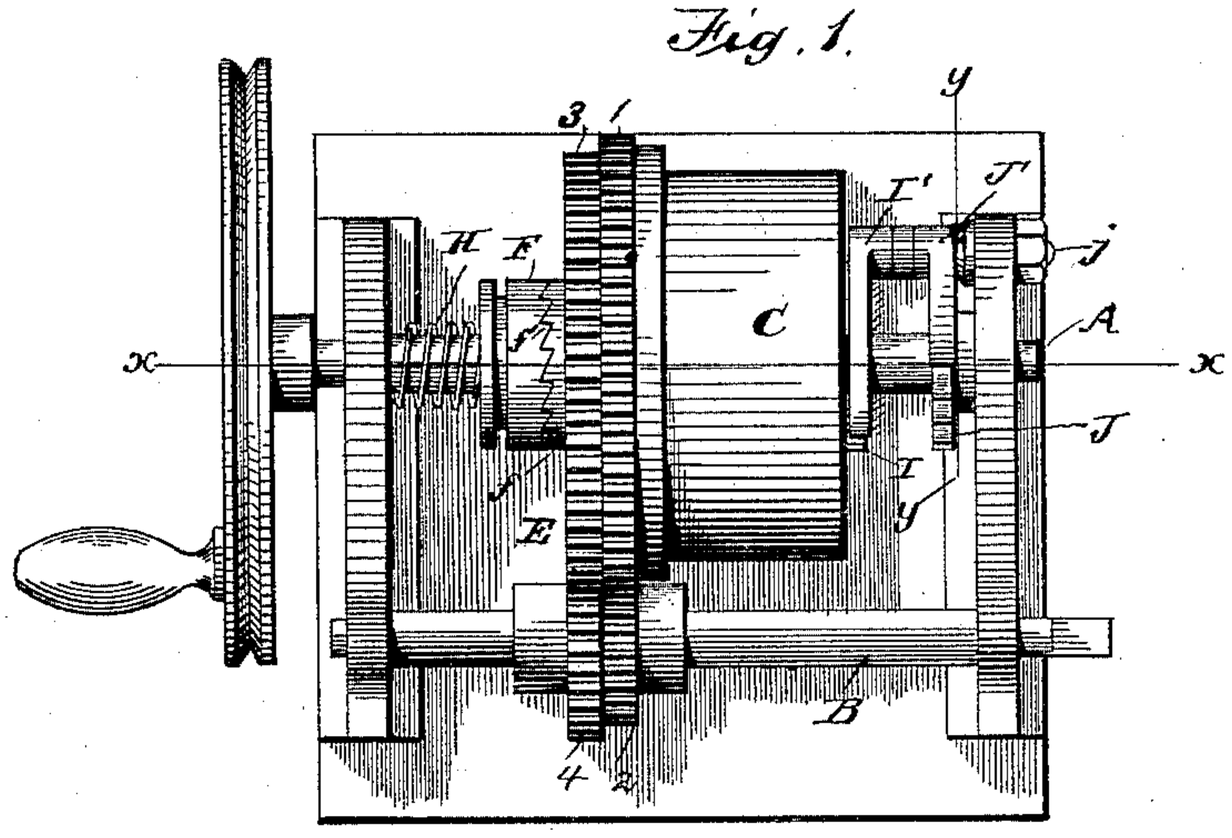
(No Model.)

S. B. WORTMANN.

MECHANICAL MOVEMENT.

No. 461,994. Patented Oct. 27, 1891.

Fig. 1.



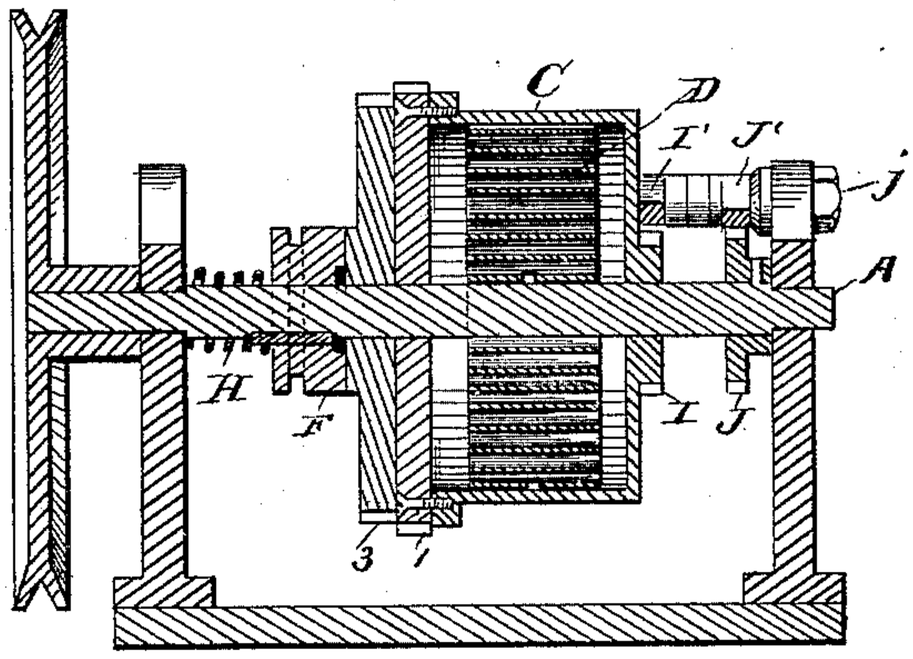
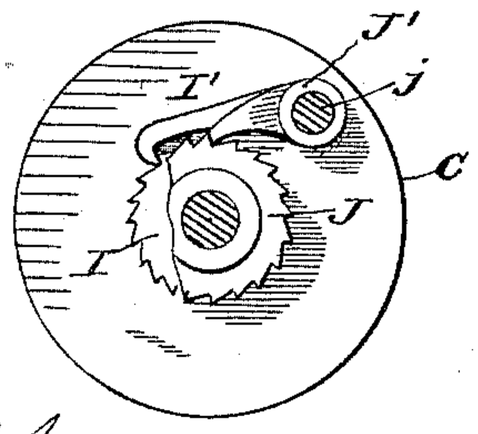


Fig. 2.

Fig. 3.



Witnesses

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MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 461,994, dated October 27, 1891.

Application filed June 18, 1891. Serial No. 396,694. (No model.)

To all whom it may concern:

Be it known that I, SIGISMUND B. WORTMANN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Mechanical Movements; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in mechanical movements of the character disclosed in a prior United States application, filed by me on the 26th day of March, 1891, Serial No. 386,501; and the object of the present improvement is to obviate the liability of the spring breaking during its reaction or uncoiling, to facilitate the operation of putting the spring under tension, and to improve the general efficiency of the movement.

In adapting a spring-motor to the propulsion of a sewing-machine, phonograph, or for other purposes where the spring is liable to uncoil rapidly, there is a tendency to break or injure the spring; but I overcome this objection by combining an automatically-operating clutch with a loose wheel forming a part of the differential gear between the spring axle or shaft and a counter-shaft, all as will be hereinafter more fully described and claimed.

I have illustrated my improved movement in the accompanying drawings, in which—

Figure 1 is a plan view; Fig. 2, a vertical longitudinal sectional view on the plane indicated by the dotted line *x x* of Fig. 1, and Fig. 3 is a detail view on the line *y y* of Fig. 1.

Referring to the drawings, in which like letters and figures of reference denote corresponding parts in all the figures, A designates the spring axle or shaft, and B the counter-shaft.

C is the spring-drum loosely mounted on the shaft; D, the spring arranged within the drum and having one end fastened or secured to the drum C and the other end to the spring axle or shaft, and E the differential transmitting-gear, all arranged substantially as shown and described in my prior application, hereinbefore referred to. The differential gear E comprises, preferably, the four wheels 1 2 3 4, two of which are fitted on the spring axle or shaft to turn thereon and the other two wheels are rigid with or fastened to the counter-shaft. The loose wheels 1 3 are arranged side by side on the spring-axle, and one of said wheels 1 is rigid with the spring-drum B, being fastened or secured thereto in any desired manner. The transmitting or compound pinion 2 4 meshes with the wheels 1 3, and said compound pinion may be made in separate parts, one part 2 meshing directly with the wheel 1 on the spring-drum and the other part 4 meshing with the wheel 3. The loose wheels 1 3 are of different diameters, the one smaller than the other, and the compound gear or pinion 2 4 has its parts likewise of different diameters.

In lieu of having the wheels of the differential gear mesh directly together, I may use equivalent gearing, such as sprocket wheels and chains or pulleys and belts, or other forms of gearing.

F designates the automatic clutch, which is keyed or feathered to the spring axle or shaft at one side of the loose gear 3, and said gear has a serrated or toothed hub *f* on one side of the same. The clutch has the serrations or teeth *f'* formed on the end thereof contiguous to the serrated hub *f* of the loose gear wheel, and when the clutch F is engaged with the hub of the loose wheel the latter is clutched or fastened rigidly with the shaft, so as to turn or rotate with the spring axle or shaft when the latter is rotated. The clutch is normally pressed into engagement with the serrated hub of the loose gear-wheel by means of a coiled spring H, fitted loosely on the spring axle or shaft between the end of the clutch and one of the bearings or supports for the axle, or equivalent means may be used to hold the clutch in engagement with the loose wheel and to permit the clutch to be disengaged automatically when the spring is uncoiling too rapidly, and thus release the drum and differential gearing from axle A.

If desired, I may provide the two ratchet-wheels I J, (shown in Figs. 1 and 3,) to be used for placing the spring under tension by a few turns of either the spring axle or drum. One of these ratchet-wheels I is rigidly secured to the outside of the spring-drum, and the other wheel J is secured directly to the spring axle or shaft. The teeth of the ratchet-wheel I are inclined or arranged reversely to

the teeth of the other ratchet J, and with the ratchet I a pawl I′ is adapted to engage, while a pawl J′ is adapted to engage with the ratchet-wheel J, both pawls being pivoted loosely on a fixed pin or stud *j*, secured to a part of the frame or one of the bearings of the spring axle or shaft.

This being the construction of my improved movement the operation may be described as follows: To wind the spring from the spring axle or shaft a crank-disk or crank may be secured to the shaft, and as it is turned by hand the clutch causes the loose wheel to turn with the shaft, which loose wheel in turn rotates the counter-shaft and the latter rotates the wheel I and the drum B, thus winding the spring from the top or outer side thereof by the rotation of the drum, which is loose on the shaft. To wind the spring on the inner side thereof and directly from the spring axle or shaft, the pawl I′ is thrown into engagement with the ratchet-wheel I on the drum, thus locking said drum from rotation, and it only requires a few turns of the hand wheel or crank to fully place the spring under tension. When the spring has been wound, it can be held under tension by adjusting the check-pawl J′ into engagement with the ratchet J, but by lifting the pawl the spring is free to unwind and rotate the axle through the differential gear and clutch. The spring does not act directly on the spring axle or shaft to which it is attached, but it operates through the drum, the differential gear, and the clutch to rotate the spring axle or shaft. The clutch is held by its spring in engagement with the loose wheel 3, so as to cause said wheel to rotate the spring axle or shaft during the time that the reacting force of the spring is exerted on the drum and differential gear, or until the parts attain such momentum or velocity as to overcome the tension of the spring; but when the force of the spring has spent itself and the parts are still revolving rapidly, owing to the momentum acquired during the time when the spring influenced the drum and differential gear, the clutch is automatically thrown or forced out of gear, thus freeing the loose wheel 3 and the spring-drum from the spring axle or shaft while the parts are in motion. As the clutch is disengaged from the loose wheel and the spring is thereby freed from the shaft to such an extent as to cease operating the same, it is evident that the spring will not be injured while the parts are revolving, which is very important.

By the employment of the differential gearing in connection with the spring and arranging the same between the spring, the counter-shaft, and the spring axle or shaft, I am enabled to multiply or increase the number of revolutions of the axle or shaft as compared with the number of turns required to place the spring under tension.

The crank wheel or disk can be applied to the end of the counter-shaft to rotate the latter, the differential gear, and the spring and its drum in the manner heretofore described; but should it be desired to wind the spring direct from the axle or shaft, the pawl J′ should be engaged with the ratchet J on the spring axle or shaft. It should be understood that the clutch does not engage with the loose wheel 3 when the parts are rotated to wind the spring direct from the shaft or axle A, as the serrated hub *f* slips past the serrations on the hub when the wheel 3 is turned.

The spring can be wound up from the counter-shaft by adjusting the pawl J′ to engage with its corresponding ratchet-wheel J and disengaging the pawl I′ from its ratchet I, after which the crank or disk on the counter-shaft can be turned and rotate the gears 1 3, the drum, and the spring, the shaft or axle being held stationary and the clutch slipping clear of the teeth or serrations in the hub *f* of the loose gear. The pawl I′ can remain at all times in engagement with the ratchet I, (except when the counter-shaft is rotated by the crank or disk to wind the spring,) as the beak of the pawl is automatically thrown out of engagement with the teeth of the ratchet when the spring unwinds to rotate the drum, its attached ratchet, the differential gearing, and the spring axle or drum.

If desired, a spring or equivalent detent may be employed to prevent the pawl I from flying back too far and thereby be thrown out of operative position.

I would have it understood that I do not deem it essential to employ the two ratchets and check-pawls I I′ and J J′, as they can be dispensed with altogether; but I prefer to illustrate and describe the same, as they enable me to have better control of the spring.

Having thus described my invention, what I claim as new is—

1. The combination of an axle, a spring-drum, a spring, the differential gearing, having its two primary wheels 1 3 loose on the axle and one of said primary wheels 1 rigid with the spring-drum, and an automatic clutch keyed to the axle to normally engage with the primary wheel 3 of said differential gearing, all combined and arranged for services substantially as and for the purpose set forth.

2. The combination of an axle, a spring, a spring-drum loose on said axle, the differential gear-wheels 1 3 loose on the axle, one of said wheels being rigid with the spring-drum and the other wheel having a serrated hub, a counter-shaft carrying gear-wheels which mesh with said wheels 1 3, and a spring-actuated clutch keyed to the axle to engage with the hub of the gear-wheel 3, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

SIGISMUND B. WORTMANN.

Witnesses:
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