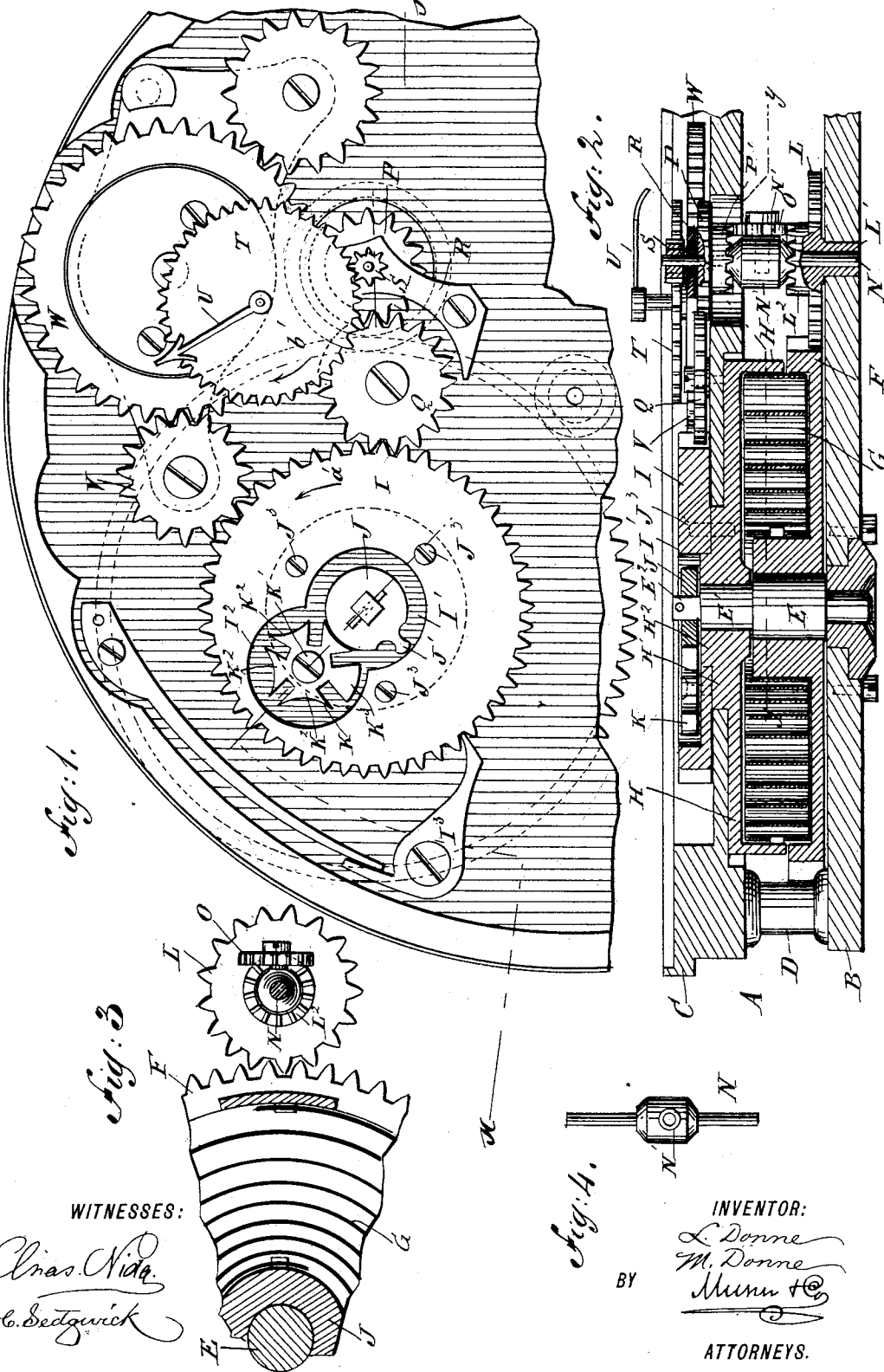


(No Model.)

L. & M. DONNE.
WATCH WINDING MECHANISM.

No. 424,185.

Patented Mar. 25, 1890.



WITNESSES:
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Fig. 4.
 BY *Munn & Co.*

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LEWIS DONNE AND MORGAN DONNE, OF LONDON, COUNTY OF MIDDLESEX,
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WATCH-WINDING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 424,185, dated March 25, 1890.

Application filed March 15, 1889. Serial No. 303,490. (No model.)

To all whom it may concern:

Be it known that we, LEWIS DONNE and MORGAN DONNE, of London, in the county of Middlesex, England, have invented new and useful Improvements in Motive Power for Watches and Clocks, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved motive power for watches and clocks which is very simple and durable in construction, effective in operation, and permits the use of a long and broad mainspring, the winding up and unwinding of which are recorded.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a face view of the improvement. Fig. 2 is a sectional elevation of the same on the line *xx* of Fig. 1. Fig. 3 is a sectional plan view of the same on the line *yy* of Fig. 2. Fig. 4 is a side elevation of the spindle.

The improved motive-power mechanism A is arranged on the top plate B and the pillar-plate C, located a suitable distance apart and connected with each other by posts D or other means. In the top plate B is mounted to turn in a suitable bearing one end of the arbor E, on which is secured the main driving gear-wheel F, provided on one face with a recess for the reception of the mainspring G, which latter is secured at one end to the hub of the said gear-wheel F. The other outer end of the mainspring G is fastened to the inside of the rim of the barrel H, preferably made of steel and held loosely on the offset E' of the arbor E. The barrel thus forms the other bearing for the arbor E.

The open end of the barrel H is opposite the recess of the main driving-wheel F, so that the spring G extends partly in the barrel and partly in the recess of the said wheel F, which permits of making the said mainspring quite wide without increasing the thickness of the watch or clock.

On the closed end of the barrel H is formed

a central boss or hub H', fitting into a corresponding aperture in the pillar-plate C, and on the said boss H' is formed a second concentric boss H², fitting into a central aperture I', formed in the ratchet-wheel I, and is secured upon the barrel by set-screws J³. The ratchet-wheel I is prevented from turning in the wrong direction by a spring-pressed pawl I³, pivoted on the pillar-plate and shown in Fig. 1.

On the ratchet-wheel I is arranged the Geneva stop in the following manner: The square end E² of the arbor E projects into the aperture I' and carries a disk J, provided with a stop-finger J', adapted to engage the star-wheel K, mounted to turn on a set-screw K', screwing in the ratchet-wheel I. The star-wheel K is set in a recess I², formed in the face of the ratchet-wheel I and opening at one side into the central aperture I' of the said ratchet-wheel, as plainly shown in Fig. 1. The star-wheel K is provided with a number of teeth K², having their outer ends concave to conform to the periphery of the disk J, one of the said teeth K² engaging the disk at a time. The wheel K is also provided with a convex tooth K³, adapted to butt with its periphery against the periphery of the disk J and serving to prevent a further winding up or unwinding of the mainspring G.

By the arrangement above described the barrel H remains stationary, except when the mainspring is wound up. When the ratchet-wheel I is turned, the barrel H turns with it, and the mainspring is wound up around the hub of the main driving-wheel F.

The star-wheel K is carried along by the ratchet-wheel I, and is turned the distance between two teeth whenever a tooth K² engages the finger J' until the tooth K³ comes in contact with the periphery of the disk J, and a further winding of the mainspring is prevented. The unwinding of the mainspring then revolves the main driving-wheel F, connected in the usual manner with the respective parts of the watch or clock.

The main driving gear-wheel F meshes into a gear-wheel L, having a hollow hub L' mounted to turn in the top plate B. Through the hollow hub passes loosely one end of a spindle N, provided with an offset N', extending at right angles to the axis of the

spindle N. On this offset N' is mounted to turn a beveled gear-wheel O, meshing on one side into a beveled gear-wheel L², formed on the face of the gear-wheel L, and on its other side the said beveled gear-wheel O meshes into a beveled gear-wheel P', formed on the face of a spur-wheel P, mounted to turn loosely on the spindle N opposite the gear-wheel L.

The spur-wheel P is in mesh with the intermediate gear-wheel Q, mounted to turn on the pillar-plate C, and in mesh with the ratchet-wheel I. The hub of the spur-wheel P is mounted to turn in a bracket R, secured to the pillar-plate C. The latter is provided with a suitable recess for the passage of the spindle N and the wheels P, P', and O. On the end of the spindle N is secured a pinion S, meshing into the gear-wheel T, carrying the indicating hand or pointer U. The ratchet-wheel I is in mesh with the pinion V, meshing into the gear-wheel W, turned by the stem-winding mechanism or other means.

It will be seen that if either of the wheels L or P is rotated while the other is held stationary the spindle N will rotate in the same direction as the wheel that is moved, but only through half the angular distance. This is owing to the fact that, although the teeth of the beveled gear-wheel O move at the same rate of speed as the turned wheels L² or P', those on the opposite side in mesh with the stationary wheel P' or L² cause it to move backward. Consequently the spindle N, on which the beveled gear-wheel O is mounted, moves only half as far as the wheel P or L.

Now when the operator winds up the watch or clock the wheel W rotates the pinion V, and the latter turns the ratchet-wheel I in the direction of the arrow a', whereby the Geneva stop star-wheel K is turned by the pin J' of the now stationary disk J the distance of one tooth K² at every revolution of the ratchet-wheel I. When the latter has made four revolutions, the tooth K² stops further motion of the ratchet-wheel I and the winding mechanism. When the ratchet-wheel I is thus turned, it turns the barrel H, and the spring G is wound. The ratchet-wheel I also turns at the same time with the wheel Q, which rotates the spur-wheel P, carrying the beveled gear-wheel P', meshing into the beveled gear-wheel O, turning on the spindle N. The gear-wheel O is thus caused to roll off on the now stationary gear-wheel L², whereby the spindle N is turned, and the pinion S, fastened on the said spindle N, turns the gear-wheel T, whereby the hand or pointer U is turned in the direction of the arrow b', making nearly a full revolution. When the winding up ceases, the spring G in unwinding turns the main driving gear-wheel F, connected in the usual manner with the other parts of the watch or clock. The driving-wheel F also turns in the direction of the arrow a' and turns the gear-wheel L, carrying the beveled gear-wheel L², in mesh with the beveled gear-wheel O, turning

on the spindle N. As the beveled gear-wheel P' on the spur-wheel P is now stationary, the said gear-wheel O rolls off on the said wheel P', whereby the spindle N is turned in an opposite direction from the one described above in reference to winding up the watch or clock. The spindle N by its wheel S turns the gear-wheel T in the inverse direction of the arrow b', whereby the hand or pointer U turns in the same direction—that is, back to its starting-point, on which it arrives when the spring is unwound—that is to say, when the spindle E and wheel F are locked in place by the Geneva stop.

It is understood that when the wheel F and its spindle have made four revolutions the pin J' on the disk J, secured on the said spindle E, has moved the star-wheel K the four teeth K² until the next tooth K³ stops further motion.

The up-and-down motion, as above described, is also applicable to the ordinary going-barrel system of watch or clock movements.

We are aware that the up-and-down motion has been previously applied to watches and clocks, and more especially to the fusee-movements, in which the motive power is transmitted to the train of wheels through the fusee; but in what is known as the going-barrel system of motive power there has not been a reliable up-and-down motion. We therefore do not claim such a combination, broadly; but

What we do claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, in a watch or clock, with the top plate B, having a bearing, and the pillar-plate C, connected therewith and provided with a circular opening opposite said bearing, of the arbor E, journaled at one end of said bearing, the recessed main driving-wheel on said arbor, the barrel H, having an apertured boss H' journaled in said circular opening, and in which the other end of the arbor E is journaled, and the mainspring within the said driving-wheel and barrel, substantially as set forth.

2. The combination, in a watch or clock, with the top plate B, having a bearing, and the pillar-plate C, having a circular opening, of the main driving-wheel recessed on its inner face and provided with a hub, the barrel H, having a boss H' journaled in the said circular opening, the mainspring secured at its inner end to the hub of the main driving-wheel and at its outer end to the drum, and the arbor E, passed through said hub and journaled in the boss H' and in the bearing in plate B, substantially as set forth.

3. In a watch or clock, the combination, with a main driving-wheel recessed on one face, of a barrel mounted to turn in the pillar-plate, a mainspring extending partly into the said recess of the main driving-wheel and into the said barrel, a ratchet-wheel secured on the said barrel and connected with the winding

mechanism, and a Geneva stop held on the said ratchet-wheel and the spindle of the main driving-wheel, substantially as shown and described.

5 4. The combination, with the main driving-wheel, the barrel having a ratchet-wheel secured to its upper side, the star-wheel K on said ratchet, the arbor E, the toothed disk J thereon, and the mainspring, of the spindle N, 10 having an offset N' between its ends, pinions L P, loosely mounted on the said spindle at opposite sides of the offset, carrying gear-wheels L² P', respectively, on their inner faces, the pinion L meshing into the main driving-wheel, the pinion O on said offset meshing 15 into gears L² P', pinion O, connecting the ratchet-wheel and pinion P, the winding-gearing connected with ratchet-wheel I, the pinion T, the pointer U carried thereby, and the 20 pinion S on the spindle N and meshing with pinion T, substantially as set forth.

5 5. In a watch or clock, a main driving-wheel recessed on one face, a barrel mounted to turn in the pillar-plate, a mainspring extending 25 partly into the said recess of the main driving-wheel and into the said barrel, and a ratchet-wheel secured on the said barrel and connected with the winding mechanism, in combination with a spindle, two beveled gear-wheels held to turn loosely on the said spindle 30 and adapted to be alternately turned by the said main driving-wheel and ratchet-wheel, and a third beveled gear-wheel mounted to turn on one side of the said spindle and in 35 mesh with the said two beveled gear-wheels, substantially as shown and described.

6. In a watch or clock, a main driving-wheel recessed on one face, a barrel mounted to turn

in the pillar-plate, a mainspring extending partly into the said recess of the main driving-wheel and into the said barrel, and a ratchet-wheel secured on the said barrel and connected with the winding mechanism, in combination with a spindle, two beveled gear-wheels held to turn loosely on the said spindle and adapted to be alternately turned by the said main driving-wheel and ratchet-wheel, a third beveled gear-wheel mounted to turn on one side of the said spindle and in mesh with the said two beveled gear-wheels, and a Geneva stop held on the said main driving-wheel and the said ratchet-wheel, substantially as shown and described.

7. In a watch or clock, a main driving-wheel recessed on one face, a barrel mounted to turn in the pillar-plate, a mainspring extending partly into the said recess of the main driving-wheel and into the said barrel, and a ratchet-wheel secured on the said barrel and connected with the winding mechanism, in combination with a spindle, two beveled gear-wheels held to turn loosely on the said spindle and adapted to be alternately turned by the said main driving-wheel and ratchet-wheel, a third beveled gear-wheel mounted to turn on one side of the said spindle and in mesh with the said two beveled gear-wheels, a Geneva stop held on the said main driving-wheel and the said ratchet-wheel, and a hand or pointer actuated by the said spindle, substantially as shown and described.

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