

J. A. BURNS.
MECHANICAL STARTING DEVICE.
APPLICATION FILED JUNE 3, 1910.

Patented Dec. 20, 1910.

979,257.

Fig. 1.

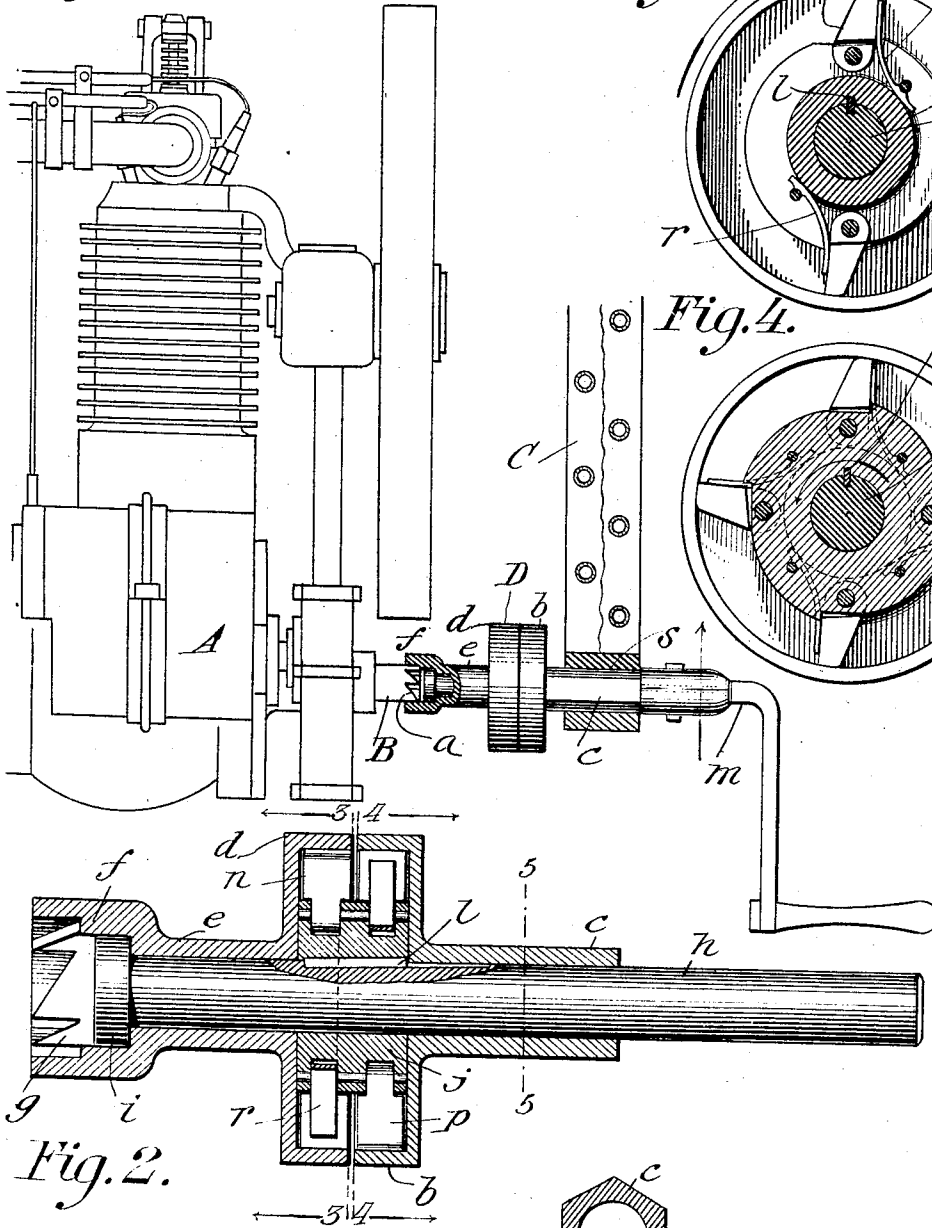


Fig. 2.

Fig. 3.

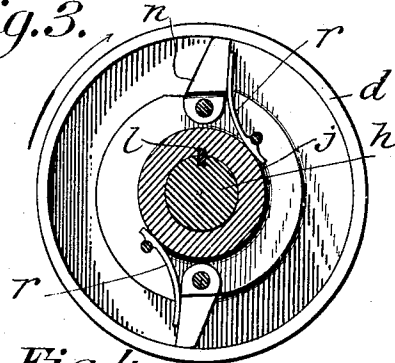


Fig. 4.

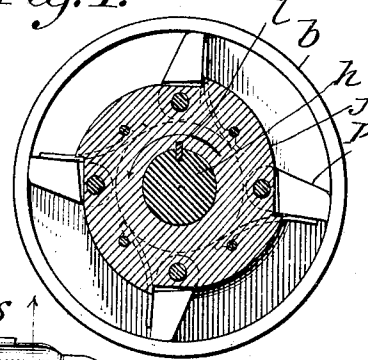
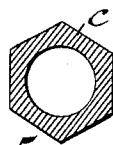


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES A. BURNS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO GEORGE D. HORNING, OF WASHINGTON, DISTRICT OF COLUMBIA.

MECHANICAL STARTING DEVICE.

979,257.

Specification of Letters Patent.

Patented Dec. 20, 1910.

Application filed June 3, 1910. Serial No. 564,801.

To all whom it may concern:

Be it known that I, JAMES A. BURNS, citizen of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Mechanical Starting Devices, of which the following is a specification.

My present invention has to do with mechanical starting devices for internal combustion engines; and it has for its object to provide a simple, compact and durable starting device calculated to effectually prevent retrograde movement of the crank and injury to the operator in the event of the engine back-firing during the starting operation.

My invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings which constitute part hereof: Figure 1 is a view, partly in side elevation and partly in section, showing my novel starting device properly applied. Fig. 2 is an enlarged view in longitudinal section and side elevation of the starting device minus the crank. Figs. 3 and 4 are transverse sections taken in the planes of the lines 3—3 and 4—4, respectively, of Fig. 2, looking in the directions of the respective arrows. Fig. 5 is a detail section taken in the plane indicated by the line 5—5 of Fig. 2.

Similar letters designate corresponding parts in all of the views of the drawings, referring to which:

A is an internal combustion engine, and B is the engine shaft which is preferably though not necessarily, provided at its outer end with a clutch member *a*.

C is a portion of a frame, in this instance a portion of an automobile frame, and D is my novel starting device as a whole. The said device D comprises an outer casing section *b* having an outwardly extending sleeve *c* that is interiorly circular and exteriorly angular in cross-section, Fig. 5; an inner casing section *d* having an inwardly extending sleeve *e* which is provided inside its enlarged end *f* with a clutch member *g* complementary to the before-mentioned clutch member *a*; a shaft *h* loosely arranged in the sleeves of the casing sections and having an

enlargement *i* at its inner end, disposed in the enlargement *f* of sleeve *e*; a pawl-body *j* connected through a key *l* or otherwise fixed to rotate with the shaft *h* and contained within the opposed casing sections *b* and *d*; a crank *m* suitably fixed on the outer portion of the shaft *h*; a pawl connection *n* intermediate the body *j* and the circular inner side of the casing section *d*; and a reversely arranged pawl connection *p*, of comparatively greater strength, intermediate said body *j* and the circular inner side of the casing section *b*. In the present instance I employ two pawls, disposed as shown and pressed by springs *r*, in the connection *n*, and four reversely arranged and spring-pressed pawls in the connection *p*.

The sleeve *c* of the outer casing section *b* is held against turning, but is free to be moved endwise in an aperture *s*, of angular form in cross-section, in the frame C.

In practice, when the device D is moved endwise inwardly to engage the clutch member *g* with the clutch member *a* of the engine shaft B, and the crank *m* is turned in the direction of the arrow in Fig. 1 to start the engine, the pawl connection *n* will cause the casing section *d* and the engine shaft to turn in the direction indicated, while the pawl connection *p* will slip or move idly in said direction in the casing section *b*. Of course after the engine is started, the crank *m* remains idle, this because of the casing section *d* revolving idly past the pawls *n* when the sleeve *c* remains in engagement with the engine shaft, and the ability of the comparatively strong pawl connection to cooperate with the casing section *b* and hold the shaft *h* against rotation in a forward direction. When, however, the clutch connection shown is employed the starting of the engine will generally operate to kick the device D back and break the connection between the shaft B and said device.

In the event of back-fire due to premature initial explosion and sudden backward rotation of the engine shaft B, the pawls of the comparatively strong pawl connection *p* will, by engaging the casing section *b*, effectually prevent backward rotation of the shaft *h* and crank *m* and in that way will preclude the possibility of the operator being slightly or materially injured by said back-fire. It will also be noted that upon backward rotation of the engine shaft B and casing section

d, the said section *d* will slip around the comparatively weak pawl connection *n*; the said casing section *d* and pawl connection *n* constituting a simple and reliable slip connection for the purpose.

From the foregoing it follows that my novel device is not injured by backward rotation of the engine shaft *B*, and that, therefore, the casing section *d* may be permanently fixed in any approved manner to the engine shaft without involving departure from the spirit of my invention.

While I have shown and described one form of my invention, it is to be understood that I am not limited to the details or the form or relative arrangement of parts disclosed, but that extensive modifications may be made therein, without departing from the spirit thereof.

Having described my invention, what I claim and desire to secure by Letters-Patent, is:

1. A mechanical starting device for internal combustion engines, comprising a shaft having an enlargement at its inner end, an inner casing section smooth interiorly and having an outer open end and also having an inwardly extending sleeve loose on the shaft and which terminates at its inner end in an enlargement that extends beyond the shaft and is provided with an interior clutch member, an outer casing section smooth interiorly and movable outward and inward with the inner casing section and having an inner open end opposed to the outer open end of the inner section and also having an outwardly extending sleeve that loosely receives the shaft and is exteriorly of angular form in cross-section, fixed means receiving said sleeve and adapted to permit endwise movement while preventing rotation thereof, a crank on the shaft for rotating the same, a plurality of swinging pawls connected and rotatable with the shaft and adapted to transmit rotary motion in one direction from the shaft to the inner casing section and permit of backward rotation of the inner casing section independently of the shaft, and a greater number of reversely arranged swinging pawls connected and rotatable with the shaft and adapted, on backward rotation of the inner casing section, to cooperate with the outer casing section and prevent backward rotation of the shaft.

2. A mechanical starting device for internal combustion engines, comprising a shaft, an inner revoluble smooth-bore casing surrounding the shaft and having an inwardly extending sleeve loose on the shaft, an outer smooth-bore casing surrounding the shaft and held against rotation, a plurality of swinging pawls connected and rotatable with the shaft and adapted to transmit rotary motion in one direction from the shaft to the inner casing and permit of

rotation of the inner casing backward or forward independently of the shaft, and a greater number of reversely-arranged swinging pawls connected and rotatable with the shaft and adapted, on backward rotation of the inner casing, to cooperate with the outer casing and prevent backward rotation of the shaft.

3. A mechanical starting device for internal combustion engines, comprising a shaft, a revoluble member loose with respect to the shaft, a member that is non-rotatable, a pawl connection, between the shaft and the revoluble member, adapted to transmit rotary motion in one direction from the shaft to the revoluble member and permit of rotation of said member backward or forward independently of the shaft, and a reversely-arranged pawl connection between the shaft and the non-rotatable member, stronger than the first-named pawl connection, and adapted to prevent backward rotation of the shaft and also adapted to prevent forward rotation of the shaft by the said revoluble member and the pawl connection between the same and the shaft.

4. A starting device for internal combustion engines comprising a shaft, a slip connection adapted to transmit rotary motion in one direction from the shaft to an engine shaft and permit rotation of the engine shaft in either direction independently of the shaft, non-rotatable means, and means intermediate the shaft and said non-rotatable means, stronger than the said slip connection, and adapted to prevent rotation of the shaft in one direction and to permit of manual rotation of the shaft in the other direction and also adapted to prevent the said slip-connection from rotating the shaft in the last-named direction.

5. A starting device for internal combustion engines comprising a shaft, a slip connection adapted to transmit rotary motion in one direction from the shaft to an engine shaft and permit rotation of the engine shaft in either direction independently of the shaft, non-rotatable means, and a reversely-arranged slip-connection intermediate the first-named shaft and said non-rotatable means, stronger than the first-named slip connection, and adapted to prevent rotation of the shaft in one direction and to permit of manual rotation of the shaft in the other direction, and also adapted to prevent the first-named slip-connection from rotating the shaft in the last-named direction.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES A. BURNS.

Witnesses:

HARRY C. COLUMBUS,
ROBERT O. KERBY.