperative position and from inoperative position to operative position by angular movement of said control means, the angular connection between said control means and said pawl being provided with an angular play at least as great as said angular excursion of the pawl to permit said control means to remain stationary during said oscillation of the pawl when in operative position.

2. A pawl and ratchet device as claimed in claim 1, wherein in the inoperative position the pawl abuts against a stop member.

3. A pawl and ratchet device as claimed in claim 1, wherein the spring is a blade spring bowed between a recess in the pawl and a fixed member, an imaginary line joining the axis of pivoting of the pawl and the fixed member defining, when the recess coincides with said line, a state of maximum bowing of the spring, the recess being located on one side of said line when the pawl is in the operative position and on the other side of said line when the pawl is in the inoperative position, and the control means enabling the pawl to be turned so that the recess can be moved from a position on one side of said line to a position on the other side.

4. A pawl and ratchet device as claimed in claim 1, wherein the ratchet has symmetrical teeth and wherein the pawl and spring can be reversibly mounted in relation to the control means, whereby the direction of rotation of the ratchet with the pawl in the operative position can be reversed.

5. A pawl and ratchet device as claimed in claim 1, wherein said shaft has first and second ends, and said control means further comprises a control button on the first end of said shaft, and a projection on the second end, said projection being engageable against a first surface of the pawl to cause pivoting thereof in a first direction and against a second surface of the pawl to cause pivoting thereof in a second direction.

6. A pawl and ratchet device as claimed in claim 5, wherein the shaft passes through an aperture in a support with radial and axial play, the button being located on one side of the support and the pawl being located on the other side of the support, and comprising an elastically deformable packing member to take up the said radial and axial play of the shaft in the aperture and to ensure a fluidtight joint.

7. A pawl and ratchet device as claimed in claim 5, wherein the pawl is mounted on the shaft with a radial play, and comprising a supporting surface adjacent to the pawl such that if a force tends to turn the ratchet in the direction opposed by the pawl while the pawl is in the operative position, the pawl is pressed against and supported by the supporting surface.

* * * * *