

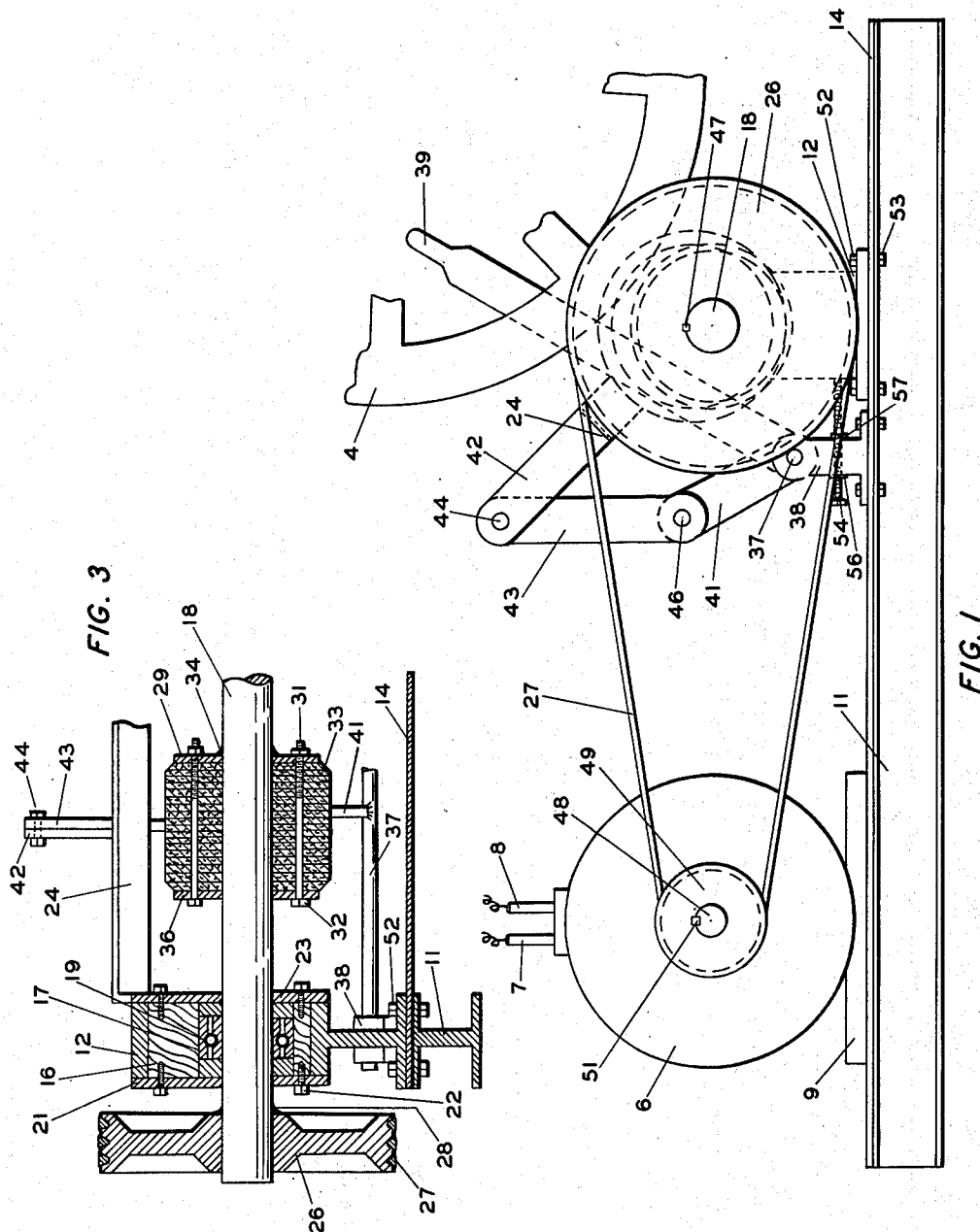
March 1, 1949.

L. T. HOOVER
MECHANICAL STARTER FOR LARGE
INTERNAL-COMBUSTION ENGINES

2,463,178

Filed March 24, 1947

2 Sheets-Sheet 1



INVENTOR.
L.T. HOOVER

BY *Hudson & Young*
ATTORNEYS

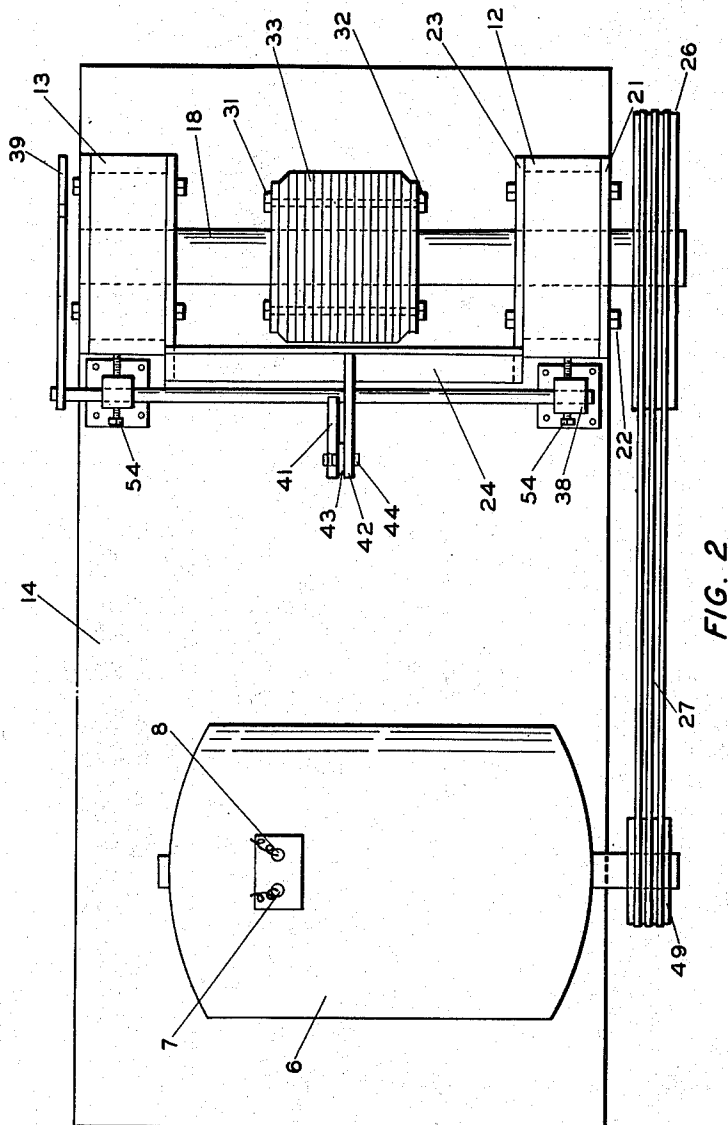
March 1, 1949.

Filed March 24, 1947

L. T. HOOVER
MECHANICAL STARTER FOR LARGE
INTERNAL-COMBUSTION ENGINES

2,463,178

2 Sheets-Sheet 2



INVENTOR.
L.T. HOOVER

BY *Hudson & Young*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,463,178

MECHANICAL STARTER FOR LARGE
INTERNAL-COMBUSTION ENGINES

Lucian T. Hoover, Seminole, Okla., assignor to
Phillips Petroleum Company, a corporation of
Delaware

Application March 24, 1947, Serial No. 736,876

2 Claims. (Cl. 74-8)

1

This invention relates to a mechanical means for safely starting large internal combustion engines. In one specific aspect it relates to a mechanical starter having a small motor with an adjustable V-belt and friction pulley drive by which the motor may be coupled to the large internal combustion engine during the period of starting and uncoupled therefrom after the large engine has started.

One object of the invention is to provide a mechanical means of starting large internal combustion engines on an economical and safe basis.

Another object is to provide a motor and coupling means for coupling the same to a large internal combustion engine for starting the same.

Another object is to provide a simple, rugged, inexpensive and fool proof starting means for large internal combustion engines.

Numerous other objects and advantages will be apparent upon reading the accompanying specification, claims and drawings.

In the drawings:

Figure 1 is an elevational view of a starting device embodying the present invention.

Figure 2 is a plan view of the device shown in Figure 1.

Figure 3 is a cross sectional view of a portion of the structure shown in Figure 2.

In Figure 1 a large internal combustion engine (not shown) is provided with a starting wheel 4 which may also act as a flywheel. Only a portion of wheel 4 is shown as it is quite common to have such wheels on internal combustion engines. Wheel 4 is turned in order to start the engine (not shown).

A suitably small motor 6 is provided to supply power to start the internal combustion engine by turning wheel 4. Motor 6 may be a small gasoline motor, which is often preferable especially where electric power is unavailable, or motor 6 may be an electric motor as shown which operates by power supplied through wires 7 and 8 connected to any suitable power source.

Motor 6 preferably mounted on a base 9 which in turn is mounted on frame 11 which may be positioned carefully relative to wheel 4.

Mounted on frame 11 are two supporting eyes 12 and 13 which may be directly mounted on 11 or if desired mounted on a bed plate 14 which is secured to frame 11.

Rotatively mounted in eyes 12 and 13 are annular sleeves 16 provided with eccentric holes 17 therethrough. Sleeves 16 surround shaft 18 and are preferably guided thereon and spaced

2

therefrom by bearings 19 which are preferably of the anti-friction type.

In order to maintain eccentric sleeves 16 in assembled relationship, end plate 21 is provided secured to 16 by any suitable means such as bolts 22. A similar end plate 23 is provided which has the added function of controlling the position of sleeve 16 by means of connecting arm 24 which extends from the end plate 23 inside of eye 12 to the corresponding inside end plate inside of eye 13.

Mounted on shaft 18 is a V-belt pulley 26 driven by one or more V-belts 27. Wheel 26 may be secured to shaft 18 by any suitable means, such as welding at 28. Also secured to shaft 18 is plate 29 which is provided with a series of holes for the accommodation of bolts 32 having nuts 31 secured thereto. Threaded on bolts 31 are discs of friction pulley material, such as leather discs 33. Disc 29 being secured by suitable means, such as welding 34 to shaft 18, it is obvious that by tightening nuts and bolts 32 and 31 that discs 34 may be drawn into a suitable friction drive wheel. Plate 36 acts as a follower.

In order to rotate eccentric sleeve 16 a linkage is provided comprising a pivot 37 on a support 38 secured to frame 11. Pivoting on pivot 37 is a bell crank having an operating handle 39 and an operating arm 41 rigidly secured thereto. Rigidly connected to eccentric sleeve 16 is cross arm 24 and ears 42 mounted on arm 24. Ears 42 and arm 41 are connected by link 43 and pivots 44 and 46. In addition to or alternative to welding pulley 26 to shaft 18 is a key 47 which may be employed.

Motor 6 is provided with the usual drive shaft 48 to which a drive pulley 49 may be secured by any suitable means such as key 51 and pulleys 49 and 26 are connected together by one or more V-belts 27.

If desired, support 12 may be longitudinally movable on frame 11 by providing slots in either 11 or 12, bolting 12 into the desired position by nuts and bolts 52 and 53. When such is done support 12 may be moved into position by means of bolt 54 threaded in support 38 or secured thereto by nuts 56 and 57.

Operation

When it is desired to start the large internal combustion engine to which wheel 4 is attached as a starting wheel, the operator starts motor 6 if the same is an internal combustion engine and then proceeds as follows, or if motor 6 is an electric motor the starting of the motor is delayed

3

preferably until after wheel 4 has been engaged, however the electric motor may be started first also.

The operator moves lever 39 to the left which pushes down on link 43 and ears 42 rotating eccentric sleeves 16 until friction drive wheel 33 firmly engages wheel 4. The length of V-belts 27 is such that when friction wheel 33 engages wheel 4 the friction belt is stretched to the optimum degree for driving a heavy load. Engine 6 then rotates wheel 4 starting the internal combustion engine (not shown). After the engine is started, lever 39 is moved back into the position shown in Figure 1, which disengages wheel 33 from wheel 4 and motor 6 may then be stopped.

It will be seen that I have produced a starter which is economical, simple and fool proof and which will carry out the objects of the invention and comply with the laws of the State of Oklahoma which require a starter for all engines of ten horse power or more. Starting a large internal combustion engine is quite hazardous unless a suitable starter is employed as disclosed in the present invention.

While I have shown in the drawings, several particular illustrative forms of my invention, various modifications may be made in the same and in the various features of construction, without materially changing the invention therein, and formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

Having described my invention, I claim:

1. Starting mechanism for an internal combustion engine having a starting wheel which comprises, in combination, a frame adapted to be secured in a predetermined location with respect to said starting wheel, a starting motor having its base firmly secured to said frame, a pair of spaced eyes mounted on said frame, a cylindrical member rotatably mounted in each of said eyes, each member having an opening formed therein which is eccentrically disposed with respect to the axis thereof, said openings being adapted to be in horizontal alignment, a pair of end plates secured to each cylindrical member, said plates having passages extending therethrough which are aligned with the eccentrically disposed openings in said cylindrical members, the peripheral portions of each set of plates being engageable with the associated structure of said eyes, a bearing disposed in each of said openings, a shaft mounted in said bearings, a pulley fixed to said shaft, a second pulley driven by said starting motor, a belt interconnecting said pulleys, said belt being loose on said pulleys when said shaft and said cylindrical members are in one position, and said belt being in driving engagement with said pulleys when said shaft and said cylindrical members are in a second position, means for moving said cylindrical members to said second position including an arm secured to both of said cylindrical members, a bell crank lever, and a link interconnecting said arm and said lever, and a friction wheel mounted on said shaft and engageable with said motor starting wheel when said shaft is in its second position whereby, upon operation of said bell crank lever, said belt is tightened and the starting motor is operatively connected to the starting wheel, said friction wheel comprising a clamping plate secured to said shaft, a second clamping plate movably mounted on said shaft, a plurality of annular leather discs mounted on said shaft between said clamping plates, and means for clamping said plates to compress said leather discs into a unitary structure.

4

terconnecting said arm and said lever, and a friction wheel mounted on said shaft and engageable with said motor starting wheel when said shaft is in its second position whereby, upon operation of said bell crank lever, said belt is tightened and the starting motor is operatively connected to the starting wheel.

2. Starting mechanism for an internal combustion engine having a starting wheel which comprises, in combination, a frame adapted to be secured in a predetermined location with respect to said starting wheel, a starting motor having its base firmly secured to said frame, a pair of spaced eyes mounted on said frame, a cylindrical member rotatably mounted in each of said eyes, each member having an opening formed therein which is eccentrically disposed with respect to the axis thereof, said openings being adapted to be in horizontal alignment, a pair of end plates secured to each cylindrical member, said plates having passages extending therethrough which are aligned with the eccentrically disposed openings in said cylindrical members, the peripheral portions of each set of plates being engageable with the associated structure of said eyes, a bearing disposed in each of said openings, a shaft mounted in said bearings, a pulley fixed to said shaft, a second pulley driven by said starting motor, a belt interconnecting said pulleys, said belt being loose on said pulleys when said shaft and said cylindrical members are in one position, and said belt being in driving engagement with said pulleys when said shaft and said cylindrical members are in a second position, means for moving said cylindrical members to said second position including an arm secured to both of said cylindrical members, a bell crank lever, and a link interconnecting said arm and said lever, and a friction wheel mounted on said shaft and engageable with said motor starting wheel when said shaft is in its second position whereby, upon operation of said bell crank lever, said belt is tightened and the starting motor is operatively connected to the starting wheel, said friction wheel comprising a clamping plate secured to said shaft, a second clamping plate movably mounted on said shaft, a plurality of annular leather discs mounted on said shaft between said clamping plates, and means for clamping said plates to compress said leather discs into a unitary structure.

LUCIAN T. HOOVER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
392,818	Merrow	Nov. 13, 1888
1,231,363	Hunt	June 26, 1917
1,304,252	Bijur	May 20, 1919

FOREIGN PATENTS

Number	Country	Date
118,288	Australia	Mar. 14, 1944