E. F. MURDOCK.

CLUTCH MECHANISM FOR RELIEVING AN INTERNAL COMBUSTION ENGINE UNDER EXCESSIVE LOAD.

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1,201,856. Patented Oct. 17, 1916.

Fig. 2.

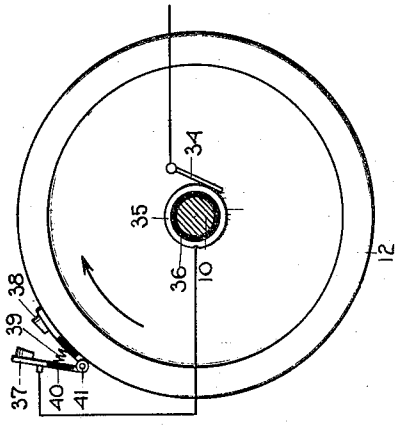


Fig. 3.

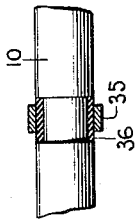


Fig. 1.

Fig. 4.

WITNESSES

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CLUTCH MECHANISM FOR RELIEVING AN INTERNAL-COMBUSTION ENGINE UNDER EXCESSIVE LOAD.

1,201,856. Specification of Letters Patent. Patented Oct. 17, 1916.

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To all whom it may concern:

Be it known that I, EDWIN F. MURDOCK, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Clutch Mechanism for Relieving an Internal-Combustion Engine Under Excessive Load, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: To automatically relieve an engine of the character mentioned of the load with which it is operatively connected; and to provide a simple and inexpensive construction for carrying into effect the above-stated objects.

Drawings.—Figure 1 is a side view in the form of a lay-out, showing an engine of the character mentioned having operatively connected therewith an apparatus constructed and arranged in accordance with the present invention; Fig. 2 is a detail view on an enlarged scale, showing the fly-wheel of an engine of the character mentioned and a circuit-operating mechanism connected therewith; Fig. 3 is a side view of a fragment of the crank shaft of the engine, having an electric circuit member mounted thereon constructed and arranged in accordance with the present invention; Fig. 4 is a longitudinal section of a compressed-air operated cylinder embodied in the present invention.

Description.—As seen in the drawings, the engine 9 is provided with a crank shaft 10, a crank case 11 and a fly-wheel 12 of conventional form and arrangement. The fly-wheel 12 is conventionally cupped to receive a cone or other suitable clutch member 13. The clutch member 13, as shown in the drawings, has an elongated hub 14, with which a rocking lever 15 of conventional pattern is operatively connected by pins 16. The lever 15 is pivoted on a shaft 17, and is provided with a foot-pad 18, by which it is manually operated to move in the direction indicated by the arrow shown in conjunction therewith. As in the usual forms of clutches of the type illustrated, within the hub 14 is contained a seating spring, 44, which functions automatically to force the clutch member 13 into engagement with the fly-wheel 12. The manual operation of the lever 15 is effected by pressing the pad 18 to rock the lever 15, for retracting the member 13 from engagement with the fly-wheel 12.

Under ordinary traveling conditions, the engine 9 becomes stalled when overloaded. Preliminary to the engine becoming stalled, the speed thereof is materially reduced. The operation of the herein-disclosed apparatus is to relieve the engine partly or entirely from the load, thereby changing the conditions under which said engine is operating. The load being released, there is nothing to prevent the engine from picking up its speed and power. To assist, however, in the operation referred to, and to insure the "pick-up" of the engine, the apparatus operates on the fuel supply to augment the supply to the engine simultaneously with the operation of releasing the load. To this end the lever 15 is operatively connected with a piston 19, preferably by means of a connecting rod 20. The piston 19 is operatively installed in an open-ended cylinder 21.

Compressed air is delivered to the cylinder 21 from a reservoir 22. The reservoir 22 is continuously charged with air, to maintain a predetermined pressure thereof. The air is delivered by a pipe 23, which is connected with any suitable pump, said pump being preferably operated by the engine 9. A pipe 24 delivers the compressed air into the cylinder 21, between the piston 19 therein and the head 25 thereof. The passage of air through the pipe 24 is controlled by a valve 26, which is open when the arm 27 and armature 28 mounted thereon are drawn toward an electromagnet 29. When air is thus admitted to the cylinder 21 from the reservoir 22, the piston 19 is moved toward the forward and open end of the cylinder 21, rocking the lever 15 in the same manner as is effected when the operator places his foot on the pad 18 and presses the lever 15 in the direction indicated by the arrow. This operation of the lever withdraws the clutch member 13 from engagement with the fly-wheel 12, and thereby relieves the load on the engine 9, imparted thereto through the clutch shaft 30. The head 25 is provided with a perforation 31, which by retarding the escape of air from the cylinder 21, retards the return of the piston 19 when in the operation of the apparatus the valve 26 is closed. The said valve is closed by a spring 32 which swings the arm 27 and

draws the armature 28 from the magnet 29 when the latter is deënergized. The size and character of the perforation 31, and the number of said perforations employed, are optional.

The magnet 29 is normally in circuit with a battery 33, one terminal of which is connected with the crank case 11 or other part of the engine of which the fly-wheel 12 is a part. One of the terminal wires, preferably leading from the magnet 29, is provided with a brush 34. The brush 34 rests in contact with a metal ring 35 mounted on the shaft 10. An insulating bushing 36 is employed to hold the ring 35 from contact with the shaft 10, as seen best in Fig. 2 of the drawings. The ring 35 is connected by a wire with the weighted contact 37. The contact 37 rests on a contact 38, being normally moved thereto by a spring 39, which connects the two contacts. The contact 37 is insulated from the contact 38 and fly-wheel 12 by a fiber or vulcanized section 40. The section 40 and the contact 38 are pivotally connected by a pin 41.

The circuit incorporating the battery 33 and magnet 29 is normally controlled by a master switch 42. The switch 42 may be separately installed, manipulated in conjunction with, or incorporated in the switch of the electric ignition system for the engine 9.

Operation.—When the various parts above mentioned are installed and connected in the manner stated, the operation is as follows:—If the switch 42 is incorporated in and operated with the ignition system of the engine, this is closed whenever the operator is about to start the engine. The fly-wheel being at rest, the spring 39 holds the contacts 37 and 38 engaged. The circuit incorporating the magnet 29 being thus closed, the valve 26 is opened to admit compressed air from the reservoir 22 to the cylinder 21, which moves the piston 19 from the head 25, rocking the lever 15 to withdraw the clutch member 13 from engagement with the fly-wheel 12. When the engine starts and picks up speed, centrifugal force acting upon the contact 37 throws the same outward from the wheel 12, the spring 39 expanding to that end, and the contacts 37 and 38 part. When the circuit referred to is thus broken, the spring 32 operates upon the arm 27 to withdraw the armature 28 from the magnet 29 and to close the valve 26, thus terminating the supply of compressed air to the cylinder 21. The clutch spring referred to as mounted within the hub 14 immediately rocks the lever 15 as rapidly as the piston 19 will permit. The rapidity with which the lever 15 may return backward is controlled by the size of the perforation 31. If during the operation of the engine the load at any time becomes excessive, a diminished speed of the fly-wheel 12 results, until the centrifugal force being less than the force of the spring 39, the contacts 37 and 38 are drawn together to complete the electric circuit in which the magnet 29 is incorporated, when automatically the valve 26 is opened to permit the air from the reservoir 22 to pass to the cylinder 21, with the effect that the clutch member 13 is withdrawn from engagement with the fly-wheel 12, and the engine, being thus relieved of the load, is permitted to pick up or attain speed.

To assist or coöperate in the action above described, which results in the engine picking up when the load is reduced, the connecting rod 20 is operatively connected by a cable 43 with the throttle of the fuel-supply system which furnishes fuel to the engine 9. In this manner, simultaneously with the release of the load, the added supply of fuel accelerates the engine, to secure a more rapid and positive action thereof.

Claims:

1. An apparatus as characterized, comprising a crank shaft; a transmission shaft; a clutch normally connecting said shafts; and means for releasing said clutch, embodying a prime mover, and means operated centrifugally from said crank shaft for actuating said prime mover.

2. An apparatus as characterized, comprising a crank shaft; a transmission shaft; a spring-operated clutch for normally connecting said shafts; a power cylinder and piston therefor, said piston being operatively connected with said clutch; and means for introducing a power medium into said cylinder for moving the piston to release said clutch, said means being operatively connected with said crank shaft and restrained from operating when the rotary speed of said crank shaft exceeds a predetermined rate.

3. An apparatus as characterized, comprising a crank shaft; a transmission shaft; a spring-operated clutch connecting said shafts; a device for releasing said clutch; means for actuating said device, said means embodying an electro-magnet and an operating circuit therefor; and a terminal for said circuit operatively affected by said crank shaft to open said circuit by centrifugal action produced in said terminal by the rotation of said crank shaft.

4. An apparatus as characterized, comprising a crank shaft; a transmission shaft; a spring-actuated clutch normally operatively connecting said shafts; a compressed-air motor operatively connected with said clutch to release the same when operated; a compressed-air supply; a valve controlling said supply to admit air to said motor for operating the same; electro-mechanical devices for operating said valve, embodying an electric circuit and supply therefor; a

terminal for said circuit operatively connected with said crank shaft to be operated by centrifugal force induced therein by the rotation of said crank shaft; and means for closing said terminal to complete said electric circuit when the rotation of said crank shaft decreases below a predetermined rotary speed.

5. An apparatus as characterized, comprising a crank shaft; a transmission shaft; a spring-seated clutch normally operatively connecting said shafts; operating means connected with said clutch for releasing the same; and actuating means for said operating means, said actuating means embodying a device operatively connected with said crank shaft to be normally restrained thereby from operating when said shaft is rotating above a predetermined speed.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN F. MURDOCK.

Witnesses:

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GEORGE H. EMSLIE.