(Model.)

A. DARDENNE.

SELF WINDING CLOCK.

No. 292,108. Patented Jan. 15, 1884.

Fig. 1.

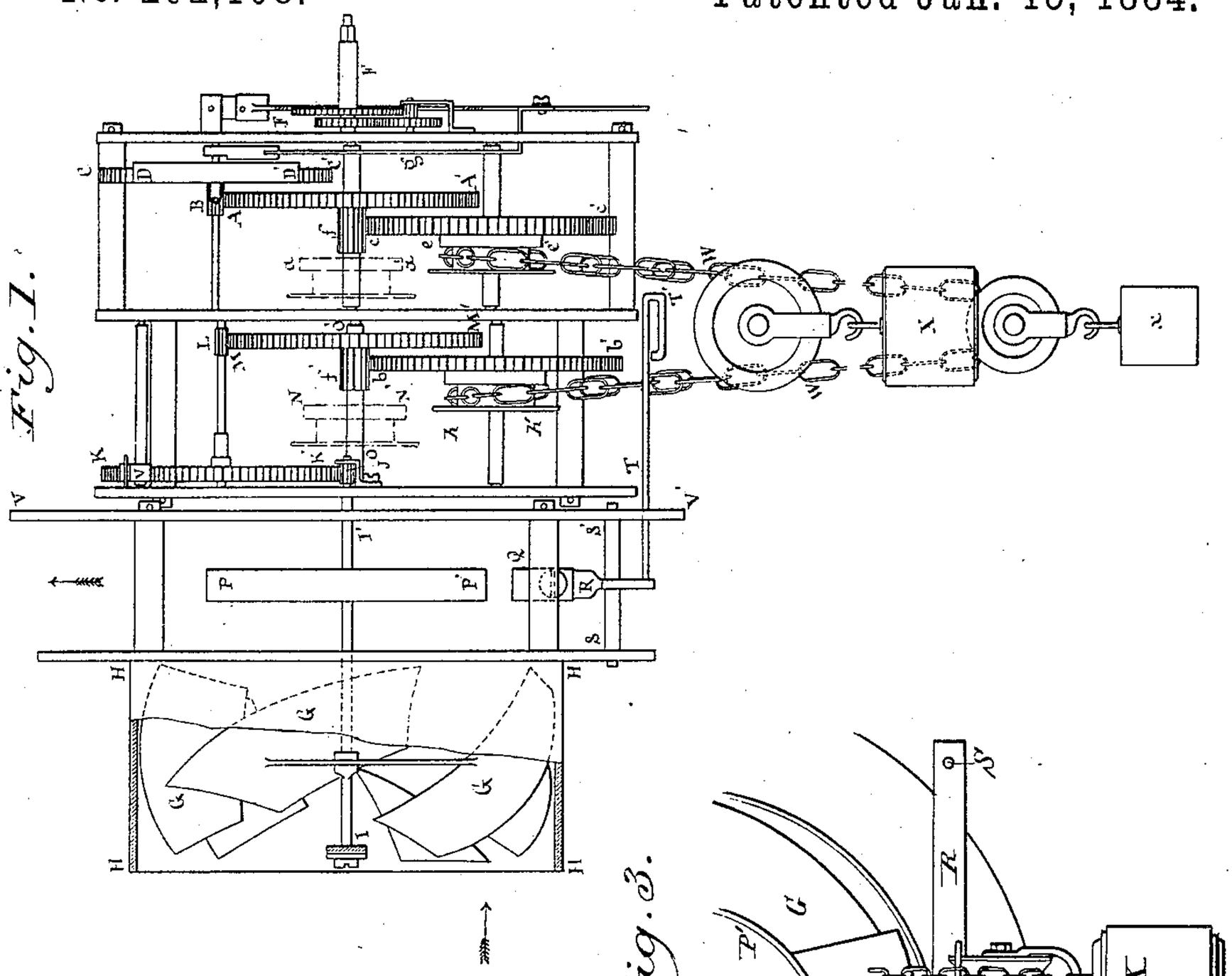


Fig. 3.

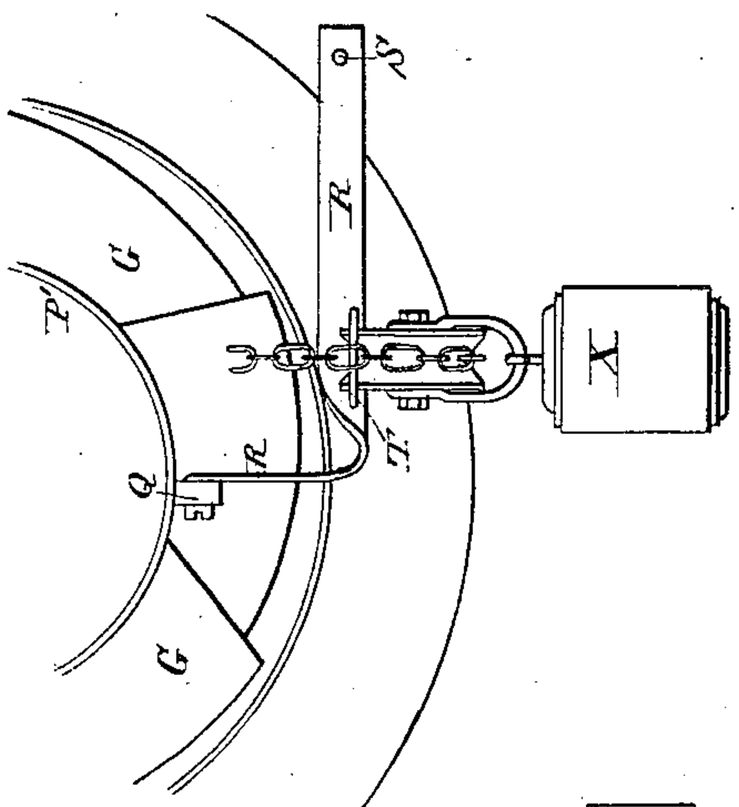
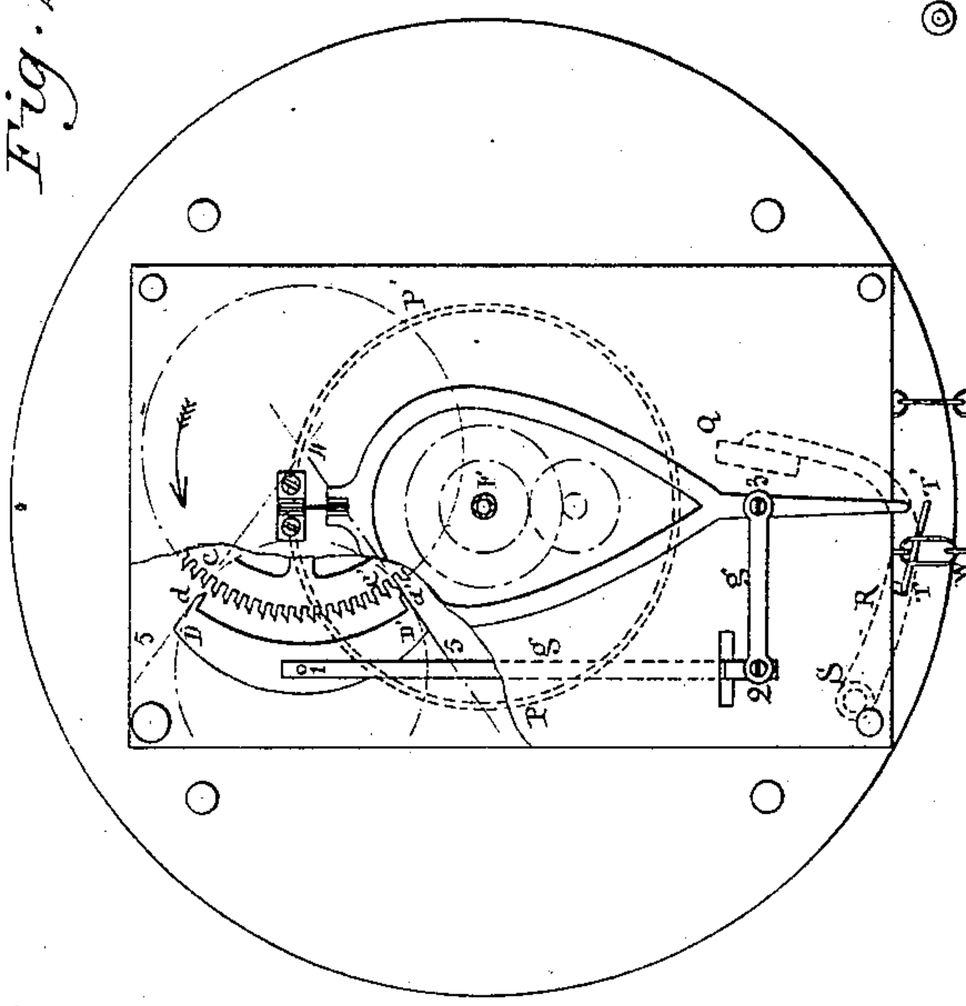


Fig. 2.



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UNITED STATES PATENT OFFICE.

AUGUSTE DARDENNE, OF MARIEMBURG, BELGIUM.

SELF-WINDING CLOCK.

SPECIFICATION forming part of Letters Patent No. 292,108, dated January 15, 1884.

Application filed October 19, 1881. (Model.) Patented in Belgium August 3, 1881, No. 55,353, and August 31, 1881, No. 55,616; in France August 5, 1881, No. 144,256; in England August 8, 1881, No. 3,425; in Austria November 23, 1881, No. 323,908; in Canada November 11, 1882, No. 15,810; in Sweden December 23, 1882; in Italy December 31, 1882, No. 265 and No. 14,736; in Norway May 1, 1883, and in Russia June 9, 1883, No. 4,188.

To all whom it may concern:

Be it known that I, AUGUSTE DARDENNE, of Mariemburg, in the Kingdom of Belgium, have invented a new and useful Improvement in Clocks, (for which I have obtained a patent in Belgium bearing date August 3, A. D. 1881, No. 55,353,) of which the following is a specification.

The new system of self-winding clocks is composed of two distinct parts—namely, first, the clock proper, and, second, the winding mechanism.

In describing it reference will be had to the accompanying drawings, of which Figure I represents a general view of the clock; Fig. II, a front view of the escapement and brake, and Fig. III a view of the brake mechanism.

The clock proper is composed of a wheel, A A′, having one hundred and sixty-eight teeth, (see Fig. I,) and driven by a sprocket-pulley, *a a′*, (shown by dotted lines in Fig. I,) and over which passes the driving-chain. This wheel A A′ drives, by means of a pinion, B, having six teeth, an escapement-wheel, C C′, of ninety teeth. The teeth of the latter are broad, and provided with sloping edges, so that the wheel forms, with the anchor D D′, a peculiar reversed dead-beat escapement, which is obtained by arranging the different elements of this escapement according to the following rules: The anchor D D′, Fig. II, is placed so that its center coincides as nearly as possible with the center 4 of the escapement-wheel C C′. Its dimensions are such that the direction of its pallets *d d′*, when they have seventeen teeth of the escapement-wheel between them, coincides exactly with these radii of the escapement-wheel C C′, which pass through the extremity of these seventeen teeth—that is to say, the radii 4 5. After this direction has been obtained, the outside of the pawls of the anchor is formed by arcs of a circle which touches the inside of two radii, 4 5, and the center of the pivot of the anchor D D′ should exactly coincide with the center of the said circle. The escapement having been constructed as described, the anchor transmits its motion to the pendulum by means of an arm pivoted at 2 and 3, and composed of two connecting-rods, *g g*, one of which is fixed at 1 to the anchor D D′ in a square shoulder, and the other at 3 to the pendulum by means of a screw with cylindrical shoulder. The axle of the wheel A A, Fig. I, drives an ordinary dial-train, which sets the clock-hands in motion. The advantage of this new combination is to indicate the minute by means of two wheels, A A′ and C C′, which, in conjunction with the new escapement, arranged as just described, enables one to obtain clocks which regulate themselves in an absolute manner, and preserve a constant regulation during long periods, as has been proved by experience. Constructed as described, the mechanism will not run longer than twenty-four hours. In practice, and with the object of prolonging this period to eight days, the wheel A A′ is not actuated directly by the driving-chain by means of the pulley *a a′*. A wheel, *c c′*, is driven by means of the chain and a sprocket-pulley, *e e′*, and the wheel *c c′* sets in motion the wheel A A′ by means of a pinion, *f*. This latter arrangement is represented in Fig. I. In this case the pulley *a a′*, (described above,) being replaced by *e e′*, is omitted from the axle of the wheel A A′.

Description of the winding mechanism principle.—The winding mechanism of the perpetual and automatic regulator is based on the action of an air-current produced solely by the upward pressure of the atmosphere in any vertical tube, as a chimney, which connects with each other two strata of air of different densities, and in the interior of which is placed the driving mechanism of the clock-winder, the direction of the air-current passing through the said driving mechanism being indicated in the drawings by arrows. The constant air-current produced by these means imparts motion to a screw with six vanes, G, contained in a circular casing, H. This helix is mounted on a shaft, I I′, carrying on one of its extremities a pinion, *j*, which drives a wheel, K K, supported by an axle carrying at one of its extremities a pinion, L. The latter sets in motion the wheel M M′, on the axle *o o′* of

which is fixed a pulley, N N′. Over this pulley N N′ (shown by dotted lines) passes the endless driving-chain.

In a similar manner as has been stated in describing the driving mechanism, in practice, and with the object of prolonging the run of the clock, I replace the toothed pulley N N′ (indicated by dotted lines) by similar pulleys, *h h′*, Fig. I, which, instead of being fixed on the axle of the pulley M M′, is driven by pinion *f′*, keyed on the axle of the wheel M M′, and gearing into a wheel, *b b′*, on the shaft of which is keyed the said toothed pulley *d d′*. Over the latter I pass the driving-chain. The wheel M M′ is driven as before. The addition of the pinion *f′* and of the wheel *b b′* greatly reduces the effect of the driving-weight on the helix. In order to avoid the effects of a back current of air which might occur in a strong wind, and which would turn the screw in the opposite direction, a pawl, V, is placed against the wheel K K′, and prevents it from turning backward. The part of the winding mechanism which contains the screw G and the elements of the brake, P P′ Q R S S′ T, is insulated from the other parts of the apparatus by a circular plate, V V′, which protects these latter parts against the draft of the chimney.

Description of the brake, Fig. II.—If a force as variable as an air-current is used for driving a mechanism the motions of which should be as regular as those of a clock, the principal question is to regulate the effects of that force automatically and with precision. For this purpose my apparatus is provided with an automatic brake driven by the clock itself, and constructed as follows, (see Figs. I and II:) The axle I I′ of the helix carries a friction-wheel, P P′, having a broad face. Under this wheel is fixed, by one of its extremities, to a pivot, S S′, a piece, R, of brass, bent at a right angle, and carrying at its other extremity a a shoe or block, Q, of copper or other suitable material. The piece R is also provided with a rigid rod, T T′, terminating at its extremity T′ with a square bend arranged so as to be placed exactly on the travel of the driving-weight X of the clock in such a manner that the latter, when it arrives at the level of the said rod T T′, cannot continue its upward motion without carrying with it the said rod, and consequently causing the lever R to pivot around S until the moment when the shoe Q comes in contact with the face of the wheel P P′, and thereby arrests the motion of the helix.

Connection between the winding and the driving mechanism.—The connection between these two structures is established by means of the endless chain W, which passes over the pulley of the winding mechanism N N′ and over that of the driving mechanism *a a′*, which pulleys are shown by dotted lines; or, if the movement is constructed to run eight days, the chain passes over the pulleys *h h′* and *e e′*. (See Fig. I.) This chain W carries at one extremity of its circuit a driving-weight, X, and at the other extremity a counter-weight, *x*. The screw, being set in motion, drives the whole winding mechanism, and lifts the chain W by means of the pulley N N′ or the pulley *h h′*. By this movement the weight is set in motion and held suspended, being thereby enabled to exert its driving-power on the pulley *a a′* or the pulley *e e′* of the driving mechanism. If the air-current continues its action on the screw, the driving-weight still under the influence of the latter, arrives at the highest point of its travel, where it meets the square bend of the rigid branch T T′ of the brake, lifts the same, and thereby moves the branch R around the pivot S until the moment when the shoe Q comes in contact with the circumference of the wheel P P′. At this moment the screw is stopped, and recommences its motion only after the clock has allowed to pass a sufficient length of the chain to cause the descending weight X to disengage the branch of the brake. As the latter is no longer pressed against the wheel P P′, it descends by its own weight. Thereby the helix becomes again free, and continues to run until the same condition is reproduced. Whatever the strength of the air-current may be, it is not to be feared that the screw may continue its movement after the brake has been once pressed on by the weight, and that it may consequently produce disturbances in the clock, because the more the screw tries to lift the weight the more is the brake Q R T pressed against the wheel P P′.

In setting up this clock in an interior it may be applied to any convenient chimney or ventilating flue by means of a small opening of five or six inches diameter. In use out of doors the box containing the winding mechanism should be applied to a tube or hollow vertical shaft eighteen or twenty feet high.

What I claim as my invention is—

1. In combination with a propelling-screw for winding the weight of a clock by the force of an air-current, an automatic click to prevent backward motion of the winding mechanism, and a friction-brake operated by the rise of the weight to prevent overwinding, all substantially as described.

2. The combination, with a friction-wheel, P, fixed on the axle of the driving-screw, of a brake consisting of rod T T′, lever R, and shoe Q, the said brake being adapted to act upon the rim of the wheel P when the rod T T′ is moved upward by the pulley of the weight X, substantially as described, and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

AUGUSTE DARDENNE.

Witnesses:
AD. STEIN,
GEORGE BEDE.