Dec. 16, 1930. F. HECKERT 1,785,551

AUTOMATIC STRIKE REGULATING MEANS FOR CLOCKS

Filed Nov. 13, 1924 2 Sheets-Sheet 1

Fig. 1.

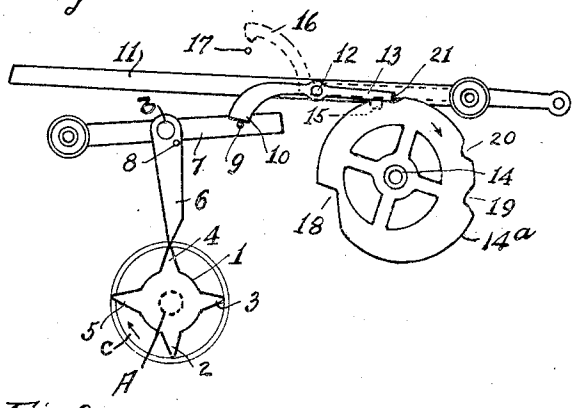


Fig. 2.

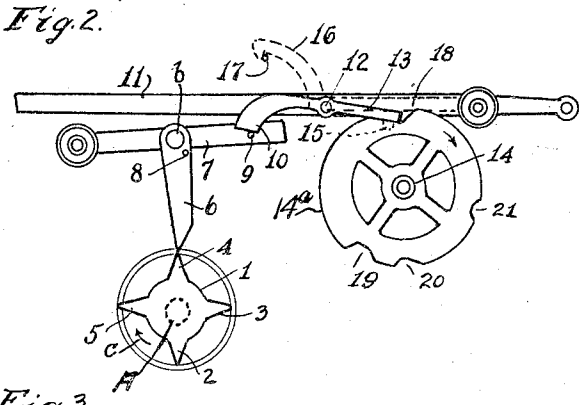
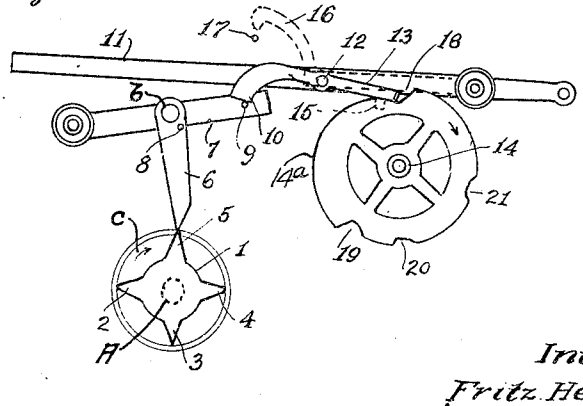


Fig. 3.



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Fig. 5.

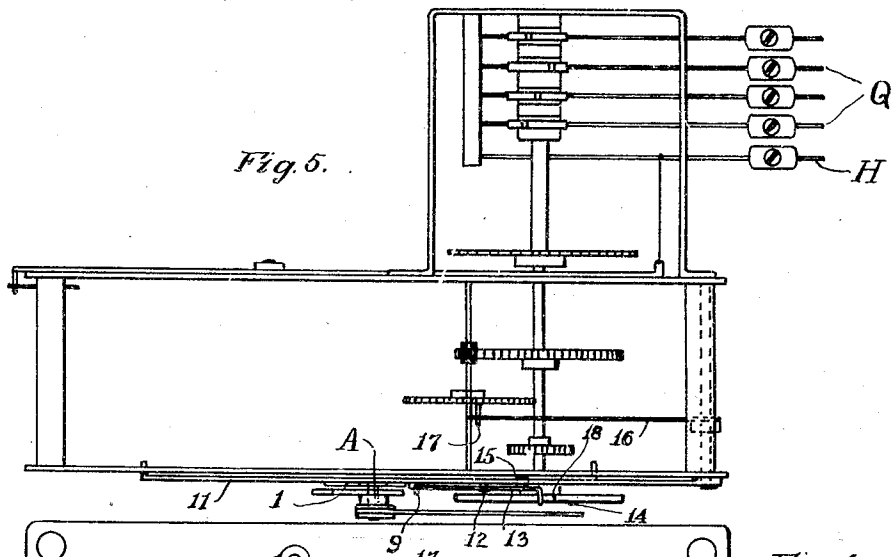


Fig. 4.

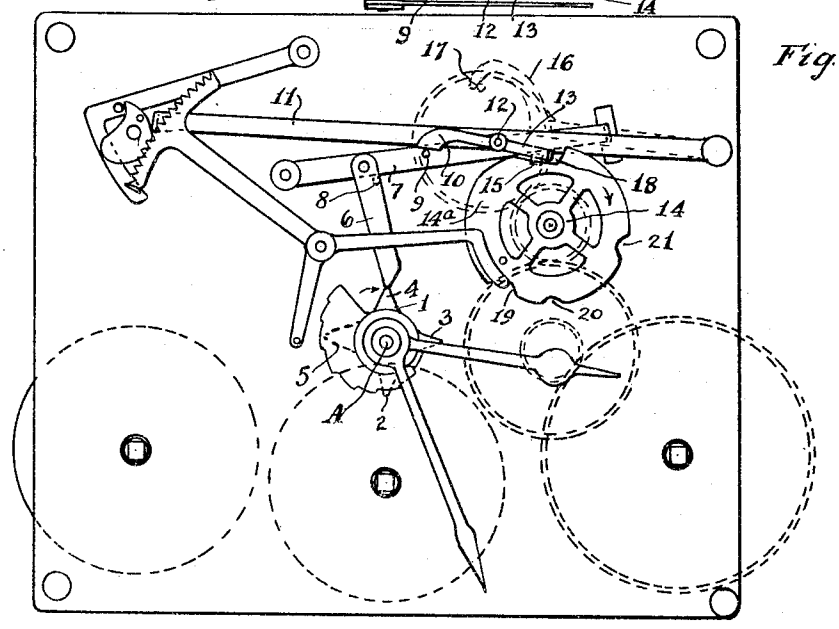
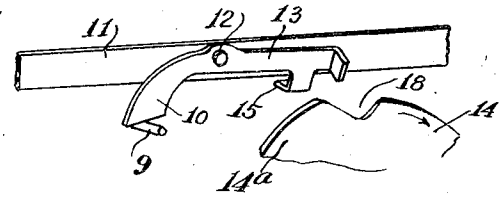


Fig. 6.



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Patented Dec. 16, 1930

1,785,551

UNITED STATES PATENT OFFICE

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AUTOMATIC STRIKE-REGULATING MEANS FOR CLOCKS

Application filed November 13, 1924, Serial No. 749,686, and in Germany February 25, 1924.

The present invention relates to improvements in means for regulating the chime-striker mechanism of clocks, and especially to that class of clocks having the so-called Westminster chime action.

A principal object of the invention is to provide mechanism of the character described, which upon disarrangement of the sequential relations of the striking thereof, through any of the well known ways in which this may occur, the proper relative operation of the coacting parts and the normal sequence of the striking of the chimes may be automatically restored.

A principal feature of the invention is the employment of a two-arm lever pivoted on the detent lever, one arm of which cooperates with a warning lever which is actuated by a releasing wheel having quarter points or teeth, and the other arm of which cooperates with a quarter closing or locking disk having quarter notches, so that when the warning lever is raised the last mentioned arm engages with the quarter notch of said disk then located beneath this arm whereby the bottom of said notch provides a fulcrum surface for movement of the arm for lifting the detent lever. The four-quarter notch of said disk is deeper than the other notches and the four quarter point or tooth of said releasing wheel is longer than the other points or teeth, and for this reason said lifting action of the two arm lever only occurs when the four-quarter tooth or point of the releasing wheel at the four quarter, or full hour, position of the hands of the clock operates to raise the warning lever and said arm engages with said four quarter notch.

I accomplish the above stated object and such other objects as may later appear herein, by the mechanism, one of the possible embodiments of which is described by way of example in the subjoined specification and shown in the accompanying drawing in which Fig. 1 is a view of the mechanism in position just prior to striking the three-quarter chime.

Fig. 2 is a view showing the position of the parts when a regulating action is proceeding, and Fig. 3 is a view of the mechanism just prior to striking the four quarter chime.

Fig. 4, is a front elevation of the clock works showing the strike control mechanism and the hands, the clock casing and dial being removed.

Fig. 5, is a plan view of Fig. 4, showing the striking mechanism having the hour striker H and the quarter hour chime strikers Q, and

Fig. 6, is a fragmental detail view of a portion of the detent lever and the two-arm striking regulation lever having the lug thereon, and a fragmental view of the quarter striking disk having a cam portion cooperating with said lug.

Similar reference characters denote similar parts throughout the several views.

The mechanism is simple in construction and of great reliability, its simplicity being shown in the employment of a single lever, that is, said two-arm lever coacting with already existent quadrature parts whereby perfect regulation and control of the striking mechanism is accomplished, such regulation taking place automatically upon each four-quarter striking and consequently occurring at least inside of one hour.

Referring to Fig. 1, the mechanism comprises the releasing wheel 1 of star form mounted upon the minute wheel shaft A of the clock, and provided with radial points or teeth 2, 3, 4 and 5, of which the teeth 2, 3 and 4 are of equal radial length and the tooth 5 for causing the four-quarter, or full hour, striking is of greater length than the others. The releasing lift lever 6 is pivotally connected to the quarter warning lever 7 as at *b*, the free end of this lever projecting into the path of the teeth of the releasing wheel 1 so that upon rotation of this wheel in the direction of arrow *c* the warning lever is lifted by engagement therewith of the pin 8 located upon the lift lever. Rotation of the releasing wheel 1 in the opposite direction causes the lift lever 6 to be idly deflected towards the left, or oppositely to its direction of movement for lifting the warning lever 7. The lever 7 is pivotally supported at one end and has near its longitudinal center a pin 9

which is contactible with the bent arm 10 of the two arm striker regulation lever connected to the detent 11 by the pivot 12, the other or straight arm 13 of the regulation lever coacting with the quarter striking disk or counting member 14. The straight arm 13 has an inwardly or rearwardly extending projection or lug 15 which is engageable with the under side of the detent 11, this lever in the well known manner releasing or causing the full hour striking mechanism to act. The detent 11 has thereon the latch lever 16 which in a well known manner cooperates with the trip wheel pin 17 of the striking control mechanism of the clock. The quarter striking disk 14 is provided with four notches 18, 19, 20 and 21, the notch 18 being deeper than the other notches and being the four-quarter notch. Normal actuation of the mechanism at three quarter striking causes the tooth 4 of the releasing wheel 1 to contact with the lift lever 6 and thereby causes the quarter warning lever 7 to be raised by engagement of the pin 8 therewith, the pin of the warning lever then contacting with the bent arm 10 of the two-arm lever and causing movement thereof on its pivot 12 so that the straight arm 13 of the two arm lever comes to rest in or engages with the notch 21 of the quarter striking disk 14. As soon as the arm 13 comes into contact with the bottom of notch 21, its downward movement will cease, the bottom of the notch 21 then acting as a supporting surface or fulcrum so that the detent 11 and with it the latch lever 16 are raised thereby releasing the trip wheel pin 17. After release of the lift lever 6 by the tooth 4 of the releasing wheel 1, the quarter warning lever 7, which has maintained the mechanism in the warning position, drops back into position of rest and at the same time releases the mechanism for striking. During rotation of the striking disk 14 the straight arm 13 of the two arm lever slides out of the notch 21 and onto the rim of the striking disk and the lug 15 of the arm 13 engages the detent 11 thereby maintaining the detent and latch lever 16 in raised position during the striking.

Referring to Fig. 2 and assuming that the detent 11 prior to the four-quarter striking has dropped in or become engaged with the notch 18 of the striking disk 14 and that the lift lever 6 is raised by the tooth 4 for causing the three-quarter striking, in mechanism not provided with striker regulation, the clock would then strike four-quarters or full hour, while the hands of the clock would be in the three-quarter position. Since the notch 18 of the striking disk 14 is deeper than the other notches on said disk, the end 13 of the two arm lever is enabled to move downwardly into said notch to the same extent that tooth 4 of the releasing wheel 1 by cooperation of the lift lever 6 raises the warning lever 7. Hence until the completion of the upward movement of the warning lever there occurs only movement of the double lever arm on its pivot 12 without the provision of support for the arm 13 of the two arm lever by the bottom of the notch 18 and as a consequence the quarter striking mechanism fails to be actuated.

If, then, at the time for the four-quarter chime and while the arm 13 is yet in the four-quarter notch 18, in the manner indicated by Fig. 3, the lift lever 6 is caused to be moved upwardly by the longer tooth 5 of the releasing wheel 1 with resultant lifting of the warning lever 7, the two-arm or striker control lever becomes operative as described in connection with Fig. 1, whereby release of the quarter striking mechanism at the time for the four-quarter chime is effected and the correction of the irregularity of this mechanism is accomplished.

It is thus seen that any disarrangement existing in the quarter striking mechanism will be automatically adjusted upon operation of the mechanism at the next four-quarter or full hour striking.

Having thus described my invention, it should be understood that there may be modifications thereof and variations therein without departing from the spirit of the invention or exceeding the scope of the appended claims.

What I claim and desire to protect by Letters Patent is:

1. In clock chime mechanism the combination with a quarter warning lever and a detent, of a quarter striking disk, and a two-arm lever pivotally supported on the detent and engaging at the end of one of its arms the quarter warning lever and engageable at the end of the other of its arms with the quarter striking disk for moving the detent when the quarter warning lever is moved.

2. In clock chime mechanism the combination with a quarter warning lever and a detent, of a quarter striking disk, a lever pivotally supported intermediately of its length on the detent and having a straight end face engaging the quarter warning lever and a bent end face engageable with the quarter striking disk and having on its under side a projection extending in direction opposite to said bent end face for engaging the under side of the detent.

3. In clock chime mechanism the combination with a quarter warning lever and a detent, of a quarter striking disk having notches therein one of which is deeper than the other notches and having a cam surface on a portion of its rim adjacent to the following side of the bottom of said deeper notch, a lever pivotally supported intermediately of its length on the detent and having a straight end face engaging the quarter warning lever and a bent end face engageable

with said notches and having on its under side a projection extending in direction opposite to said bent end face for engaging the under side of the detent, said bent end face when disengaged from said deeper notch by rotation of said disk engaging said cam surface.

4. In clock chime mechanism the combination with a quarter warning lever and a detent, of means for moving the quarter warning lever, a quarter striking disk having notches therein, and a lever pivoted on the detent and engaging the quarter warning lever and engageable with said notches and fulcruming on the bottoms of the notches for moving the detent when the quarter warning lever is moved.

5. In clock chime mechanism the combination with a quarter warning lever and a detent, of a quarter striking disk having notches therein one of which is deeper than the other notches, a lever engaging the quarter warning lever and engageable with said notches and fulcruming on the bottoms of the notches for moving the detent when the quarter warning lever is moved, said second mentioned lever when engaging said deeper notch being normally out of contact with the bottom of the notch and inoperable for moving the detent, and a movable member cooperating between the quarter warning lever and a rotatable member provided with points, said movable member being engageable with one of the points of said rotatable member for moving the quarter warning lever so as to bring said second mentioned lever into fulcruming contact with the bottom of said deeper notch for moving the detent.

6. In apparatus of the character described, a detent; a counting member having active portions; an operating member having active parts; and a warning mechanism operated by any of said parts and adapted to positively actuate the detent and operative only when in cooperation with the combination of certain of said parts and portions to release the detent.

7. In apparatus of the character described, a detent; a counting member having active portions; an operating member having active parts; and a warning mechanism operated by any of said parts and adapted to positively actuate the detent and operative when in cooperation with the combination of certain of said parts and portions to release the detent; said warning mechanism remaining inoperative during the operation of the operating member when the warning member is in cooperation with another combination of said parts and portions.

8. In apparatus of the character described, a detent; a counting member having active fulcrum portions; an operating member having active parts; and a warning mechanism including a lever system operated by said parts and operative when the lever system engages certain of said parts and portions to positively release the detent; said portions and parts being so positioned that said warning member remains inoperative during the operation of the operating member when the lever system is in cooperation with another combination of said parts and portions.

9. In combination, a warning lever; a detent; a striking disk having notches therein; a lever pivoted to the detent and fulcruming in the bottoms of the notches and operatively connected with the detent to operate the latter; and a rotatable member provided with points corresponding to said notches for operating the warning lever.

10. In combination, a warning lever; a detent; a striking disk having notches therein, one of them extended nearer to the disk center than the others; a lever pivoted to the detent and fulcruming in the bottoms of the notches and operatively connected with the detent to operate the latter; and a rotatable member provided with points corresponding to said notches for operating the warning lever, one of the points being more remote from the center of said member than the others.

11. In apparatus of the character described, a detent; a counting member having active portions; an operating member having active parts; and a warning mechanism including an intermediate member positioned by said portions and moved by said parts to positively move said detent and rendering said mechanism operative when in co-operation with the combination of certain of said parts and portions to positively release the detent; said intermediate member being shaped and positioned to cause said warning member to remain inoperative during the operation of the operating member when the intermediate member is in cooperation with another combination of said parts and portions.

12. In apparatus of the character described, a detent; a counting member having active fulcrum portions; an operating member having active parts; and a warning mechanism including an intermediate lever pivoted to the detent and engageable with said parts and portions and operative when in cooperation with the combination of certain of said parts and portions to release the detent; said warning member remaining inoperative during the operation of the operating member when the intermediate lever is in cooperation with another combination of said parts and portions.

13. In combination, a warning lever; a detent lever; a rotary striking member having a comparatively deep notch therein and other notches providing fulcrum faces extended more remote from the center of rotation than

the bottom of the first named notch; a two arm member pivoted to the detent lever and positioned to have one arm engage in said deep notch or to fulcrum on said fulcrum faces depending upon the position of the striking member; and a rotatable member provided with a plurality of points cooperating with said two arm member for causing the warning lever to raise the detent, one of the points being more remote from the center of said member than the others and adapted to cause the warning lever to bring about the raising of the detent lever an operative distance when the two arm member is fulcrumed in said deep notch.

14. In combination a warning lever, an engagement part carried by the warning lever and adapted to raise the lever when said part is raised, a detent, a striking disk, having therein eccentric notches, one of said notches being less eccentric than the others, a two arm lever, pivotally connected to said detent and positioned to have one of its arms extend into the said notches and said extending arm to fulcrum on the bottoms of the said notches, said two arm lever being actuated by said warning lever, intermittently to raise the detent by means of the said pivotal connection thereof, and a rotatable member, having thereon multiple points corresponding to said notches, for engaging and raising said engagement part, certain of said points being less remote from the center of said member than one other of said points, said certain points being only sufficiently remote to raise the warning lever sufficiently for causing said two arm lever to raise said detent when said extending arm of the two arm lever is engaged in and fulcrums on the bottoms of said more eccentric notches and insufficiently remote for causing said two arm lever to raise the detent when the said extending arm of the two arm lever is engaged in said least eccentric notch, and the said more remote point on said member being sufficiently remote from the center of said member to cause the two arm lever to raise the detent when said extending arm of the two arm lever is engaged in and fulcrums on the bottom of said least eccentric notch.

15. In combination, a warning lever; a detent lever; a rotary striking member having a notch therein and a fulcrum face extended more remote from the center of rotation than the bottom of the notch; a two-arm member pivoted to one of the levers and positioned to have one arm engage in said notch or to fulcrum on said fulcrum face; and a rotatable member provided with a plurality of points cooperating with said two arm member for causing the warning lever to raise the detent, one of the points being more remote from the center of said member than the others and adapted to raise the warning lever an operative distance when the two arm member is disposed in said recess.

16. In combination, a movable member; a detent controlled thereby; an intermediate member engaging, and movable relative to, the movable member; a rotary counting member engageable with said intermediate member and positioned and constructed to move said intermediate member from a first position to a second position; a rotatable actuating member provided with a plurality of normal points and a point more eccentric than the others; the movable member engageable by said points and engaging said intermediate member; any one of said normal points in said first position acting to move the movable member an amount sufficient to release the detent; said most eccentric point in said second position acting to move said movable member said amount; any of said normal points in said second position being inoperative to move said movable member.

17. In combination a lever, an intermediate member, movably connected thereto to actuate the same, a rotary counting member, engageable with said intermediate member and adapted to allow said intermediate member to move from a first position to a second position with relation to said counting member, a rotatable member, having thereon a plurality of normal points, one of said points being more eccentric than the other points on said member an operative connection, having thereon a part which is disposed to be engageable by said points, thereby actuating said intermediate member, said connection, when said part thereof is engaged by any of said normal points, cooperating with said counting member and the intermediate member in said first position to raise the lever a requisite amount, said connection, when said part thereof is engaged by said most eccentric point, cooperating with said counting member and the intermediate member in said second position to raise said lever a requisite amount, and said intermediate member, in said second position with relation to said counting member, being inoperative to raise said lever when said part on said connection is engaged by any of said less eccentric normal points on said rotatable member.

18. In combination, a warning lever; a detent lever; a two arm lever pivoted to one of the first named levers and forming an operative connection between the two to raise the detent lever a releasing distance when the two arm lever is in one position and the warning lever is raised a certain distance and to raise the detent lever said releasing distance when the two arm lever is in another position only when the warning lever is raised a greater distance; a rotatable member provided with points for operating the warning lever, one of the points being more remote from the center of said member than the

others for raising the warning member said greater distance; and a quarter striking disk having means thereon cooperating with the two arm lever, at one quarter position of the striking disk, for permitting said two arm lever to move to said other position.

Signed at Wurttemberg, Stuttgart, Germany, this 30th day of October, A. D. 1924.

FRITZ HECKERT.