No. 832,566. PATENTED OCT. 2, 1906.

C. E. WISNER.

STARTING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED SEPT. 18, 1905.

2 SHEETS—SHEET 1.

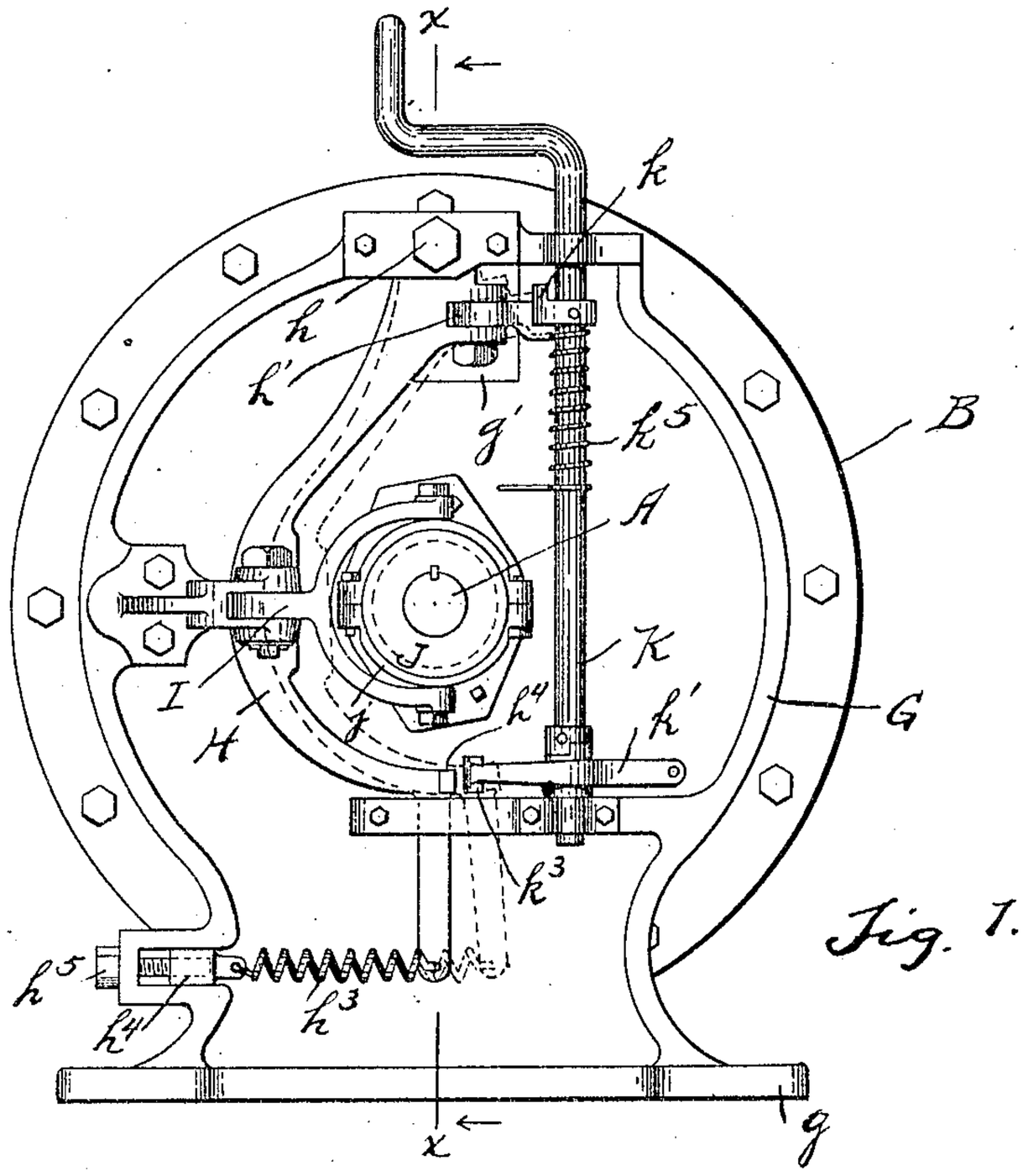

Fig. 1.

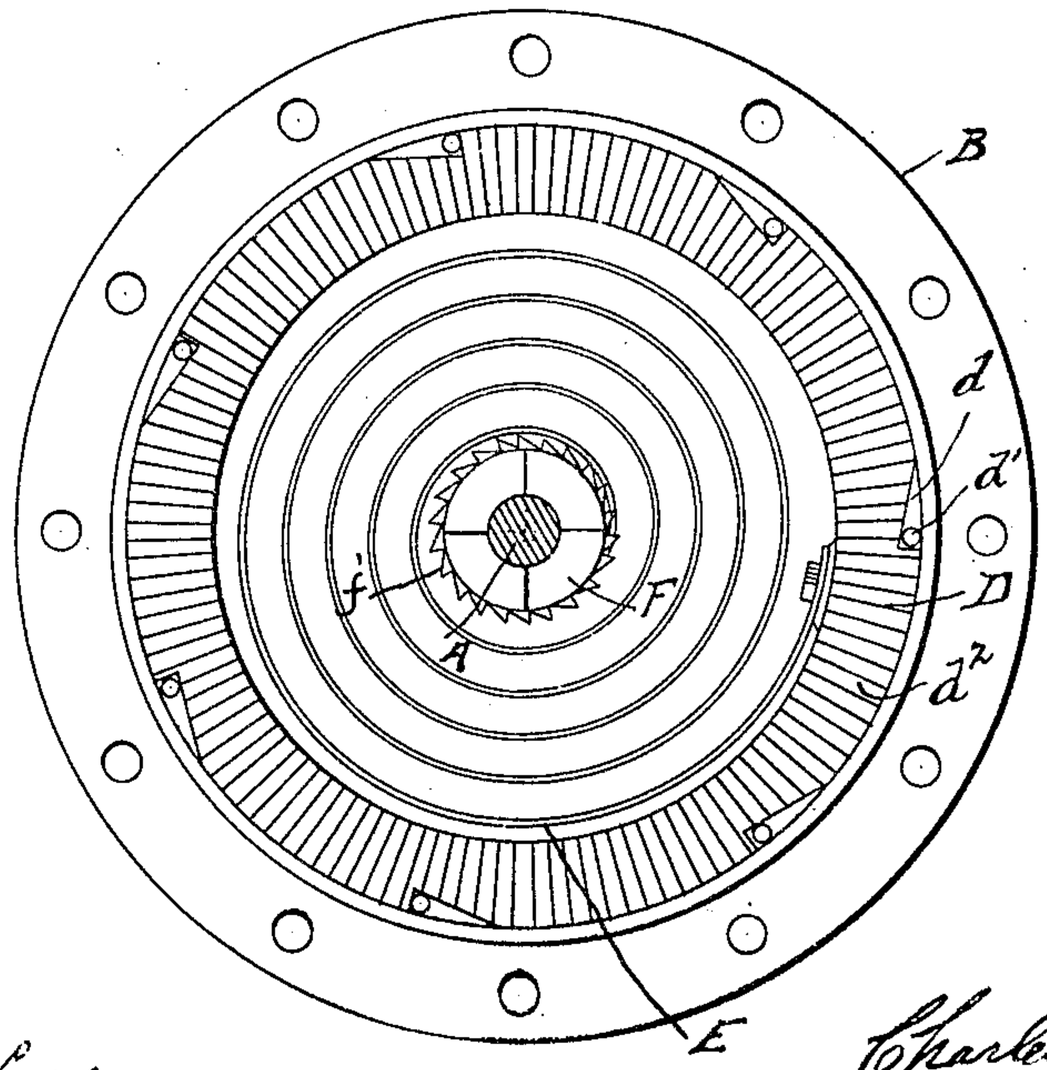

Fig 2.

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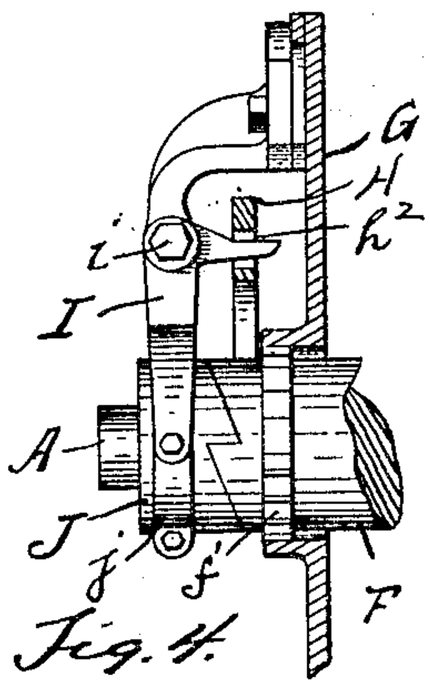

Fig. 4.

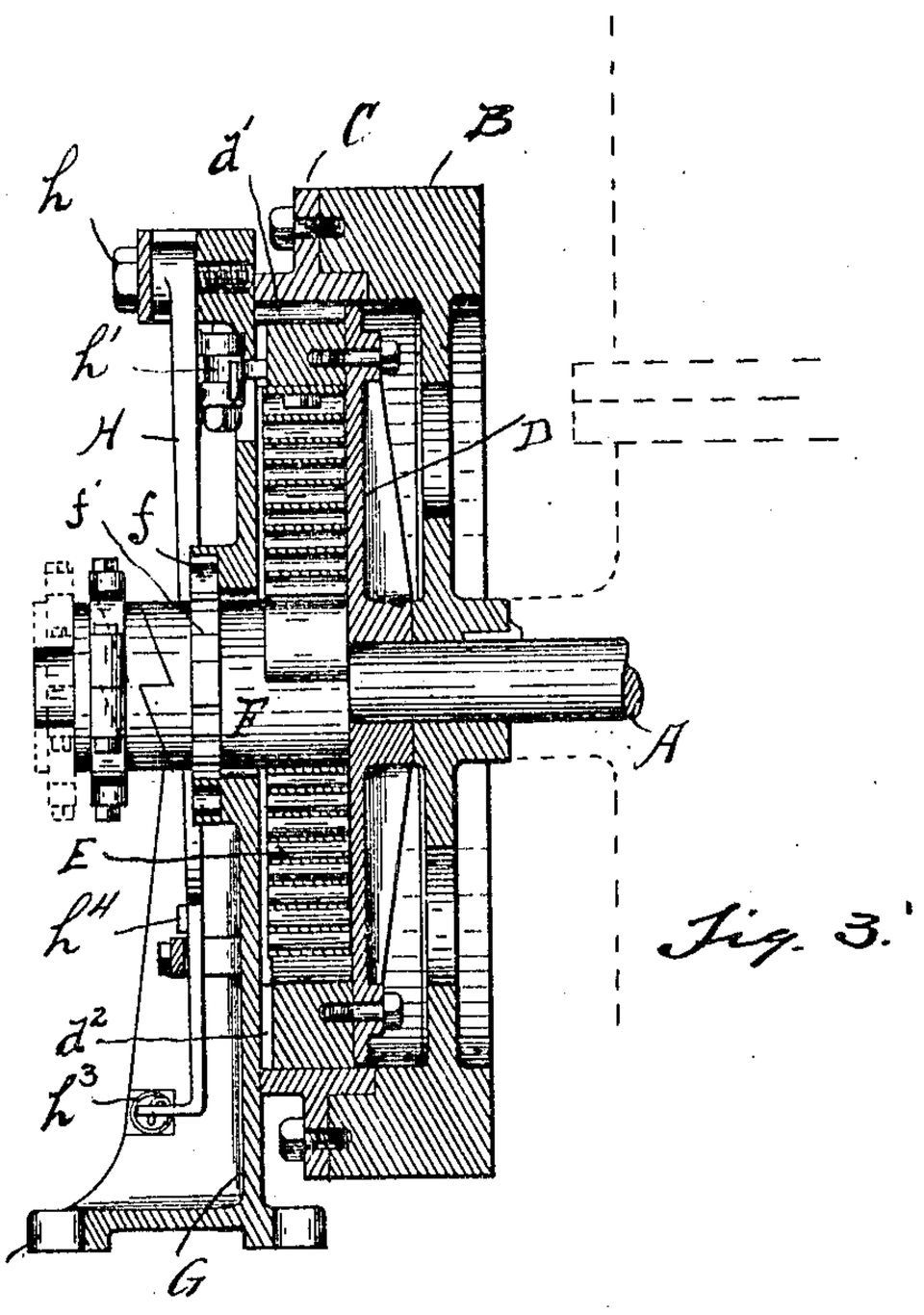

Fig. 3.

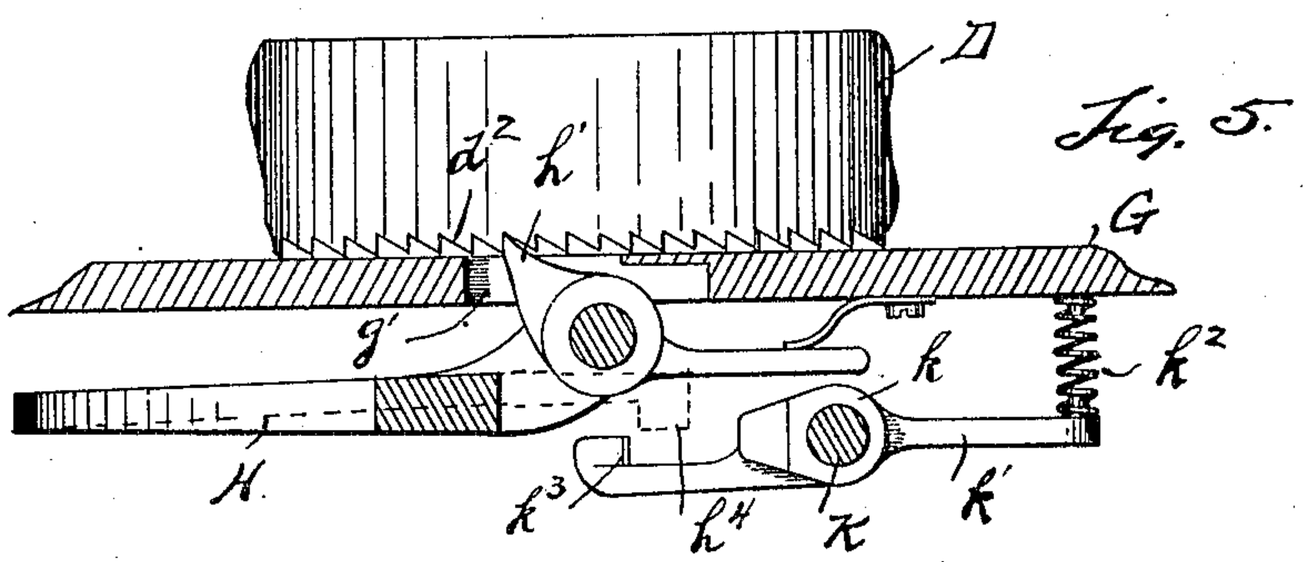

Fig. 5.

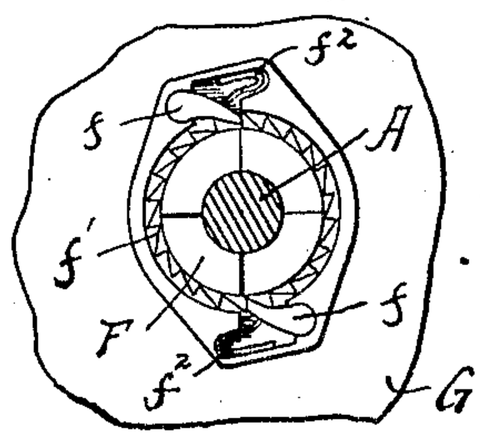

Fig. 6.

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UNITED STATES PATENT OFFICE

CHARLES E. WISNER, OF DETROIT, MICHIGAN.

STARTING DEVICE FOR EXPLOSIVE-ENGINES.

No. 832,566. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed September 18, 1905. Serial No. 278,887.

To all whom it may concern:

Be it known that I, CHARLES E. WISNER, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Starting Devices for Explosive-Engines; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to starting devices for explosive-engines or the like; and its object is to provide means whereby an engine may receive its initial impulse without the necessity of rotating the crank-shaft manually; and its novelty consists in the peculiar arrangement and combination of parts hereinafter more fully described and claimed.

In the drawings, Figure 1 is a side elevation of my device as it appears attached to the balance-wheel of an engine. Fig. 2 is an elevation showing the clutch-ring, spring, and loose sleeve in position in balance-wheel. Fig. 3 is a section on line $x\,x$ of Fig. 1. Fig. 4 is a detail, partly in section, showing means for holding the clutch-ring from rotation while the spring is wound, and the method of releasing said clutch-ring. Fig. 5 is a detail view in sectional plan. Fig. 6 is a detail showing the ratchet and pawls which prevent the spring from unwinding at the center.

Similar letters refer to similar parts throughout the several views.

A indicates the shaft of an engine, the cylinder being partially indicated by dotted lines in Fig. 3.

B is the balance-wheel keyed to the shaft A.

C is a steel ring fastened to the balance-wheel which forms a bearing-surface for the rollers d', that are held in pockets d in the face of the clutch-ring D. The clutch-ring D is held concentric with the steel ring C by a plate D′, that has a bearing on the shaft A. A coiled spring E has its outer end attached to the clutch-ring D and its inner end attached to the loose sleeve F. This loose sleeve F forms one member of the winding-clutch and is held from rotation in one direction by the pawls f and ratchet f'. (Shown in Fig. 6.) The pawls f are held in pockets f^2 in the stationary plate G, which is held in close proximity to the balance-wheel B by bolts through the base g. At the upper end of the plate G the lever H is pivoted at h. The lever H is provided with lugs to which the pawl h' is pivoted. The pawl h' normally engages the ratchet d^2 on the clutch-ring D, an opening g' in the plate g being provided to allow such engagement. Midway its length the lever H is provided with an opening h^2, into which projects the end of the clutch-operating lever I, which is pivoted at i to a bracket on the plate G. The lever I is attached to a ring j, which rides in a groove in the clutch J, which is splined on the shaft. Consequently movement of the lever H toward or away from the shaft will throw the clutch into or out of engagement with the corresponding clutch F. The lower end of the lever H rides in a slot provided on the face of the plate G, and at its extreme end is attached a spring h^3, preventing movement in one direction except by a strain of greater force.

The spring h^3 is attached to a traveling nut h^4, and by turning bolt h^5 the tension of the spring h^3 is adjusted, thus enabling the operator to regulate the tension of the spring E.

An operating-lever K is supported in suitable bearings on the plate G and is provided with a cam k and pawl k' and spring k^5 to return the lever to original position after being operated.

To more clearly comprehend the interrelation of parts as enumerated above, let us suppose that the spring E is wound up. The ring D, to which the spring is attached, is held from rotation by the pawl h', pivoted to the lever H. Consequently the strain of the spring E is transmitted to the lever H and swings the lever toward the shaft, as shown by dotted lines in Fig. 1. The spring h^3 is attached to the lever H nearly ten times as far from the pivot h as the pawl h' is. Therefore the tension on spring E must be ten or more times the tension of the spring h^3 before the lever H can move and operate the clutch J, which is attached to it by means of lever I holding clutch J out of engagement with clutch F.

The pawl k' is loose on rod K and is provided with a spring k^2 at one extremity tending to hold the notched end k^3 in the path of travel of the lug h^4 on the lever H. A collar k^4 is keyed to the rod and is provided with a notch or step corresponding to a like step on the pawl k'. To start the engine, it is necessary to turn the handle of the rod K. The cam k then engages the end of pawl h' and

disengages it with the ratchet d^2 on the clutch-ring D, thus allowing the full tension of the spring E to act on the balance-wheel B by means of the rollers *d*. This rotation draws a charge into the cylinder of the engine, compresses it, and explodes in the usual manner, and the engine begins to run.

Upon releasing the lever K the pawl h' first drops into place and a little farther movement of the lever forces the notched end k^3 of the pawl k' out of engagement with lug h^4 on lever H. The lever H is then drawn back by action of the spring h^3 and turns lever I on pivot *i* and forces the clutch J, which is keyed to the shaft, into engagement with the clutch F, to which the inner end of the spring is attached. As the engine is now running, this engagement of the clutch begins to rewind the spring until sufficient tension is acquired to overcome the tension of spring h^3 when the clutch is thrown out and the apparatus is again in position to start the engine.

What I claim is—

1. In a starting device for explosive-engines, the combination with the balance-wheel and shaft, of a clutch-ring supported within the balance-wheel, said clutch-ring being provided with means for automatically clutching said balance-wheel, a spring within said clutch-ring and attached to it, a loose sleeve on the shaft, attached to the spring and provided with a ratchet, a stationary plate contiguous to the balance-wheel and covering the side thereof, pawls held in said stationary plate and adapted to engage the ratchet on the loose sleeve, means on the shaft for winding the spring; a controlling-lever pivoted at one end to said stationary plate and provided with a spring on the opposite end adapted to swing the controlling-lever in one direction, means intermediate the clutch-ring and controlling-lever whereby the strain of the wound spring tends to swing the controlling-lever in one direction, means whereby the movement of the controlling-lever throws the means for winding the spring into or out of engagement, and an operating-lever attached to the stationary plate and provided with means whereby the controlling-lever is held from movement at the time the tension of the wound spring is released from it, substantially as shown and described.

2. In a starting device for explosive-engines the combination with the balance-wheel and shaft, of a clutch-ring supported within the balance-wheel, and provided with means for automatically clutching said balance-wheel, a spring within said clutch-ring, the outer end of said spring being attached to said clutch-ring, a loose sleeve on the shaft, attached to the inner end of said spring and provided with a ratchet, a stationary plate, contiguous to the balance-wheel and covering the side thereof, pawls held in the stationary plate and adapted to engage the ratchet on the loose sleeve, means on the shaft whereby the loose sleeve may be rotated with said shaft, a controlling-lever pivoted to the stationary plate and provided with a spring at one end adapted to swing the controlling-lever in one direction, means intermediate the clutch-ring and controlling-lever whereby the tension of the spring attached to the clutch-ring, when wound, tends to swing controlling-lever in the opposite direction and thereby release said means for rotating the loose sleeve and an operating-lever attached to the stationary plate and provided with means whereby the controlling-lever is held from movement at the time the tension of the wound spring is released from it, substantially as shown and described.

3. In a starting device for explosive-engines the combination with the balance-wheel and shaft, of a clutch-ring within the balance-wheel, adapted to clutch said balance-wheel when free to rotate, a coiled spring within said clutch-ring having its outer end attached to it, a loose sleeve on the shaft having the inner end of said coiled spring attached to it, and being provided with a ratchet and with means whereby it may be rotated in one direction, a stationary plate contiguous to the balance-wheel, pawls attached to the stationary plate adapted to engage the ratchet in the loose sleeve, a controlling-lever pivoted to the stationary plate and provided with means whereby the clutch-ring may be held from rotation, means on the shaft for rotating the loose sleeve in one direction, means whereby the movement of the controlling-lever throws the means for rotating the loose sleeve into or out of engagement with said sleeve, and an operating-lever attached to the stationary plate and provided with means for releasing the clutch-ring and holding the controlling-lever from movement during the time the clutch-ring is released, substantially as shown and described.

4. In a starting device for explosive-engines, the combination with the balance-wheel and shaft, of a clutch-ring supported within the balance-wheel, said clutch-ring being provided with means for automatically clutching said balance-wheel when free to rotate, a coiled spring within said clutch-ring and attached to it, a loose sleeve on the shaft, attached to the coiled spring and provided with a ratchet, a stationary plate, contiguous to the balance-wheel and covering the side thereof, pawls held in said stationary plate and adapted to engage the ratchet on the loose sleeve, means on the shaft for winding the spring, a controlling-lever pivoted at one end to said stationary plate and provided with a spring on the opposite end adapted to swing the controlling-lever in one direction, said spring being provided with means for regulating its tension, means intermediate the clutch-ring and the controlling-lever

whereby the strain of the wound spring tends to swing the controlling-lever in one direction, means whereby the movement of the controlling-lever throws the means for winding the spring into or out of engagement, and an operating-lever attached to the stationary plate and provided with means whereby the controlling-lever is held from movement at the time the tension of the wound spring is released from it, substantially as shown and described.

In testimony whereof I sign this specification in the presence of two witnesses.

CHARLES E. WISNER.

Witnesses:
GEO. S. FIELD,
STANTON CLARKE.