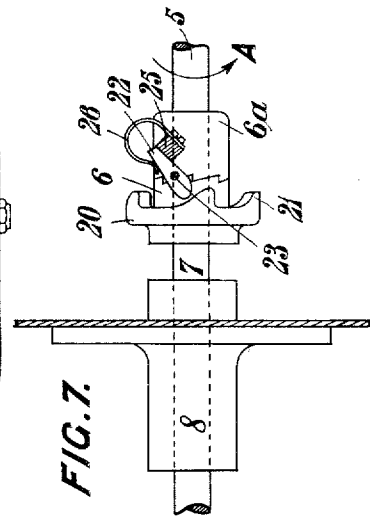
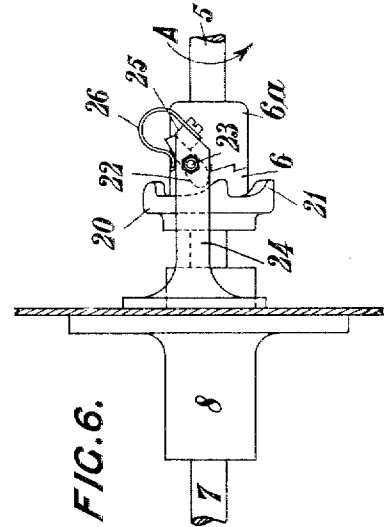
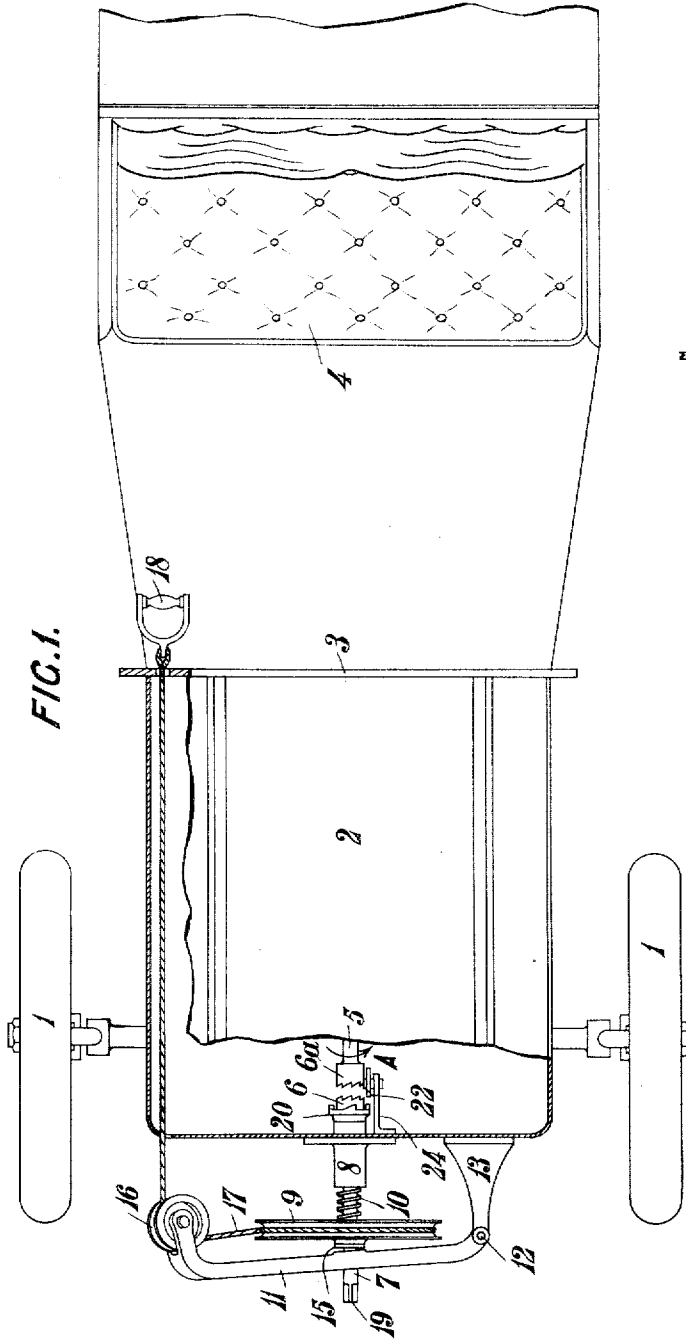


C. W. MALLINS.
 STARTING MOTOR VEHICLE INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED DEC. 2, 1908.

1,023,212.

Patented Apr. 16, 1912.

2 SHEETS—SHEET 1.



Attest:

Edw. L. Tolson,
Bent M. Stahl.

Inventor:

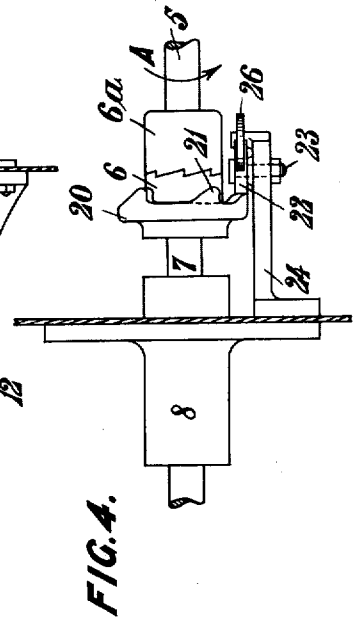
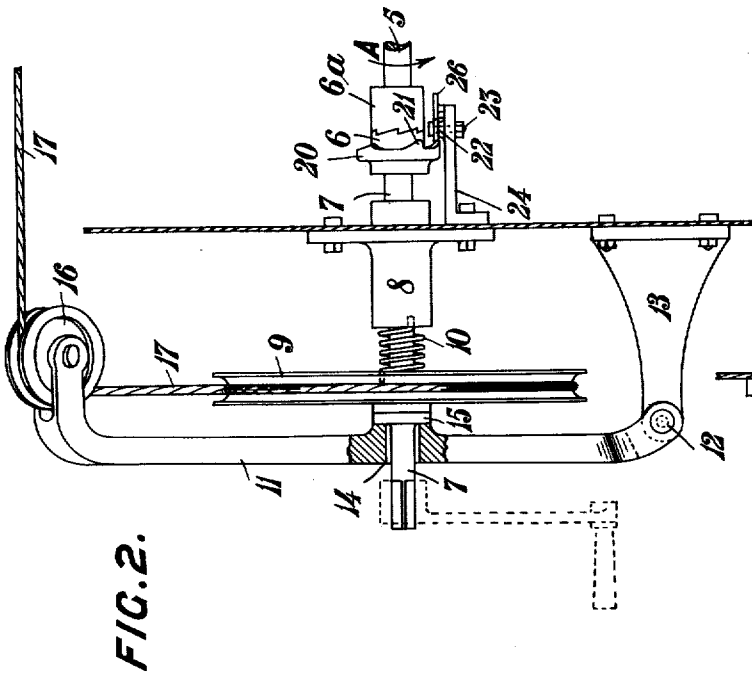
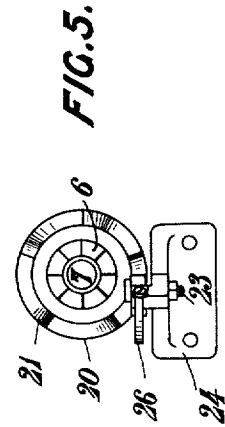
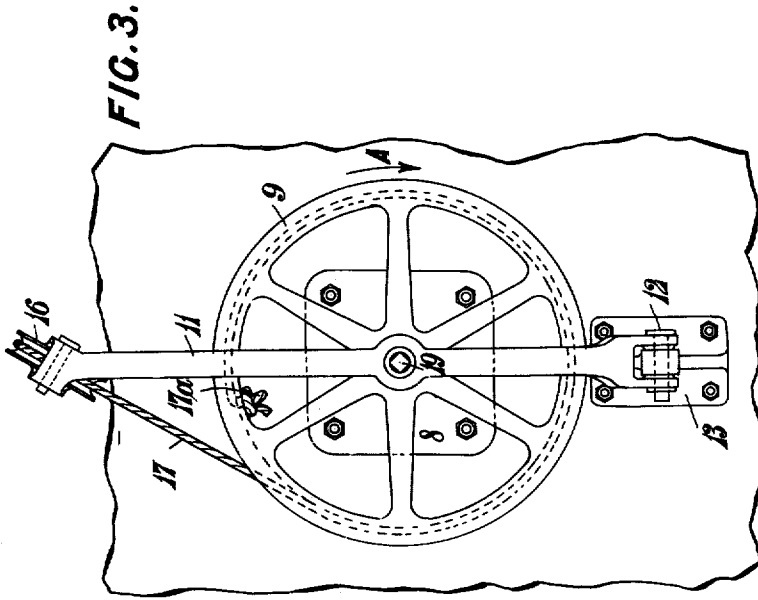
Charles W. Mallins,
By Spear, Wadsworth, Donnell & Field,
Attys.

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 Attys.

UNITED STATES PATENT OFFICE.

CHARLES WILLIAM MALLINS, OF LIVERPOOL, ENGLAND.

STARTING MOTOR-VEHICLE INTERNAL-COMBUSTION ENGINES.

1,023,212.

Specification of Letters Patent.

Patented Apr. 16, 1912.

Application filed December 2, 1908. Serial No. 465,746.

To all whom it may concern:

Be it known that I, CHARLES WILLIAM MALLINS, a subject of the King of Great Britain, and residing in Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements Relating to the Starting of Motor-Vehicle Internal-Combustion Engines, of which the following is a specification.

This invention has reference to mechanism intended to supersede the usual starting handle fitted in front of motor vehicles propelled by internal combustion engines, the object being to enable the driver to start the engine without leaving his seat.

The invention is specially applicable to motor omnibuses or the like vehicles.

In the accompanying drawings which illustrate my invention, Figure 1 is a plan view of the front portion of a motor vehicle showing the application of my invention thereto; irrelevant details of the vehicle are omitted and only so much of it is shown as is necessary for the present purpose. Figs. 2 and 3 are respectively plan and front elevation of the starting mechanism to a larger scale, and the remaining figures are fragmentary detail views to a still larger scale showing more particularly the claw coupling and the safety device, Fig. 4 being a plan corresponding to Fig. 2, Fig. 5 being an end elevation, and Fig. 6 a side elevation; Fig. 7 corresponds with Fig. 6, except that for the sake of clearness, the bracket 24 is removed, while the pawl 22 and its spring 26 are retained in order to show their relation to the crown cam 20.

1 are the fore wheels of the vehicle, 2 is the engine bonnet, 3 the dash board, 4 the driver's seat, and 5 the fore end of the engine shaft.

6^a is one element of a claw coupling rigidly attached to the end of the shaft 5, and the other element 6 of the coupling is rigidly attached to the end of the short starting shaft 7, which is mounted so that it can rotate and slide axially in the bearing bracket 8 fixed to the vehicle frame.

The teeth of the claw coupling 6, 6^a are of saw tooth form so that when the shaft 7 is moved axially so as to engage the two elements of the coupling, the starting shaft is adapted to rotate the engine shaft in the normal direction of engine rotation, as shown by the arrow A, but not to be ro-

tated by the engine shaft in the same direction.

9 is a grooved pulley rigidly fixed to the starting shaft 7, and 10 is a coil spring interposed between the pulley and the bracket 8. This spring not only urges the starting shaft 7 away from the engine shaft 5, so as to maintain it normally uncoupled from the latter, but it also tends to rotate the shaft 7 and the pulley 9 in a direction opposed to the normal direction of engine rotation.

In order to start the engine it is necessary first to slide the shaft 7 axially, in opposition to the spring 10, from the normal uncoupled position shown in Fig. 1 into the position shown in Fig. 2 where the two coupling elements 6 and 6^a are engaged, and then to rotate the shaft 7 sharply through a fraction of a revolution in the direction of the arrow A.

11 is a lever fulcrumed at 12 on the bracket 13 carried by the vehicle frame. This lever is pierced by the hole 14 which loosely encircles the shaft 7, and it abuts against the collar 15 of the latter shaft. The free end of the lever is forked and carries the fair-lead pulley 16.

17 is a flexible wire cable or the like, the end 17^a of which is secured to the rim of the pulley 9; the cable is carried around the pulley groove for nearly one turn and is then led around the fair-lead pulley 16, then along inside the engine bonnet 2, and finally out through the dash board 3, where it ends in a stirrup handle 18 within convenient reach of the driver. The cable is coiled around the pulley in such a direction that when it is pulled it rotates the pulley in the direction of the arrow A, in opposition to the spring 10, and when the pull is relaxed, the spring 10 turns the pulley 9 back again so as to rewind the cable on the pulley.

The action will now be readily understood.

In order to start the engine, the driver pulls the handle 18 sharply toward him. The cable being led around the fair-lead pulley 16 on the free end of the lever 11, the first effect of the pull is to deflect the lever from the position shown in Fig. 1 into that shown in Fig. 2, so pushing the starting shaft 7 axially and causing the latter to engage, through the claw coupling 6, 6^a, with the engine shaft. The continuation of the pull rotates the pulley 9 and with it the shaft of the engine, so starting the latter.

It will be understood that the relative axial and torsional strengths of the spring 10 are regulated so that the movements occur in the order stated. When the pull on the handle 18 is relaxed; the starting shaft 7 is retracted and uncoupled from the engine shaft and the cable is rewound on the pulley 9, ready for another operation. The end of the shaft 7 is squared as indicated at 19 so that, if the emergency arise, an ordinary handle as indicated in dotted lines may be used for starting the engine in the ordinary manner from the road way.

In starting internal combustion engines, it is possible, under some circumstances that the ignition may occur prematurely, so causing the engine to start in the wrong direction; this would obviously be dangerous to the person starting the engine, as the claw coupling 6, 6^a would under these circumstances be operative to drive the starting shaft 7, and the object of the safety device before referred to is to safe-guard against this contingency by causing the starting shaft to be automatically disengaged from the engine shaft should the engine happen to start in the wrong direction.

20 is a cam in the form of a crown wheel secured to the shaft 7; it may be conveniently made integral with the coupling element 6. This cam has on its annular edge a series of ratchet like teeth 21 of curved contour and when the shaft 7 is moved axially into engagement with the shaft 5, these teeth 21 engage with the pawl 22 which is pivotally mounted at 23 on the bracket 24 carried by the vehicle frame.

The movement of the pawl in one direction is limited by the stop 25 on the bracket 24, but it is free to move in the opposite direction in opposition to the spring 26 which urges it against the stop.

The pawl and its pivot are arranged relatively to the crown cam as shown, so that when the latter rotates in the normal direction the pawl 22 trips freely over the teeth, but if the crown cam should commence to rotate in the opposite direction, the end of the pawl will immediately engage against the sloping back of one of the teeth 21, and the latter will ride over the pawl, which backs against its stop 25. The result is to immediately push the shaft 7 axially away from the engine shaft a sufficient distance to uncouple it from the latter.

Having now fully described my invention, I declare that what I claim, and desire to secure by Letters Patent, is;—

1. In combination with the shaft of an internal combustion engine, an axially movable starting shaft, a disengageable coupling adapted to transmit rotation in one direction only from the starting shaft to the engine shaft, a pulley on the starting shaft, an operating cable coiled on the pulley, means

urging the shaft axially out of engagement with the engine shaft and for urging the pulley in opposition to the cable and means operated by the cable for moving the starting shaft axially into engagement with the engine shaft.

2. In combination with the shaft of an internal combustion engine; an axially movable starting shaft, a disengageable coupling adapted to transmit rotation in one direction only from the starting shaft to the engine shaft, a spring urging the shaft axially out of engagement with the engine shaft, a pulley on the starting shaft, an operating cable coiled on the pulley, said spring urging the pulley in opposition to the cable, and means operated by the cable for moving the starting shaft axially into engagement with the engine shaft; substantially as described.

3. In combination with the shaft of an internal combustion engine; an axially movable starting shaft, a disengageable coupling adapted to transmit rotation in one direction only from the starting shaft to the engine shaft, a spring urging the shaft axially out of engagement with the engine shaft, a pulley on the starting shaft, an operating cable coiled on the pulley, said spring urging the pulley in opposition to the cable, a lever engaging axially with the starting shaft, and a fair-lead pulley on the free end of the said lever around which the operating cable is deflected; substantially as described.

4. In combination with the shaft of an internal combustion engine; an axially movable starting shaft, a disengageable coupling adapted to transmit rotation in one direction only from the starting shaft to the engine shaft, a pulley on the starting shaft, an operating cable coiled on the pulley, means urging the shaft axially out of engagement with the engine shaft and for urging the pulley in opposition to the cable, and means for automatically disengaging the said coupling from the engine shaft if the rotation of the latter is reversed; substantially as described.

5. In combination with the shaft of an internal combustion engine, a disengageable device for rotating the engine shaft in the normal direction only, a crown cam rigidly fixed to the said device, and a spring controlled pawl mounted on a fixed pivot, engaging said cam and adapted to push the said cam axially away from the engine shaft if the rotation of the latter is reversed, substantially as described.

6. In combination with the shaft of an internal combustion engine; an axially movable starting shaft, a disengageable coupling adapted to transmit rotation in one direction only from the starting shaft to the engine shaft, a spring urging the shaft axially out of engagement with the engine shaft, a pul-

ley on the starting shaft, an operating cable coiled on the pulley, said spring urging the pulley in opposition to the cable, means operated by the cable for moving the starting
5 shaft axially into engagement with the engine shaft, a crown cam fixed to the starting shaft, and a spring controlled pivoted pawl engaging said cam and adapted to push the starting shaft axially out of engagement
10 with the engine shaft if the rotation of the latter is reversed; substantially as described.

7. In combination with the shaft of an internal combustion engine; an axially movable starting shaft, a disengageable coupling adapted to transmit rotation in one direction only from the starting shaft to the engine shaft, a spring urging the shaft axially out of engagement with the engine shaft, a pulley on the starting shaft, an operating cable coiled on the pulley, said
20 spring urging the pulley in opposition to the cable, a lever engaging axially with the starting shaft, a fair-lead pulley on the free end of the said lever around which the operating cable is deflected, a crown cam fixed to
25 the starting shaft, and a spring controlled

pivoted pawl engaging said cam and adapted to push the starting shaft axially out of engagement with the engine shaft if the rotation of the latter is reversed; substantially 30 as described.

8. In combination with the shaft of an internal combustion engine, an axially movable starting shaft, a disengageable coupling adapted to transmit rotation in one direction only from the starting shaft the engine shaft, a pulley on the starting shaft, an operating cable coiled on the pulley, means urging the shaft axially out of engagement with the engine shaft and for urging the
40 pulley in opposition to the cable, and means operated by the cable for moving the starting shaft axially into engagement with the engine shaft.

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

CHARLES WILLIAM MALLINS.

Witnesses:

ROBT. A. SLOAN,
JOSEPH E. HIRSH.