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O. LE R. FIELD.

MECHANICAL MOVEMENT.

APPLICATION FILED OCT. 5, 1905.

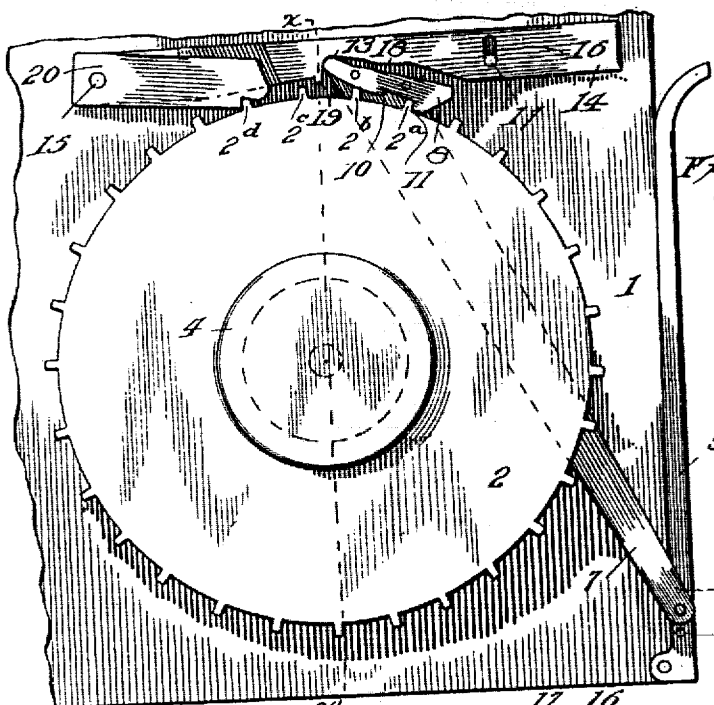

Fig. 1.

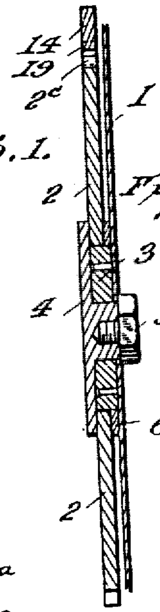

Fig. 3.

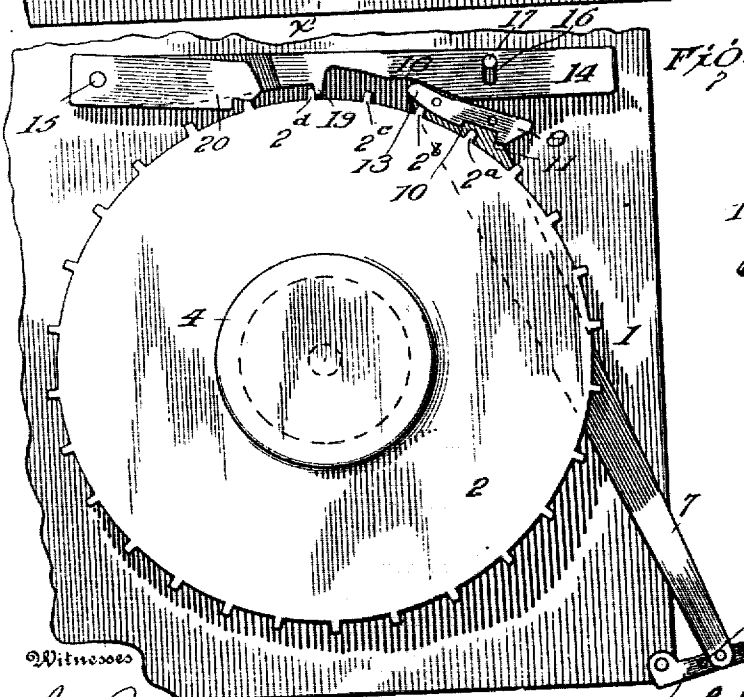

Fig. 2.

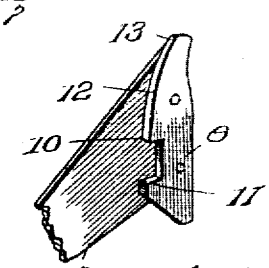

Fig. 4.

Witnesses

[signature]

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MECHANICAL MOVEMENT.

No. 816,546. Specification of Letters Patent. Patented March 27, 1906.

Application filed October 5, 1905. Serial No. 281,453.

To all whom it may concern:

Be it known that I, OSCAR LE ROY FIELD, a citizen of the United States, residing at Ithaca, in the county of Tompkins and State of New York, have invented a new and useful Mechanical Movement, of which the following is a specification.

My invention relates to devices in which an oscillating driving member gives an intermittent motion to a driven member; and my object is to produce a mechanism in which the oscillating driving member on its forward stroke engages and advances the driven member, while on its return stroke it again engages the driven member to correct any overthrow of said member due to its own inertia or to variation in the extent of the forward stroke of the driving member.

A further object is to provide means cooperating with the driving member to limit the advance movement of the driven member.

A further and more general object is to produce a mechanism that is simple in construction and at the same time sure and accurate in operation.

In the accompanying drawings, which constitute part of this specification, I illustrate a practical embodiment of my invention. The mechanism in the form shown is used to operate a letter-box dial designed to indicate the times of collection; but the invention may be applied to other forms of indicating and recording apparatus, to the feed mechanism of machine-tools, and to various other devices that will occur to those skilled in the different arts.

Referring to the drawings, Figure 1 is a front elevation of the mechanism, showing the parts in their normal positions. Fig. 2 is a similar view showing the parts in the positions assumed at the end of the forward stroke of the operating member or pawl. Fig. 3 is a sectional view on line $x\,x$ of Fig. 1, and Fig. 4 is a detailed perspective view of the upper end of the operating-pawl.

The working parts of the mechanism are mounted in this instance upon the plate or wall 1. The toothed wheel 2 is rotatably mounted upon an axle formed by the flat ring 3, which is rigidly secured to the plate 1. The wheel is held in position by the disk 4 and bolt 5, as shown in Fig. 3, and is spaced from the plate by a thin washer 6. Mounted in operative engagement with the toothed periphery of the wheel is a peculiarly-formed driving-pawl which consists of a shank member 7 and head 8, rigidly secured together. The shank, which is made of sheet metal, is disposed between plate 1 and wheel 2 and at its lower end is pivotally connected with an operating-lever 9 through one of the series of holes 9^a. The lever 9 in turn is pivotally secured at its lower end to plate 1. The lower edge of the head 8 is recessed to form shoulders 10 and 11, each of which are adapted to operatively engage the radial straight-sided teeth of the wheel. That part of the lower edge of the head which extends toward the left from shoulder 10 constitutes a cam-surface 12, which in the return stroke of the pawl rides upon the outer ends of the teeth of the wheel.

The upper rounded end 13 of the head 8 cooperates with an oscillating bar 14, mounted on the fixed pivot 15. The movement of said bar is limited to the length of the slot 16, which works on the fixed pin 17. A recess is formed in the lower side of the bar 14, and the irregular outline of this recess constitutes a cam-surface 18, which operates in conjunction with the rounded end 13 of the driving-pawl to determine the rise and fall of said bar. Just to the left of the recess in the lower side of the bar is a depending tooth 19, which when the bar falls serves as a detent to limit the advance movement of the wheel 2. Backward movement of said wheel is prevented by the gravity-detent 20, mounted on the pivot 15.

The operation of the mechanism will now be pointed out.

Referring to Fig. 1, it will be noted that with the parts in normal position the wheel 2 is rigidly locked between the detent 20 and the shoulder 11 of the operating-pawl. To advance the wheel, the operating-lever 9 is swung downward, thus giving to the driving-pawl its forward movement. The first part of this movement is not effective to advance the wheel on account of the lost motion due to the distance between shoulders 10 and 11 being greater than the thickness of the teeth of wheel 2; but at the end of this lost motion the shoulder 10 engages tooth 2^a and the wheel advances with the pawl. In the meantime the end 13 of the pawl is in sliding contact with the cam-surface 18, which is so shaped that during the first part of the forward movement of the parts the bar 14 falls but slightly; but after the wheel begins to move forward and about the time the tooth

2^c passes from under the depending tooth 19 the conformation of the cam-surface changes so that the bar falls more rapidly, bringing tooth 19 in the path of tooth 2^d so as to limit the advance movement of the wheel in the manner shown in Fig. 2, where the driving-pawl is at the end of its forward stroke and the wheel is shown as having moved away from the pawl, on account of its own inertia, until stopped by the tooth 19. Of course tooth 19 would act as a stop in the same manner if the overthrow were produced by an unlimited forward stroke of the operating-lever instead of the inertia of the wheel.

Referring to Fig. 2, it is seen that the contact of wheel and driving-pawl is between the outer end of tooth 2^b and the cam-surface 12 of the pawl. This cam-surface is so formed that upon the return movement of operating-lever and pawl the latter is raised so that the shoulder 11 clears tooth 2^a, this action being possible on account of the previously-mentioned lost motion between the teeth of the wheel and the shoulders 10 and 11 of the pawl. As the return movement continues the shoulder 10 reaches the tooth 2^b and the pawl suddenly falls as the recess therein passes over said tooth. This movement brings shoulder 11 in the path of tooth 2^b, and as the return movement of the pawl continues said tooth is engaged and the wheel turned back, so that when the operating-lever reaches its home position the wheel is again rigidly locked between the detent 20 and the shoulder 11 of the pawl in the manner shown in Fig. 1. Throughout the return movement of the driving-pawl the bar 14 serves to maintain the pawl in proper engagement with the wheel, the weight of the bar as well as the positive limitation of its movement by the slot and pin being effective to this end. In this connection I would point out that spring-pressure may be substituted for gravity in the case of the driving-pawl and the detents 14 and 20, if in any application of the mechanism the parts were made extremely light or were so disposed that their weight could not be utilized as in the present case.

In certain applications of my invention it is desirable that the number of teeth on the ratchet-wheel may be varied, and in order that wheels having different numbers of teeth but of the same diameter may be used I provide the series of pivot-holes 9^a in the lever 9. By connecting the pawl at the proper hole its stroke may be made to conform with the circular pitch of the toothed wheel that is to be used.

It will now be understood that in the mechanism described the driven member is given an intermittent forward motion, the steps or stages of which are very accurately determined, but that this result is not due to an accurately-determined throw of the driving member nor to a precise limitation of the forward movement of the driven member. On the contrary, the driven member may have a certain amount of overthrow caused by its own inertia or a more or less indefinite stroke of the driving member, but such overthrow is corrected on the return stroke of the driving member, so that the driven member has its final position precisely determined and in such position is rigidly locked.

What I claim is—

1. A mechanism comprising a driven member in combination with a detent to stop backward movement of said member, and an oscillating driving member adapted on its forward stroke to engage and advance the driven member and on its return stroke to reëngage said member and press it back against the said detent.

2. A mechanism comprising in combination a driven member, a detent to stop backward movement of said member and an oscillating driving member adapted on its forward stroke to advance the driven member and on its return stroke to engage said member and lock it in an advanced position.

3. A mechanism comprising in combination a driven member and an oscillating driving member adapted on its forward stroke to advance the driven member and near the end of its return stroke to operatively engage said member, whereby the final position of the driven member is determined by the final or normal position of the driving member.

4. A mechanism comprising in combination a ratch, a detent to stop backward movement of said ratch, and an oscillating driving-pawl adapted to operatively engage the ratch both on its forward and its return strokes.

5. A mechanism comprising in combination a ratchet-wheel, a detent to stop backward movement of said wheel, and an oscillating driving-pawl adapted on its forward stroke to advance the wheel and near the end of its return stroke to reëngage the wheel, whereby in its final position the wheel is rigidly locked between the detent and the pawl.

6. A mechanism comprising a ratchet-wheel, a driving-pawl, and a detent controlled by said pawl and adapted to limit the advance movement of the ratchet-wheel.

7. A mechanism comprising in combination a ratchet-wheel, a driving-pawl, and a detent pivotally mounted and formed with a cam-surface that is held yieldingly in engagement with the driving-pawl, whereby the movement of said pawl controls the position of the detent so as to limit the advance movement of the wheel.

8. A mechanism comprising a ratchet-wheel, a detent to stop backward movement of said wheel, a driving-pawl, and a second detent controlled by the driving-pawl and

adapted to limit the advance movement of the wheel.

9. A mechanism comprising a toothed wheel in combination with a detent adapted to stop backward movement of the wheel, and an oscillating driving-pawl coöperating with the teeth of the wheel and adapted on its forward stroke to engage one of said teeth to advance the wheel and on its return stroke to engage the next following tooth and press the wheel back against the detent.

10. A mechanism comprising a toothed wheel in combination with a detent adapted to stop backward movement of the wheel, a second detent controlled by a moving part of the mechanism and adapted to limit the forward movement of the wheel, and an oscillating driving-pawl coöperating with the teeth of the wheel and adapted on its forward stroke to engage one of said teeth to advance the wheel and on its return stroke to engage the next following tooth and press the wheel back against the first-named detent.

11. A mechanism comprising in combination a ratchet-wheel having teeth adapted to be operatively engaged in both directions, an oscillating driving-pawl held yieldingly in engagement with the teeth of the wheel, shoulders formed on said pawl, one to engage a tooth during the forward stroke and the other during the return stroke of the pawl, and means for lifting said pawl during the first part of its return stroke, whereby the backwardly-engaging shoulder clears the tooth engaged during the forward stroke and engages the next following tooth.

12. A mechanism comprising in combination a ratchet-wheel having teeth adapted to be operatively engaged in both directions, an oscillating driving-pawl held yieldingly in engagement with the teeth of the wheel, a pair of oppositely-facing shoulders formed on said pawl at a distance apart greater than the thickness of the ratchet-wheel teeth, and a cam-surface on said pawl adapted to coöperate with said teeth.

13. A mechanism comprising in combination a ratchet-wheel having teeth adapted to be operatively engaged in both directions, a detent engaging said teeth to stop backward movement of the wheel, an oscillating driving-pawl held yieldingly in engagement with the teeth of the wheel, a pair of oppositely-facing shoulders formed in the engaging face of the pawl at a distance apart greater than the thickness of the ratchet-wheel teeth, a cam-surface on said pawl adapted to coöperate with said teeth, and a second detent pivotally mounted and formed with a cam-surface that is held yieldingly in engagement with the driving-pawl, whereby the movement of the pawl controls the position of the detent so as to limit the advance movement of the wheel.

14. A mechanism comprising in combination a ratch, a driving-pawl, a member adapted to press against the pawl and hold it yieldingly in engagement with the ratch, and means to positively limit the movement of said member.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

OSCAR LE ROY FIELD.

Witnesses:

JEREMIAH W. JENKS,

R. S. GEHR.