No. 753,212. PATENTED FEB. 23, 1904.

W. RAUSCH.

CLOCK.

APPLICATION FILED APR. 1, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.

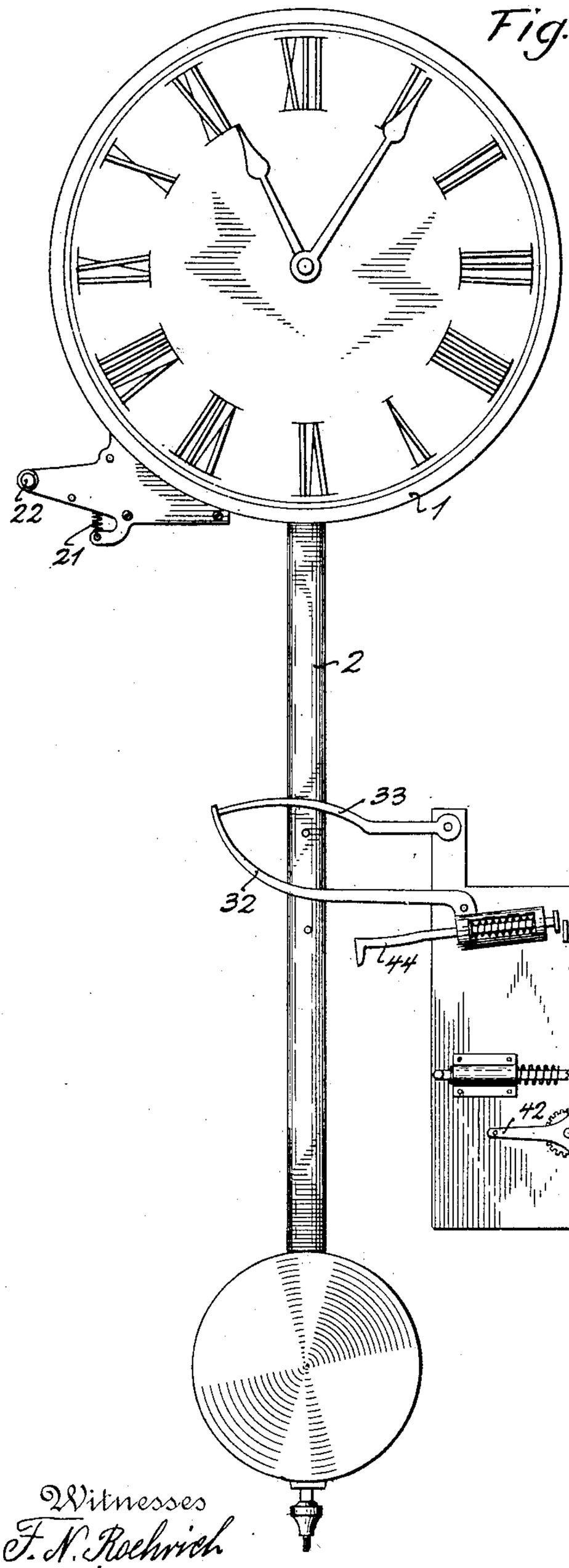
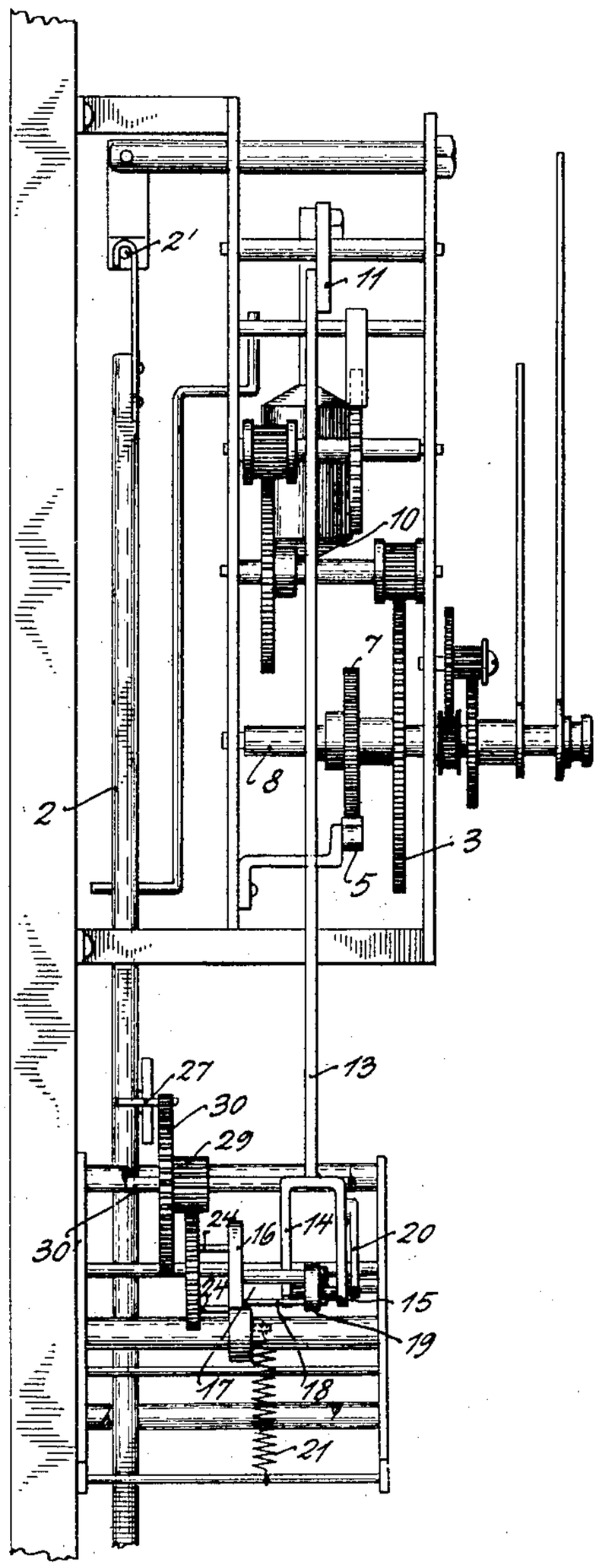


Fig. 3.



Witnesses
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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.

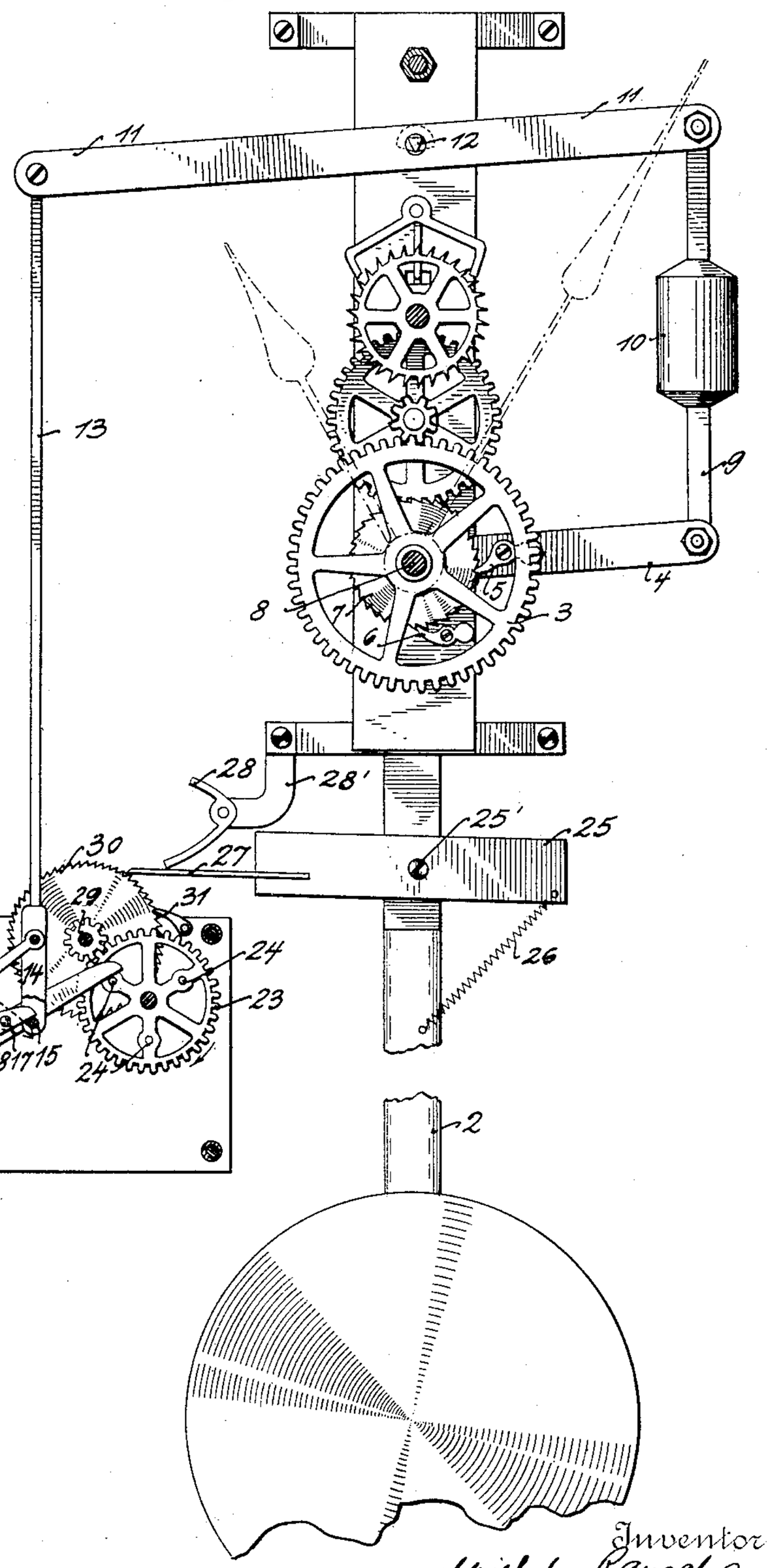
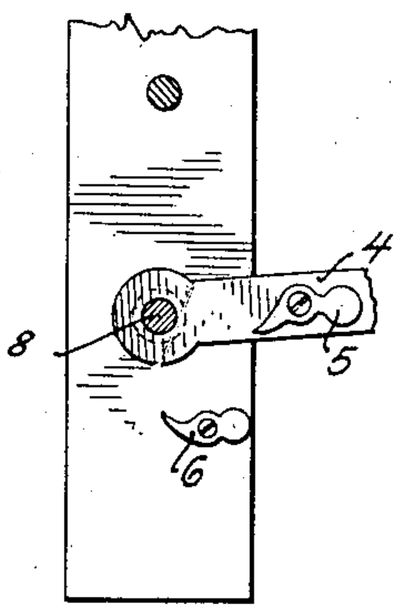


Fig. 4



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 5.

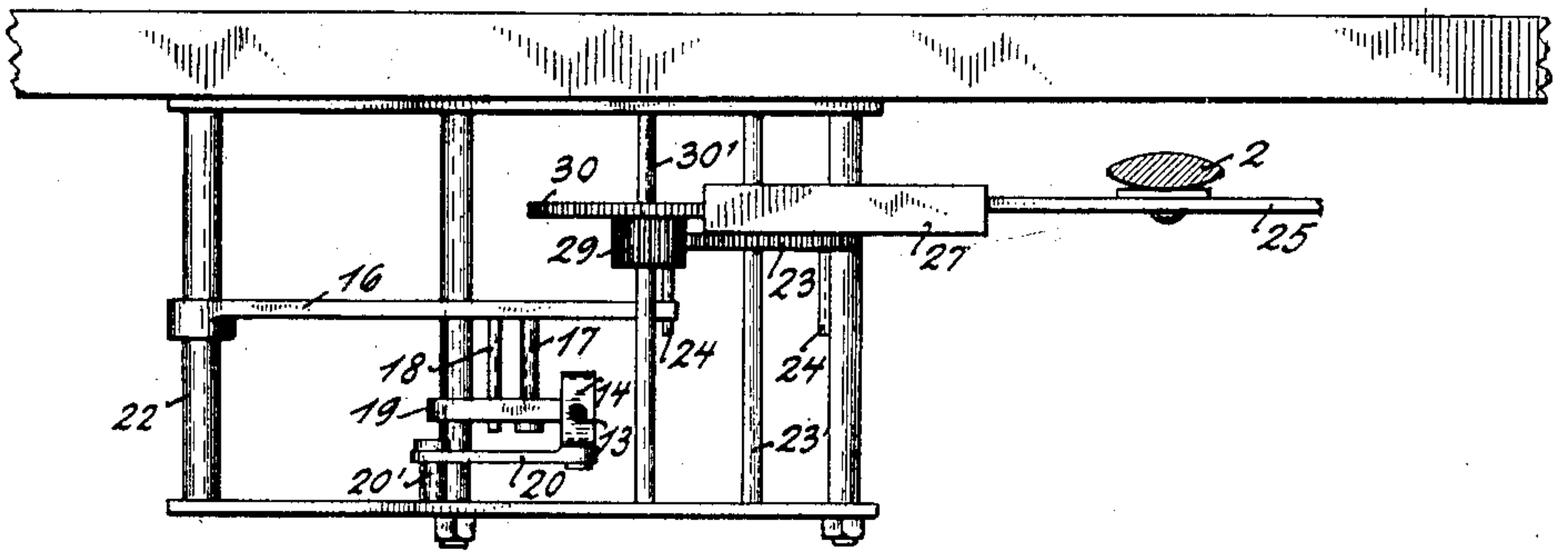
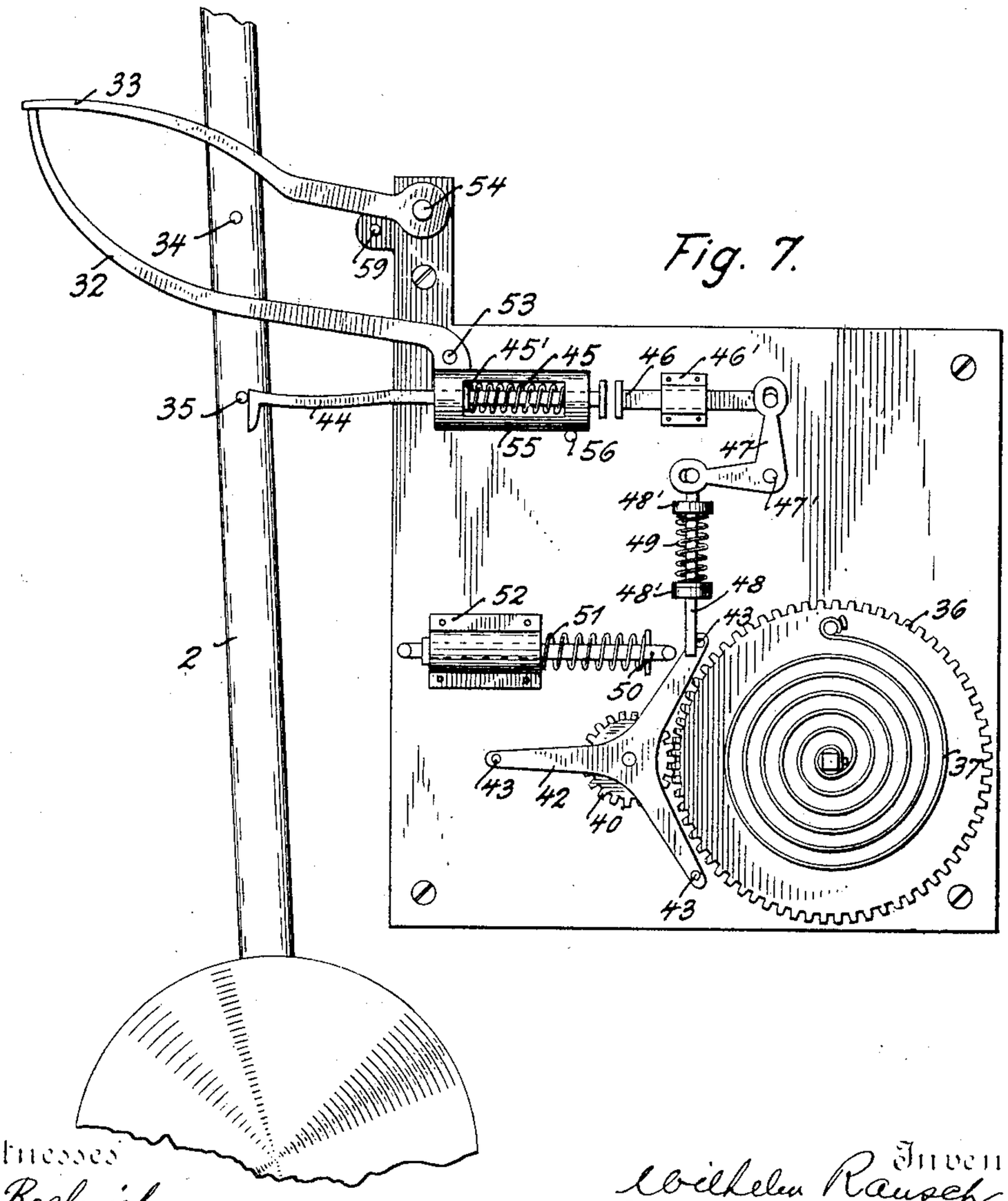


Fig. 7.



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No. 753,212. PATENTED FEB. 23, 1904.

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CLOCK.

APPLICATION FILED APR. 1, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 8.

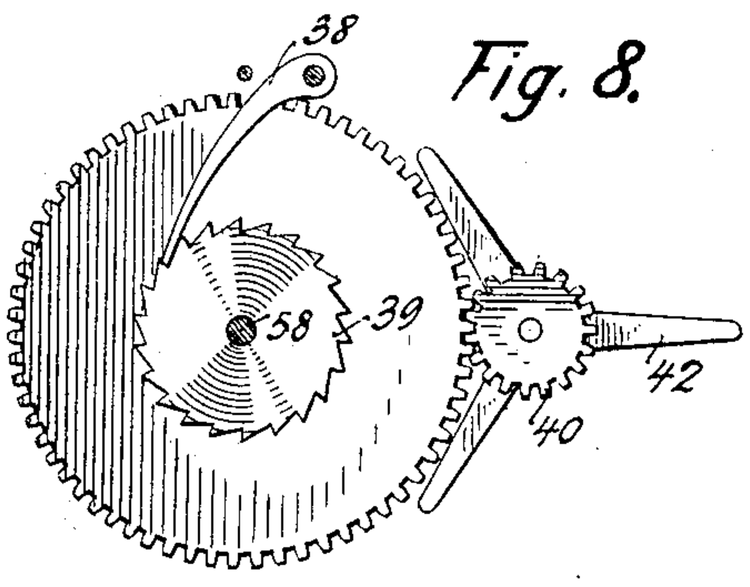

Fig. 6.

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No. 753,212. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

WILHELM RAUSCH, OF NEW YORK, N. Y.

CLOCK.

SPECIFICATION forming part of Letters Patent No. 753,212, dated February 23, 1904.

Application filed April 1, 1903. Serial No. 150,513. (No model.)

To all whom it may concern:

Be it known that I, WILHELM RAUSCH, a subject of the Emperor of Germany, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Clocks, of which the following is a specification.

My invention relates to clocks, and has for its object to provide a clock having the usual train of gearing driven by a weight, with means to intermittently raise said weight and means actuated by the pendulum in its vibrations to control the time of actuation of said weight-raising means.

Another object of the invention is to provide means to give the requisite impulse for maintaining the vibrations of the pendulum.

I will describe a clock embodying my invention and point out the novel features thereof in the claims.

In the accompanying drawings, forming a part of my specification, Figure 1 is a front view of a clock provided with my invention, certain of the parts being broken away. Fig. 2 is a front view of the interior mechanism of a clock, showing a portion of my improved mechanism. Fig. 3 is a side view of the mechanism shown in Fig. 2. Fig. 4 is a detail view of the end of a pawl-carrying lever shown in Fig. 2. Fig. 5 is a top view of a portion of the mechanism shown at the left in Fig. 2. Fig. 6 is a front view of the mechanism for giving a fresh impulse to the pendulum. Fig. 7 is a view of the same part shown in Fig. 6, but in a different position; and Fig. 8 is a view on the reverse side of Figs. 6 and 7.

Similar reference-numerals indicate similar parts throughout the several views.

I will first describe the mechanism by which the vibrations of the pendulum are caused to set for operation mechanism for raising the weight which drives the train of gearing.

Referring first to Figs. 1 to 5, inclusive, my invention is shown as applied to a clock having the usual train of wheels moved by a weight and regulated by a pendulum 2 and having hands or pointers which are moved around the face or dial 1 for marking the hours and minutes. As the train of gearing is well known, I have not deemed it necessary to describe it in detail. This train comprises a great wheel 3, rigidly secured on its arbor 8. This wheel and the train of gearing connected therewith are rotated by means of a ratchet-wheel 7, also rigidly secured upon the arbor 8. The movement of the ratchet-wheel 7 is effected by means of a weight 10, secured to an upright arm 9, which arm is pivotally connected at its lower end to a lever 4, fulcrumed on the arbor 8 and carrying a pawl 5, said pawl engaging the teeth on the ratchet-wheel 7. A backlash-pawl 6 may be provided to prevent reverse movement of the wheel 7. The weight 10 is free at all times to descend, except as will hereinafter be described, and is so proportioned that by its descent it will cause the rotation of the wheel 3 and through it the train of gearing. To raise the weight 10 after it shall have reached the limit of its downward movement, so that it may continue its work, I provide the following mechanism, which is adapted to be set for operation by the vibrations of the pendulum.

Loosely pivoted at any convenient place on the pendulum, as at 25′, is an arm 25, carrying at one of its ends a pawl 27, which pawl at each vibration of the pendulum to the left, as here shown, is caused to engage a ratchet-wheel 30, mounted upon a spindle 30′. A pinion 29, fast on the spindle 30′, engages a wheel 23, mounted on the spindle 23′. The spindles 23′ and 30′ are supported in a suitable frame, as shown. A spring 26, attached to the arm 25 and to the pendulum, and a light weight 28, loosely pivoted on a bracket 28′, may be provided to hold the arm 25 and the pawl 27 in normal position. It will be readily understood from this description of the relative arrangement of the parts that upon each alternate vibration of the pendulum the pawl 27 will engage the ratchet-wheel 30, imparting thereto an intermittent rotary movement, and through the pinion 29 the wheel 23 will be rotated in the direction indicated by the arrow in Fig. 2. The backlash-pawl 31 may be provided to prevent reverse movement of the wheel 30.

Rigidly secured to one side of the wheel 23 are a suitable number of projecting pins 24, three being shown in the drawings. Suitably

mounted on a rock-shaft 22, secured in the casing, is a lever 16 of sufficient length to project across the path of the pins 24. Loosely pivoted at 17 on the lever 16 is a pawl 19, weighted at its end 19′ and limited in its movement by a stop-pin 18 on the lever 16. During the normal running of the clock—that is, when the weight 10 is descending—the forward end of the pawl 19 rests loosely on a pin 15, which connects the ends of a yoke 14, forming the lower end of a rod 13, which rod at its upper end is pivotally connected to a lever 11, suitably fulcrumed on a stud 12, secured to the frame. The other end of the lever 11 is pivotally connected to the upper end of the weight-carrying rod 9. As the wheel 23 is rotated one of the pins 24 engages the under side of the lever 16, raising said lever against the stress of a spring 21, secured at one end to said lever and at the other end to the casing. The lever 16 continues to be raised until the particular pin 24 with which it is in engagement passes from under the said lever. When that occurs, lever 16 is free to be retracted by the spring 21, and as the said lever is retracted it acts through the pawl 19 upon the pin 15 to draw down the rod 13, thereby raising the weight 10, restoring its energy, and causing the pawl 5 to engage a higher tooth on the ratchet-wheel 7. The raising of the weight 10 by the means described is very quickly effected and, in fact, occupies but a second or two of time.

A stop-pin 16′, secured to the frame, limits the downward movement of lever 16, and at or about the time said lever reaches the limit of its downward movement the next succeeding pin 24 on the wheel 23 engages the under side of lever 16, and at each movement of said wheel the said lever is raised. In Fig. 2 I have shown in dotted lines the position of certain of the parts at about the time a pin 24 first engages the lever 16. During the downward movement of rod 13 said rod is swung laterally by an arm 20, pivoted at one end to the side of the yoke 14 and at the other to the frame, as shown in Fig. 2, so that as the rod 13 descends the pin 15 will wipe from under the end of pawl 19, and at the end of the downward movement the pin 15 will be entirely free from said pawl and resting upon its upper face, as indicated in dotted lines in Fig. 2. As the weight 10 descends the rod 13 will be raised, and during the upward movement the pawl 19 will gradually be swung so as to assume the position shown in full lines in Fig. 2—that is, with its forward end resting upon the pin 15.

The parts above described should be so proportioned that lever 16 will engage pin 15 through the pawl 19 a short interval of time before the weight 10 has reached its lowest position in order that said weight may be raised in time to continue its work on the train of gearing.

In starting a clock equipped with my invention an impulse is given the pendulum by an attendant, and as the accurate performance of a clock depends, essentially, on the pundulum I have provided means by which its motion can be made sufficiently uniform for practical purposes. To automatically provide for giving the requisite impulses to maintain the vibrations of the pendulum, I have devised the mechanism shown in Figs. 6, 7, and 8. To accomplish this, the mechanism now to be described is so adjusted that when the amplitude of vibration of the pendulum decreases to a predetermined arc the pendulum is caused to impinge upon a projecting arm to release a striker to deliver the required blow upon the pendulum—that is, the pendulum controls the time of operation of the striker.

Loosely pivoted at 53 and 54, respectively, on a plate secured to the clock-case are levers 32 and 33. One end of lever 32 is constituted of a casing 55, in which is suitably supported an arm 44, which may be moved longitudinally. A spring 45, surrounding that portion of rod 44 within the casing and bearing at one end against said casing and at the other end against a collar 45′, secured to said rod, tends to press said rod outward. When the amplitude of vibration of the pendulum decreases, as above indicated, arm 44 will be permitted, by means hereinafter described, to retain the position shown in Fig. 7, and in such position it will be impinged upon by a pin 35, projecting from the pendulum, and moved against the stress of its spring 45 to impinge against a rod 46, mounted to slide longitudinally in a suitable fixed bearing 46′. The rod 46 has its outer end seated in a bearing in one end of a bell-crank lever 47, fulcrumed on a stud 47′. From the other end of lever 47 is suspended a rod 48, which when held in its normal position by means of a spring 49 surrounding said rod and held between collars 48′ thereon, projects into the path of travel of pins 43 on the arms of a rotating striker 42.

Secured in suitable bearings in the casing or frame is a shaft 58, upon which is mounted a wheel 36. One end of a spring 37 is secured to said shaft, and the other end at 57 is secured to the wheel 36. The outer end of the shaft 58 is squared, so that the spring 37 may be wound by a suitable key. A ratchet 39, secured to shaft 58, and a pawl 38 may be provided to prevent the reverse movement of wheel 36. Meshing with wheel 36 is a pinion 40, on the side of which pinion is secured the striker 42. Supported in a suitable bracket 52 so as to move longitudinally is a rod 50, said rod being projected so as to lie in the path of the arms of striker 42. A spring 51, surrounding rod 50 and having its bearings between the casing 52 and a collar or pin on said rod, tends to keep rod 50 in the position shown in Figs. 6 and 7. It is apparent from

the above description that spring 37 will cause the wheel 36, pinion 40, and striker 42 to rotate. Such rotation will continue until one of the pins 43 is caused to bear against the lower end of rod 48, and the parts will remain in that position until the amplitude of vibration of the pendulum so far decreases that pin 35 will impinge upon rod 44. When that occurs, rod 44 will be moved longitudinally, thus raising rod 48 to release the striker 42, when the force of spring 37 will cause an arm of the striker to impinge against the end of rod 50, driving the latter forward and causing it to deliver a blow against the pendulum at the instant the latter is at its position to the right.

In order that arm 44 may not be impinged upon at each vibration of the pendulum to the right when an impulse is not necessary, the said arm is moved out of the path of travel of pin 35 by the following means: When the pendulum swings to the left, a pin 34, projecting from the pendulum, will in the course of its travel bear against the curved upturned portion of lever 32, turning it on its pivot 53 and causing the casing 55 and rod 44 to be tilted from a horizontal position to that indicated in Fig. 6. The lengths of levers 32 and 33 are so proportioned that when the pendulum moves to the left the outer end of lever 32 is depressed, so as to pass beyond the outer end of lever 33, the latter bearing upon the lever 32 and holding it in the position shown by full lines in Fig. 6. The two levers will retain this position until pin 34 on the return of the pendulum to the right strikes a shoulder 33′ of lever 33, thus raising the latter and permitting the outer end of lever 32 to rest upon the under side of lever 33. Before this occurs, however, pin 35 will have passed above arm 44, and the latter will not be impinged upon. On the return of the pendulum to the left pin 35 will ride over arm 44, and the two levers 32 and 33 will again be locked, as above described. When the amplitude of vibration of the pendulum decreases to a predetermined arc—that is, when pin 34 moving to the left does not depress the outer end of lever 32—then arm 44 will retain a substantially horizontal position, as shown in Fig. 7, and will lie in the path of pin 35 to be impinged upon by the latter to release the striker 42, as previously described. Casing 55 slightly overbalances the long arm of lever 32, so that when the latter is not locked in a depressed position by lever 33 said casing will assume a horizontal position, resting upon stop-pin 56. A stop-pin 59 limits the downward movement of lever 33. If desired, arm 44 may be curved slightly to permit pin 35 to ride easily over it when the amplitude of vibration is such that said pin is carried above said arm.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, means to intermittently raise said weight, and means actuated by the pendulum to operate the weight-raising means, and means for giving intermittent impulses to said pendulum.

2. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, means to intermittently raise said weight, means actuated by the pendulum to operate the weight-raising means, and intermittently-acting means to give a fresh impulse to the pendulum.

3. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a spring-actuated lever to raise said weight, means actuated by the pendulum to control the time of operation of said lever, and means for giving intermittent impulses to said pendulum.

4. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, a spring-actuated lever to raise said weight, and means actuated by the pendulum to move said lever against the stress of its spring and to release said lever to permit said spring to act to raise the weight, and means for giving intermittent impulses to said pendulum.

5. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, a lever connected to said weight, a rod connected to said lever so as to be raised when the weight is lowered, means to raise the weight through said rod, means actuated by the pendulum to control the time of actuation of said weight-raising means, and means for giving intermittent impulses to said pendulum.

6. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, means to intermittently raise said weight comprising a wheel having pins thereon, a lever adapted to be raised by said pins and means attached to the pendulum to rotate said pin-carrying wheel and means to retract said lever when released from said pins, and means for giving intermittent impulses to said pendulum.

7. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, a ratchet-wheel, a pawl attached to the pendulum and adapted to engage and intermittently rotate said wheel, a wheel carrying pins thereon and geared to said ratchet-wheel, a lever projecting into the path of travel of said pins and adapted to be raised thereby, connections between said lever and weight, and a spring to retract said lever when released from said pins, and means for giving intermittent impulses to said pendulum.

8. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, means to intermittently raise

said weight, means actuated by the pendulum to operate the weight-raising means, means for giving intermittent impulses to said pendulum, and means actuated by the pendulum to control the time of operation of said impulse-giving means.

9. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, means to intermittently raise said weight, means actuated by the pendulum to operate the weight-raising means, a spring-controlled striker adapted to impart fresh impulses to the pendulum, and means actuated by the pendulum to control the time of operation of said striker.

10. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, a pendulum, mechanism to impart a fresh impulse to the pendulum when the amplitude of vibration of the pendulum decreases to a predetermined arc comprising a spring-controlled striker, a movable stop to engage said striker, and means actuated by the pendulum to move said stop to release the striker.

11. In a clock the combination with the usual train of gearing, of a weight to drive said gearing, means to intermittently raise said weight, a pendulum, a striker having a plurality of arms, means to rotate said striker, a stop-rod interposed in the path of the arms of said striker and means actuated by the pendulum to move said stop to release the striker.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILHELM RAUSCH.

Witnesses:
GRACE L. HEASLEY,
FRANK N. ROEHRICH.