(No Model.)

D. B. MERRY & W. M. SHELMAN.

SPRING MOTOR.

No. 444,073. Patented Jan. 6, 1891.

Fig. 1.

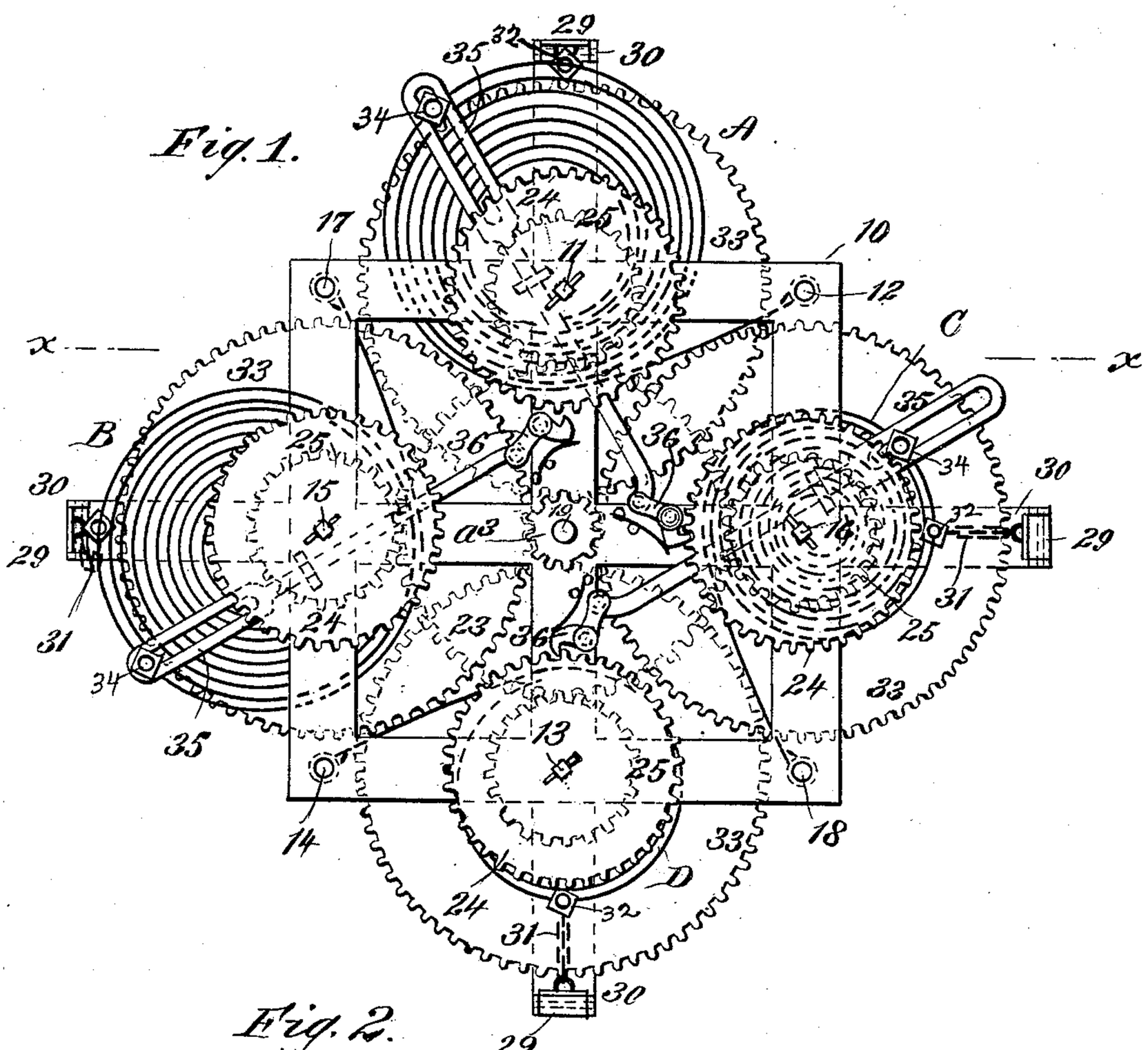
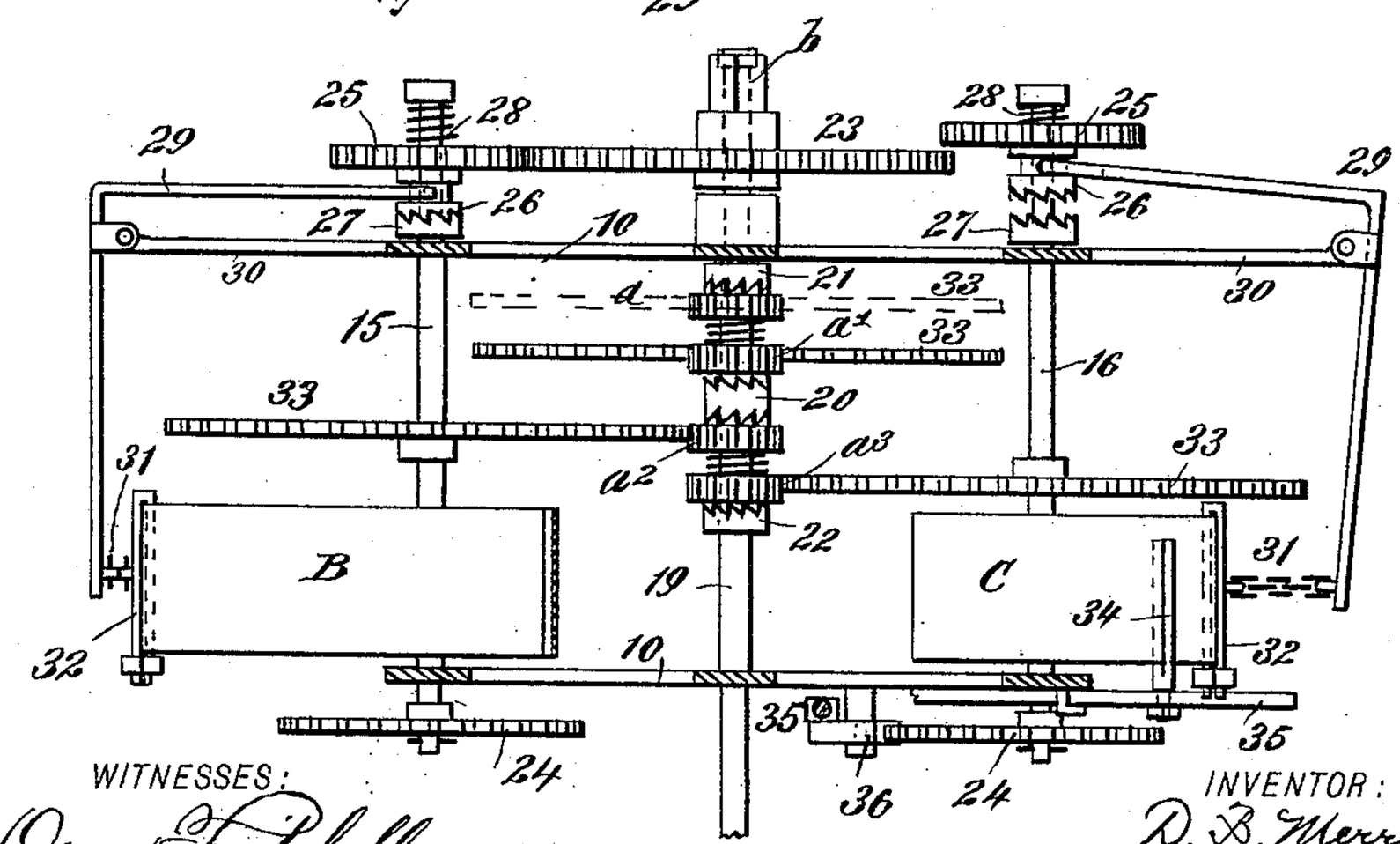


Fig. 2.



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SPRING-MOTOR.

SPECIFICATION forming part of Letters Patent No. 444,073, dated January 6, 1891.

Application filed April 22, 1890. Serial No. 348,984. (No model.)

To all whom it may concern:

Be it known that we, DANIEL B. MERRY and WILLIAM M. SHELMAN, of East Las Vegas, in the county of San Miguel and Territory of New Mexico, have invented a new and Improved Spring-Motor, of which the following is a full, clear, and exact description.

Our invention relates to an improvement in spring-motors, and has for its object to provide a simple and effective motor for running sewing-machines or other light machinery so constructed that a series of springs, all having connection with one drive-shaft, may be wound from one stem, and wherein the said springs are so arranged that when one or more of them are partly run down they may be immediately rewound, and wherein, also, as each spring is fully wound it will be thrown out of connection with the winding mechanism; and a further object of the invention is to so construct the motor that when one spring is unwound it will release the next for unwinding, and wherein the unwound spring or springs when idle or when being rewound will not tend to retard the movement of the drive-shaft as acted upon by the wound springs.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

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

Figure 1 is a side elevation of the motor, and Fig. 2 is a horizontal section practically on the line $x\,x$ of Fig. 1.

The frame 10 may be of any suitable or approved construction. Preferably, however, the said frame is rectangular, and four or more springs may be employed, four springs being illustrated in the drawings, and lettered, respectively, A, B, C, and D.

The spring A is secured at one end and wound upon a spindle 11, held to turn in the upper portion of the frame, the other end of the spring being rigidly attached to a post 12, attached in the upper portion at one side of the frame—for instance, the right-hand side, as illustrated in Fig. 1.

The spring D is attached to a spindle 13, journaled in the bottom of the frame, and at its other end to a post 14, secured at the lower left-hand side of the frame, for instance. The springs B and C are attached, respectively, to spindles 15 and 16, journaled in opposite sides of the frame and to studs or posts 17 and 18, fastened rigidly to the frame.

In the center of the frame, preferably at an equidistance from each spring, the drive-shaft 19 is journaled, which drive-shaft is provided with a central integral clutch-section 20, having teeth upon both sides, and clutch-sections 21 and 22 at each side of the central clutch-section, the teeth whereof face inward, as best shown in Fig. 2.

When four springs are employed, four pinions a, a', a^2, and a^3 are loosely mounted upon the shaft, the pinion a having a clutch-surface adapted for engagement with the clutch 21 of the shaft, the pinion a' being similarly constructed to engage with one side of the central clutch-surface 20 of the shaft and the pinion a^2 with the opposite side surface of the said clutch-section, the clutch-face of the pinion a^3 being adapted to engage with the clutch-section 22 of the shaft.

The extremities of the drive-shaft 19 project beyond the sides of the frame, one end of said shaft being adapted for connection with the machine to be driven, and upon the other end of the shaft a spur-wheel 23 is held to turn, the hub whereof is squared to receive a key, as illustrated at b in Fig. 2. The spindles 11, 13, 15, and 16 also project through the frame at both sides and upon one extending end of each spindle a ratchet-wheel 24 is secured. Upon the opposite end of each spindle a pinion 25 is held to slide, each of which pinions is provided with an inner clutch-face 26, adapted for engagement with a clutch-collar 27, one collar being formed upon each spindle. The pinions 25 are pressed upon their outer faces by a spring 28, the tendency of which spring is to force the clutch-faces of the pinions into contact with the clutch-collars of the spindles upon which they are mounted, and each spring-pressed pinion 25 is adapted to mesh with the loosely-mounted spur-wheel 23, and each pinion is further provided with an angled shifting-lever 29, which levers

are fulcrumed upon suitable projections or extensions 30 of the frame.

The inner end of each lever 29 is connected with one of the springs by means of a chain 31 or its equivalent, the said chain being attached to a clamp 32, secured to the outer coil of the spring, and upon each spring-spindle a spur-gear 33 is securely fastened, the spur-gear upon the spindle of the side spring B being adapted to mesh with the pinion a^2 upon the drive-shaft and the spur-gear upon the spindle of the spring C with the pinion a^3, while the spur-gear of the lower spring-spindle meshes with the pinion a' and the spur-gear of the upper spring-spindle with the pinion a.

The pinions are normally held in contact with the clutch-sections upon the drive-shaft by means of suitable springs, as illustrated in Fig. 2.

Upon the outer coil of each spring a second clamp 34 is secured, the outer end of which clamp is adapted to slide in the slotted end of a lock-bar 35, each of which lock-bars is pivoted at its inner end to one end of a pawl 36, the said pawls being pivoted at or near their centers upon the main frame, as shown in Fig. 1.

The pawl of the lock-bar attached to the spring B is adapted to engage with the ratchet-wheel 24 of the upper spring A, and the pawl upon the lock-bar of the upper spring A engages with the ratchet-wheel attached to the spindle of the spring C, while the pawl of the lock-bar attached to the said spring C is adapted for engagement with the ratchet-wheel secured upon the spindle of the lower spring D, as is best illustrated in Fig. 1.

In operation, if all the springs are unwound their expansion will suffer the spring-pressed pinions 25 to be thrown into gear with the loosely-mounted spur-wheel 23, and also into engagement with the clutch-sections 27 of the spindles upon which they are mounted, and when such contact is made by applying the key to the square hub of the said spur-wheel each spring is simultaneously wound upon its spindle, and when the springs are fully wound the contraction thereof operates the shifting-levers 29 automatically and causes them to throw the spring-pressed pinions out of gear both with the spindle and the spur-wheel 23, as illustrated to the right in Fig. 2. In the event that one spring is completely unwound and the others only partially so, the shifting-lever of each spring as the latter is tightened to its fullest extent acts instantly and independently of the other levers. All the springs having been wound, for instance, the ratchet or other locking device of the spindle 15 is released and the spring B expands, and thereby drives the main shaft, and when the spring is about fully expanded it draws upon its attached lock-lever and releases the pawl from engagement with the ratchet-wheel of the upper spindle 11, thereby permitting the upper spring A to act, and this spring when unwound releases the side spring C which performs the same office for the lower spring D. It is not necessary to await the unwinding of all the springs before rewinding, as if one is unwound and another is in operation the winding of the idle-spring will not retard in the least the revolution of the drive-shaft, since in the operation of winding the clutch-section of the pinion upon the drive-shaft connected with the spring operated upon slips upon its opposed clutch-section upon the shaft and does not exert any pressure thereon.

When more than four springs are used, an additional winding-stem is necessary for each set of four connected with the main shaft preferably by means of an endless chain and a sprocket-wheel governed by suitable ratchets.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a spring-motor, the combination, with a frame, two contiguous spindles held to turn in the frame, each provided with an attached ratchet-wheel, and an independent spring coiled around each spindle, having one end attached thereto and the other to the frame, of a lock-rod attached to the outer coil of one spring at one end and having the other end attached to a pawl adapted for engagement with the ratchet-wheel of the opposed spindle, a drive-shaft, and a connection between the drive-shaft and the said spindles, substantially as shown and described.

2. The combination, with a drive-shaft, of a series of springs, the axes or shafts of which are arranged around and parallel to said drive-shaft, a gear connection between the springs and drive-shaft, and lock-bars carried by various of the springs operating in conjunction with an adjacent spring, substantially as and for the purpose specified.

3. The combination, with a frame, a drive-shaft mounted in said frame, having a series of clutch-collars attached thereto, and spring-pressed pinions loosely mounted upon the drive-shaft, one pinion being adapted for engagement with each clutch-collar, of spindles held to turn in the frame, each spindle having a spring wound thereon, one end of which spring is secured to the spindle and the other to the frame, a gear attached to each spindle and meshing with one of the pinions of the drive-shaft, a ratchet-wheel attached to each pinion, pawls pivoted to the frame and adapted for engagement one with each of the ratchet-wheels of the spindles, and a slotted lock-bar attached to each spring at its outer end, the inner end of the said bars being connected with said pawls, substantially as shown and described, and for the purpose specified.

4. The combination, with a frame, a drive-shaft mounted in said frame, having a series of clutch-collars attached thereto, and spring-pressed pinions loosely mounted upon the drive-shaft, one pinion being adapted for engagement with each clutch-collar, of spindles

held to turn in the frame, each spindle having a spring wound thereon, one end of which spring is secured to the spindle and the other to the frame, a gear attached to each spindle and meshing with one of the pinions of the drive-shaft, a ratchet-wheel attached to each pinion, pawls pivoted to the frame and adapted for engagement one with each of the ratchet-wheels of the spindles, a slotted lock-bar attached to each spring at its outer end, the inner end of the said bars being connected with the said pawls, a clutch-section formed upon the outer end of each spindle, a spring-pressed pinion loosely mounted upon each of the said spindles and adapted for engagement with the clutch-section thereof, a spur-wheel loosely mounted upon the drive-shaft and adapted for engagement with the said spring-pressed pinions, and shaft-levers fulcrumed upon the frame, the ends of which levers are attached to the spring-pressed pinions and the springs, substantially as and for the purpose specified.

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