P. W. KANE.

STARTING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED APR. 1, 1911.

1,035,356.

Patented Aug. 13, 1912.

2 SHEETS—SHEET 1.

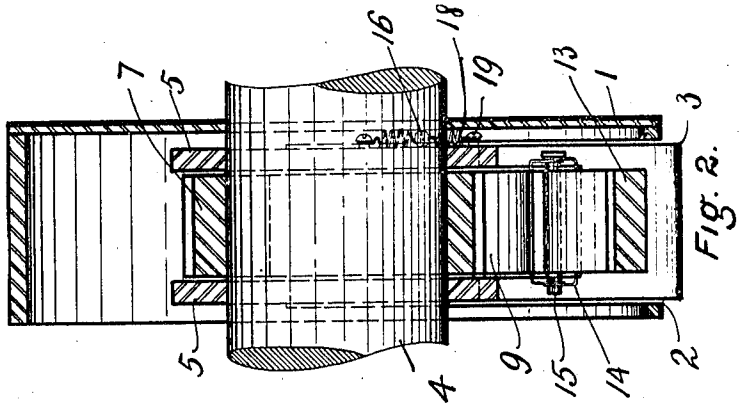

Fig. 2.

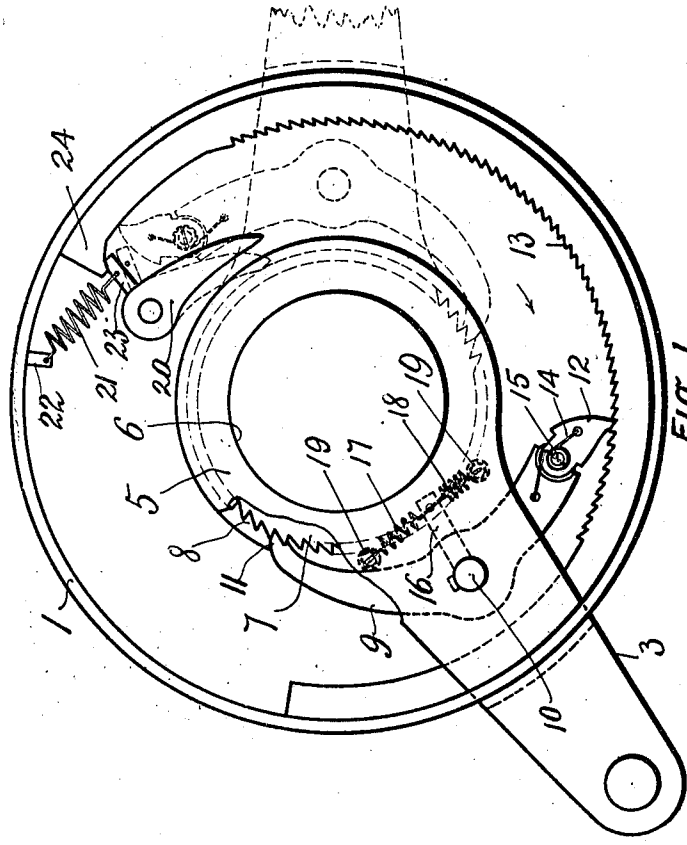

Fig. 1.

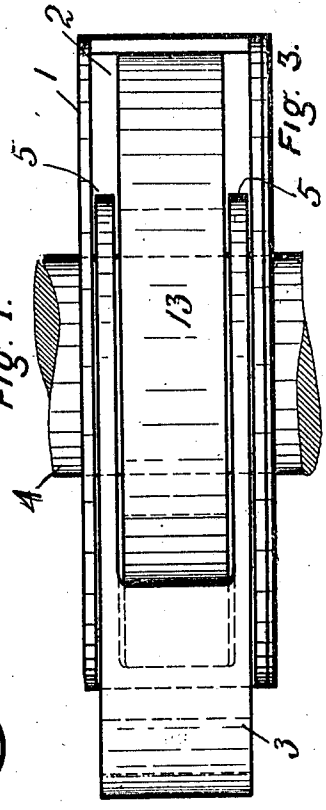

Fig. 3.

Witnesses:-
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Charles W. Jones

Inventor:-
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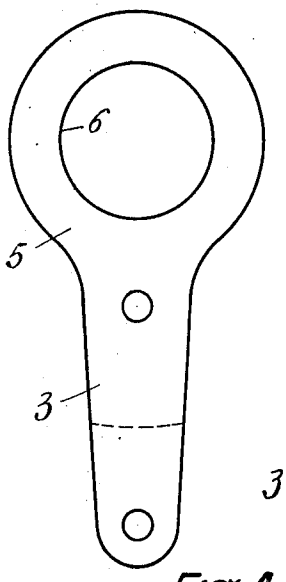
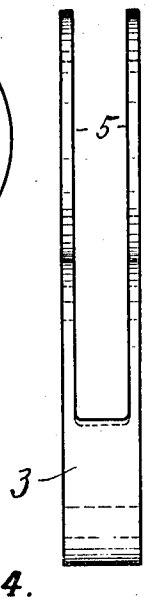


Fig. 4.



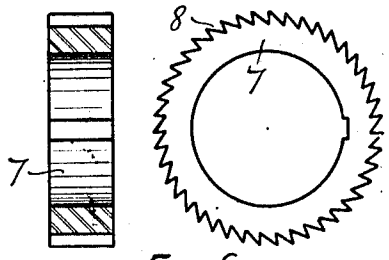


Fig. 6.

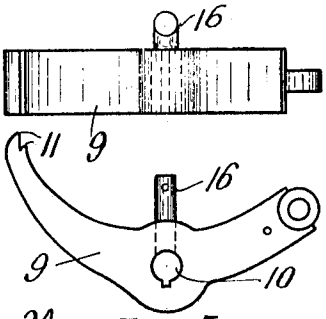


Fig. 5.

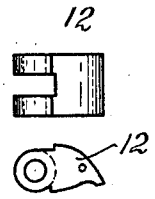


Fig. 7.

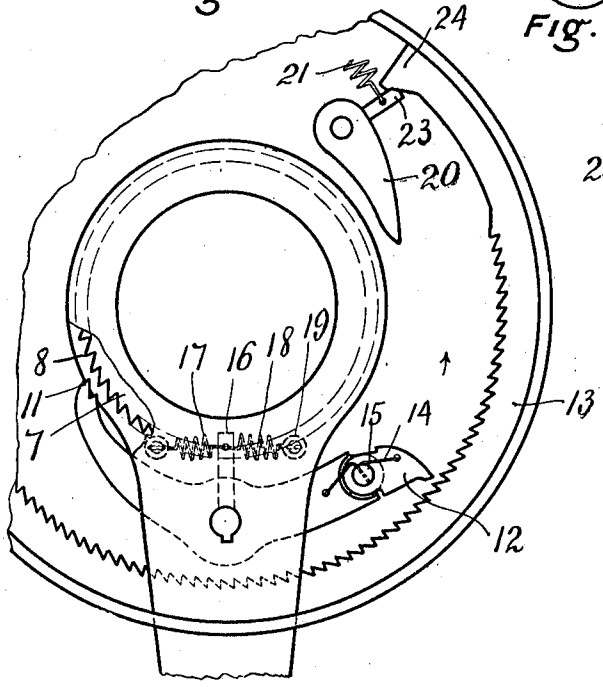


Fig. 9.

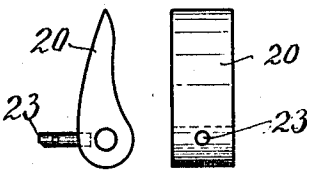


Fig. 8.

Witnesses:-
Edward K. Lonergan
Charles W. Jones

Inventor:-
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UNITED STATES PATENT OFFICE.

PETER W. KANE, OF CHICAGO, ILLINOIS, ASSIGNOR TO KANE MACHINERY COMPANY, A CORPORATION OF ILLINOIS.

STARTING DEVICE FOR EXPLOSIVE-ENGINES.

1,035,356. Specification of Letters Patent. Patented Aug. 13, 1912.

Application filed April 1, 1911. Serial No. 618,277.

To all whom it may concern:

Be it known that I, PETER W. KANE, a citizen of the United States, and residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Starting Devices for Explosive-Engines, of which the following is a complete specification.

The main objects of this invention are to provide a starting device for explosive engines which will be positive in its operation and simple in its construction; to provide a starting device which will automatically release itself from the shaft in case the engine backfires or kicks; to provide a starting device in which the operating pawl is normally held out of engagement with the operating ratchet to prevent injury in case the engine backfires or kicks during the return movement of the pawl; and to provide a very strong and durable starting device in which the operating mechanism is automatically thrown into operative position at the beginning of the starting movement.

A specific construction embodied in said invention is illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of the starting device with one side of the casing removed to show the mechanism, and showing in dotted lines the position of the operating lever and pawl at the beginning of the stroke. Fig. 2 is a central vertical section of Fig. 1. Fig. 3 is a bottom plan view of the device. Fig. 4 is a side and front elevation of the operating lever. Fig. 5 is a side elevation and top plan view of the operating pawl. Fig. 6 is a side elevation and a central section of the operating ratchet. Fig. 7 is a side elevation and top plan view of the tripping pawl. Fig. 8 is a side elevation and top plan view of the actuating dog for the operating pawl. Fig. 9 is a fragmentary side elevation of the device with the pawls in normal position.

In the construction shown, the casing 1 is stationary and is provided in its lower side with a slot or opening 2 through which the operating lever 3 projects. The engine shaft 4 extends axially through the casing 1 and is rotatable therein, and the inner end of the lever 3 is forked and the prongs 5 of the fork are provided with apertures 6 in which the shaft is journaled. Rigidly keyed on the shaft between the prongs 5 of the lever is the operating ratchet 7, which has teeth 8 on its periphery. An operating pawl 9 is pivoted intermediate its ends between the prongs of the lever by means of a pin 10 which is rigidly secured to said pawl and journaled in the prongs 5. The forward end of the pawl is provided with teeth 11 which are adapted to engage the teeth 8 of the ratchet 7. Hinged to the rear end of the pawl 9 is a tripping pawl 12 which has its point turned toward a stationary ratchet 13, which is concentric with the ratchet 7 and is rigidly secured to the casing 1 in position for the tripping pawl to travel along the same. A spring 14 is carried on the hinge or pivot pin 15 of the tripping pawl, and is secured at its ends to the tripping pawl and to the rear end of the operating pawl 9. Said spring acts normally to hold the tripping pawl in alinement with the rear end of the pawl 9 and out of engagement with the ratchet 13.

For the purpose of normally holding the pawl teeth 11 out of engagement with the ratchet 7, and the pawl 12 out of engagement with the ratchet 13, an arm 16 is connected with one end of the pin 10 and extends toward the shaft 4. Springs 17 and 18 are connected to the end of the arm 16 and to pins 19 on the side of the lever 3 and act to hold the pawls 9 and 12 out of engagement with their respective ratchets, as shown in Fig. 9, at all times except during the forward movement of the lever 3 when starting the engine.

For the purpose of throwing the operating pawl 9 into engagement with the ratchet 7 when the lever 3 is at the rearward limit of its movement, a wedge shaped actuating dog 20 is pivoted on the side of the casing at the rearward limit of movement of the pawl 9, and has its thin end directed toward the forward travel of said pawl. A spring 21 is connected at one end to a lug 22 on the casing at the rear of the dog, and its other end is connected to an arm 23 on the dog. Said arm 23 is adapted to contact with a lug 24 on the ratchet 13 to limit the outward movement of the dog. The spring 21 normally holds the dog in position for the rear end of the ratchet 9 to travel thereon and to force said rear end outwardly toward the periphery of the casing and thereby throw the teeth of the pawl into engagement with the teeth of the ratchet 7, and the pawl 12

into position to travel against the teeth of the ratchet 13, as shown in dotted lines in Fig. 1.

The operation of the construction shown is as follows: The operating pawl 9 and the tripping pawl 12 are normally held out of engagement with the ratchets 7 and 13 by means of the springs 17 and 18. When the pawls are in that position the operating lever 3 may be swung rearwardly, and as the rear end of the pawl 9 rides over the dog 20 the dog forces the teeth 11 into engagement with the teeth 8 of the ratchet 7, and forces the pawl 12 into yielding engagement with the ratchet 13. When the operating lever is swung forwardly the pawl 9 rotates the shaft 4 to start the engine. Should the engine backfire or kick before the pawl 9 is released from the ratchet 7, the pawl 12 will engage the teeth of the ratchet 13, and, by turning downwardly on its hinge, will force the rear end of the pawl 9 toward the ratchet 7 and throw the teeth 11 out of engagement with the teeth 8, thereby permitting the shaft to reverse without throwing the lever 3 back. The springs 17 and 18 will then throw the pawls to normal position, and the lever 3 may be thrown back to repeat the operation.

While I have shown but one specific embodiment of my invention it will be understood that numerous details of the construction shown may be varied or omitted without departing from the scope of the claims.

I claim:

1. A starting device, comprising a shaft, a ratchet rigidly secured on the shaft, a lever journaled on the shaft adjacent to the ratchet, an operating pawl pivoted on the lever and adapted to engage the ratchet, a tripping pawl on the rear end of the operating pawl, a ratchet adapted to engage the tripping pawl and release the operating pawl from the ratchet and means connecting the operating pawl with the lever adapted to normally hold said pawls out of engagement with their ratchets.

2. A starting device, comprising a shaft, a ratchet rigidly secured on the shaft, a stationary ratchet adjacent to the shaft, a lever journaled on the shaft, a pair of pawls hinged together and pivoted on the lever in position to engage the ratchets, a spring on the hinge joint between said pawls and adapted to normally hold them in alinement, and means adapted to normally hold said pawls out of engagement with the ratchets.

3. A starting device for explosive engines, comprising an operating ratchet adapted to be secured to the engine shaft, a stationary ratchet concentric with the operating ratchet, a lever journaled on the engine shaft, an operating pawl pivoted intermediate its ends on the lever and adapted to engage the operating ratchet, a tripping pawl hinged to the rear end of the operating pawl and adapted to engage the stationary ratchet when the operating pawl is in engagement with the operating ratchet, means adapted to normally hold said pawls out of engagement with the ratchets, and means for throwing said pawls into engagement with the ratchets at the rearward limit of their movement.

4. A starting device for explosive engines, comprising an operating ratchet adapted to be secured to the engine shaft, a stationary ratchet concentric with the operating ratchet, a lever journaled on the engine shaft, an operating pawl pivoted intermediate its ends on the lever and adapted to engage the operating ratchet, a tripping pawl hinged to the rear end of the operating pawl and adapted to engage the stationary ratchet when the operating pawl is in engagement with the operating ratchet, a spring controlled actuating dog adapted to throw said pawls into engagement with the ratchets when at their rearward limit of movement, and means for normally holding said pawls out of engagement with their ratchets.

5. A starting device for explosive engines, comprising an operating ratchet rigidly secured on the engine shaft, a lever journaled on the shaft, a stationary ratchet, an operating pawl pivoted on the lever and adapted to engage the operating ratchet, a tripping pawl hinged to the rear end of the operating pawl and adapted to engage the stationary ratchet when the operating pawl engages the operating ratchet and to throw the operating pawl out of engagement with the operating ratchet when the engine fackfires, means adapted to normally hold said pawls out of engagement with the ratchets, and means at the rearward limit of travel of said pawls adapted to throw them into engagement with the ratchets.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

PETER W. KANE.

Witnesses:
EDWARD L. LONERGAN,
CHARLES W. JONES.