To all whom it may concern:

Be it known that I, Vincent Bendix, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Starters for Engines, of which the following is a specification.

My invention relates to a starter for an engine such as a gas engine, and the object thereof is to provide a simple, efficient and reliable device of this character operated by a prime mover of any kind, such for instance as an electric motor.

My starter is of that type exemplified by the devices illustrated in my Patent No. 1,125,085 issued to me on January 28, 1915. This type of starter is provided with a screw shaft or the like operated by the prime mover either directly from the armature shaft or indirectly by gearing therewith and having mounted thereon a driving member in the form of a pinion adapted to engage or mesh with some member of the engine, such as the fly wheel, for rotating its crank shaft or the like.

The particular object of this invention is to improve the means and manner of the attachment or the anchoring of the spring (which forms the resilient driving connection for the screw shaft) to the driving shaft, and to accomplish this result by making therein a portion of the screw shaft adjacent one end of the spring of eccentric form and likewise make eccentric a portion of the spring barrel connected to the driving shaft so that on the first tightening of the spring the ends thereof will be brought into frictional contact with such eccentric portions and thereby relieve the eyes at the end of the spring and the anchoring bolts or studs of much of the strain incident to the winding up of the spring in the actual operation of the mechanism.

In the drawings, Fig. 1 is an elevation of my mechanism embodying the invention showing a portion of a fly wheel of a gas engine with which the pinion of my mechanism or transmission cooperates; Fig. 2 a longitudinal sectional elevation of my mechanism or transmission; Figs. 3 and 4 cross sections on the section line A—A, Fig. 3 looking in the direction of the arrows 3—3, Fig. 4 looking in the direction of the arrows 4—4. Fig. 5 a view similar to Fig. 3 but showing the outermost coil wound against the barrel, and Fig. 6 a top plan view of the right hand end of the device shown in Fig. 1.

In the present instance I have shown merely the transmission portion of the self-starter mechanism, that is I have not shown the prime mover which, it will be understood, is operatively connected to and driven by the prime mover such as an electric motor, either directly or indirectly as shown in my prior patent aforesaid.

Referring to the embodiment of my invention as shown in the drawings, the transmission comprises a driving shaft 1 which is operatively connected to the prime mover 7 such as an electric motor (not shown.) The screw shaft 2 is in the form of a sleeve having external screw threads intermediate its length and mounted upon the driving shaft 1 and adapted to rotate therewith and also to have a rotational movement with respect thereto as hereinafter explained.

A pinion 3 is screw-threaded upon the screw shaft and adapted to mesh with the circular rack portion 4 of the fly wheel 4 of the engine, though it will be understood that the pinion may be arranged to drive any other portion of the engine or parts operated thereby in order to accomplish the same result, that is the starting of the engine.

The yielding driving connection which is provided between the driving shaft 1 and the screw shaft 2 comprises a coiled spring 5 which is anchored at one end to the driving shaft and at the other end to the screw shaft. According to the construction herein shown, the outer end of the spring is not connected directly with the driving shaft but through the medium of a spring barrel 6 which is arranged concentric of the driving shaft and held in place at the outer end thereof by means of the pin or bolt 7 which bolt also forms the means for anchoring the outer end of the spring 5. The other end of the spring is anchored to a stud or bolt 8 screwing into the outer end of the screw shaft. The screw shaft and spring barrel are arranged in alinement but not in contact at their adjacent ends inasmuch as a space 9 is left thereat in order that the screw shaft may have a slight movement longitudinally against the tension of the spring for the purposes described in my patent aforesaid.

The cylindrical portion at the outer end
of the screw shaft is formed eccentric of the axis thereof, the fat portion being at
the upper side in Fig. 1 as shown at 10 adjacent the bolt or stud 8. In like manner
the outer end of the spring barrel is made eccentric, thereby providing a fat portion
11 adjacent the spring end of its anchoring bolt 7. As the central coils of the spring
are free of the barrel and extreme end of
the screw shaft, it follows that the outer-
most coils of the spring will bear firmly
and with considerable friction upon said ec-
centric or fat portions described upon the
first turning or twisting movements tending
to tighten and wrap the spring. This
results in utilizing these outermost coils to
assist in the anchoring or holding of the ends thereof and thereby relieving the eyes
of the springs and the anchoring bolts or
studs of a considerable strain. With re-
spect to the eccentric portion on the screw
shaft, another advantage is obtained in that
an additional thickness of metal is provided
for the screw stud 8 which cannot be inserted
further than the inner wall of the screw
shaft owing to the presence of the driving
shaft therewith. Moreover, by so raising
the coils beyond the body of the barrel, the
danger of a coil dropping into the space
9 during the twisting of the spring is avoided.

While I have for convenience described
my invention in connection with a certain
type of starter or transmission characterized
by a hollow screw shaft and a pinion ini-
tially movable outwardly, it will be under-
stood that the invention, in its broader as-
pect, is not limited thereto but is applicable
to other types of transmission including
those in which the screw shaft is solid as
shown in my Patent No. 1,184,975, issued on
April 12, 1913, and the pinion initially mov-
able inwardly, as shown in my patent there-
said, it being understood that my invention
is applicable to any type employing a coiled
spring as the yielding driving connection.

The starter or transmission as a market-
able product comprises all the parts shown
with the exception of the shaft 1 which goes
with the motor, and of course with the ex-
ception of the fly wheel of the engine. In
such product, therefore, the driving member
may be considered such part of the barrel or
sleeve 6 or equivalent construction provided
with the eccentric as to accomplish the de-
sired result, the spring barrel portion proper
not being essential.

I claim:

1. An engine starter comprising a driv-
ing member, a rotatable member driven
thereby, a driving device mounted to travel
longitudinally on said rotatable member
and adapted to engage a part of the engine to
be started, and a yielding driving connection
between said two members comprising a
spring having its ends anchored to said
members respectively, and means for sup-
porting the outermost coils of the spring,
the other coils being unsupported.

2. An engine starter comprising a driv-
ing member, a rotatable member driven
thereby, a driving device mounted to travel
longitudinally on said rotatable member and
adapted to engage a part of the engine to be
started, and a yielding driving connection
between said two members comprising a
spring having its ends anchored to said
members respectively, one of said members
having a portion eccentric to its axis of ro-
tation with its fat side adjacent the point of
anchorage of the spring.

3. An engine starter comprising a driving
member, a rotatable member driven thereby,
a driving device mounted to travel longitudi-

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vice screw threaded upon the screw shaft, and a yielding driving connection between the two shafts, consisting of a coiled spring arranged around the barrel and having its ends anchored to the sleeve and to the screw shaft respectively, said screw shaft and sleeve having eccentric portions whose fat sides are at the points of anchorage of the spring.

8. An engine starter comprising a sleeve extended to form a barrel, a screw threaded shaft driven thereby, a driving device screw threaded upon the screw shaft, and a yielding driving connection between the two shafts, consisting of a coiled spring arranged around the barrel, and bolts on the sleeve and screw shaft, to which bolts the ends of the spring are anchored, said screw shaft and barrel having eccentric portions whose fat sides are at the points of anchorage of the spring.

9. An engine starter comprising a driving shaft, a screw threaded shaft mounted thereon, a driving device mounted to travel longitudinally on said screw shaft, a driving member driven by said driving shaft, and a yielding driving connection between said screw shaft and driving member comprises a coiled spring anchored at its ends to said screw shaft and driving member respectively which are provided with eccentric portions whose fat sides are at the points of anchorage of the spring.

VINCENT BENDIX.

Witnesses:
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