

(No Model.)

2 Sheets—Sheet 1.

A. D. MAGGART & L. EARNHART.
SPRING POWER FOR BICYCLES.

No. 551,867.

Patented Dec. 24, 1895.

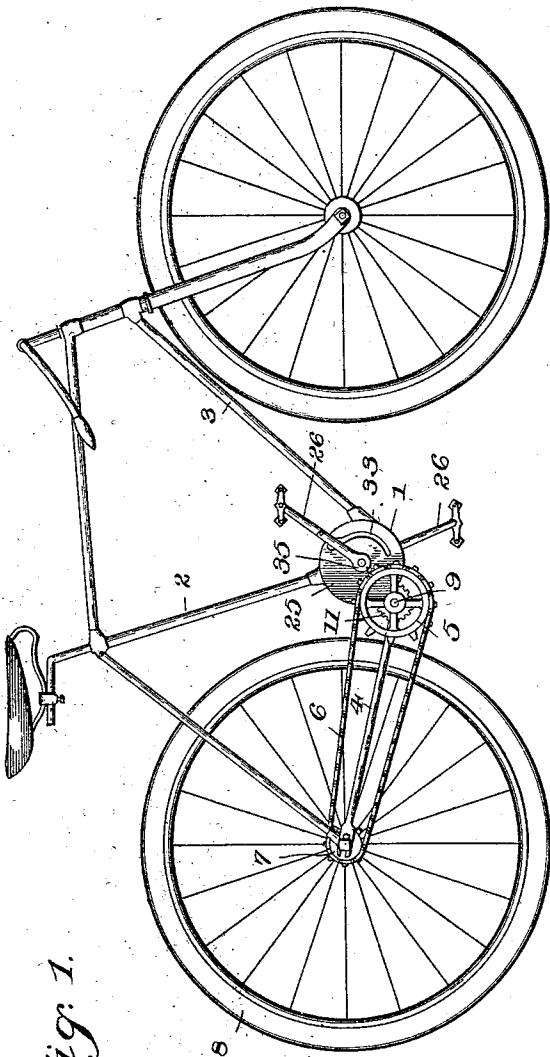


Fig. 1.

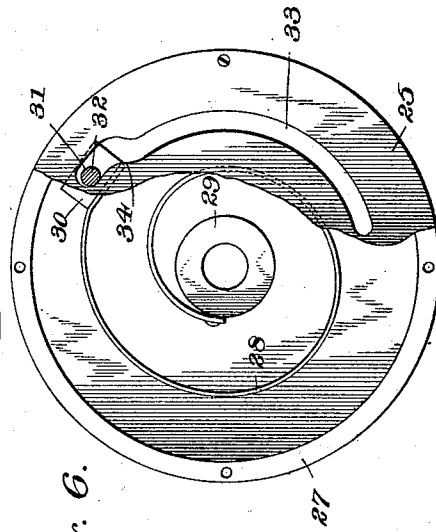


Fig. 6.

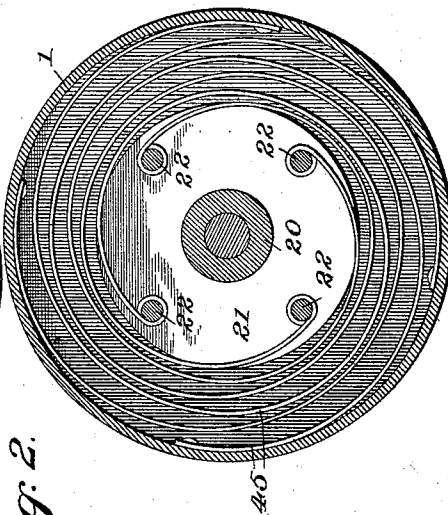


Fig. 2.

Witnesses

Chas. A. Ford.
R. M. Smith.

By their Attorneys.

Inventors

A. D. Maggart,
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Leroy Earnhart,

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(No Model.)

2 Sheets—Sheet 2.

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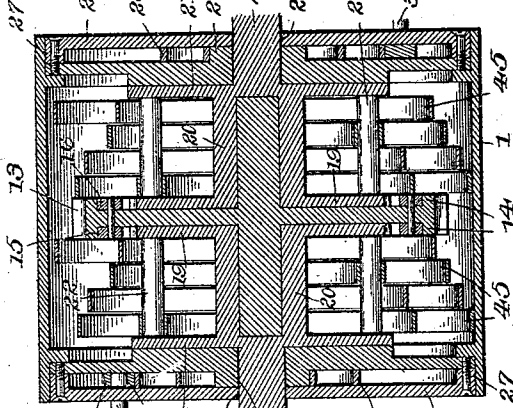


Fig. 9.

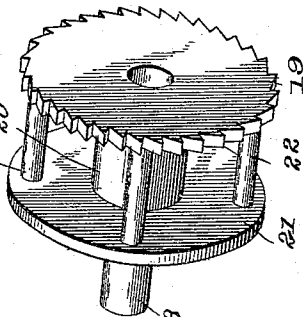


Fig. 4.

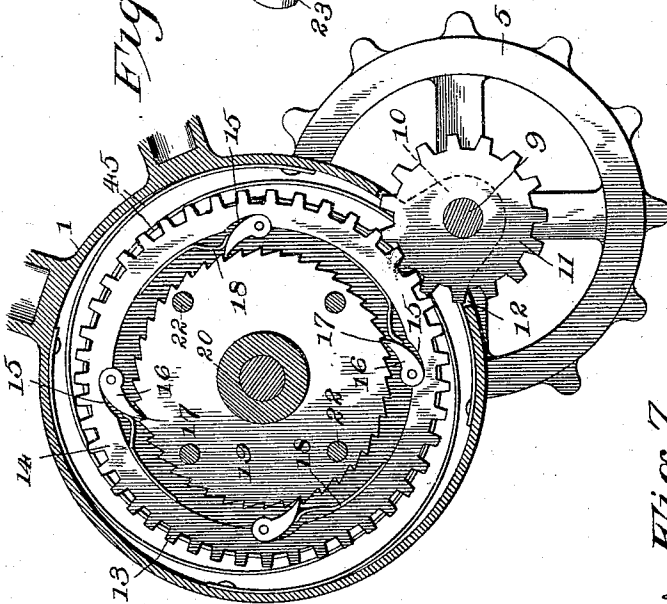


Fig. 5.

Witnesses

Chas. Ford.
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Fig. 3.

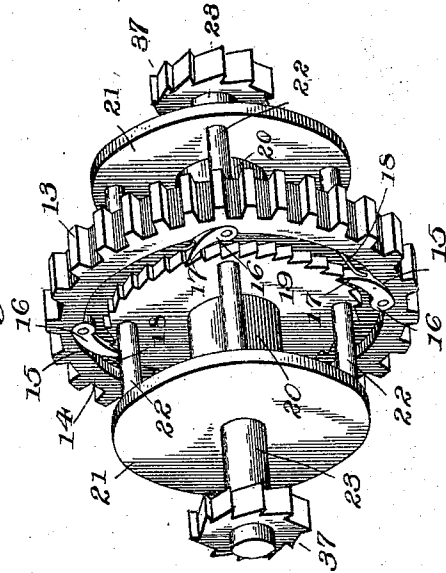


Fig. 7.

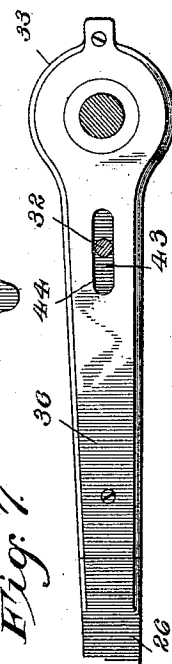
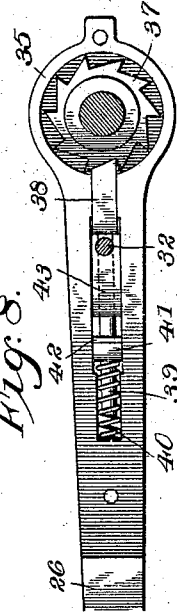


Fig. 8.



Inventors

UNITED STATES PATENT OFFICE.

ADAM D. MAGGART AND LEROY EARNHART, OF CROMWELL, INDIANA.

SPRING-POWER FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 551,867, dated December 24, 1895.

Application filed March 8, 1895. Serial No. 541,033. (No model.)

To all whom it may concern:

Be it known that we, ADAM D. MAGGART and LEROY EARNHART, citizens of the United States, residing at Cromwell, in the county of Noble and State of Indiana, have invented a new and useful Spring-Power for Bicycles, of which the following is a specification.

This invention relates to an improved spring-power for bicycles, and while it is especially designed for use in connection with the driving-gear of bicycles, it is also adapted to be employed in connection with other light-running machinery.

The object of the invention is to provide a simple and inexpensive spring-motor which is adapted to be geared to the main sprocket-shaft for applying the accumulated power thereto, and which is adapted to be operated or wound up by means of suitable pedal-levers, and to construct such motor in such manner that it will be positive in its action, reliable and durable in practice, not liable to get out of order, and which shall be thoroughly effective for the purpose for which it is intended.

The present invention consists in the combination, with the reach, rear fork and other frame-bars of an ordinary safety-bicycle, of a stationary drum located in close proximity to the main driving-sprocket, and provided with an internally-arranged spur-gear from which motion is imparted to the main sprocket by means of a spur-pinion secured to the sprocket-shaft and meshing with said internally-arranged spur-gear through a slot in the surrounding casing or drum; in the combination, with the master-gear, of ratchet-disks operating in connection therewith and actuated by the pedal-levers; in the particular arrangement of the motor-springs with relation to said ratchet-disks; in the manner of connecting the pedal-levers with the shafts at the ratchet-disks, and in the manner of retracting the pedal-levers and throwing them out of gear with the shafts of the ratchet-disks; and in certain features and details of construction and arrangement of parts hereinafter fully described, illustrated in the drawings, and pointed out in the claims.

In the drawings, Figure 1 is a side elevation of a bicycle constructed in accordance with my improvements and showing the location

of the spring-power drum. Fig. 2 is a vertical longitudinal section through the drum, taken just outside of the power-springs. Fig. 3 is an enlarged perspective view of the spring-winding mechanism, the drum being omitted. Fig. 4 is a detail perspective view of one of the winding-hubs and ratchet-disks. Fig. 5 is a vertical longitudinal section through the drum near the master-gear, showing also the sprocket-shaft, main sprocket, and pinion. Fig. 6 is a side elevation of the drum with the double-plate end disk partially broken out to show the internally-arranged spring for retracting the pedal-lever, the lever-pin being shown in section. Fig. 7 is a detail view of a portion of one of the pedal-levers, looking toward the inner side thereof. Fig. 8 is a similar view with the removable covering-plate omitted to show the arrangement of the sliding pawl. Fig. 9 is a central transverse section through the inclosing-case and internal mechanism.

Similar numerals of reference indicate corresponding parts in the several figures of the drawings.

Referring to the drawings, 1 indicates an annular casing or drum which is supported and held in place by means of the frame-bars 2, 3, and 4, arranged as in the ordinary construction of safety-bicycles.

5 indicates the main driving-sprocket from which a chain 6 extends to the smaller sprocket 7, on the hub of the rear driving-wheel 8, as indicated. The shaft 9 of the main sprocket 5 is mounted in suitable laterally-projecting ears or bearings 10, attached to or formed upon the exterior surface of the stationary drum 1. The main sprocket 5 is keyed to and drives said shaft 9, and the latter carries a spur-pinion 11 keyed thereto and arranged centrally of the drum 1. The spur-pinion 11 projects at its periphery through an aperture or opening 12 in the wall of the drum and meshes with the internally-arranged master-gear 13. The master-gear 13 is provided on either side with a laterally-projecting annular flange 14, provided at suitable intervals with notches 15, in which are located and pivoted pawls 16, provided with inwardly-extending points or lips 17, and with actuating-springs 18, secured to any convenient point and lying behind the pawls

16, serving by their tension to force the lips or points 17 of the pawls inwardly into engagement with a ratchet-disk 19, carried on the inner end of a hollow hub 20. The hub 5 20 is also provided at its outer edge or end with a disk 21, approximating in size the ratchet-disk 19, and connected therewith at suitable intervals by connecting pins or bars 22, four of said pins being shown.

10 The hub 20, with the ratchet-disk 19 and disk 21, is mounted upon and turns around a short laterally-projecting and centrally - arranged shaft of the master-gear, the pawls 16 allowing said hub to turn in one direction but 15 preventing the rotation thereof in the opposite direction.

23 designates a centrally-arranged outwardly-extending shaft, which is formed upon the hub 20 and projects outwardly through a central perforation 24 in the end disk 25 of the inclosing drum, beyond which the shaft 23 is adapted to receive the pedal-lever 26, which is attached thereto in a manner that will hereinafter appear.

25 The end disks or covering-plates on either side of the drum are made in two parts having an inner and an outer plate, one of which is provided with an annular flange or rim 27, which when the two plates are secured together affords a space between them in which 30 is arranged a spiral spring 28, the inner end of which is secured to the hub 29, and the outer end to a block 30, provided with a perforation 31, adapted to receive a pin 32, projecting inwardly from the inner face of the pedal-lever. The block 30 is slidably arranged between the two end covers of the drum, being maintained in position through the resilient action of the spring 28. The pin 32 travels in a circular path partially around 40 the axle 23, and projects through a curved slot 33 in the outer plate 25 of the end disk. The curved slot just described has an offset 34, or is deflected outwardly from its natural 45 course for a purpose that will appear.

The inner end of the pedal-lever 26 is provided with an expanded hub portion 35 and with a removable cap or plate 36, as shown in Figs. 7 and 8. The expanded end of the lever is hollowed out, as shown, to receive and embrace a small ratchet-wheel 37, fast upon the outer end of the short shaft 23, keyed within the hub 20. A sliding pawl 38 travels lengthwise in a recess or depression in the contiguous inner faces of the pedal-lever 55 and the covering-plate, and engages said ratchet for driving the axle 23 when the pedal-lever is depressed. The shank 39 of the sliding pawl 38 has a spiral spring 40, disposed 60 around it and interposed between a collar 41 on said shank and the rear wall of the recess or depression referred to, whereby the pawl is normally held in engagement with the ratchet-disk 37. A centrally-perforated sliding block mounted on the shank 39 moves 65 back and forth thereon and carries the pin 32, above described. A leather or rubber

washer 42 is interposed between the collar 41 and the sliding block 43 for cushioning the end thrust thereof. The pin 32 projects 70 through an elongated slot 44 in the removable covering-plate 36, also entering and passing through the curved slot 33 in the end disk 25 and into the perforation or recess 31 in the block 30 on the outer free end of the spiral 75 spring 38.

A series of spiral springs 45 is arranged within the drum upon either side of the master-gear 13, four springs being shown in the series. Each spring 45 is secured at its inner 80 end to one of the pins or bars 22 between the disk 21 and ratchet-disk 19, and the outer end of said spring is secured to the interior wall of the drum or cylindrical case in any suitable or preferred manner. It will now be appar- 85 ent that by depressing the pedal-lever the latter, by means of its pawl-and-ratchet connection with the shaft 23, will partially revolve the latter and also the hub 20 keyed thereto, thereby winding up the springs 45 on that side 90 of the master-gear on which the lever is located. The lever 26 is now retracted by means of the spring 28 in the end disk 25, and in this way may be repeatedly depressed for entirely winding up the springs 45 and storing power. 95 The arrangement of the pawls 16 on the master-gear 13 admits of the winding up of the springs 45 without affecting the master-gear, but when the springs 45 are permitted to exert their tension and force and to pay out the 100 power stored thereby, the master-gear will be revolved through the engagement of the ratchet-disk 19 and pawls 16. Being geared to the spur-pinion 11 on the sprocket-shaft, said master-gear will thus drive said sprocket 105 and thereby propel the machine forward in a manner that will be readily understood. In order to permit the small ratchet-wheel 37 to revolve freely within the hollow enlarged end of the pedal-lever 26 when said pedal-lever 110 reaches the limit of its upward movement the pin 32 is acted upon by the offset 34, above described, thereby withdrawing the sliding pawl 38 from its engagement with said ratchet-disk and permitting the same to revolve freely 115 with the shaft 23.

It will be understood that the ratchet-hub, disk 19, springs 45, pedal-lever 26, end disk 25, and retracting-spring, &c., are duplicated upon either side of the master-gear. 120

From the foregoing description it will be apparent that our improved spring-motor as applied to bicycles is very simple and inexpensive in construction, and very powerful, reliable, and effective in operation. 125

It will also be apparent that greatly-increased power is secured from the fact that both pedal-levers may be operated simultaneously, thereby enabling the rider to successfully pass over an obstruction or short steep 130 incline, which would otherwise be impossible were he able to use only one lever, as in the ordinary construction.

It will also be apparent that the improved

spring-motor described may be applied to other light-running machinery, such as sewing-machines, &c., and we therefore do not wish to be limited to the application to bicycles only.

Changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a bicycle spring power mechanism, the combination with the crank axle, of a gear wheel keyed thereto, a master gear meshing therewith, a stationary drum surrounding said master gear and attached rigidly to the machine frame, a ratchet hub operating in connection with said master gear and arranged within the drum, a plurality of power springs interposed between and connected with said ratchet hub and drum, a pedal lever mounted on the shaft of the ratchet hub, and a pawl and ratchet connection between said pedal lever and the shaft of the ratchet hub, all arranged for joint operation, substantially as specified.

2. In a spring power driving device for bicycles, the combination with the frame of the machine, of a horizontally disposed cylindrical drum rigidly attached to said frame, a centrally arranged master gear wheel mounted upon a horizontal shaft arranged concentrically of the drum, a ratchet disk resting against the side face of said master gear and formed with an outwardly extending hub journaled upon one of the projecting ends of said master wheel shaft, a plurality of power springs connected at their inner ends to said hub and at their outer ends to the drum, an outwardly projecting centrally arranged stud shaft projecting from said hub through the end casing of the drum, a pedal lever having a pawl and ratchet connection with said last named shaft, and a retracting spring slidably arranged within the end casing of the drum and in engagement with an inwardly projecting pin or stud on said pedal lever, substantially as and for the purpose described.

3. In a spring power driving device for bicycles, a spring actuated master gear meshing with a pinion on the main sprocket shaft, in combination with a revoluble hub mounted on the shaft of said master gear, the ratchet disk on said hub, a supplemental disk also carried by said hub, the interposed pins or bars to which the springs are secured, a series of springs connected with said hub and adapted to apply their power thereto, the interposed pawls connecting said ratchet disk and the master gear, and means substantially as described for rotating said hub.

4. In a spring power driving mechanism for bicycles, the combination with the drum containing the spring winding mechanism, of an end disk or cover provided with an internal

cavity, a spiral retracting spring located in said cavity, a pedal lever mounted on a shaft arranged centrally of and projecting through said end disk, and a pin interposed between said lever and retracting spring, substantially as and for the purpose specified.

5. In a spring power driving mechanism for bicycles, the combination with the spring winding mechanism, of a centrally arranged shaft, the end disk provided with a central aperture through which said shaft projects and also provided with a cavity and a curved slot leading thereto, a spiral retracting spring arranged within said cavity in the end disk, a pedal lever pivoted upon said centrally arranged shaft, a ratchet disk keyed to said shaft and arranged within the hollow expanded end of the pedal lever, a sliding pawl for engaging said ratchet disk, a pin interposed between said sliding pawl and the free end of the retracting spring, and an offset 34 adapted to act upon said pin for withdrawing the pawl out of engagement with the ratchet disk and permitting the free revolution thereof, substantially in the manner and for the purpose described.

6. In a spring power driving mechanism for bicycles, the combination with the centrally arranged spring winding shaft, of a pedal lever mounted loosely thereon and provided with a hollow expanded end, a ratchet disk located therein and keyed to said centrally arranged shaft, a longitudinally movable and sliding pawl engaging said disk and located within the hollow end of the pedal lever, an actuating spring for sliding said pawl longitudinally into engagement with said disk, and a detachable covering plate applied to said pedal lever in such manner as to inclose said disk and the pawl and its actuating spring, substantially as specified.

7. In a spring power driving mechanism for bicycles, the combination with the centrally arranged spring winding shaft, of a pedal lever mounted loosely thereon and provided with a hollow expanded end, a ratchet disk located therein and keyed to said centrally arranged shaft, a longitudinally movable and sliding pawl engaging said disk and located within a recess in the expanded end of said lever, a sliding block or collar mounted upon the shank of said pawl in such manner as to allow the pawl to reciprocate, a pin carried by said block and projecting through a slot in the wall of the lever, and an actuating spring arranged behind said pawl for sliding the latter longitudinally into engagement with the ratchet disk, substantially as and for the purpose specified.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

ADAM D. MAGGART.
LEROY EARNHART.

Witnesses:

E. D. MESSIMON,
F. E. BENDER.