Nov. 17, 1942. P. J. McCULLOUGH 2,302,131

CLOCK RATCHET STRUCTURE

Filed April 11, 1942

FIG. 1.

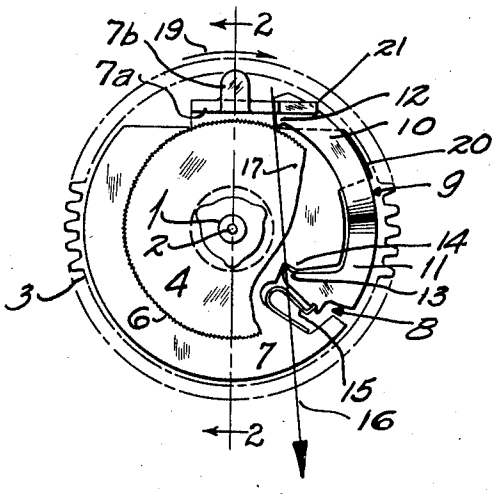


FIG. 2.

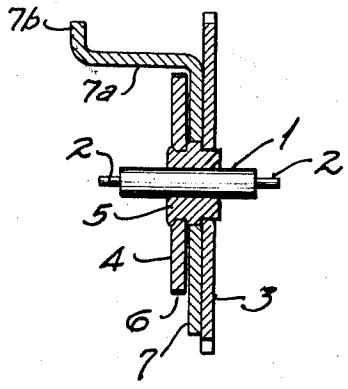


FIG. 3.

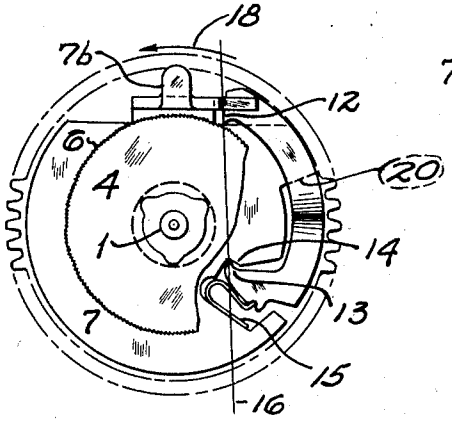
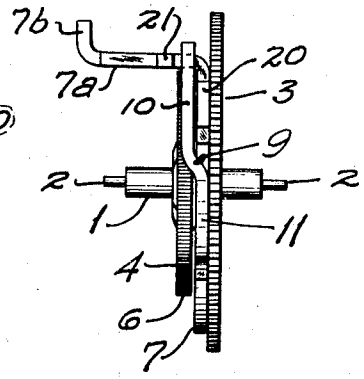


FIG. 4.



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CLOCK RATCHET STRUCTURE

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7 Claims. (Cl. 74—577)

The invention relates to ratchet mechanisms and more particularly to a ratchet mechanism adapted for use in a clock such as may be used as a timing mechanism in electric toasters and similar appliances where the timer is energized manually when the appliance is put to use.

Reference is made to Patent No. 2,274,724, issued to the present applicant March 3, 1942, and showing the application of such a timer to an electric toaster. The present invention comprises improvements upon the ratchet structure illustrated and described in the above-mentioned patent.

One of the objects of the present invention is to provide for simple and economical manufacture of an accurate and durable timer of the class described.

A more specific object of the invention is to prevent lost motion in ratchet parts and thereby make it possible to accurately duplicate timing periods of the same duration for successive operations of the appliance.

Another specific object of the invention is to provide positive engagement of the ratchet pawl and ratchet teeth.

Another object of the invention is to provide for the positive movement of the pawl point towards the pawl teeth without using the surface of the pawl teeth as a cam or guide for the pawl point.

These and other incidental objects of the invention as will appear from the following description are attained by the structure illustrated in the accompanying drawing in which—

Figure 1 is an elevation of a ratchet assembly, a portion of the ratchet wheel being broken away to more clearly illustrate the parts beneath. The figure shows the parts in the position assumed when the ratchet wheel is being rotated by the pawl.

Figure 2 is a vertical section taken on the line 2—2 of Figure 1.

Figure 3 corresponds to Figure 1 but shows the parts in the position assumed when the pawl is riding over the ratchet teeth.

Figure 4 is a side or edge view of the structure shown in Figures 1 and 3.

The structure is shown as mounted upon a shaft 1 with pinlies 2 and a gear wheel 3 which may form part of a clock gear train. A ratchet wheel 4 is rotatably mounted on the hub 5 of gear 3, and the periphery of wheel 4 is formed with continuous indentations or unusually fine teeth 6.

Also rotatably mounted on gear hub 5 is a pawl carrier or driver member having a disc-like body 7 with an offset arm or crank 7a having a lip 7b disposed to be engaged by a link or other connection to a manually operable part by which the driver may be moved in one direction when the timer is energized. The disc-like body 7 is provided with a deep recess 8 extending inwardly from the periphery of the disc towards shaft 1 and inwardly of the periphery of wheel 4.

Associated with the driver is a pawl 9 having a head 10 and a tail 11. Head 10 terminates in a tooth element 12 directed towards wheel teeth 6. Tail 11 terminates in a pivot element 13 directed towards a bearing 14 on the driver at the inner end of recess 8. A spring 15 engages opposing surfaces of recess 8 and the pawl tail to thrust the pawl about pivot element 13 so as to move tooth 12 towards the wheel teeth. Elements 12 and 13 oppose each other and are spaced at a substantial distance from each other along a line 16 disposed to form a chord across wheel 4 and defining a segment 17 of substantial area. Pawl tail 11 lies in the same plane as the carrier body part 7. Pawl head 10 and tail 11 are offset from each other transversely of the general plane of the device, the tail lying in the plane of disc 7 and the head lying in the plane of wheel 4 and extending between an ear 20 on disc 7 and a lug 21 on arm 7a whereby pawl 9 is held in position transversely of the general plane of the device. This construction provides a simple effective pivotal assembly of the parts, without requiring a pivot pin, and overlapping elements on the pawl tail and the disc at the pin to provide bearings for the pin. Obviously such overlapping could not be provided inwardly of the periphery of wheel 4 without thickening the unit.

Operation.—When carrier 7 is rotated about the axis of shaft 1 in the direction indicated by the arrow 18 in Figure 3, pawl 9 is yieldingly pushed in said direction by spring 15 and the pawl may swing on its pivot element 13 to permit its tooth element 12 to ride freely over teeth on the wheel 4. This is the relative action of the parts which is effected through arm 7a and lip 7b by the manual movement of the toaster, for example, to begin a toasting operation and energize the clock mechanism and start the timing of a toasting period.

When carrier 7 is rotated in the opposite direction, indicated by the arrow 19 in Figure 1, as by a clock spring (not shown) energized in the starting operation, carrier bearing 14 positively and immediately moves pawl 9 in the direction of the arrowhead on line 16, positively thrusting

pawl tooth 12 into contact with adjacent teeth 6 and the carrier moves the pawl and the ratchet wheel in the direction of arrow 19. The pull on the pawl is directly towards the base of the recess between successive teeth and not laterally of the tooth itself. Hence there is no tendency of the pull to shear the teeth and the teeth may be made much finer than would be possible with an ordinary ratchet structure in which the driving thrust of the pawl is resisted primarily by the resistance of the tooth to shear. Hence the usual lost motion between the manual energizing movements and the spring actuated timing movement will be so reduced that there will be no noticeable variation in successive timing periods as would follow the use of larger teeth.

The parts of the device are readily manufactured from stampings and need not be accurately finished to produce the desired results and the parts may be readily assembled. The positive action of the pawl tooth towards the wheel, free of guidance by the face of the tooth, makes the contour of the teeth relatively unimportant. Indeed, if the pawl be made of hard metal and the wheel 4 of relatively soft metal, the pawl point will bite into the wheel and create its own teeth even though wheel 4 has a smooth periphery initially.

It will be understood that the details of the structure may be varied without departing from the spirit of the invention and that the device may be used in appliances other than a toaster, and the exclusive use of the structure illustrated and the modifications coming within the scope of the claims is contemplated.

What is claimed is:

1. In a device of the class described, a shaft, a toothed wheel thereon, a disc-like carrier adjacent said wheel with a deep recess extending from its periphery a substantial distance inwardly of the wheel towards the shaft, the wheel and carrier being rotatable about the shaft axis relative to each other, a pawl associated with the carrier and including a tooth point part and a bearing part opposing each other but spaced apart, said bearing part being seated on an element at the inner end of said recess and said tooth point part being movable about said bearing part as a pivot to ride over the wheel teeth, when the carrier and wheel are rotated relative to each other in one direction, and being moved positively towards the wheel teeth by said carrier element when the carrier is moved in the opposite direction.

2. In a device of the class described, a shaft, a disc-like wheel, provided with peripheral teeth, and a disc-like pawl driver mounted side by side on said shaft and rotatable relative to each other, the pawl driver having a recess extending inwardly from its periphery and inwardly of the periphery of the wheel, a pawl having a tail part positioned in the plane of the driver and extending into said recess and having a head part offset from the tail part to lie in the plane of the wheel and provided with a tooth opposing the wheel teeth, the end of the pawl tail part extending under the wheel and having a bearing against the edge of the inner portion of said recess to form a pivot for the pawl.

3. A structure as described in claim 2 in which the pawl driver includes elements at opposite sides of the pawl head to hold the latter against movement transversely of the wheel, there being a spring between the end of the pawl tail part and an opposing face of the driver recess yieldingly holding the pivot forming end of the tail part against its bearing in the recess.

4. A structure as described in claim 2 which includes a spring between the end of the pawl tail part and an opposing face of the driver recess yieldingly holding the pivot forming end of the tail part against its bearing in the recess.

5. In a device of the class described, a shaft, a wheel thereon, a driver, said wheel and driver being rotatable about the shaft axis relative to each other, said wheel having a toothed periphery and said driver having a recess extending inwardly from its edge and abreast of a portion of said wheel, a pawl of arcuate contour extending about a portion of the periphery of the wheel and having points at its opposite ends facing towards each other along a chordal line extending across the wheel and defining a wheel segment of substantial area, one of said points opposing the toothed periphery of said wheel and the other of said points opposing a side of the recess in said driver, whereby movement of the driver about the shaft axis in the direction in which the point-opposed side of said recess faces positively thrusts the other pawl point towards the wheel periphery.

6. A structure as described in claim 5 in which the recess is wide enough to accommodate the shifting of the adjacent end of the pawl across the recess to permit the point at the other end of the pawl to ride over the wheel teeth when the driver is moved in the opposite direction.

7. A structure as described in claim 5 in which the recess is wide enough to accommodate the shifting of the adjacent end of the pawl across the recess to permit the point at the other end of the pawl to ride over the wheel teeth when the driver is moved in the opposite direction, there being a spring seated against one side of the recess and thrusting the adjacent end of the pawl towards the other side of the recess to yieldingly hold the pawl in predetermined relation to the driver.

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