J. KUHN.

DRIVING MECHANISM FOR CLOCKS.

APPLICATION FILED JAN. 11, 1912.

1,037,643.

Patented Sept. 3, 1912.

2 SHEETS—SHEET 1.

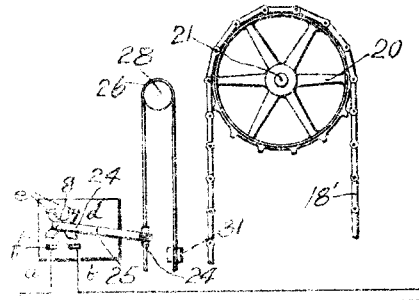
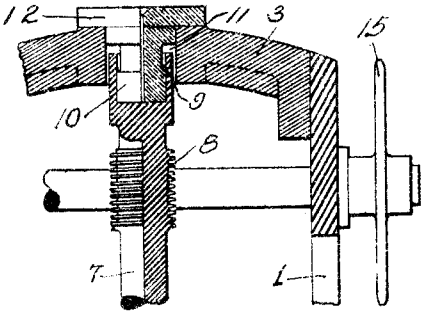
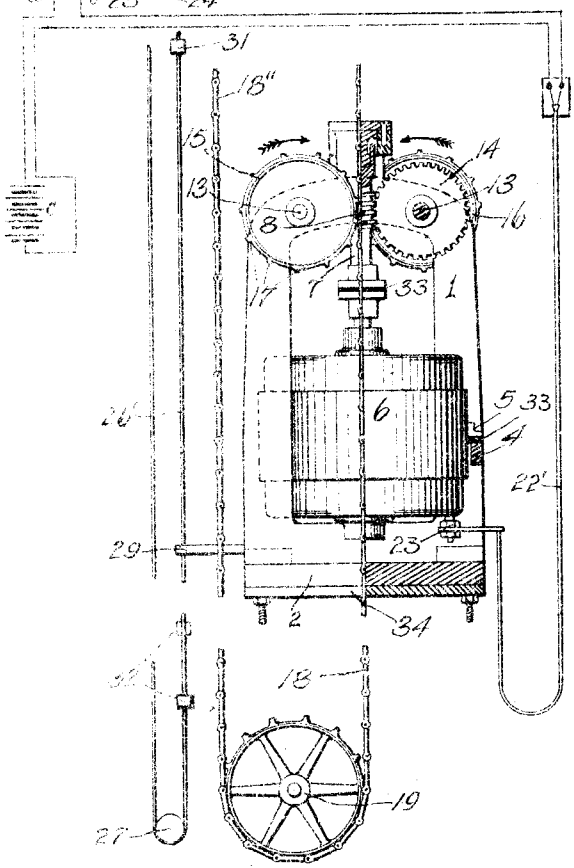


Fig. 4





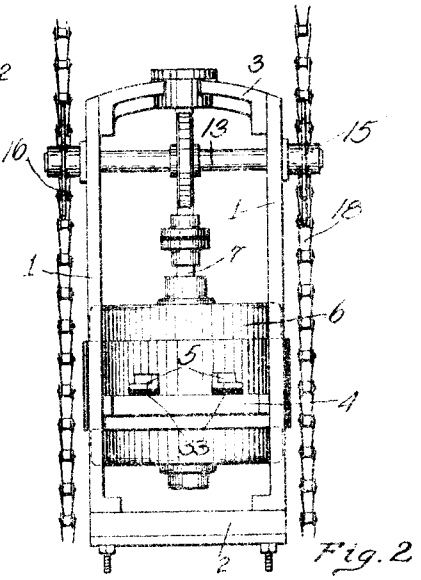


Fig. 2

Fig. 1

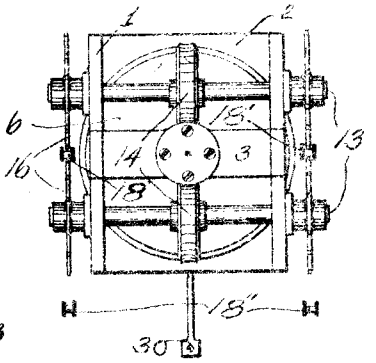


Fig. 3

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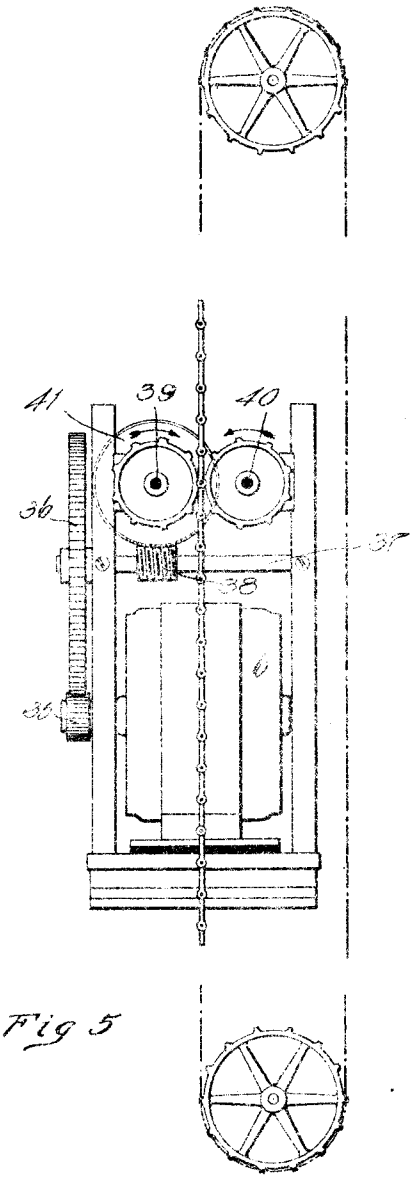

Fig 5

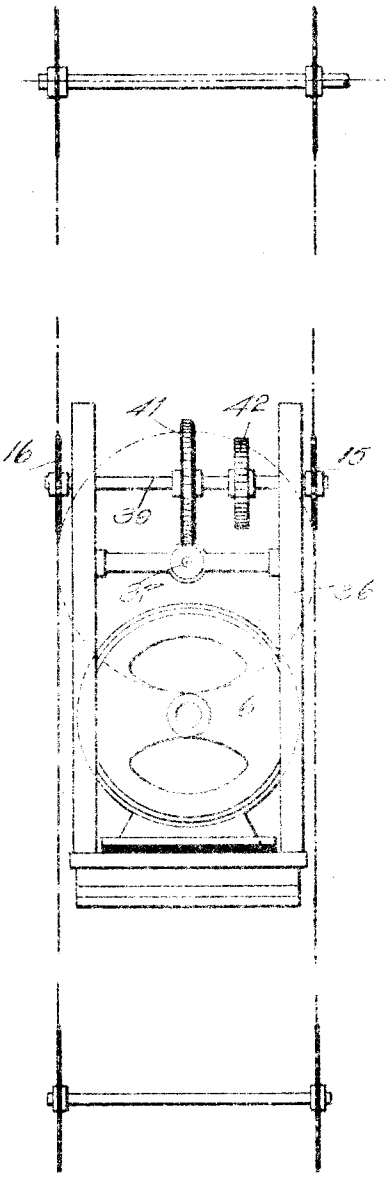

Fig. 6

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DRIVING MECHANISM FOR CLOCKS.

1,037,643. Specification of Letters Patent. Patented Sept. 3, 1912.

Application filed January 11, 1912. Serial No. 670,610.

To all whom it may concern:

Be it known that I, JOSEPH KUHN, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Driving Mechanism for Clocks, of which the following is a specification.

This invention relates to clock-actuating mechanism and particularly to devices of that class operated by gravity of a depending weight.

It is the object of this invention to provide simple and self-operative means for raising the weight of a clock for renewing the source of energy at intervals, usually before the lowest point in possible descent of the weight has been reached.

A further object of the invention is the provision of means whereby the tension exerted by the gravity of the clock-weight upon the suspending flexible connections and through them in turn influencing the clock movements is constant at all times and is not removed during the period required by the elevation of the weight. Thus by the application of the invention to the clock movement proper the clock may be built without the so-called maintaining devices intended to continue the functions of the clock during an interim of inoperativeness of the clock main actuating devices, as during the periods of rewinding, or if these be introduced in the mechanism the same may be made operative only at the will of the attendant in some emergency.

The device is especially applicable and advantageous in the actuation of the striking and chiming mechanism of clocks. In an instance of the kind the clock may be striking when the weight reaches its lowermost point and the elevating mechanism is actuated, in which case should the weight be relieved from its tension upon the suspending means, the strokes or chimes as the case may be, would cease until the weight has been again applied to its operative functions whereupon the strokes or chiming would be resumed. In the present invention the weight is raised without relieving the striking or chiming devices of the actuating forces and in such interval the striking or chiming is continued without interruption.

With these and other objects in view, as will hereinafter appear, the invention consists in the novel construction of a clock-weight and the adaptation and combination of means for maintaining the same automatically operative, as will be fully described in the following specification, illustrated in the accompanying drawings, and finally set forth in the appended claims.

In said drawings, Figure 1 is a side elevation, partly in section, of devices embodying my invention. Fig. 2 is a front elevation of a portion of the same. Fig. 3 is a top plan view of Fig. 2. Fig. 4 is a fragmentary view partly in section of a detail of the invention. Fig. 5 is a side elevation of a modification of the invention. Fig. 6 is a view in front elevation of Fig. 5.

Referring to Figs. 1 to 4, inclusive, of the drawings, the reference numeral 1 designates two side frame plates of a clock weight rigidly spaced and connected together at their bottoms by rectangular base plate 2 and at their tops by medially disposed bar 3. The plates are further secured together by intermediately disposed transverse bars 4, upon which is mounted, as by brackets 5, an electric motor 6. Said motor is provided with a vertical shaft 7 which is extended upwardly in the axis of the frame and formed with a worm 8 while its upper extremity is formed with a cup 9 to receive the end of a thrust block 10 positioned in a chamber 11 in said bar 3 as shown in detail in Fig. 4. A removable cap 12 for said chamber affords access to the latter for inspection and oiling. Upon opposite sides of said shaft 7 are a pair of parallel horizontal mandrels 13 rotatably journaled in bearings near their ends in side plates 1 and each provided with a worm gear 14 keyed thereon in mesh upon opposite sides with the worm 8. The extremities of each said mandrel extend outwardly of said plates whereat are keyed pairs of toothed wheels 15 and 16 upon opposite sides of the apparatus, respectively. Through the described manner of driving connection with the driving shaft, said toothed wheels are rotated in unison and each said pair are rotated in opposite directions. The wheels of each pair 15 and 16 are mounted in the same vertical plane and are actuated to revolve in the directions indicated by the arrows in Fig. 1. The teeth 17 of each wheel are spaced to register with

the teeth of the adjacent wheel in engaging the openings in the sprocket chains 18 of which there are two upon opposite sides of the apparatus. Said chains are endless and are each engaged about idler sprocket wheel 19 below the travel of the weight and about sprocket wheel 20 keyed to the main driving shaft 21 of the clock mechanism proper. The respective pairs of sprockets 19 and 20 are in vertical alinement and the tension side 18′ of the respective chains is vertically disposed. The weight is suspended upon said tension side of the chains by the latter passing through the registering teeth of the toothed wheels 15 or 16 while the sprockets 19 and 20 are formed of sufficient diameter to spread the chain to cause the loose side 18″ of the chain to be clear of the weight, as clearly shown in Fig. 3. The reference letters *a* and *b* indicate the conducting wires of an electrical circuit including the energizing batteries *c* and motor 6. Said wires may be included at 22 in a flexible cord 22′ and connected with the respective poles of said motor at 23 to permit the reciprocation of said weight. Interposed in said circuit is a switch *d* whose terminals *e* and *f* are opened and closed by contact points *g* upon one arm of a lever 24 pivoted at 25 whose opposite arm 24′ is attached to an endless cable 26 which is passed over sheaves 27 and 28 in proximity, respectively, of the sprockets 19 and 20, the cable between such sheaves being parallel to the chain parts 18′ and 18″. The numeral 29 designates an arm rigidly connected at its inner end with the weight and projecting outwardly into the plane of the adjacent side 26′ of the cable. Said arm is formed with apertured end 30 to receive said cable and is adapted to interfere with stops 31 and 32 at the upper and lower extremes, respectively, of the weight's travel to actuate the switch in the manner desired to open or close the electric circuit. As has before been stated, the weight is suspended from the teeth 17 upon the chains 18, the resistance afforded by the worm 8 against rotation by the gears 14 being sufficient to prevent any reverse movement and consequent descent of the weight relative to the chains. The tension upon the chains due to the gravity of the weight suspended thereon actuates the main driving shaft 21 which, through suitable escapement devices, not shown, performs the functions in the operation of the clock to which it is applied, as will be well understood. The weight therefor descends slowly with the chains as the latter is drawn over the sprocket 20 until the weight approaches its lowermost limit whereat the arm 26 engages the lowermost stop 32 whereupon the cable side 26′ is carried downward therewith and the opposite side correspondingly raised to vibrate the switch lever arm 25 upwardly and opposite arm 24 with contact-*g* downwardly to close the electric circuit and energize the motor 6. As will be apparent, the axially disposed shaft 7 from the motor through worm 8 acting upon oppositely disposed gears 14 turns the mandrels 13 and pairs of toothed wheels 15 and 16 respectively, in opposite directions. The power thus applied causes the weight to be elevated upon the chains 18 until the power is again cut off at the upper limit of travel of the weight by the arm 29 of the latter contacting with the stop 31 and influencing the same with the attached cable upwardly to lower the arm 24′ of the switch *d* and cut off the power. The weight thereupon depends inertly upon the chains by the engagement therewith of said toothed wheels 15, 16, the flat angle of incidence between the worm gears 14 and the worm 8 preventing any reverse motion in the mandrels 13. It is to be noted particularly that the tension of the weight upon the chain and consequently the actuating forces upon the clock or correlating movements are constant and uniform. The self-regulative functions of the weight are simple, may be made noiseless and are operative without shock or disturbance to the mechanism of the clock proper. It may be noted that the motor may be insulated from electrical connection with the clock movement by the proper application of suitable material, as indicated at 33. The main driving shaft 21 may likewise be insulated by equivalent devices, not shown. Provision is afforded for adjustment of gravity of the weight by adding plates of varying thickness and ponderosity as shown at 34 in the views.

In the modification illustrated in Figs. 5 and 6, a weight is employed having different but substantially equivalent devices for actuating the toothed elements 15 and 16. A motor 6 is provided having a horizontally arranged armature shaft upon which is operatively mounted a toothed pinion 35 in mesh with the relatively large gear wheel 36 keyed upon the end of shaft 37 protruding at one side of the rectangular frame. Within said frame shaft 37 is provided with a worm 38. Rotatably mounted in said frame in superposed rectangular relation to said shaft 37 are spaced mandrels 39 and 40 each provided with a pair of toothed wheels 15 and 16 fixedly secured upon the oppositely projecting ends of said shafts. A worm-gear 41 is keyed to one of said mandrels, as 39, in operative engagement to be driven by said worm 38. Said mandrel 39 is provided with a keyed gear-wheel 42 and intermeshing therewith is a like gear wheel, not shown, mounted upon mandrel 40 to drive the latter at a uniform rate of speed and in the opposite rotary direction as the mandrel 39. The general construction other

than that set forth, is similar to that described hereinbefore. The operation is substantially the same and will be readily understood from the foregoing description.

While I have described with some detail the various parts and workings of two embodiments of the invention, I do not wish to be understood as confining myself exactly to the same, as obviously various modifications and changes in detail as well as its application to other purposes as are within the scope of the claims may be made without sacrificing its advantages.

What I claim as new and desire to secure by Letters Patent, is—

1. In driving apparatus for clocks, a chain operatively engaged with a driving shaft, and a weight including a motor suspended from said chain, and means engageable with said chain and operable by said motor capable of raising the weight relative to the chain.

2. Driving apparatus for clocks, consisting in combination with a sprocket chain operatively engaged with a driving shaft, of a weight suspended from said chain comprising a frame, a motor in said frame, a pair of oppositely rotatable toothed wheels enmeshed in said chain, power connections between said motor and wheels, and means to energize said motor at a point in the travel of the weight.

3. Driving apparatus for clocks, consisting in combination with a sprocket chain operatively engaged with a driving shaft, of a weight suspended from said chain, said weight including a motor, a pair of toothed wheels locked against reverse rotation engaged with said chain, and power connections between said motor and wheels, and means interposed in the travel of said weight to actuate said motor.

4. Driving apparatus for clocks, consisting in combination with a pair of sprocket chains operatively engaged with a driving shaft, of a weight suspended from said chains comprising a frame, an electric motor in said frame, a pair of oppositely rotatable toothed wheels locked against reverse rotation enmeshed in each said chain, power connections between said motor and wheels, an electric circuit including said motor, and a switch interposed in said circuit opened or closed by movement of said weight.

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