F. M. SCHMIDT.

FEED AND POSITIVE LOCK FOR CLOCK TRAINS.

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919,647. Patented Apr. 27, 1909.

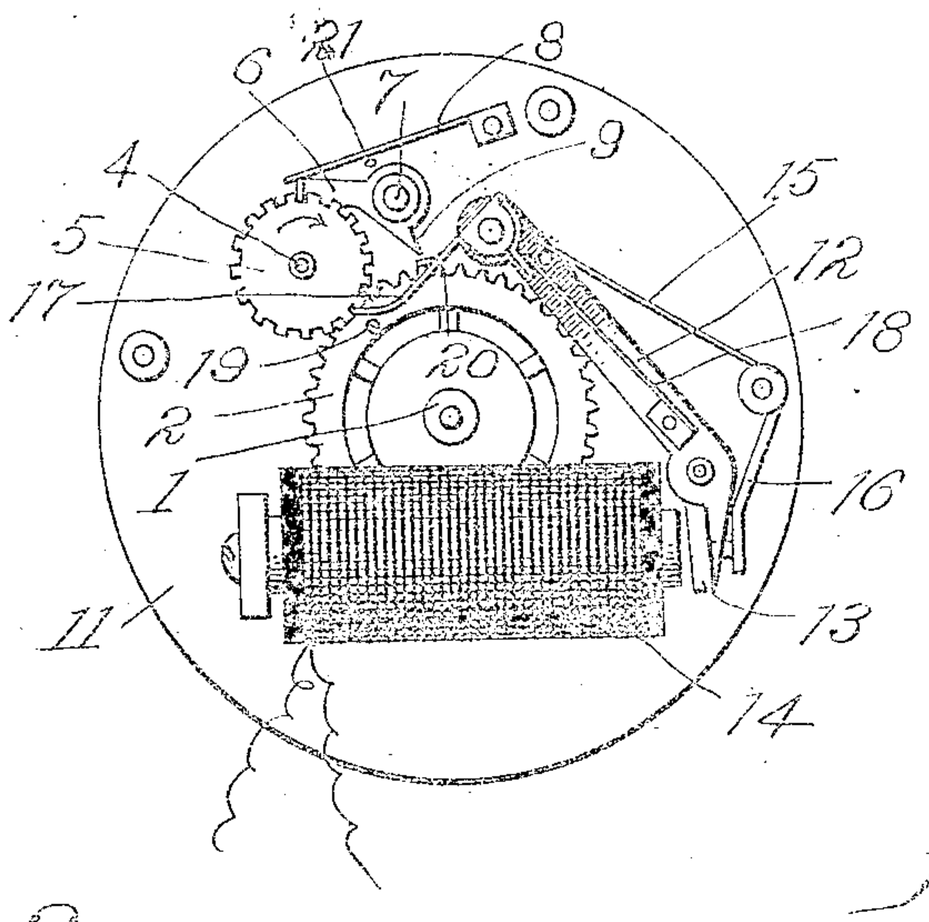


Fig. 1.

Fig. 2.

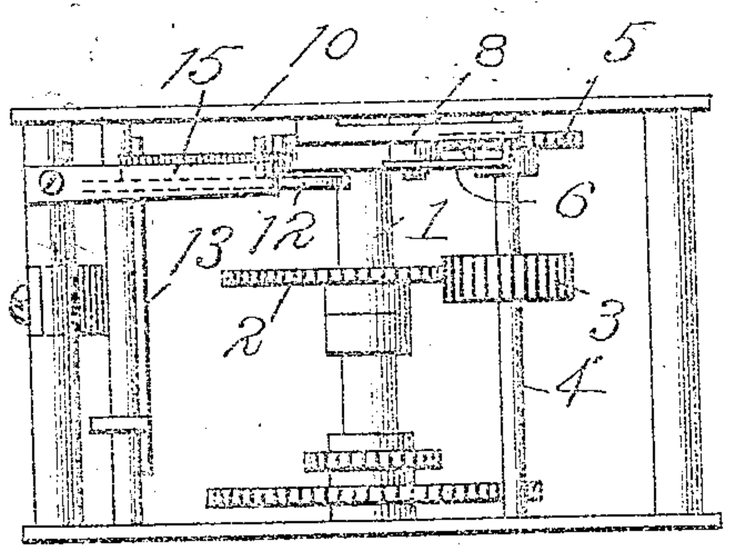
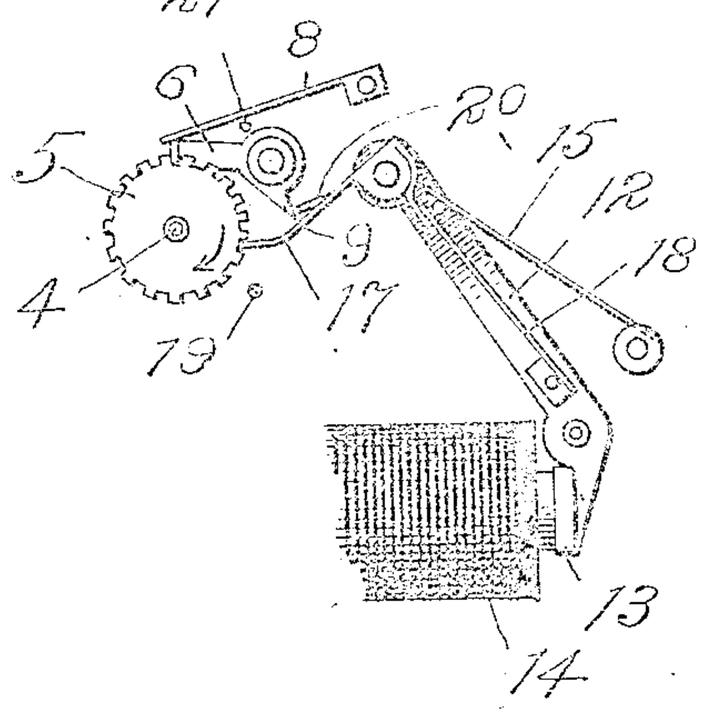


Fig. 3



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UNITED STATES PATENT OFFICE.

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FEED AND POSITIVE LOCK FOR CLOCK-TRAINS.

No. 919,647. Specification of Letters Patent. Patented April 27, 1909.

Application filed November 5, 1908. Serial No. 461,230.

To all whom it may concern:

Be it known that I, FREDERICK M. SCHMIDT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Feeds and Positive Locks for Clock-Trains and the Like, of which the following is a full and clear specification, and the novel features of which are more particularly pointed out in the annexed claims.

My invention relates to a feeding and positive locking device for moving any kind of gears, in particular clock trains, step by step. The particular advantage of such a positive locking device for clock trains is that the train will be prevented from any movement so long as it is locked by this mechanism, so that the vibrations in buildings in which the clock may be installed will have no effect on the accurate time-keeping of the clock, which is the case in many of such clock trains heretofore used in synchronizing clock systems.

The feeding device may be operated by any suitable mechanism or electrical means well-known in the art. In this particular instance I have illustrated in the accompanying drawings the feeding device operated electrically and I have shown the device employed as an example in so-called secondary clocks, such as are used in synchronizing clock systems which are electrically controlled from a master clock.

In the accompanying drawings Figure 1 is a rear elevation of a secondary clock train, such as above referred to, with the rear end plate removed. Fig. 2 is a plan view thereof. Fig. 3 is a rear elevation of the feeding and locking device shown in Fig. 1 in a different position.

In Fig. 1, 1 is the minute arbor of the clock which is turned by suitable gearing 2, 3 from shaft 4 (Fig. 2), on which the square-toothed spur wheel 5 is mounted, which cooperates with the feeding and locking mechanism. Feeding wheel 5, as I shall call hereafter this square-toothed spur wheel, is normally prevented from rotating in either direction by means of locking pawl 6, pivoted at 7 in the clock frame, and held in engagement with wheel 5 by leaf spring 8. On pawl 6 is provided a nose 9, the purpose of which will be described later on. Between the two end plates 10 and 11 (Fig. 2) is pivotally disposed rocking lever 12, the short end of which forms an armature 13 cooperating with electro magnet 14. Lever 12 is spring-pressed by means of leaf spring 15 and rests in its normal position against a stop 16 provided in the clock frame near armature 13, with the armature withdrawn from the magnet. At the free end of lever 12 is pivoted pawl 17, suitably shaped at its end to engage between the teeth of feeding wheel 5. Pawl 17 is held in engagement with these teeth by means of leaf spring 18, fastened on lever 12 and bearing against the short arm of pawl 17. A pin 19 is provided on the end plate 10 (which is removed in Fig. 1), which will prevent the end of pawl 17 from becoming disengaged from wheel 5, should the spring pressure of leaf spring 18 be overcome by some unforeseen cause.

On pawl 17 between its end and its pivot point is provided a finger 20, which is slightly bent upward out of alinement with pawl 17, so that its end will be located near nose 9 of locking pawl 6 without, however, coming in contact with it in the position in which feeding pawl 17 is shown in Fig. 1. If, now, lever 12 is rocked into the position shown in Fig. 3 by energizing electro magnet 14, it will be seen that pawl 17 has been withdrawn one tooth of wheel 5 in its feeding direction, which is indicated by the arrow in Figs. 1 and 3, and is held in engagement in this position with wheel 5 by its spring 18. If, now, electro magnet 14 is again deënergized, spring 15 will throw lever 12 back into its normal position (shown in Fig. 1), and during this forward motion finger 20 (which, in the position shown in Fig. 3, has then just passed nose 9 and has been moved in line with it by the upward movement of pawl 17) will, on the return stroke of lever 12, trip locking pawl 6 so that it will release wheel 5 and allow feeding pawl 17 to feed it forward in the direction of the arrow. Sufficient lost motion is provided between the end of pawl 17 and its point of engagement on wheel 5, when in the position shown in Fig. 3, so that finger 20 will first trip pawl 6 before pawl 17 commences its feeding stroke. However, the relative position of nose 9 and finger 20 and their shapes are chosen so that the tripping of pawl 6 will occur only instantaneously and so that pawl

7 will be released from finger 20 before pawl 17 has completed its feeding stroke. Thus pawl 6, being again in engagement with wheel 5, will first ride on top of the following tooth and immediately fall into the following notch at the moment the feeding stroke of pawl 17 is completed. At this moment feeding pawl 17 has again arrived at the position shown in Fig. 1. It will be clearly seen that thus an over-throw of feeding wheel 5 by too strong a feeding impulse of pawl 17 is impossible, and that wheel 5 will be moved one tooth only as desired. A stop pin 21 is provided at a suitable place on the clock frame for preventing pawl 6 from being thrown too high in case its spring 8 should become weak. In order to render the locking wheel 5 in its normal position still more positive pin 19 (already referred to above) is provided, which will, besides preventing pawl 17 from becoming disengaged from wheel 5, also prevent a further rotation of wheel 5 in the direction of the arrow in case pawl 6 should through some cause become disengaged and remain out of engagement with wheel 5 because in this instance wheel 5, tending to rotate, would tend to throw pawl 17 downward, which is prevented by pin 19.

The operation of the device is shortly as follows:—When an electric impulse is transmitted to electro magnet 14 from the master clock, armature 13 of lever 12 is attracted and thereby pawl 17 drawn one tooth back on feeding wheel 5 and finger 20 brought into line with nose 9. The electric impulse, however, being only instantaneous, armature 13 is immediately released, so that lever 12 upon its return stroke will first unlock instantaneously wheel 5 by lifting pawl 6 and then cause pawl 17 to feed wheel 5 one tooth. Upon the completion of the return stroke pawl 6 will lock wheel 5 again as described.

While I have shown my novel feeding and locking device in a particular structure for which I find this mechanism most suitable, I do not wish to limit myself to this use of the mechanism alone, since it is obvious that this mechanism may be employed to the same advantage in like devices which should be normally locked and be fed step by step.

What I claim is:—

1. In a step by step feeding device for clock trains and the like, the combination with a step by step operating feeding pawl, a toothed wheel adapted to be fed by said pawl, and a spring-pressed locking pawl normally in positively locking engagement with said wheel; of a finger integral with said feeding pawl adapted to disengage said locking pawl from the wheel at the beginning, and release it to reëngage said wheel before the completion of the feeding stroke.

2. In a step by step feeding device for clock trains and the like, in combination with a step by step operating spring-pressed feeding pawl and means for reciprocatingly operating said pawl, and a spring-pressed locking pawl normally locking said wheel in either direction, having a nose, a finger integral with said feeding pawl disposed adjacent to said nose to pass it at the idle stroke of said feeding pawl and to trip it at the beginning of the feeding stroke of said pawl, to cause the disengagement of said locking pawl from said wheel at the beginning and its reëngagement with it before the completion of the feeding stroke.

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