

No. 688,040.

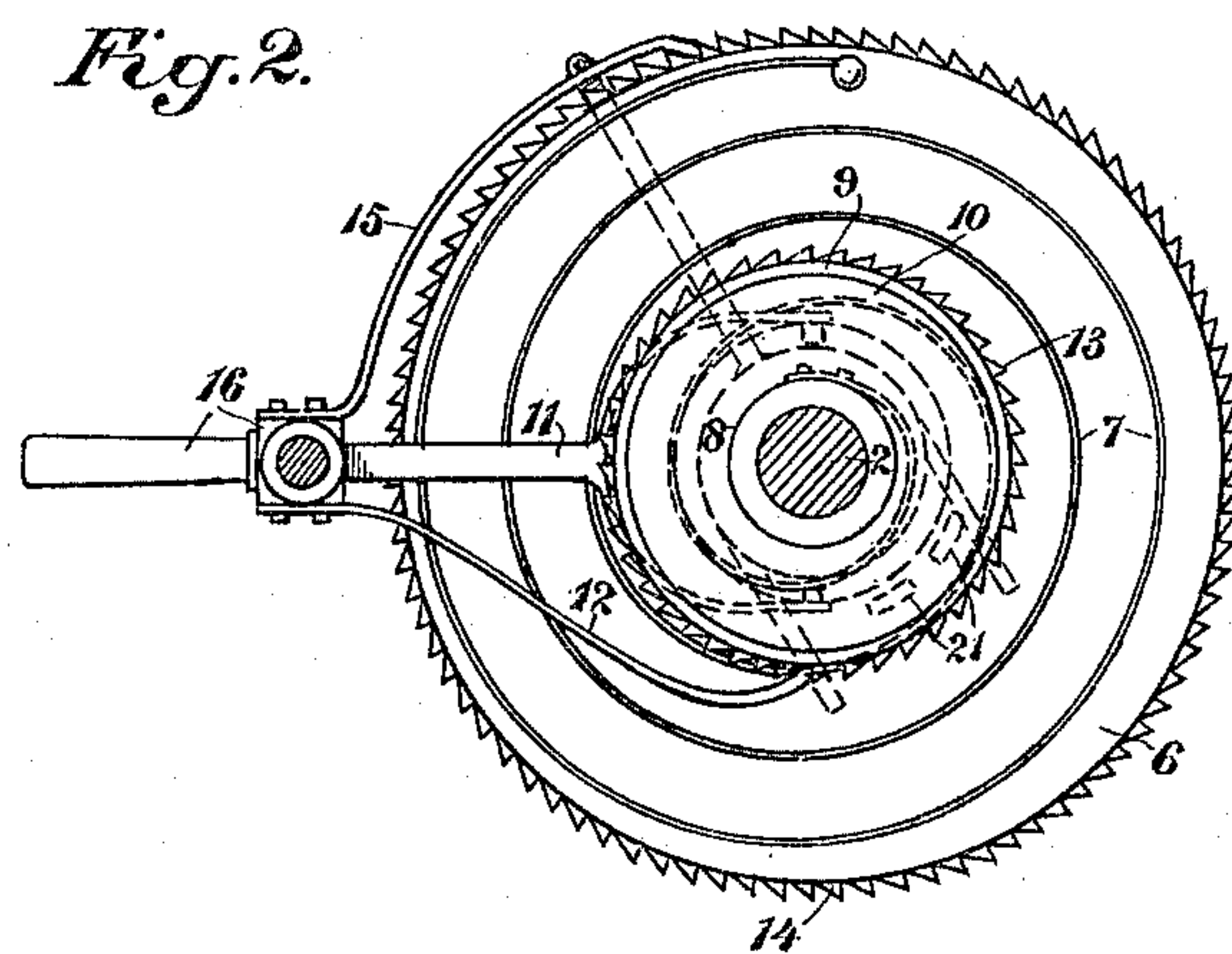
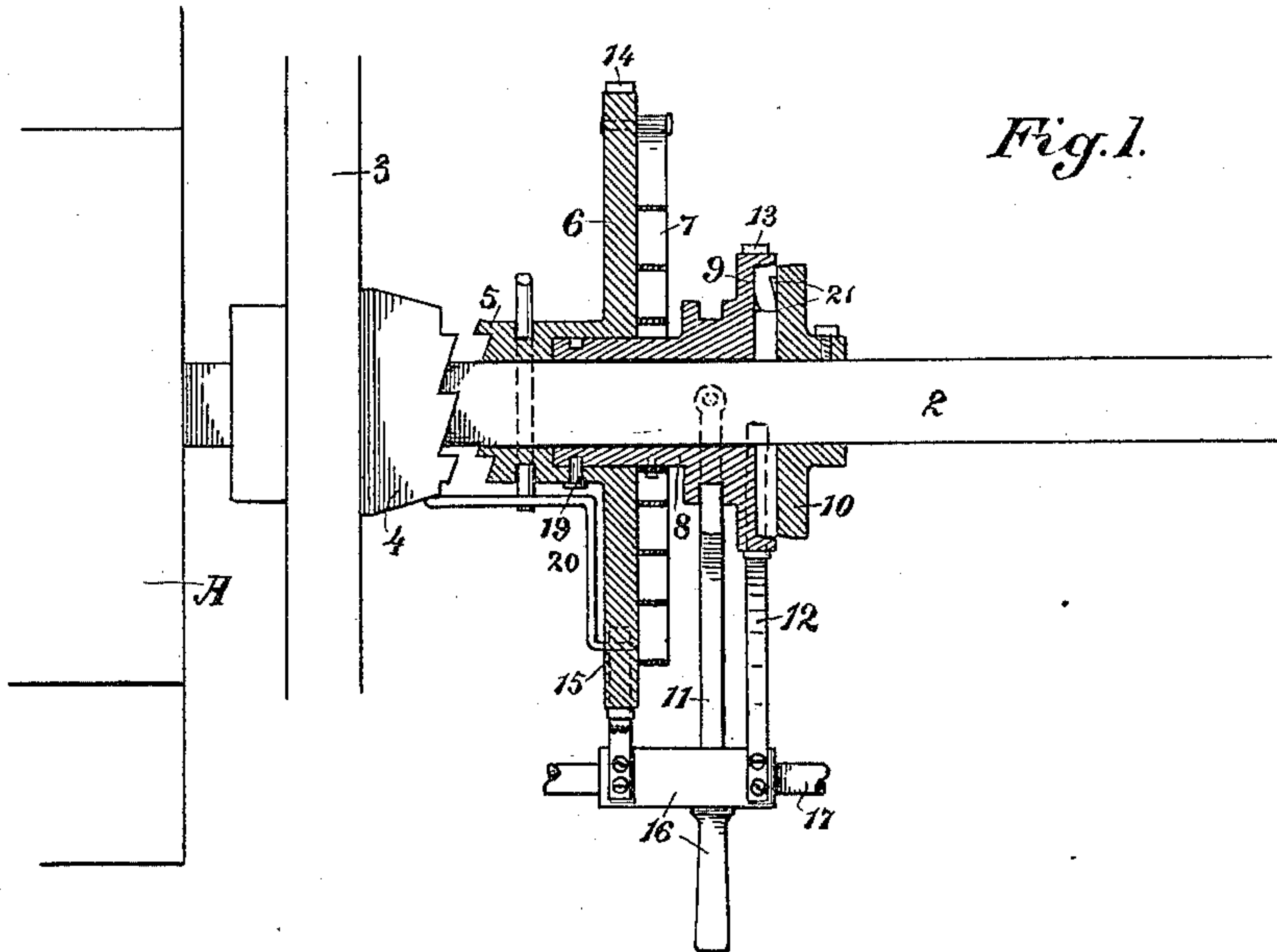
Patented Dec. 3, 1901.

W. E. TWICHELL.

STARTING DEVICE FOR EXPLOSIVE ENGINES.

(Application filed Dec. 15, 1889.)

(No Model.)



Witnesses,

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UNITED STATES PATENT OFFICE.

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STARTING DEVICE FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 688,040, dated December 3, 1901.

Application filed December 15, 1899. Serial No. 740,471. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. TWICHELL, a citizen of the United States, residing at St. Helena, county of Napa, State of California, have invented an Improvement in Starting Devices for Explosive-Engines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a device the object of which is to provide a starting mechanism for engines, so that the necessity for turning such engines two or three revolutions to start them is avoided.

It consists of the parts and the constructions and combinations of parts hereinafter described and claimed.

Figure 1 is a horizontal section through the device. Fig. 2 is an end view of the same.

A indicates an explosive-engine of any suitable pattern having a crank-shaft 2, and the engine may also have a fly-wheel 3 or not, as desired. The hub 4, which is keyed to and turnable with the shaft 2, forms one member of a clutch, the other member of which is shown upon the hub 5 of the disk 6, which disk carries the stout coiled spring 7. The hub 5 and disk 6 are turnable loosely upon the hub 8. This hub is a cylindrical elongation or extension of the clutch-disk 9, which is turnable loosely upon the shaft 2. 10 is the other member of the frictional or clutch disk, and is fixed to the shaft 2 and revoluble with it, so that when the disk 9 is moved into contact with 10 the friction between the two is sufficient to rotate the disk 9.

11 represents a clutch-lever of any description by which the disk 9 is moved longitudinally upon the shaft 2 to either disengage it from 10 or engage it therewith.

The hub of the disk 6 is connected so as to be moved longitudinally with relation to the shaft 2 and in unison with the disk 9 and its hub 8, this connection consisting of one or more pins 19 passing through the hub 5 and engaging a groove or channel made around the hub 8. This action allows the two hubs 5 and 8 and their disks to rotate independent of each other, but they slide longitudinally upon the shaft as one.

The spring 7 has one end fixed near the periphery of the disk 6, while the other end is fixed to the hub 8 of the clutch-disk 9, so that

when this disk 9 is revolved by being engaged with the disk 10 upon the revolving shaft 2 the spring 7 will be coiled tightly around the hub 8 until it has been coiled as far as its length will admit, when the clutch 9 may be disengaged from the clutch member 10. At the same instant the pawl 12 engages with a ratchet-wheel 13, and thus prevents such rotation of the disk 9 as would allow the spring to again uncoil as soon as this disk was released from 10. A second ratchet-wheel 14 is connected with the disk 6 to also prevent from being turned by the tension of the coiled spring, this ratchet being engaged by the pawl 15, and when the spring has once been coiled by the engine while it is running the parts are then in readiness for future use and remain in this condition, the disks 9 and 10 having been disengaged as soon as the spring has been properly coiled. The pawls 12 and 15 are fixed upon a lever-arm 16, which is movable upon a shaft 17.

The engaging ends 11 of the clutch travel in grooves made in the hub of the clutch-disk 9, so that by moving the lever 16 this hub, slidable with the hub 5 upon the shaft 2, may throw 5 into engagement with the other member 4 of this clutch, which member 4, as previously described, is secured to the shaft 2.

The operation of the device will be as follows: After the engine has been started and is running the spring 7 should be coiled and in readiness for the time when the engine is stopped and its power will be necessary to again start it. This is done by movement of the clutch-lever 16. The hubs 5 and 8 are slid along the shaft 2 until the clutch members 9 and 10 are engaged, and as 10 is fixed to and revoluble with the shaft 2 the disk 9 will be immediately caused to revolve. The disk 6 is prevented from revolving by the engagement of the pawl 15 with the ratchet 14. Therefore the spring 7 will be coiled until it is entirely wound up, when the clutch-lever 16 is moved and the clutch members 9 and 10 are disengaged. As this occurs the pawl 12 will engage with the ratchet 13 and will thus prevent the spring from acting to turn the disk 6. The parts may then remain in this condition, the spring coiled in readiness for use until such time as the engine has been stopped and it is desired to again start it.

This is effected by movement of the clutch-lever, which engages the clutch members 4 and 5. At the instant when these are brought together an arm 20 is actuated by contact with the inclined outer surface of the clutch member 4, and its outer end engaging with the pawl 15, which has hitherto locked the disk 6, raises this pawl out of engagement with its ratchet, and thus allows the spring to turn the disk 6. This action is communicated through the hub 5 to the hub 4, and thus revolves the shaft 2 of the engine as many revolutions as may be necessary to compress a charge of explosive vapor into the cylinder and ignite it, when the engine will have been started. This having been done, the spring can again be wound at any desired time before the engine is stopped and in readiness to again start it. This construction is desirable and available on all forms of explosive-engine, but is particularly useful where such engines are used for motor carriages, launches, and any similar connection.

Inclined lugs 21 are fixed to the inner faces of the disks 9 and 10 for the purpose of separating the two members after the spring has been wound up sufficiently. Any further movement of member 10 will cause same to slip and to come in contact with the opposite lug, which will force the disk 10 outwardly and be disengaged from 9.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a revoluble engine-shaft, of engaging clutch members, one of said members fixed to said shaft, the other slidable and revoluble on said shaft, a disk fixed on said revoluble clutch member, a second disk revoluble on the hub of said member, a spring having one end secured to one disk and its opposite end secured to the hub of the other disk, means for moving said revoluble clutch member longitudinally on said shaft, a third disk fixed to said shaft and which is adapted to engage the fixed disk on said revoluble clutch whereby said disks are made to revolve in unison and coil the spring, ratchets and pawls whereby the disks on the revoluble clutch are engaged and the coil held tense, a lug upon said fixed disk on the clutch, adapted to engage a like lug or cam upon said fixed disk on the shaft, whereby said disks are separated automatically when said spring is coiled, and means whereby the revoluble disk on said hub is automatically released when the two clutch members are brought into engagement.

2. The combination with a revoluble engine-shaft, of engaging clutch members, one of said members fixed to said shaft, the other member slidable and revoluble on said shaft, said

second member having a hub portion and a disk portion integral with said hub, a disk revoluble upon said hub and having a spring attached to its outer edge, the other end of the spring secured to said hub, ratchet-teeth upon the periphery of said disks, pawls engaging these ratchet-teeth whereby the spring-carrying disk may be held stationary while the hub is revolved and the spring coiled, and whereby the aforesaid disk portion is held with relation to said spring-carrying disk after the spring is coiled, a peripheral flange upon said disk portion, a disk fixed to and revoluble with said shaft, with whose periphery said flange is adapted to engage and cause the hub and said last-named or fixed disk to revolve in unison whereby the spring is coiled, means whereby this disk-carrying clutch member is moved horizontally on the shaft, lugs upon the opposing vertical faces of the disk portion of said clutch and the fixed disk whereby the parts are automatically separated from each other the moment said spring is coiled, and means whereby the spring is automatically released when the aforesaid clutch members are brought into engagement.

3. The combination with a revoluble engine-shaft, of engaging clutch members, one of said members fixed to said shaft, and having a peripheral cam-surface, the other slidable and revoluble on the shaft, a disk fixed on said revoluble member, a second disk revoluble on said member, a spring having one end secured to one disk and the other end secured to the hub of the other disk, a clutch-arm engaging said member whereby it is moved slidably upon said shaft, a fixed disk upon the shaft having its periphery adapted to engage the fixed disk on said slidable clutch whereby the spring is coiled, pawl-arms carried on said clutch-arm, engaging the respective peripheries of the disk on said slidable member whereby the spring is held in coiled position, means whereby the fixed disk on the clutch, and the fixed disk on the shaft are automatically separated when the coiling is complete, an arm loosely supported upon the slidable clutch, which latter is turnable independently of said arm, said arm having an extension adapted to ride upon the cam-surface of the fixed clutch on the shaft when the slidable clutch is moved into engagement therewith, whereby the arm is lifted vertically into engagement with the pawl-arm controlling the independently-revoluble disk and the spring released.

In witness whereof I have hereunto set my hand.

WALTER E. TWICHELL.

Witnesses:

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