L. C. VAN RIPER.

STARTING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED SEPT. 12, 1910.

1,044,952.

Patented Nov. 19, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

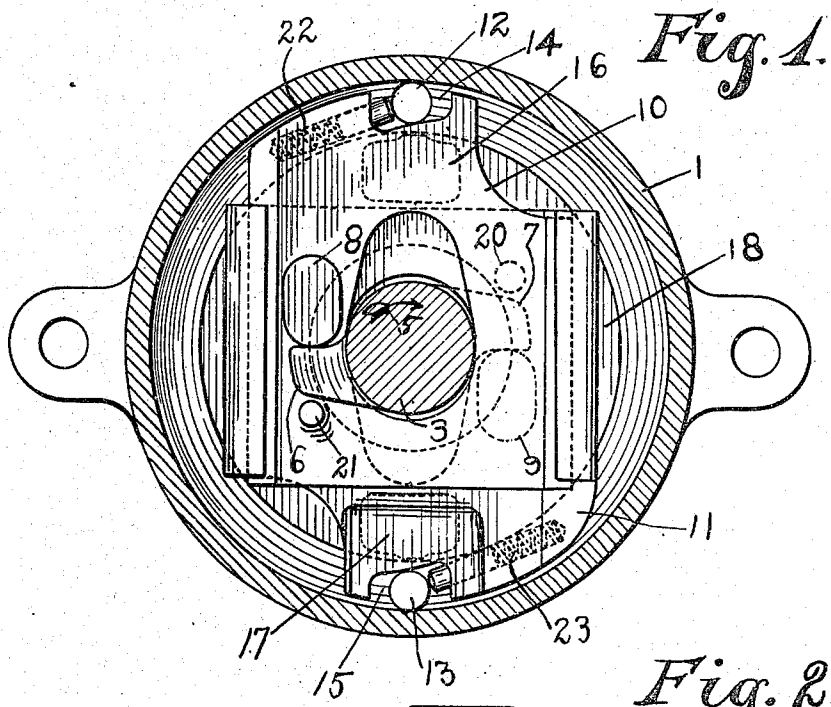
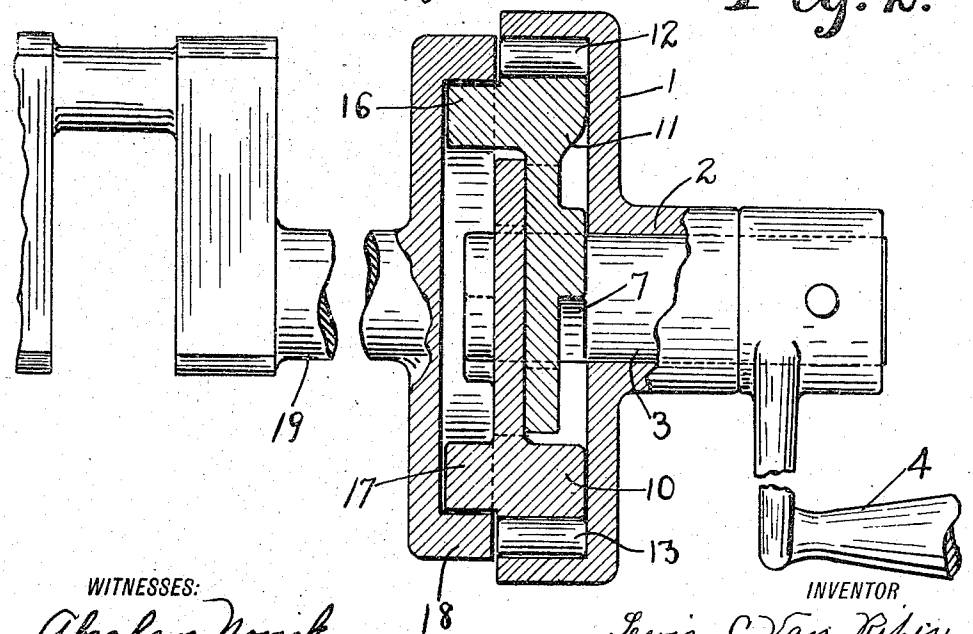


Fig. 2.



WITNESSES:

Abraham Novick

Joseph Frechlich

INVENTOR

Lewis C. Van Riper

BY

George Finkelstein

ATTORNEY

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Fig. 3.

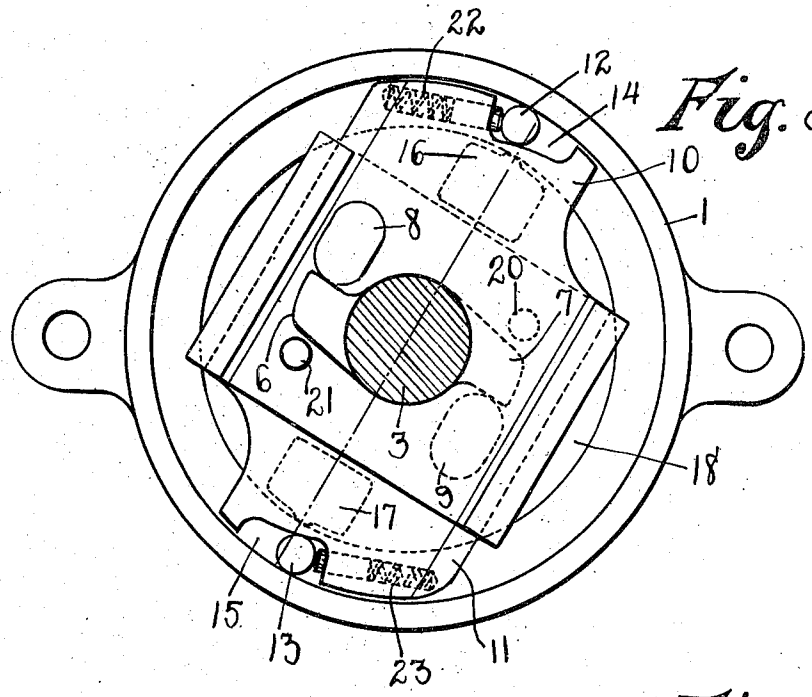
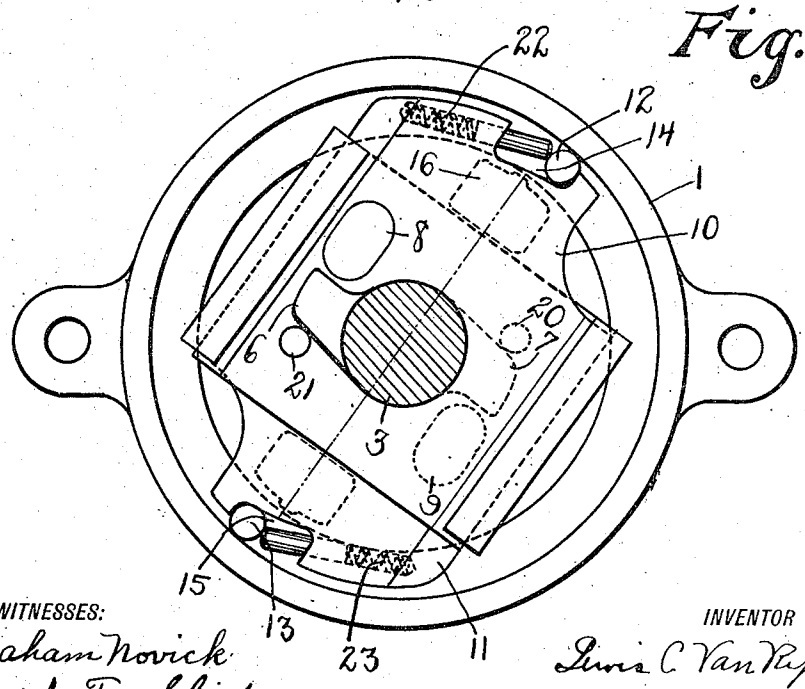


Fig. 4.



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ATTORNEY

UNITED STATES PATENT OFFICE.

LEWIS C. VAN RIPER, OF NEW YORK, N. Y.

STARTING DEVICE FOR EXPLOSIVE-ENGINES.

1,044,952. Specification of Letters Patent. Patented Nov. 19, 1912.

Application filed September 12, 1910. Serial No. 581,600.

To all whom it may concern:

Be it known that I, LEWIS C. VAN RIPER, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Starting Devices for Explosive-Engines, of which the following is a specification.

My invention relates to certain new and useful improvements in the starting mechanism for explosive engines.

The purpose of my invention is to provide a starting device which will release the starting crank or starting mechanism with no backward movement of said starting crank or starting mechanism when a premature explosion or back fire occurs, so as to prevent injury to the person or mechanism employed in operating the starting device.

Reference is to be had to the accompanying drawings forming a part of the specification, in which similar characters of reference indicate corresponding parts in all the figures, wherein:

Figure 1 is a sectional view showing the starting mechanism in its normal position when the engine is either running automatically or standing idle. Fig. 2 is a side sectional view. Figs. 3 and 4 are views showing the operation of the starting device.

My improved starting device consists of a non-rotatable casing 1 which may be fastened to any suitable stationary support as for instance the front cross member of an automobile frame. The bearing 2 which forms a part of casing 1 is for the purpose of carrying the revolving shaft 3, on one end of which may be connected the starting crank 4 or other suitable device with which to revolve shaft 3. When shaft 3 (see Fig. 1) is revolved in the direction shown by arrow 5, the lugs 6 and 7, which are parts of shaft 3, press on the lugs 8 and 9 which are parts of sliding members 10 and 11 causing the sliding members 10 and 11 to press outward and revolve as shown in Fig. 3. These sliding members 10 and 11 with their friction lugs 16 and 17 form an expanding friction clutch. As the sliding members 10 and 11 are revolved the friction rollers 12 and 13 are caused to roll back to the large end of the pockets 14 and 15, as shown in Fig. 3, thereby permitting the sliding members 10 and 11 to slide outward until the friction lugs 16 and 17 come in contact with and grip the inside of the cup disk 18 which is fastened to or preferably is a part of the engine shaft 19 (see Fig. 2), so that any further rotary motion imparted to the starting device is then transferred to the engine shaft 19. Should the premature explosion or back fire occur while the engine shaft 19 is being so revolved, the pressure between the friction lugs 16 and 17 and the cup disk 18 will be transferred to the friction rollers 12 and 13, thereby releasing and permitting the engine shaft 19 to slip backward with no backward movement being imparted to the starting crank.

When the engine starts forward, the increased speed of the engine shaft over the starting crank will automatically release the engine shaft from the starting device, but I preferably use more positive means, as the pins 20 and 21 (see Fig. 4) which strike the lugs 6 and 7 when the engine shaft 19 starts forward under power imparted by the engine, causing the sliding members 10 and 11 to withdraw their pressure and release the cup disk 18 thereby permitting the engine shaft 19 to revolve forward without turning the starting device around with it.

As the pressure between the friction lugs 16 and 17 and the cup disk 18 is withdrawn, the springs 22 and 23 cause the friction rollers 12 and 13 to regain their normal position, see Figs. 1 and 4.

As shown in Fig. 4 the clutch members 10 and 11 can be rotated backward at any time by rotating the shaft 3 backward which causes the lugs 6 and 7 to strike the pins 20 and 21, and the continued backward rotation of the shaft 3 then causes the clutch to contract so that the lugs 16 and 17 do not touch the friction cup disk 18. The rollers 12 and 13 are thus advanced to the shallower ends of their inclined grooves 14 and 15 and are engaged by the shoulders of the lugs which form the end wall of the grooves at the shallow ends, and further backward rotation causes the clutch members to contract still more until the rollers 12 and 13 are drawn entirely away from the non-rotatable roller race, thus leaving the clutch and its rotating means entirely free to rotate backward.

I claim:

1. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, an expanding friction clutch at all times rotatable either

forward or backward at a single operation, means rotatable either forward or backward for frictionally connecting said friction clutch to said engine shaft through said friction surface to move connectedly in one direction only.

2. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, a plurality of friction shoes rotatable either forward or backward, means rotatable either forward or backward for frictionally connecting said shoes to said friction surface for rotating it in a forward direction and means whereby the said frictional connection will be discontinued upon the reverse movement of said frictional connecting means or said engine shaft.

3. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, a plurality of rotatable friction shoes, means rotatable either forward or backward for frictionally connecting same to the engine shaft through said friction surface upon forward rotation of said connecting means, and means for causing said frictional connection to become inoperative upon backward rotation of said engine shaft.

4. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, a plurality of friction shoes rotatable either forward or backward, means rotatable either forward or backward for frictionally connecting said shoes to said friction surface when said connecting means are revolved in a forward direction and means whereby the frictional connection of said shoes to said friction surface will be reduced upon the reverse movement of said engine shaft.

5. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, an expanding friction clutch rotatable at all times either forward or backward, means rotatable either forward or backward for frictionally connecting said clutch to an engine shaft through said friction surface at a single operation, and means for reducing the friction in said frictional connection when the power exerted in a backward direction on the engine shaft exceeds the forward pressure exerted on said frictional connecting means.

6. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, an expanding friction clutch at all times rotatable either forward or backward, means rotatable either forward or backward for frictionally connecting said clutch to said engine shaft at a single operation, and means for reducing the friction between said expanding friction clutch and friction surface upon the backward rotation of said engine shaft.

7. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, an expanding friction clutch rotatable either forward or backward, means rotatable either forward or backward for rotating and expanding said friction clutch upon forward rotation, a non-rotatable friction roller race, friction rollers and springs for contracting said friction clutch upon backward rotation of the said engine shaft by its engine.

8. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, an expanding friction clutch at all times rotatable either forward or backward, means rotatable either forward or backward for frictionally connecting said clutch to an engine shaft through said friction surface at a single operation and means for reducing the friction between said expanding friction clutch and friction surface when the power developed in a reverse direction by said engine exceeds the forward pressure on said frictional connecting means.

9. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, a plurality of friction shoes rotatable either forward or backward, means rotatable either forward or backward for frictionally connecting said shoes to said engine shaft through said friction surface to rotate it in one direction, a stationary annular friction surface, and means by which the pressure of said friction shoes upon said first friction surface is transferred to said stationary annular friction surface upon the reverse rotation of said engine shaft.

10. A starting device adapted to be used in connection with explosive engines, comprising an annular friction surface upon or connected to an engine shaft, a starting crank rotatable either forward or backward, a plurality of friction shoes, means for causing said shoes to operatively grip said annular friction surface upon the forward rotation of said crank, and means for causing said grip to become inoperative upon the reverse rotation of said engine shaft by its engine.

11. A starting device adapted to be used in connection with explosive engines, comprising an annular friction surface attached or connected to an engine shaft, a plurality of shoes slidably mounted upon each other,

means rotatable either forward or backward for causing said shoes to frictionally connect with said annular friction surface upon the rotation of said frictional connecting means in one direction and means for reducing the friction in said frictional connection of said shoes to said friction surface upon the reverse rotation of said engine shaft.

12. In a starting device adapted to be used in connection with explosive engines, the combination of a friction surface fastened or connected to an engine shaft, an expanding friction clutch rotatable either forward or backward, means rotatable either forward or backward for rotating, expanding and frictionally connecting said clutch to said friction surface upon forward rotation of said rotating means and means for reducing the friction of said frictional connection upon backward rotation of said engine shaft, said friction reducing means comprising a non-rotatable friction roller race, an inclined friction roller groove integral with each member of the said expanding clutch, a friction roller in each inclined groove and a spring behind said frictional roller to hold said friction roller always in frictional engagement with the bottom of said inclined groove and the non-rotatable friction roller race upon forward rotation of said rotating means.

13. In starting mechanism for internal combustion engines, the combination of a rotary clutch member connected to the engine and having a friction surface, a coöperating friction shoe normally held out of contact with said friction surface, a starting member, connections between said starting member and said shoe for rotating the latter and for shifting said shoe to and from said surface and into and out of contact therewith at a single operation as said starting member is moved in opposite directions, and means for releasing the latter at any point upon the reverse movement of the engine.

14. In starting mechanism for internal combustion engines, the combination of a rotary clutch member connected to the engine and having a friction surface, a coöperating friction shoe normally held out of contact with said friction surface, a starting member, connections between said starting member and said shoe for rotating the latter and for shifting said shoe to and from said surface and into and out of contact therewith at a single operation as said starting member is moved in opposite directions, a non-rotatable member and means interposed between said non-rotatable member and said connections for releasing said shoe at any point in the path of movement upon the reverse movement of the engine.

15. In starting mechanism for internal combustion engines, the combination of a rotary clutch member connected to the engine and having a friction surface, a coöperating friction shoe normally held out of contact with said friction surface, a starting member, connections between said starting member and said shoe for rotating the latter and for shifting said shoe to and from said surface and into and out of contact therewith as said starting member is moved in opposite directions, a non-rotatable member having a surface of revolution, and a roller engaging said surface and revolving with said friction shoe for releasing the latter upon the reverse movement of the engine.

Signed at New York in the county of New York and State of New York this 10th day of September A. D. 1910.

LEWIS C. VAN RIPER.

Witnesses:
JOSEPH FROEHLICH,
ABRAHAM NOVICK.