No. 793,502. PATENTED JUNE 27, 1905.

W. J. BELL.

SPRING MOTOR ATTACHMENT FOR ENGINE SHAFTS.

APPLICATION FILED NOV. 25, 1903.

2 SHEETS—SHEET 1.

Fig. 1

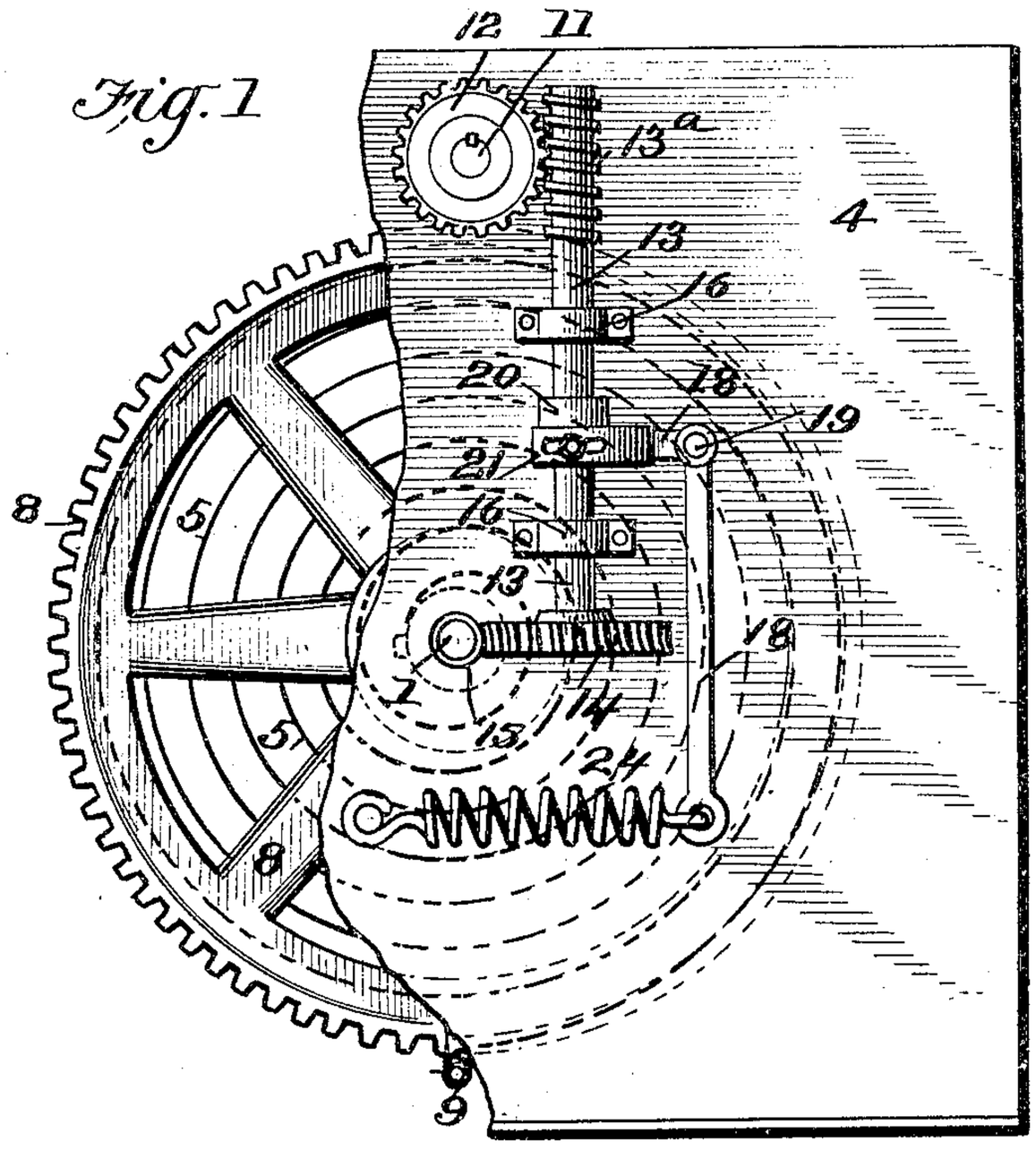
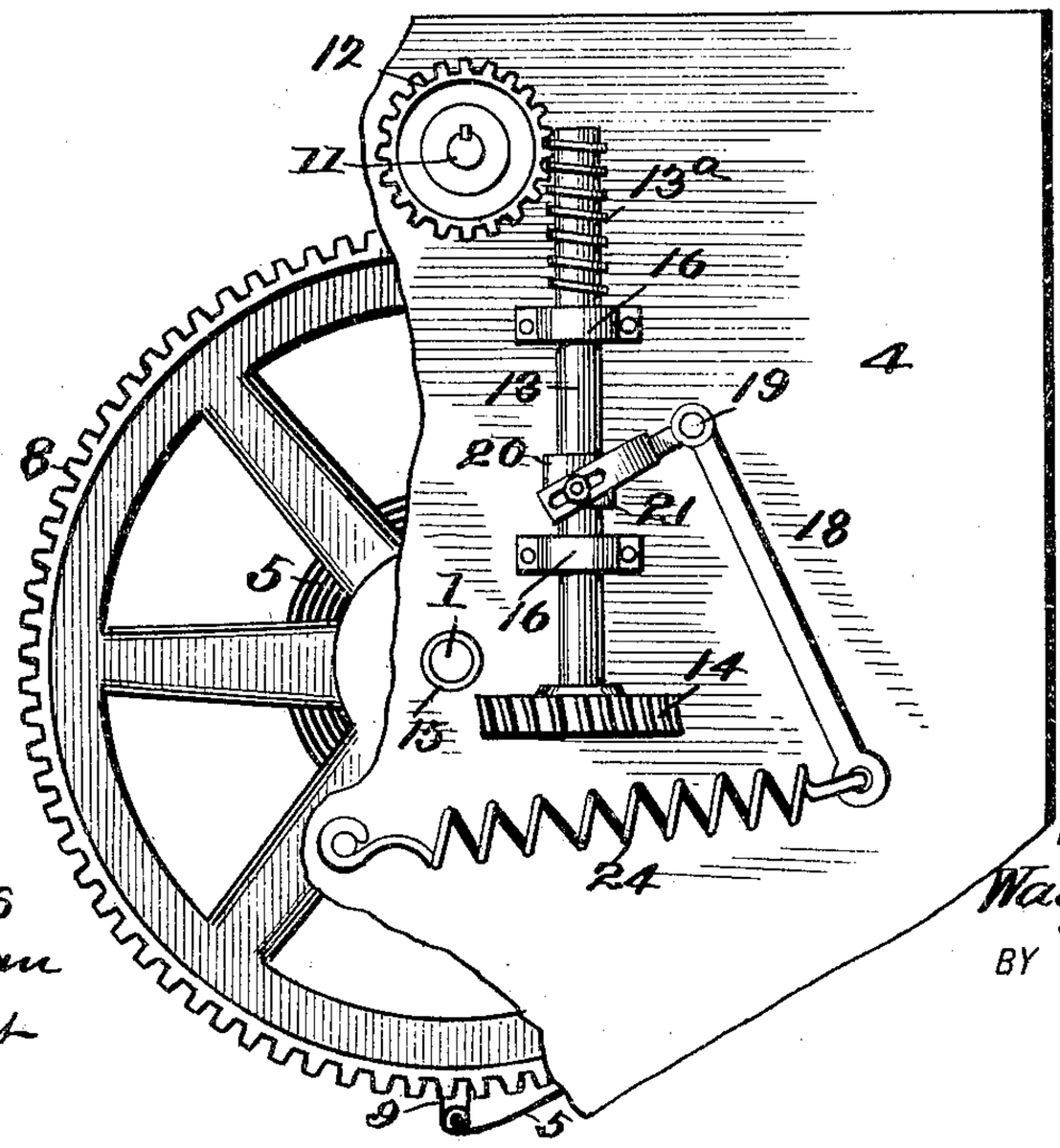


Fig. 2



WITNESSES
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Fig. 3

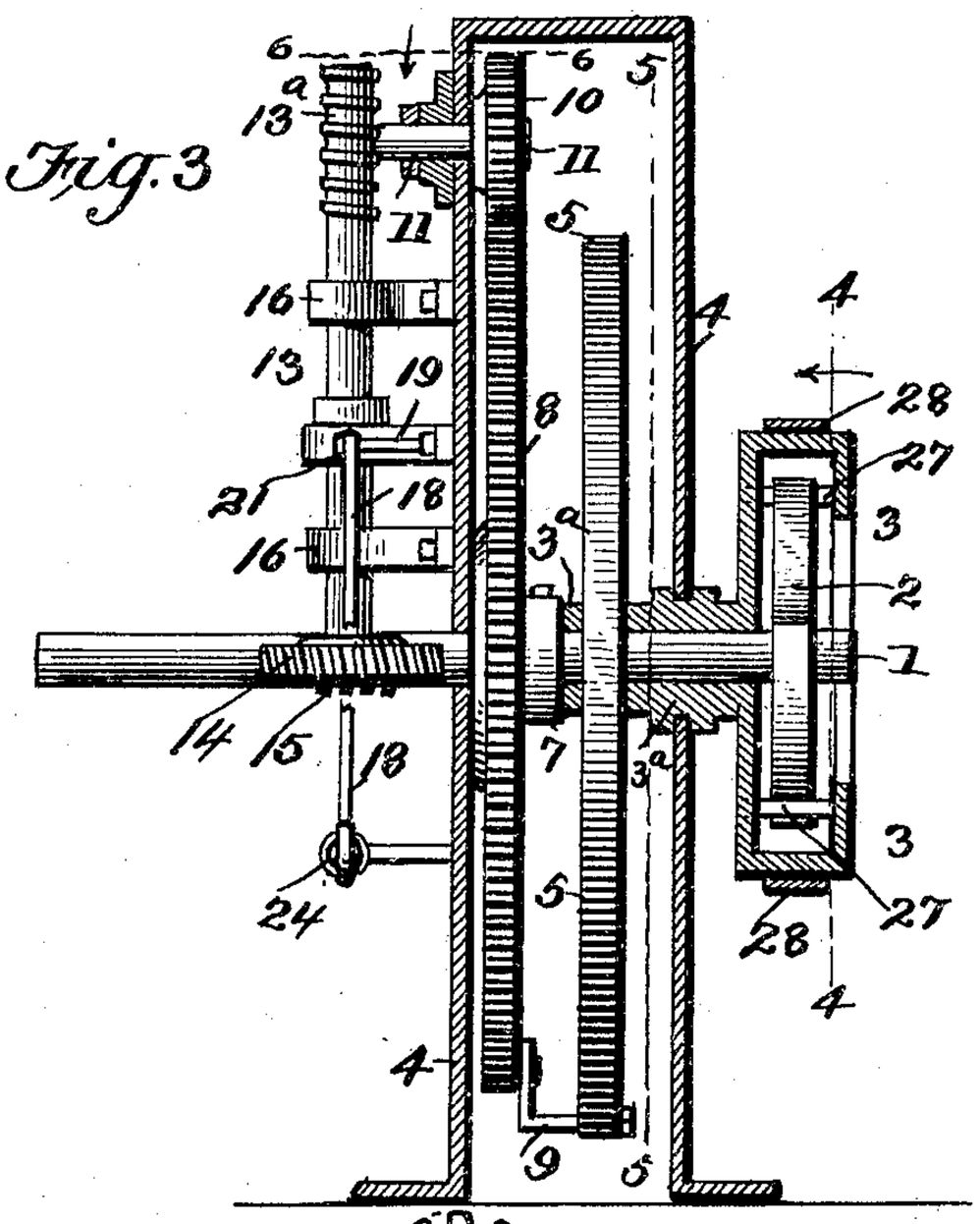


Fig. 4.

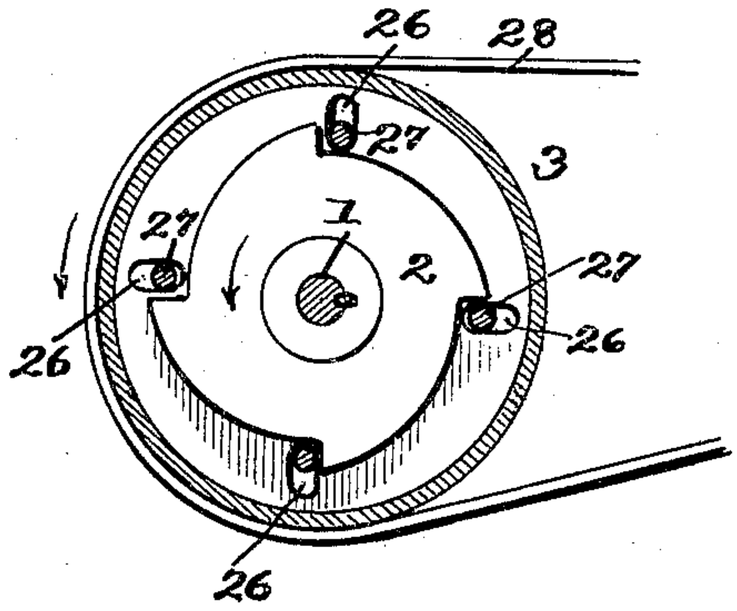


Fig. 5

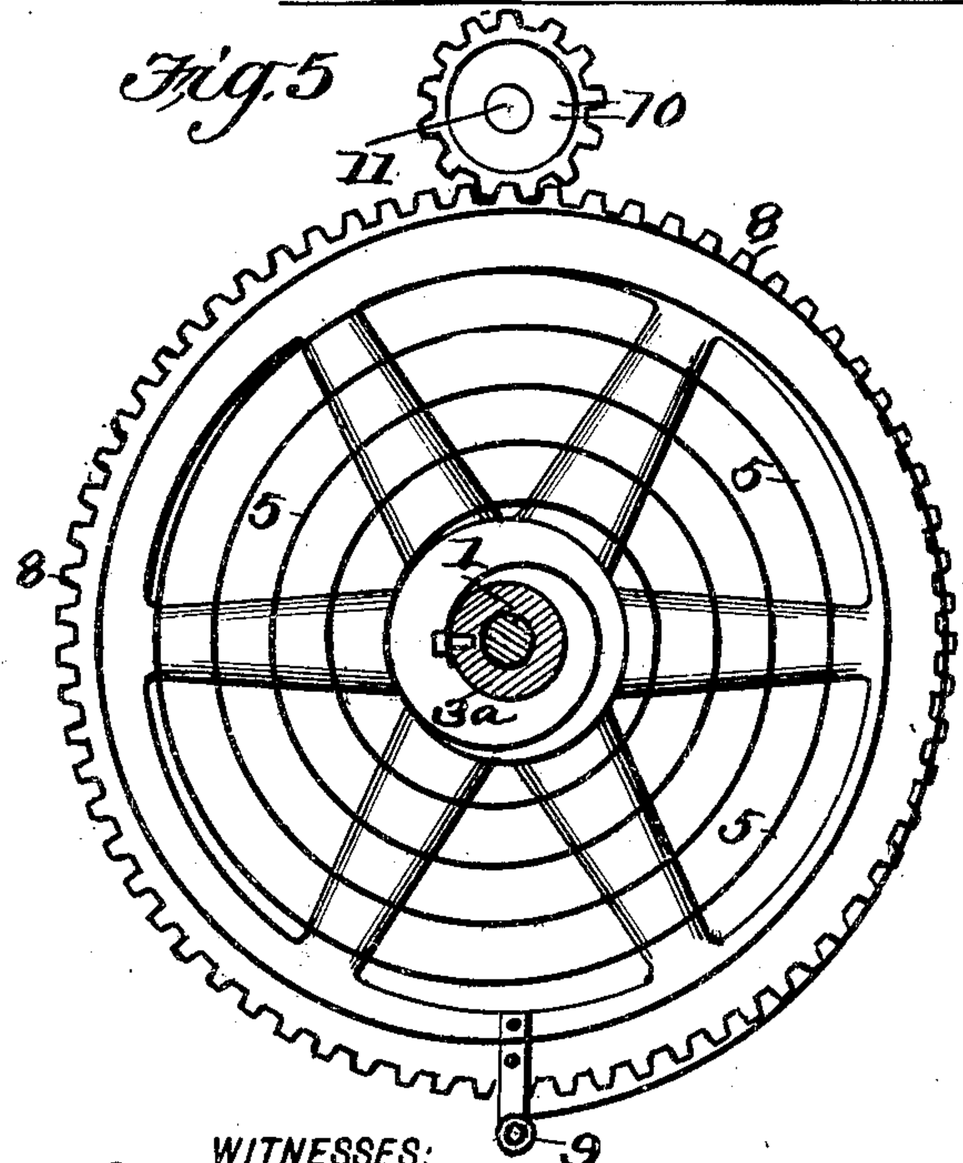
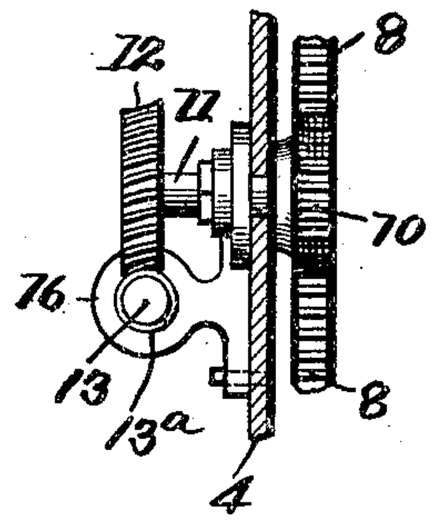


Fig. 6.



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No. 793,502. Patented June 27, 1905.

UNITED STATES PATENT OFFICE.

WALTER JOEL BELL, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO SAMUEL L. KISTLER, OF LOS ANGELES, CALIFORNIA.

SPRING-MOTOR ATTACHMENT FOR ENGINE-SHAFTS.

SPECIFICATION forming part of Letters Patent No. 793,502, dated June 27, 1905.

Application filed November 25, 1903. Serial No. 182,621.

To all whom it may concern:

Be it known that I, WALTER JOEL BELL, a citizen of the United States, and a resident of Los Angeles, in the county of Los Angeles and State of California, have made certain new and useful Improvements in Spring-Motor Attachments for Engine-Shafts, of which the following is a specification.

My invention is an improved means for starting an engine or other rotatable shaft or adding power to such shaft at any period of its rotation.

The construction, arrangement, and operation of parts are as hereinafter described, reference being had to accompanying drawings, in which—

Figure 1 is an end view of my improved attachment, a part of the fixed casing being broken away. Fig. 2 is another end view showing the operative parts in different position. Fig. 3 is a vertical section of the attachment. Fig. 4 is a vertical section on the line 4 4 of Fig. 3. Fig. 5 is a vertical section on the line 5 5 of Fig. 3. Fig. 6 is a horizontal section on the line 6 6 of Fig. 3.

The numeral 1 indicates an engine-shaft or other form of shaft adapted to rotate. The same has its bearings at one end in a vertical stationary casing 4. The shaft 1 is provided at a point adjacent to the casing 4 with a worm 15, which engages a worm-wheel 14, that is fixed on the lower end of a vertical shaft 13, having a worm 13^a at its upper end. The said worm 13^a engages a wheel 12, which is fixed on the outer end of a short horizontal shaft 11, having its bearings in the upper portion of the casing 4 and carrying at its inner end a spur-pinion 10, which meshes with a large spur-gear 8, both said pinion and gear being arranged within the casing 4 and the gear being mounted loose on the shaft 1. As will be seen by reference to and comparison of Figs. 1 and 2, the worm-shaft 13 is adapted to slide vertically in its bearings 16 and to become disengaged from the worm 15 of shaft 1, without, however, becoming disengaged from the worm-wheel 12. It is supported by a spring elbow-lever 18, which is fulcrumed at 19 on the casing 4 and whose shorter member is forked and slotted to adapt it for engagement with pins or trunnions projecting laterally from opposite sides of a collar 21, mounted loose on the shaft 13 and abutting a collar 20, fixed on said shaft. The free end of the longer arm of the lever is connected by a spiral spring 24 with a fixed point on the casing 4. It will be seen that the spring 24 applies a constant pressure in an upward direction upon the shaft 13.

Adjacent to the spur-gear 8 on the shaft 1 is a fixed collar 7. (See Fig. 3.) On the right-hand side of the casing 4 (see Fig. 3) is a small casing 3, having a hub 3^a, through which the shaft 1 passes, the said hub being rotatable independently of the shaft and having its bearings in the casing 4, as shown. A coiled ribbon-spring 5 is attached at one end to a projection 9, fixed on the periphery of the gear 8, and at its inner end to the aforesaid hub 3^a of the casing 3. Within the latter is arranged a four-toothed cam 2, which is fixed on the shaft 1. The casing 3 is provided with four radial slots 26, in which are arranged pins 27, the same extending across the cam 2, so as to engage the teeth of the same when they are in an inward position. (Illustrated in Fig. 4.) It is obvious that the cam 2 may revolve with the shaft 1 in the direction of the arrow (see Fig. 4) when the casing 3 is fixed or immovable, since the pins will then ride out on the cam; but if the casing 4 be rotated in the same direction it will carry the cam and shaft with it. I employ a friction-belt 28 as a means for adjusting and locking the casing 3, as conditions may require.

It is apparent that if the shaft 1 be rotated its worm 15 will impart rotation to the shaft 13, which will in turn rotate the shaft 11, and the latter, through the pinion 10, will rotate the gear 8. If at such time the casing 3 be held locked or immovable by tightening the belt 28, it is obvious that the effect of the rotation of the gear 8 will be to wind up the spring 5 or coil the same, as shown in Fig. 2. It is further apparent that as the coiling of the spring progresses the downward pressure upon the shaft 13, through the medium of the worm-gear 12 and worm 13^a, will tend to move

the said shaft down, so that finally its worm-wheel 14 will become disengaged from the worm 15 on shaft 1. The worm 13ª will, however, remain locked with the wheel 12, and the shaft 11 will therefore hold the spur-pinion 10 fixed, and this in turn locks the gear 8, so that all the leverage of the spring 5 is applied through the medium of the hub 3ª, casing 3, and cam 2 to the shaft 1. If then the band 28 be loosened, the power of the spring will be applied for rotating the casing 3 in the direction of the arrow, Fig. 4, which through the medium of the pins 27 is locked with the cam 2, so that the final result is the rotation of the shaft 1 to the extent of the power of the spring. My improved attachment is thus available for starting an engine or starting the rotation of any shaft to which it may be applied or for energizing—that is, maintaining or increasing the rotation of—the shaft at any juncture.

What I claim is—

1. The worm-shaft and mainspring, a second shaft geared to the spring to wind the same and to the shaft to take power therefrom, and bodily movable with reference to both in such manner to disengage from the main shaft, and a spring holding the second shaft in engaged position against a predetermined tension of the mainspring, whereby when such tension has been reached disengagement follows and when the mainspring is unwound the gears are reëngaged, substantially as described.

2. The improved spring attachment for an engine or other rotary shaft, the same comprising a worm on said shaft, a supplemental shaft and fixed bearings in which the said supplemental shaft is adapted to slide, the same being arranged at an angle to the first-named shaft and provided with a worm-wheel and worm at its respective ends, a spur-gear mounted loose on the engine-shaft, a third shaft which operatively connects said gear with the sliding shaft, a rotary casing having a hub adapted to rotate free on the engine-shaft, a coil-spring connecting the casing-hub with the aforesaid spur-gear, a cam fixed on the engine-shaft within the rotatable casing, radially-slidable pins held in the casing and adapted to engage the cam when the latter is rotated in one direction, and means for locking the casing whenever required, substantially as described.

3. The combination, with a rotatable shaft, a spur-gear mounted loose thereon, a rotatable hub, means for locking it with the shaft, and a coil-spring connecting said hub with the gear, of a shaft 13 slidable bearings therefor, the said shaft being arranged in a plane at right angles to the rotatable shaft worm-and-spur gearing connected with the rotatable shaft and the aforesaid gear in the manner described, and a spring-support for said shaft 13, the same tending to press the shaft upward, as and for the purpose specified.

4. The combination, with an engine-shaft, a spur-gear mounted loose thereon, a worm-shaft and worm-and-spur gearing operatively connecting the said shaft and gear, of a rotatable casing having a hub which is loosely mounted on the shaft, a coil-spring which is connected at its respective ends with the aforesaid gear and hub, and means for locking the casing with the shaft, substantially as shown and described.

5. The combination with a rotatable shaft, a coiled spring, means for winding said spring comprising a spur-gear mounted loose on the shaft and engaging one end of the aforesaid spring, of a supplemental slidable shaft 13 arranged at an angle to the rotatable shaft and geared therewith, means for operatively connecting the last-named shaft with the aforesaid spur-gear, a spring-support for the slidable shaft, a locking device by means of a brake to control the other end of the spring, a clutch for engaging the rotatable shaft when the brake is released substantially as described.

WALTER JOEL BELL.

Witnesses:
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M. M. MEYERS.