

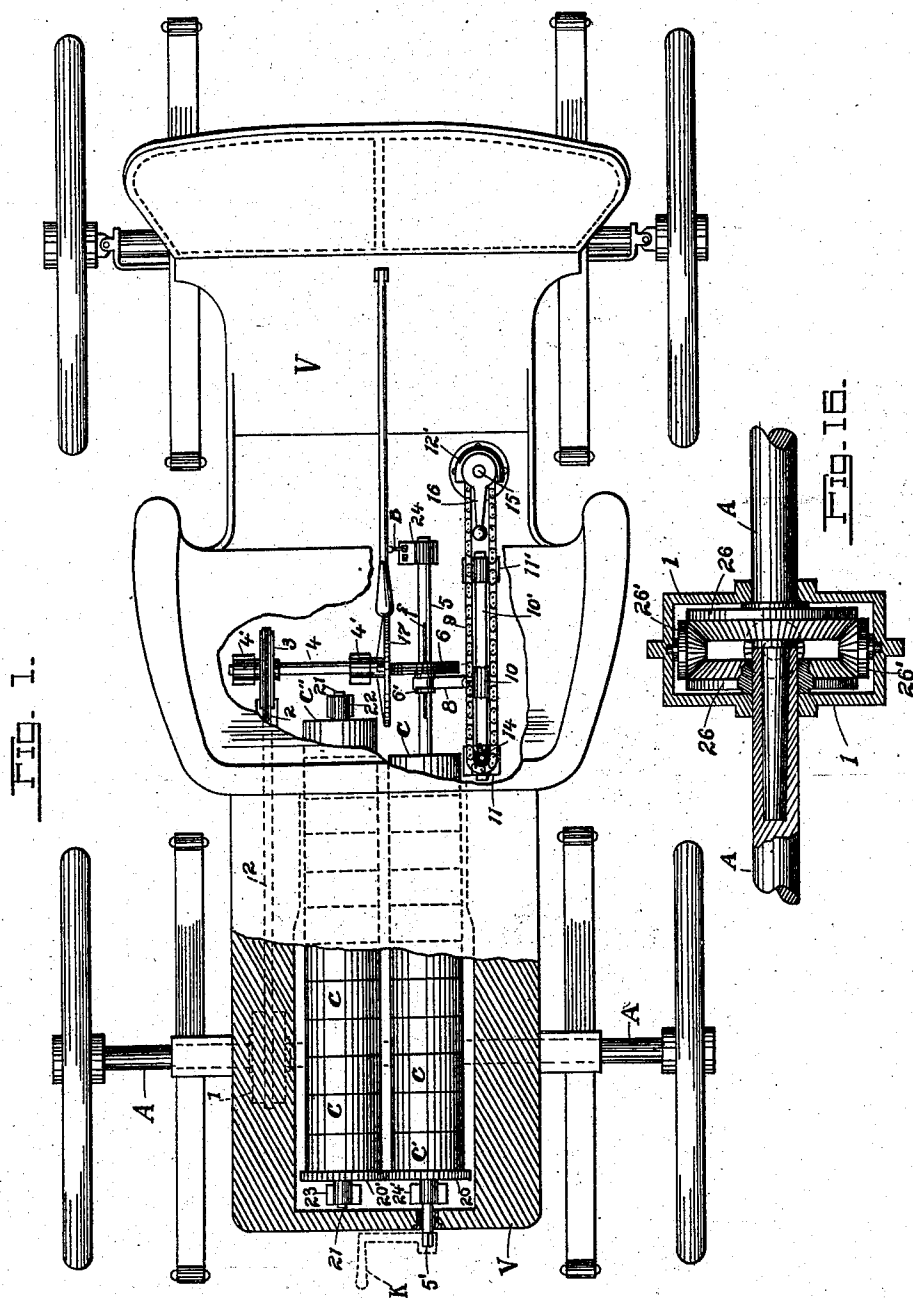
No. 695,430.

Patented Mar. 11, 1902.

C. A. HAAS.  
SPRING MOTOR VEHICLE.  
(Application filed Dec. 12, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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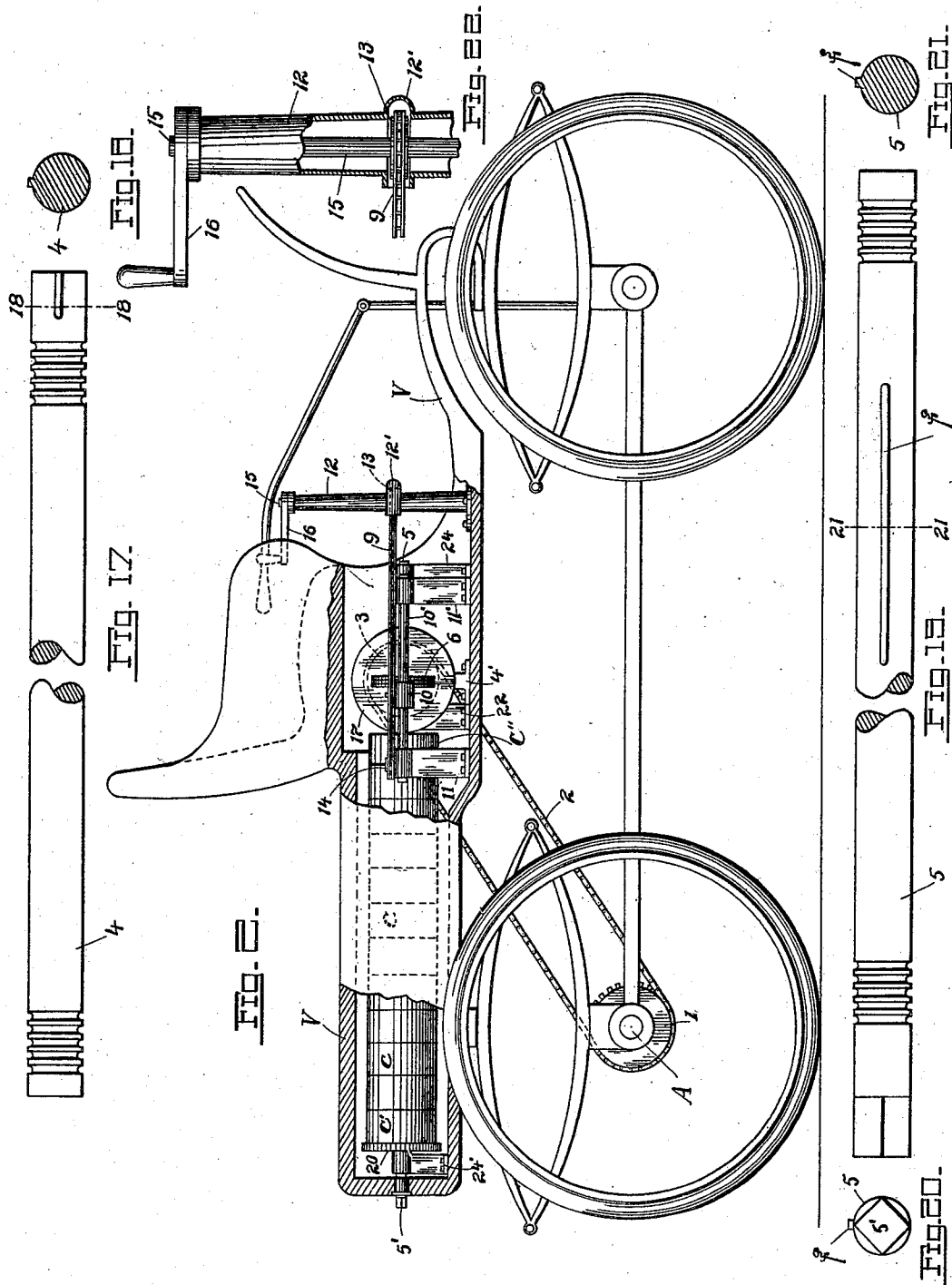
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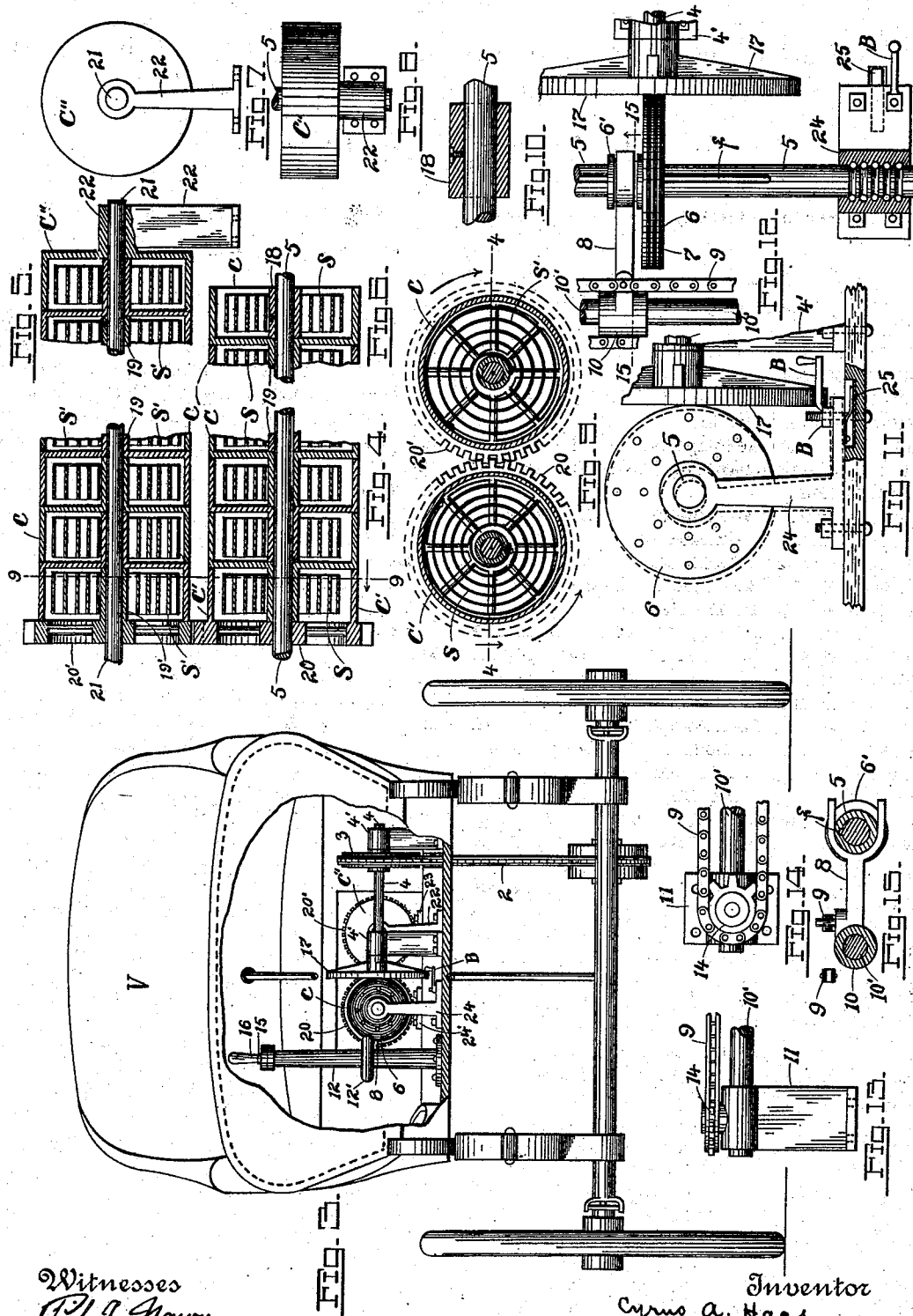
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# UNITED STATES PATENT OFFICE.

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## SPRING-MOTOR VEHICLE.

SPECIFICATION forming part of Letters Patent No. 695,430, dated March 11, 1902.

Application filed December 12, 1901. Serial No. 85,637. (No model.)

*To all whom it may concern:*

Be it known that I, CYRUS A. HAAS, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Spring-Motor Vehicles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in spring-motor vehicles; and it consists in the novel construction and arrangement of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a top plan of the vehicle with portions of the body portion broken away to show the operating parts. Fig. 2 is a side elevation with parts of the body portion broken away. Fig. 3 is a front elevation with portions of the body portion removed. Fig. 4 is a horizontal section on line 4 4 of Fig. 9, showing one end of the series of cups and individual sections of springs constituting the composite spring of my motor. Fig. 5 is a sectional detail of the cup constituting the abutment of the composite spring. Fig. 6 is a sectional detail of the first cup of the series mounted on the winding-bar, being the cup farthest removed from the gear-wheel and cup at the opposite end, as shown in Fig. 4. Fig. 7 is an end elevation of Fig. 5. Fig. 8 is a top plan of Fig. 7. Fig. 9 is a transverse section on line 9 9 of Fig. 4 looking in the direction of the arrow. Fig. 10 is a sectional detail of the ring or collar carried by the winding-bar over which the terminal cup shown in Fig. 6 is passed and to which the first spring is directly secured. Fig. 11 is an enlarged end elevation of the standard carrying the forward end of the winding-bar and of the contact-disk or drive-shaft. Fig. 12 is a top plan thereof, showing also a section of the controller-chain. Fig. 13 is an elevation of the rear standard carrying the sprocket-wheel over which the controller-chain passes. Fig. 14 is a top plan thereof. Fig. 15 is a transverse vertical section on line 15 15 of Fig. 12. Fig. 16 is a sectional detail of the differential gear carried by the rear axle. Fig. 17 is a detail of the drive-shaft, showing grooves for antifriction-

rollers. Fig. 18 is a cross-section on line 18 18 of Fig. 17, showing the feather to which the contact-disk is keyed. Fig. 19 is a detail of the winding-bar, showing grooves for the reception of ball-bearings. Fig. 20 is an end view showing the polygonal head to which the winding-key is applied. Fig. 21 is a transverse section on line 21 21 of Fig. 19, showing the feather along which the friction spur-disk is moved; and Fig. 22 is an enlarged detail showing the hollow post carrying the controller-staff.

The object of my invention is to construct a spring-propelled vehicle which shall store a maximum quantity of power in a minimum amount of space, the economy in the latter being accomplished by substituting for one driving-spring a series of separate springs coupled together to produce a joint effect, as will more fully hereinafter appear.

A further object is to construct a vehicle which can be readily stopped or reversed, one whose speed can be readily adjusted, and one possessing further and other advantages better apparent from a detailed description of the invention, which is as follows.

Referring to the drawings, V represents the body of the vehicle, which may be of any approved design. Mounted on the rear axle A is a casing 1, constituting the rotatable section of any form of differential driving-gear, (though one form will subsequently be described herein,) said casing serving as a sprocket-wheel for the drive-chain 2, whose opposite end passes over a sprocket-wheel 3, secured to the transverse drive-shaft 4, mounted in bearings 4' 4' beneath the seat of the body portion V. Rotation is imparted to the drive-shaft from the spring-motor by mechanism which in detail may be described as follows: Slidably feathered to the forward end of the winding bar or shaft 5 (by the rotation of which, as presently to appear, the springs are wound up) is a friction spur wheel or disk 6, whose periphery is provided with a series of wood-fiber bands 7 to insure a more positive grip, the grooved hub 6' of said wheel being embraced by the forked end of a link 8, whose opposite end is coupled, respectively, to the adjacent lap of the controller sprocket-chain 9 and to a block 10, sliding on a rod 10',

mounted between the standards 11 and 11'. In front of the seat is a hollow post 12, provided with a central housing or enlargement 12', within which is confined the sprocket-wheel 13, over which the chain 9 passes, the opposite end of the chain passing over a similar sprocket 14 on top of the standard 11. The wheel 13 is carried by a staff 15, confined in the hollow post, the staff being rotated in either direction by the controller lever or handle 16, coupled thereto directly over the post. By rotating the handle 16 in either direction rotation will be imparted to the wheels 13 and 14 and chain 9, the block 10 being made to slide by the draft of the chain along the rod 10' in either direction, said block in turn reciprocating the link 8, which thus shifts the spur wheel or disk 6 along the feather *f* on the winding-bar, the disk 6 of course rotating with the said bar under the action of the springs, as presently to be seen. The adjacent end of the drive-shaft 4 has secured thereto a terminal contact-disk 17, adapted to be driven by frictional contact with the disk 6 against the plane face thereof. When by means of the controller 16 the disk 6 is moved opposite or in line with the axis of rotation of the disk 17, of course no rotation can be imparted to the latter under the circumstances, but if shifted so as to contact therewith on either side of said axis, then motion will be imparted thereto, and this in a direction depending upon which side of the axis the disk 6 is on. Furthermore, the farther the disk 6 is moved from the axis of the disk 17 the greater will be the leverage exerted by the disk 6 against disk 17 and the greater the speed imparted to the shaft 4 and to the vehicle, so that not only can the direction of travel and speed thereof be controlled with the greatest nicety, but the vehicle can be stopped gradually by shifting the disk 6 against the center of the disk 17, (or opposite the shaft 4,) where the resistance offered to the free rotation of the disk 6 will be at a maximum, thus stopping the rotation thereof and of the shaft 4.

The spring driving mechanism or motor may be described as follows: Secured to the winding-bar 5 at a convenient point along the length thereof is a ring or collar 18, over which is slipped one (the first) of a series of cups C, each provided with a hub 19, adapted to enter the chamber of the next adjacent cup. The hub of the last cup of the series C enters the chamber of the terminal cup C', formed integrally with the gear-wheel 20, freely rotatable about the winding-bar and which is located near the rear end of said bar. Meshing with the gear-wheel 20 is a similar gear-wheel 20', freely rotatable about an axle 21, disposed parallel to the bar 5, the axle 21 being mounted between the standards 22 23, respectively, the forward standard having formed integrally therewith the hub portion of a terminal stationary cup C". Into this cup C" there is inserted the hub 19 of another

cup C, which in turn receives the hub of the next adjacent cup, and so on until the last cup receives the hub 19', formed integrally with the gear-wheel 20', it being understood that the cups C strung on the bar 5 are the reverse in position from those nested together on the axle 21. Within the chamber of each cup is coiled a spring S around the bar 5 and a spring S' around the axle 21. Beginning with the ring 18, the inner end of the spring is secured to said ring and the outer end to the peripheral wall of the first cup C. The next spring has its inner end secured to the hub 19 of said first cup C and its outer end to the inner peripheral wall of the next succeeding cup receiving said hub, and so on till the last cup is reached, when the spring whose inner end is secured to the hub thereof has its outer end secured to the inner peripheral wall of the cup C'. Beginning again with the cup C", the spring S', whose outer end is secured to the inner peripheral wall thereof, has its inner end secured to the hub 19 of the next adjacent cup nesting therein. The peripheral wall of this cup is again connected by a spring S' with the hub of the next following cup, and so on till the last cup is reached, when the spring coiled therein has its inner end coupled to the hub 19', carried by the gear-wheel 20', so that, following the series of springs from the cup C along the bar 5 to the gears 20 20', thence along the axle 21 to the cup C", we find that the first spring S of the series has its inner end fixed to the collar 18 and the last of the springs S' has its outer end secured to the cup C", the series between these extreme springs being connected in the manner indicated and forming virtually one long spring, whose stationary abutment is in the cup C' and whose opposite point of attachment is on the winding-bar 5, Figs. 4, 5, and 6. If, therefore, we apply a winding-key K to the projecting rear polygonal head 5' of the winding-bar 5 and wind the latter in the direction indicated by arrows, Fig. 9, the first spring to be subjected to tension will be the spring coupled directly to the ring 18, this tension being successively communicated through the successively-nested cups C to the various springs until the gear 20 is reached, when the latter will be rotated in the direction of the winding. This will impart a rotation to the gear-wheel 20' in an opposite direction, thereby similarly winding up the springs S' (set reversely to the springs S) until all the sections of the composite spring are wound up, the last section, as already stated, being secured to the stationary abutment C". The composite spring in unwinding of course imparts rotation to the bar 5, and thus in turn to the train of gearing, as already described, thus propelling the vehicle. To permit the bar 5 to be wound up, of course the spur-disk 6 must for the time being be disengaged from the contact-disk 17. This is accomplished by loosening slightly the crank-nut B, by which the adjacent end of

the base of the standard 24, supporting the bar 5, is secured to the body of the vehicle, this slight loosening enabling the spring-plate 25, located beneath that end of the standard, to tilt the latter sufficiently (a fraction of an inch) to effect the disengagement of this disk 6 from the disk 17. (See dotted position in Fig. 11.) When the machine is wound up, the nut B can be tightened, the spring 25 depressed, and the disk 6 made to reengage the disk 17 to any degree necessary to insure driving of the latter. 24' represents the standard supporting the rear end of winding-bar 5.

No claim is made herein to the differential gear, of which the casing 1 constitutes the outer shell, as such gear is well known in the market; but a very ordinary form of this gear is represented in Fig. 16. The rear axle is made sectional, the adjacent ends of the two sections having secured thereon the bevel gear-wheels 26 26', the casing having mounted on its inner peripheral wall between the gears 26 a series of pinions 26', engaging both sets of gear-wheels. The casing itself is loose on the axle, and in its rotation the pinions 26' simply grip (without themselves rotating) the bevel-gears 26, and thus impart simultaneous and equal rotation to both sections of the axle. Should one of the sections, however, tend to revolve slower than the other—as, for example, in turning a corner—the pinions 26' simply revolve over the slower one of the bevel-gears while driving the faster one, the amount of rotation imparted to the pinions depending on the difference in speed between the two sections of the axle.

The spring-motor can of course be applied to any machinery, and its application is not limited to vehicles. So can, too, the details of the present construction be altered without in any wise departing from the spirit of my invention.

Having described my invention, what I claim is—

1. In a spring-motor vehicle, a suitable spring-motor, a winding-bar for the same, a friction spur-disk slidingly feathered on said bar and rotatable therewith, a grooved hub forming a part of said disk, a forked arm embracing said hub, a block coupled to the opposite end of said arm, a rod along which the block is free to slide, a hollow post mounted on the vehicle, a staff in said post, a sprocket-wheel on said staff, a second sprocket-wheel rearward of said post, a chain connecting said sprocket-wheels, and having one lap coupled to the block aforesaid, and an operating-handle for said staff, whereby upon rotation of

the staff, the block and arm, and consequently the spur-disk may be adjusted at will, substantially as set forth.

2. In a spring-motor vehicle, a suitable rotatable winding-bar, a gear-wheel loosely mounted at one end thereof, a cup carried by said gear-wheel, a series of cups each having a hub portion passed over the bar, the hub of one cup being inserted into the chamber of the next adjacent cup, the last cup of the series farthest removed from the gear-wheel being passed over a ring secured to the winding-bar, springs having each one end secured to the wall of one cup and the opposite end to the hub of the next adjacent cup, an axle mounted adjacent and parallel to the winding-bar, a gear-wheel loosely mounted at one end thereof and meshing with the first-named gear-wheel, a hub forming part of said second gear, a series of cups nesting with the hub of the gear-wheel and the hubs of the cups each respectively inserted into the chamber of the next succeeding cup, the last cup of the series farthest removed from the gear-wheel being rigidly secured or fixed to serve as an abutment, a series of springs coiled in reverse order from the first-named series and having each one end secured to the hub of one cup and to the peripheral wall of the next succeeding cup, the parts operating substantially as and for the purpose set forth.

3. In a spring-motor vehicle, a winding-bar, springs for actuating the same, a friction spur-disk carried by said winding-bar, a drive-shaft, a contact-disk on said shaft actuated by the spur-disk, and means for disengaging the spur-disk from the contact-disk during the winding of the motor, substantially as set forth.

4. In a spring-motor vehicle, a spring-actuated winding-bar, a friction spur-disk slidingly feathered to, and rotatable with said bar, a drive-shaft for the vehicle, a contact-disk on said shaft adapted to be actuated by the spur-disk, means for disengaging the spur-disk from the contact-disk during the winding of the motor, a controller-staff, and intermediate connections between said staff and spur-disk for shifting the position of the latter along the winding-bar and shifting the point of contact between the contact-disk and spur-disk, substantially as set forth.

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

CYRUS A. HAAS.

Witnesses:

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