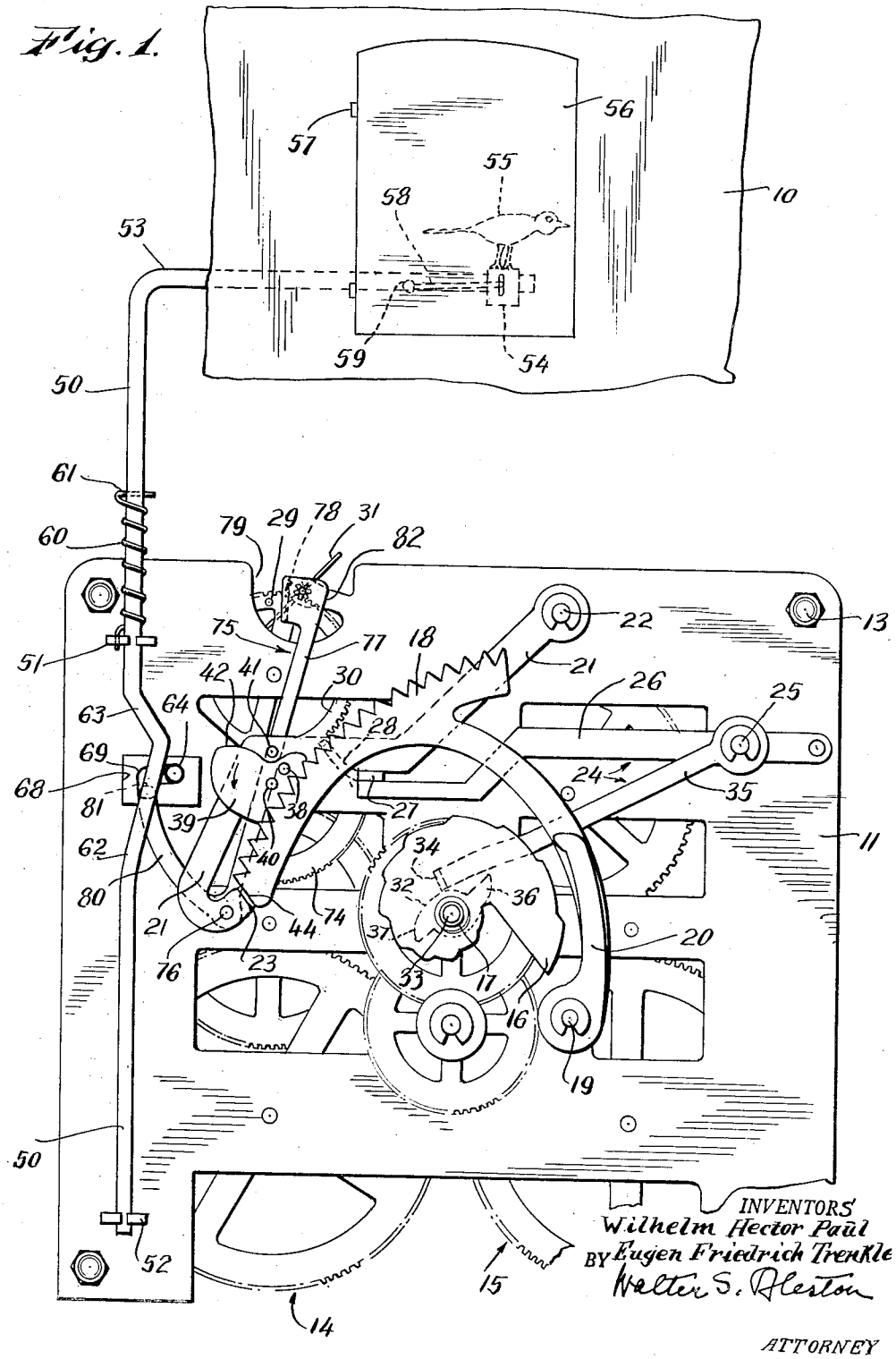
Nov. 13, 1951 W. H. PAUL ET AL 2,574,704

MECHANISM FOR CUCKOO CLOCKS

Filed Aug. 19, 1950 2 SHEETS—SHEET 1

Fig. 1.



INVENTORS
Wilhelm Hector Paul
BY Eugen Friedrich Trenkle
Walter S. Preston

ATTORNEY

Nov. 13, 1951 W. H. PAUL ET AL 2,574,704

MECHANISM FOR CUCKOO CLOCKS

Filed Aug. 19, 1950 2 SHEETS—SHEET 2

Fig. 4.

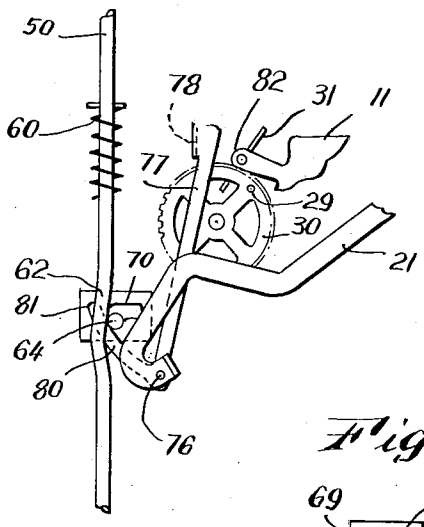


Fig. 5.

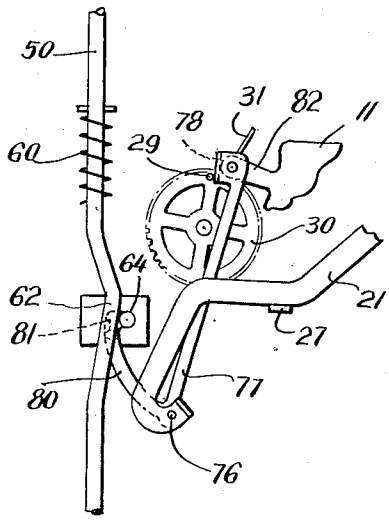


Fig. 6.

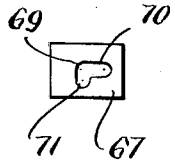


Fig. 3.

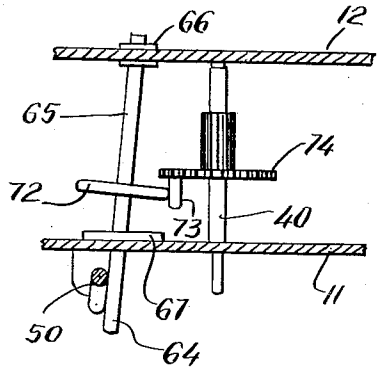
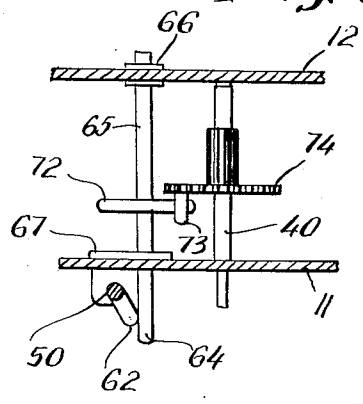


Fig. 2.



INVENTORS.
Wilhelm Hector Paul
BY Eugen Friedrich Trenkle
Miller S. Denton
ATTORNEY

Patented Nov. 13, 1951

2,574,704

UNITED STATES PATENT OFFICE

2,574,704

MECHANISM FOR CUCKOO CLOCKS

Wilhelm Hector Paül and Eugen Friedrich Trenkle, Furtwangen, Black Forest, Germany, assignors to Badische Uhrenfabrik G. m. b. H., Furtwangen, Black Forest, Germany, a corporation of Germany

Application August 19, 1950, Serial No. 180,372
In France July 10, 1947

14 Claims. (Cl. 58—12)

1

The present invention relates to a mechanism for moving the cuckoo figure in a cuckoo clock with a rack striking mechanism.

Rack striking mechanism for producing the acoustical signals in conformity with the setting of the hands of clocks provided with gongs or chimes are well known. In cuckoo clocks where the acoustical signal is a pneumatically emitted cuckoo call, either solely or in addition to the sounding of a gong or chime, the conventional system of the rack mechanism can be readily used for causing the acoustical signals as there is no material difference whether the mechanism is used to operate a hammer striking a gong or to operate bellows supplying air to the pipes producing the cuckoo call.

However, in a cuckoo clock it is further required that the cuckoo appears at the beginning of the acoustical signal, thereafter remains in the visible position until the acoustical signal is finished, and, finally, disappears at the end of that signal.

In conventional cuckoo-clocks of the type here under consideration complicated apparatus is used whereby the positive connection between a shaft moving the bird figure and the striking mechanism is interrupted only at the striking of the hours, whereas the movement of the bird at the half hours is caused in a different manner.

The invention aims to provide means whereby members of the striking and/or calling mechanism are instrumental to control a relatively simple mechanism for the moving of the bird in the same way and with the desired effect each time an acoustical signal will be sounded at the full and the half hours.

The invention further aims to utilize the kinetic energy of rotating parts of the striking mechanism for imparting impulses to the bird-moving mechanism to cause the appearance and disappearance, respectively, of the cuckoo.

The invention essentially consists in that a spring biased element connected with the bird is held in either of the two positions by a shiftable member under the control of rotating parts of the striking or calling mechanism, the arrangement being such that a shift of the member in the one direction will cause a movement of the element against the restraint of the spring for the appearance of the bird, whereas a shift of the member in the other direction will cause a movement of the element under the action of the spring so as to withdraw the cuckoo.

The invention further consists in the combination of the mentioned shiftable member with

2

an abutment defining one end position into which the member is urged under the action of the mentioned spring, and means to retain it in another end position when shifted against the restraint of the spring.

Also according to the invention there are means whereby a rotating part of the striking mechanism is adapted to cause a shift of the shiftable member from its first to its second end position by an impact at the beginning of an acoustical signal, and other means whereby the shiftable member is shifted from the other end position by an impact at the end of the acoustical signal.

Further objects and details of the invention will be apparent from the description given hereinafter and the accompanying drawing illustrating an embodiment thereof by way of example. In the drawing;

Fig. 1 is a front elevation of a clock movement with a mechanism according to the invention for moving the cuckoo figure.

Figs. 2 and 3 are top plan views of parts of the mechanism in positions immediately before and after the appearance, respectively, of the cuckoo, which parts are instrumental to cause the appearance of the bird figure,

Figs. 4 and 5 are front elevations of those parts which cause the disappearance of the cuckoo, in positions during its visibility and immediately before its disappearance, respectively, and

Fig. 6 is a front elevation of a guide plate of the mechanism.

Referring now to the drawing, Fig. 1 illustrates a cuckoo-clock of which the hands, the driving means for the movement and striking mechanism and the sounding devices such as gongs, pipes and bellows are not shown, as they may be of any suitable and conventional type. Only so much has been shown of such movement and striking mechanism as necessary for the understanding of the invention.

The clock comprises within a housing of which a portion of the front wall 10 is visible in the upper part of Fig. 1, a front plate 11 and a rear plate 12 connected in a spaced relationship by posts 13. Between the plates, the gear train of the striking mechanism, in general denoted by 14, and the gear train of the movement in general denoted by 15 are accommodated. In front of the front plate, the control elements including a rack drive are arranged which ensure conformity of the operation of the striking mechanism with the turning of the hands regardless

whether they are turned by the drive of the movement or by a user in adjusting the hands. These parts comprise a snail cam 16 secured to the hour shaft 17 which completes one revolution in twelve hours and an arcuate rack 18 pivoted at 19 to the front plate 11 and provided with an arm 20 adapted to bear on the snail cam thereby to limit the movement of the rack 18 when the latter is free to turn owing to gravity in a counter-clockwise direction in Fig. 1. A holding pawl 21 is pivoted at 22 and so shaped that in the position of Fig. 1 the lower rack end bears on the forwardly bent lower end portion 23 of the pawl which is adapted to engage between the rack teeth as it will be described hereinafter. The pawl can be lifted by a lever in general denoted by 24 and pivoted at 25. The free end of arm 26 of lever 24 is provided with a lateral projection 27 which is forwardly directed so as to lie underneath the pawl 21, and with an upwardly and backward directed extension 28. This extension is so arranged that when lever 24 is lifted, it enters into the path of a pin 29 on a gear wheel 30 of the striking mechanism which drives a fan governor 31. Lever 24 can be reciprocated under the control of the clock movement. For this purpose a cam 32 is secured to the minute shaft 33 and the free end 34 of the other arm 35 of lever 24 is formed as the cam follower. The cam 32 has two crests 36 and 37 spaced 180° from each other and coordinate to the full hour and to the half-hour positions, respectively, of the minute hand (not shown). For a reason to be explained later, the crest 36 is higher than the crest 37. This cam mechanism serves to withdraw the holding pawl 21 from its position of Fig. 1 in order to permit the rack 18 to drop. A lifting pawl for raising the rack is formed by a pin 38 eccentrically secured to another cam 39 which is fixed on the shaft 40 of a suitably driven wheel 74 of the striking mechanism. A pin 41 forwardly projecting from the holding pawl 21 constitutes the follower of cam 39. The latter is provided with a recess 42 into which pin 41 engages in the position of Fig. 1. The shape of the cam and the arrangement of the parts is such that when the holding pawl end 23 is in a position in which it has entered the space between two adjacent teeth of the rack dropped from the position of Fig. 1, and when, then, the cam 39 rotates in counter clockwise direction, the lifting pawl 38 will engage a tooth of the rack and lift it one step whereas at the same time the cam 39 will lift the holding pawl out of engagement, but will let it drop back to enter the subsequent space between adjacent teeth when the lifting pawl 38 leaves the tooth it engaged.

The mechanism so far described operates in the following manner. When the minute shaft 33 turns and the minute hand approaches the full hour position, the higher cam crest 36 will contact the follower 34 so as to raise lever 24 which in turn by means of the projection 27 will swing the holding pawl 21 in clockwise direction. Thereby the pin 41 which in engagement with recess 42 of cam 39 prevents the operation of the striking mechanism will be lifted out of the recess. At the same time, however, extension 28 of lever arm 26 enters the path of the pin 29 of wheel 30 so that the striking mechanism cannot run off prematurely. Owing to the withdrawal of the holding pawl 21, rack 18 can drop until stopped by the snail cam follower 20 engaging the snail cam. Exactly when the minute hand reaches the full hour position the cam follower 34 drops from crest 36, thereby withdrawing extension 28 from the path of pin 29 and permitting the pawl 21 to fall with its end 23 in the space between two adjacent teeth of the rack 18. Simultaneously the striking mechanism will start to operate whereby the cam 39 will be rotated. Per each revolution of the cam disc 39 the lifting pawl will raise the rack one tooth until finally the rack has been lifted so high that the holding pawl end 23 can slide under the end face 44 of the rack and pin 41 reengages the recess 42 to stop the striking mechanism.

At the half hours the smaller crest 37 will lift lever 24, and with the aid of the latter, also pawl 21. The latter, however, will be lifted only so far that the pawl end 23 will still stay in engagement with the end surface 44 of rack 13, but will permit the rack to drop a distance equal to the spacing of two adjacent teeth, for which purpose the end face 44 is inclined similarly to the flank of a rack tooth. This movement of the pawl 21 is sufficient to lift the pin 41 out of the recess 42 so that the disc 39 can complete one revolution to raise the rack one tooth and to reestablish the original position of the parts. It will be clear, that the distance the rack 18 can drop at the half hours will be the same as permitted by the cooperation of the snail cam 16 and its follower 20 at the stroke of 1 o'clock.

Although any other suitable and conventional rack striking mechanism can be substituted for the illustrated mechanism in the realization of the present invention, a detailed description thereof has been given in order to show the function and manner of operation of the holding pawl 21 to which essential parts of the invention are connected in order to bring about the desired movement of the cuckoo figure.

For this purpose a vertical shaft 50 is journaled in bearings 51 and 52 on the left hand side of the front plate 11. The upper end 53 of shaft 50 is bent at a right angle and carries the cuckoo figure 55 secured thereto by a clamp 54. The cuckoo is concealed in Fig. 1 by the door 56 which is hinged at 57 to the front wall 10 of the clock housing. A connecting rod 58 is linked to clamp 54 and to the inside of the door at 59. Thus it will be clear that a turn of shaft 50 in a clockwise direction seen from the top will push door 56 open through connecting rod 58 and bring the cuckoo to appear in the door space. Turning of shaft 50 in the opposite direction will cause shutting of the door and disappearance of the figure.

Shaft 50 is biased by a torsion spring 60 secured to the shaft at 61 with its one end and to the bearing 51 with its other end. Intermediate the bearings 51 and 52, shaft 50 forms a crank having inclined cheeks 62 and 63. Under the action of spring 60 the crank of shaft 50 bears with its cheek 62 against the free end 64 of a rod 65.

As apparent from Figs. 2 and 3, the rear end of the rod 65 is journaled in a bearing 66 in the rear plate 12 so that the rod can freely swivel therein. The front end portion 64 of rod 65 is guided in a slotted plate 67 secured to the front wall 11 in the rear of a window 68. The guiding slot in general denoted by 69 and clearly shown in Fig. 6 is of arcuate or right-angular shape having a substantially horizontal portion 70 and a downwardly extending arm 71. The crank portion 62 will tend to push the rod end 64 against the right hand end of the horizontal portion 70. When, however, rod end 64 having turned shaft 50 against the tension of spring 60 engages the

lower end of the downwardly directed arm 71 of the slot, the rod and shaft are locked in the position of Figs. 3 and 4. This locking effect is due to the fact that the direction of the slot arm 71 is at right angles to the plane of the rotation of the crank. In addition, the pressure of the crank on the rod end 64 under the action of the spring has a downwardly directed component owing to the inclination of the cheek 62. Intermediate the front plate 11 and the rear plate 12, rod 65 carries a disc 72 for cooperation with a pin 73 projecting from a wheel 74 which is secured to the aforementioned shaft 40 on which the cam 39 of the rack-lifting pawl is mounted. If now in the position of Fig. 2 by rotation of wheel 74 pin 73 strikes the disc 72, rod 65 will be thrown by the impact towards the left hand side so as to enter with its portion 64 the downwardly directed slot arm 71 thereby to turn the crank shaft 50. The inclination of the cheek 62 helps to urge rod end 64 towards the end of slot portion 71. The mass of the disc 72 is so selected that its kinetic energy owing to the impact is sufficient to overcome the restraint of spring 60.

Means are provided to release rod-end 64 from locking position in proper timing with the end of a stroke of the sounding mechanism. For this purpose a bell crank lever in general denoted by 75 is pivoted at 76 to the holding pawl 21 near the lower end of the latter. The one arm 77 of lever 75 extends upwardly and has a projection 78 at its upper end which reaches through a recess 79 of front wall 11 and which, in the position of Figs. 1 and 5, is in the path of the aforementioned pin 29 of the governor-driving wheel 30. The angular movement of arm 77 towards the right hand side is limited by a projection 82 of plate 11 in which the one end of the governor-shaft is journaled. The other arm 80 of lever 75 is arcuate and so formed that its upper end 81 slightly overlaps the lower end of the slot arm 71, when the lever 75 is in the position of Figs. 1 and 5. If, however, the rod end 64 is in the position of Fig. 4 and pawl 21 is raised, the concave side of arm 80 will be engaged by rod end 64 so that lever 75 is turned about its pivot 76 in a counter-clockwise direction and its end 78 is spaced from the plate projection 82.

The mechanism operates in the following manner: When, as hereinbefore described the minute hand approaches a full hour or a half hour position and the holding pawl 21 will be raised, lever 75 pivoted to pawl 21 will also be lifted out of the path of the pin 29 on wheel 30 while arm 80 bypasses the end 64 of the locking rod 65 which is still in the position of Figs. 1, 2, and 5. When, now, the striking mechanism begins to run off, pin 73 of wheel 74 will impact disc 72 and the imparted energy will throw the end 64 of rod 65 into the locking position of Fig. 4. Thereby shaft 50 will be turned against the restraint of the spring 60 so as to rapidly open the door 56 and to bring the cuckoo figure 55 forward.

When, at the end of the hour or the half hour stroke, pawl 21 drops back to the position of Fig. 1, arm 80 of lever 75 will be guided by the rod end 64 so that arm 77 stays spaced from its abutment at 82, until the end 81 of the arm 80 reaches a position by which it engages the locked rod end 64 from below. Simultaneously, however, projection 78 of arm 77 has moved downward in the path of pin 29 on the rapidly rotating wheel 30. The impact throws lever arm 77 against abutment 82, thereby slightly raising the end 81 of arm 80 to shift rod end 64 out of its locking position. This causes spring 60 to turn shaft 50 so that the crank-cheek 62 pushes rod end 64 back to the end of the slot arm 70 and that the shaft arm 53 rapidly withdraws the bird figure 55 and slams door 56 shut. At the same time the impact of the pin 29 on the projection 78 strongly brakes the wheel 30, so that the striking mechanism which notwithstanding the engagement of pin 41 in cam recess 42 has not yet come to a complete standstill, will now be abruptly stopped.

Thus, the mechanism serves to cause a rapid appearance of the cuckoo at the beginning of an operation of the striking mechanism and also a rapid disappearance at the end of such operation, both under the control and owing to an impact of a member or members of the striking mechanism on parts of the mechanism of the bird movement.

It will be apparent to those skilled in the art that many modifications and alterations of the structure illustrated and hereinbefore described are possible without departure from the essence and spirit of the invention which for that reason shall not be limited but by the scope of the appended claims.

We claim:

1. In a cuckoo-clock, the combination of a rack striking mechanism, a reciprocable member adapted to move a cuckoo-figure, a spring connected to said member and tending to urge it in the one direction, a shiftable member permanently bearing against said reciprocable member in said direction, means under the control of said mechanism and adapted to shift said shiftable member into an end position against the restraint of said spring, means to hold said shiftable member locked in said end position, and other means under the control of said mechanism to release said shiftable member from its locked position.

2. In a cuckoo clock with a rack striking mechanism, the combination of a reciprocable member adapted to move a cuckoo figure, a spring connected to said member and tending to urge it in the one direction, a shiftable locking member permanently bearing against said reciprocable member in said direction and having two end positions, said locking member when shifted by said reciprocable member under the action of said spring into its first end position, being in the path of a movable part of said striking mechanism, guiding means for said locking member whereby said locking member will be shifted into its second end position by an impact of said part at the beginning of an operation of the striking mechanism so as to urge said reciprocable member against the restraint of said spring, said guiding means including means to retain said locking member in said second end position so as to lock said reciprocable member against a movement in the first mentioned direction, and means under the control of said striking mechanism to release said locking member from its second end position at the end of an operation of said striking mechanism.

3. In a cuckoo clock with a rack striking mechanism, the combination of a cranked shaft adapted to move a cuckoo figure, a spring connected to said shaft and tending to turn it in one direction, a shiftable locking member permanently bearing against the crank of said shaft and having two end positions, said locking member when shifted by said crank under the action of said spring into its first end position being in the path of a movable part of said striking

mechanism, guiding means for said locking member whereby said locking member will be shifted into its second end position by an impact of said part at the beginning of an operation of said striking mechanism so as to turn said cranked shaft against the restraint of said spring, said guiding means including means to retain said member in said second end position so as to lock said shaft against a turn in the first mentioned direction, and means under the control of said striking mechanism to release said member from its second end position at the end of an operation of said striking mechanism.

4. In a cuckoo clock with a rack striking mechanism, the combination of a cranked shaft adapted to move a cuckoo figure, a spring connected to said shaft and tending to turn it in one direction, a rod swivellingly journaled with one of its ends in a stationary part of said clock, the free end of said rod permanently bearing against the crank of said shaft, a guiding means for the free end of said rod, said guiding means including abutment faces so as to define two end positions of said free rod end, whereby said rod when shifted by said crank under the action of said spring into the first end position is in the path of a movable part of said striking mechanism, and whereby said rod when impacted by said movable part at the beginning of an operation of said striking mechanism will be shifted by said impact into said second end position so as to turn said cranked shaft against the restraint of said spring, said guiding means further including means to retain said free rod end in said second end position, and means under the control of said striking mechanism to release said free rod end from its second end position at the end of an operation of said striking mechanism.

5. In a cuckoo clock with a rack striking mechanism, the combination of a cranked shaft adapted to move a cuckoo figure, a spring connected to said shaft and tending to turn it in one direction, a rod swivellingly journaled with one of its ends in a stationary part of said clock, the free end of said rod permanently bearing against the crank of said shaft, a guiding means provided with a slot engaged by said free end of said rod, said slot having a first portion directed substantially at right angles to said shaft and a second portion substantially parallel to said shaft, whereby said crank under the action of said spring tends to shift said free rod end towards the end of said first slot portion, a means secured to a movable part of said striking mechanism and adapted upon operation of the latter to impact said rod so as to urge it from the first into the second portion of said slot, and means under the control of said striking mechanism to move said free rod end out of said second portion.

6. In a cuckoo clock, the combination of a rack striking mechnism including a train of gear wheels, a cranked shaft adapted to move a cuckoo figure, a spring connected to said shaft and tending to turn it in one direction, a rod swivellingly journaled with one of its ends in a stationary part of said clock, the free end of said rod permanently bearing against the crank of said shaft, a guiding means provided with a slot engaged by said free end of said rod, said slot having a first portion directed substantially at right angles to said shaft and a second portion substantially parallel to said shaft whereby said crank under the action of said spring tends to shift said free rod end toward the end of said first slot portion, a means secured to one of the wheels of said train of wheels and adapted upon rotation of said wheel to impact said rod so as to urge the free rod end from the first into the second portion of said slot, and means under the control of said striking mechanism to move said free rod end out of said second portion.

7. A device as claimed in claim 6, the crank of said shaft being formed by two portions at an angle to each other, said free rod end bearing against one of said portions, the inclination of said portion being such that the pressure exerted by said portion on said rod end has a smaller component directed towards the end of said second portion of said slot.

8. A device as claimed in claim 6, said rod including a disc intermediate its ends, and said means secured to a wheel of said train of wheels consisting of a lateral projection of said wheel adapted to impact the periphery of said disc.

9. In a cuckoo clock, the combination of a rack striking mechanism including an element having an end position from which it is removed at the beginning and to which it is returned at the end of an operation of said mechanism, a reciprocable member adapted to move a cuckoo figure, a spring connected to said member and tending to urge it in the one direction, means under the control of said striking mechanism to shift said member in the opposite direction into an end position against the restraint of said spring, a locking member adapted to engage a stationary part of said mechanism so as to retain said reciprocable member in said end position, a third member linked to said element, means to guide said third member in a path so as to engage said locking member in its locking position upon a return movement of said element, and means under the control of said striking mechanism at the end of an operation of the latter to impact said third member so as to remove said locking member from locking position.

10. In a cuckoo clock the combination of a rack striking mechanism including a gear wheel having a lateral projection, and an element having an end position from which it is removed at the beginning and to which it is returned at the end of an operation of said striking mechanism, a reciprocable member adapted to move a cuckoo figure, a spring connected to said member and tending to urge it in the one direction, means under the control of said striking mechanism to shift said member in the opposite direction into an end position against the restraint of said spring, a releasable locking member adapted to engage a stationary part of said mechanism so as to retain said reciprocable member when in said end position, a two-armed lever pivoted to said element, and means to guide the first one of said lever arms so as to engage said locking member in its locking position and said second lever arm into the path of said wheel projection upon the return movement of said element, whereby the impact of said projection on said second arm will cause said first arm to remove said locking member from locking position.

11. In a cuckoo clock the combination of a rack striking mechanism including a pawl for said rack having an end position from which it is lifted at the beginning and to which it drops back at the end of an operation of the striking mechanism, and a wheel having a lateral projection, a reciprocable member adapted to move a cuckoo figure, a spring connected to said member and tending to urge it in the one direction, means under the control of said striking mechanism to

shift said member in the opposite direction into an end position against the restraint of said spring, a releasable locking member adapted to engage a stationary part of said mechanism so as to retain said reciprocable member when in said end position, a two-armed lever pivoted to said pawl, means to guide the first one of said lever arms so as to engage said locking member in its locking position and said second lever arm into the path of said wheel projection upon the dropping of said pawl whereby the impact of said projection on said second arm will cause said first arm to remove said locking member from locking position, and an abutment for said second lever arm to limit the lever movement due to the impact of said wheel projection.

12. In a cuckoo clock, the combination of a rack striking mechanism including a first and a second gear wheel each having a lateral projection, and a pawl for the rack, said pawl being movable from an end position at the beginning and free to return to said end position at the end of an operation of said mechanism, a cranked shaft, a spring connected to said shaft and tending to turn said shaft in one direction, a rod swivellingly journaled with one of its ends in a stationary part of said clock and permanently bearing with its free end against the crank of said shaft, a guiding means for the free end of said rod defining two end positions of the latter, and being so shaped that the free rod end in its second end position locks said shaft against turning under the action of said spring, said rod in said first end position being in the path of said projection of said first wheel so as to be urged into its second end position by an impact of said projection when said wheel rotates, and a bell crank lever pivoted to the free

end of said pawl, the first arm of said lever being in the path of said projection of said second wheel, and said second lever arm engaging said free rod end when it is in its second position and the pawl is in its end position, whereby an impact of the projection of the second wheel on said first lever arm will cause the second arm to move said free rod end from the locking position.

13. A device as claimed in claim 12, said guiding means including a slot engaged by said free rod end, said slot having one portion substantially at right angles to said shaft, against the end of which portion said free rod end bears in its first end position, said slot having a second portion substantially parallel to said shaft and in which said free rod end is located in its second end position, and the portion of the crank engaged by said rod being so inclined as to exert on said rod end a larger pressure component directed towards the end of said first slot portion, and a smaller pressure component directed towards the end of said second slot portion.

14. A device as claimed in claim 12, further comprising an abutment engageable by said bell crank lever on the side towards which said lever will be turned under the impact of said projection of said second wheel, said second arm of said bell crank lever being curved and adapted during a movement of said pawl, to engage said free end of said rod while the latter is in its second position so as to hold said bell crank lever spaced from said abutment.

WILHELM HECTOR PAÜL.
EUGEN FRIEDRICH TRENKLE.

No references cited.