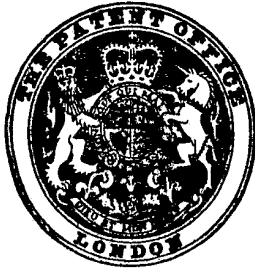


PATENT SPECIFICATION

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International Classification:—B62d, F02f, F06b, d.

COMPLETE SPECIFICATION

Improvements in or relating to Internal Combustion Engines

We, THE BIRMINGHAM SMALL ARMS COMPANY LIMITED, of Armoury Road, Small Heath, Birmingham, 11, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to internal combustion engines and also to vehicles or machines when provided with such engines.

The combined engine and transmission unit with which this invention is concerned is primarily intended for use with a two-wheeled vehicle of the motor cycle type and particularly motor scooters or motorised pedal cycles.

According to this invention the engine and transmission unit is of U-form with a single cylinder extending along one limb of the U and a change-speed gearbox along the other limb of the U, said engine and gearbox being connected by a crankshaft through the intermediary of a clutch which, with the crankshaft, extends across the bridge joining the two limbs of the U, an electric generator being mounted for rotation with the crankshaft.

Preferably the clutch is located adjacent to the gearbox, and the generator close to it but on the side remote from the gearbox.

According to a further feature of the invention the engine unit straddles the rear wheel of a vehicle of the motor cycle type.

The rear wheel is preferably mounted between and is supported by rearward extensions of the said limbs.

The air intake for the engine carburettor is preferably disposed at the junction of the limb along which the engine extends and the said bridge joining the two limbs of the U, so that the air intake is in a position to receive air as the vehicle moves forwardly.

In order that the invention may be fully understood and more readily carried into practice, we have caused to be appended hereto drawings illustrating a constructional

example thereof, wherein—

Figure 1 is a fragmentary plan view of an internal combustion engine unit in accordance with the invention,

Figure 2 is a fragmentary side elevation, illustrating the engine unit shown in Figure 1 in operative position on a vehicle, and

Figure 3 is a view similar to Figure 2 but from the reverse side.

Figure 1 is drawn to a larger scale than that of Figures 2 and 3.

Referring to the drawings, in the construction shown therein as applied by way of example to an internal combustion engine unit for a light weight motor cycle or motor scooter, an internal combustion engine 1, with its carburettor 2, electric generator 3, clutch 4 and change-speed gearbox 5 is arranged in U-form around the wheel of the lightweight motor cycle or scooter (generally indicated by the reference numeral 6), the engine 1 forming one limb, and the gearbox 5 forming the other limb, of the U.

The rear wheel 7 of the vehicle is carried within the U, parallel to the limbs of the U, the wheel spindle 8 being mounted in members 9, 10 forming extensions of the gearbox 5 and engine 1 respectively. The complete unit of engine 1, clutch 4, generator 3, gearbox 5 and wheel 7 is conveniently pivoted to the frame 11 of the cycle 6 at 12, and is resiliently connected to the frame 11 at 13 and 14 through springs 15, 16 respectively.

The engine 1 of the crankcase compression, two-stroke cycle, overhung crank type, is disposed with its single cylinder 17 extending along one limb of the U, the carburettor 2 being housed in a cavity 18 formed on the outside of the crankcase 19, fuel-air mixture being supplied to the crankcase 19 from the carburettor 2. An air inlet 20 (see Figure 2) to the carburettor cavity 18 is provided, such air inlet being provided with a filter (not shown). The air inlet 20 is disposed as shown in a position in which it can receive air from

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the air flow occurring when the cycle 6 moves forwardly.

The crankshaft 21 of the engine 1 extends across the bridge of the U, and carries an electric generator 3 keyed to the crankshaft 21 to provide electric current for ignition and lighting purposes. The driving member 22 of the clutch 4 is secured at the extreme end of the crankshaft 21 to the electric generator, by means of clutch projections 23 engaging generator recesses 24. The driven part of the clutch 4 is secured to a mainshaft 25 of the gearbox 5, which carries the clutch operating rod 34.

The driving member 22 has slots 26 and an intermediate clutch ring 27 which is castellated and disposed between two discs 28, 29 respectively of the driven clutch part, the castellations of the ring 27 registering with and engaging the slots 26 in the driving member 22. The discs 28, 29 have frictional material inserts 30, 31 respectively and are connected for rotation together by studs 32 mounted on the disc 28 and having compression springs 33 bearing on the disc 29.

The clutch 4 is operated to move the disc 29 axially away from the disc 28 against the pressure of the springs 33 and thereby free the ring 27 from the discs 28, 29 by axial movement of the clutch operating rod 34 which engages the disc 29 at 35 and causes it to move in the manner described.

Parallel to the cylinder 17 of the engine 1 and forming the second limb of the U is the gearbox 5, having its input or main shaft 25, intermediate shaft 36, and output shaft 37 parallel to each other and to the bridge of the U. The intermediate shaft 36 projects outside the gearbox at 38 (see Figure 1) and is splined for engagement of a kick starter and/or hand starter lever 39 (see Figure 3). The output shaft 37 of the gearbox 5 carries and drives a sprocket 40, exterior to the gearbox 5, but on the inner side of the U-form. The sprocket 40 drives a sprocket 41 secured to the rear wheel 7 through a chain (not shown).

Wheel spindle mounting members are formed as extensions 10, 9 of, and are secured to, the engine 1 and gearbox 5 respectively, and are formed with slots 43, 42 respectively, to allow of adjustment of position of the wheel spindle. Chain tensioners 45, 44 are secured to the members 10, 9 respectively. The mem-

ber 9 is shaped so as to provide a chain guard. The rear wheel 7 of the cycle 6 is thus carried between the arms of the U-formation.

Such an arrangement as herein described affords a convenient compact balanced assembly of engine, transmission and attendant parts, particularly suitable for a lightweight motor cycle or motor scooter.

WHAT WE CLAIM IS:—

1. An internal combustion engine and transmission unit wherein the unit is of U-form with a single cylinder extending along one limb of the U and a change-speed gearbox along the other limb of the U, said engine and gearbox being connected by a crankshaft through the intermediary of a clutch which, with the crankshaft, extends across the bridge joining the two limbs of the U, an electric generator being mounted for rotation with the crankshaft.

2. A unit according to claim 1, wherein the clutch is located adjacent the gearbox, and the generator is located adjacent the clutch on that side which is remote from the gearbox, the generator being connected to the driving member of the clutch.

3. A unit according to either of claims 1 and 2 and adapted to straddle the rear or driving wheel of a vehicle of the motor cycle type.

4. A unit according to claims 1 and 3 wherein the rear or driving wheel is mounted between and is supported by rearward extensions of the limbs.

5. A unit according to any of the preceding claims, wherein the air intake for the engine carburettor is disposed at the junction of the limb of the U along which the engine extends and the bridge joining the two limbs of the U, whereby in the case of a unit according to claims 3 or 4 the air intake is in a position to receive and direct air to the engine as the vehicle moves forwardly.

6. An internal combustion engine unit having its parts constructed, arranged and combined to operate substantially as hereinbefore described and illustrated in the accompanying drawings.

7. A light-weight motor cycle or motor scooter having an internal combustion engine unit according to any of the preceding claims.

N. H. BUCKLEY,
Chartered Patent Agent,
Agent for Applicants.

PROVISIONAL SPECIFICATION

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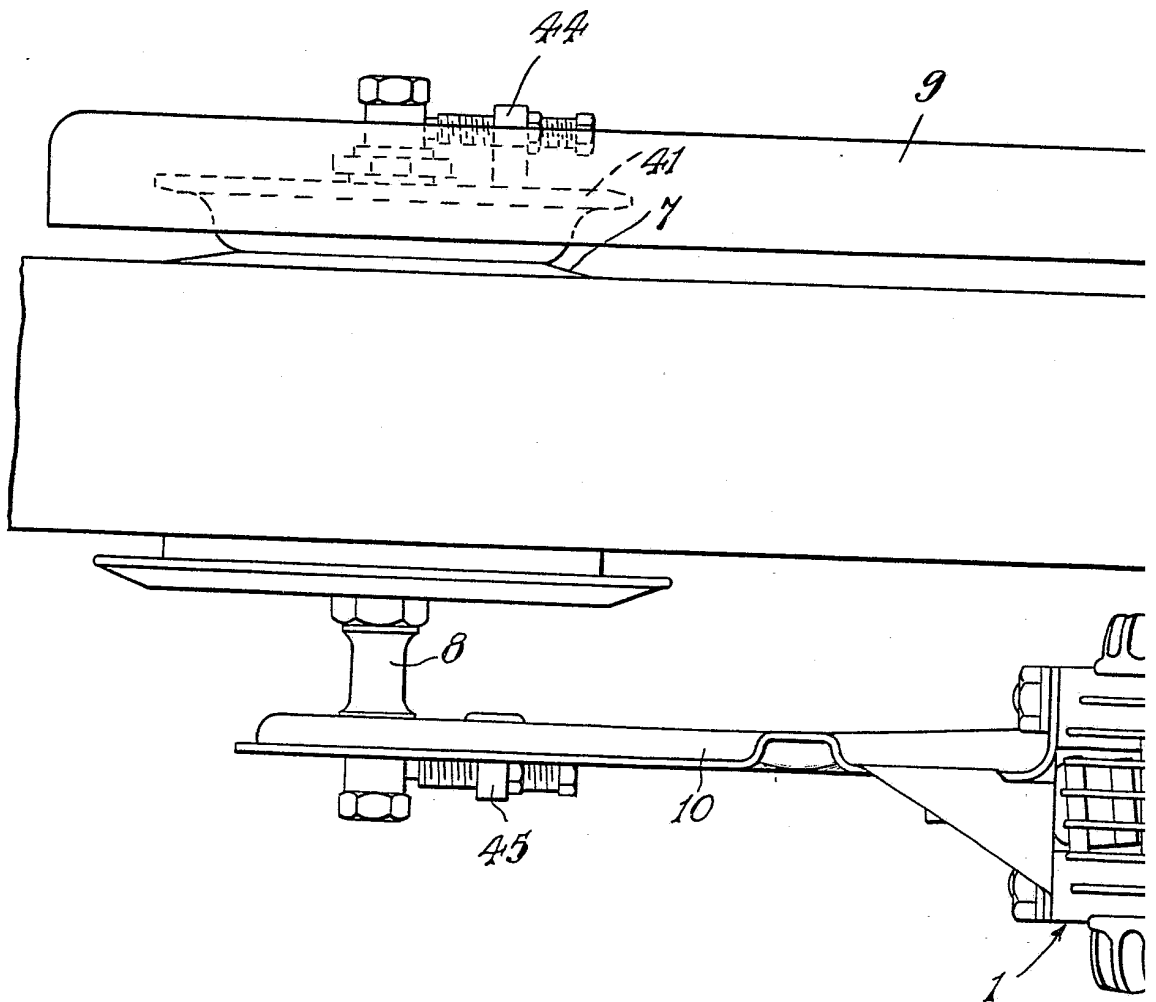
The engine unit with which this invention is concerned is primarily intended for use with a two-wheeled vehicle of the motor cycle type and particularly motor scooters or motorized pedal cycles.

According to a main feature of this inven-

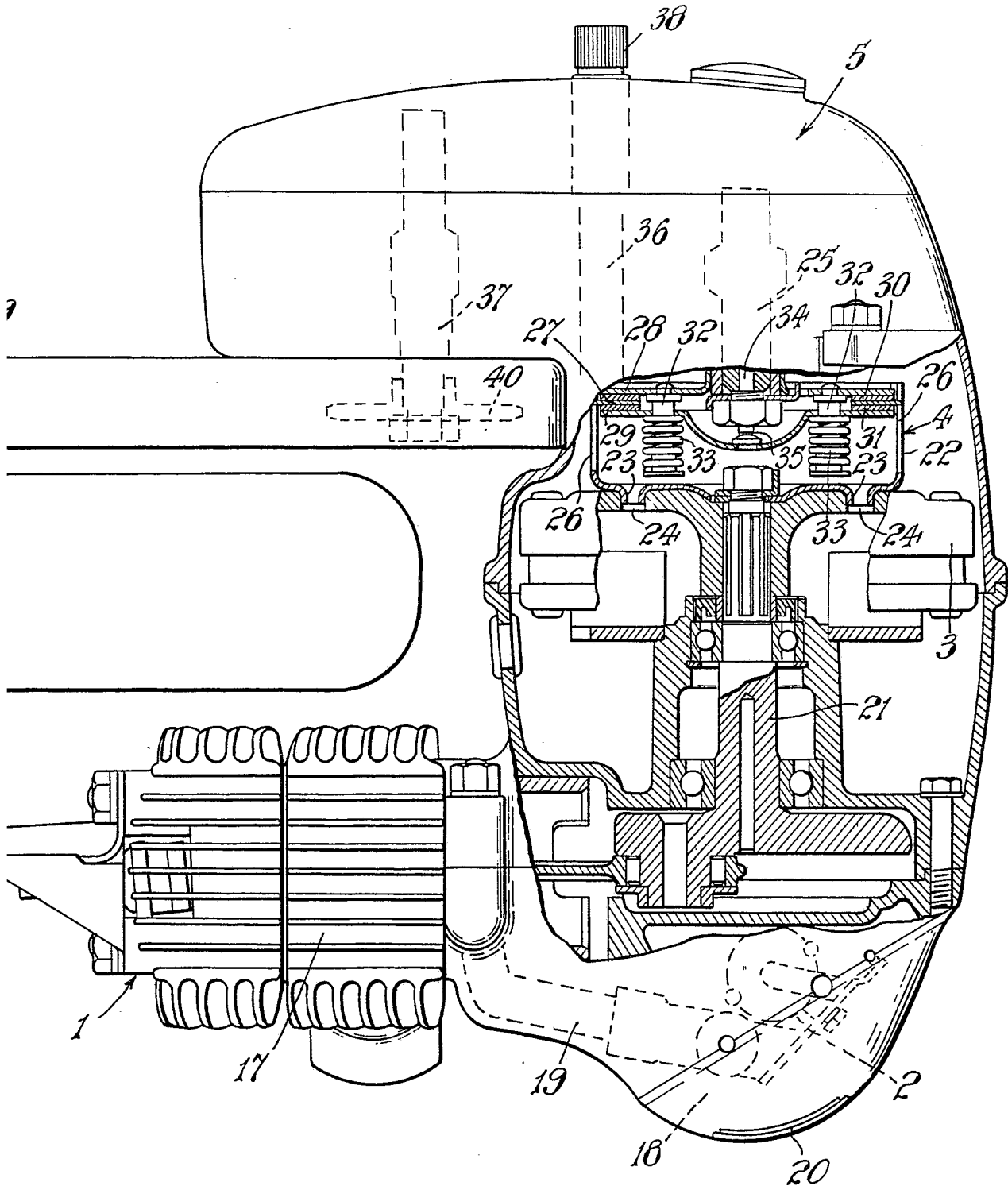
- tion the engine unit is of U-form, the cylinder extending along one limb, the gearbox along the other limb, and the crankshaft with clutch and electric generator extending across the bridge joining the two limbs of the U.
- 5 Preferably the clutch is located adjacent to the gearbox, and the generator close to it but on the side remote from the gearbox.
- 10 According to a further feature of the invention the engine unit straddles the rear wheel of a vehicle of the motor cycle type.
- One preferred construction of the invention will now be described by way of illustration.
- 15 An internal combustion engine, with its carburetter, electric generator, clutch and gearbox is arranged in U-form around the wheel of a lightweight motor cycle or scooter, the engine forming one limb, the gearbox forming the other limb, of the U.
- 20 The rear wheel of the vehicle is carried within the U, parallel to the limbs of the U, the wheel spindle being mounted in members forming extensions of the gearbox and engine. The complete unit of engine, clutch, generator, gearbox and wheel is conveniently pivoted to the frame of the vehicle at one point, and is resiliently connected to the frame at a further point or points.
- 25 The engine of the crankcase compression, two stroke cycle, overhung crank type, is disposed with its cylinder extending along one limb of a U, the carburetter being housed in a cavity formed on the outside of the crankcase, fuel-air mixture being supplied to the crankcase from the carburetter. An air inlet to the carburetter cavity is provided, such air inlet being provided with a filter.
- 30 The crankshaft of the engine extends across the bridge of the U, and carries an electric generator keyed to the crankshaft to provide electric current for ignition and lighting purposes. The outer member of a clutch is secured at the extreme end of the crankshaft to the electric generator, by means of clutch projection engaging generator recesses. The
- inner member of the clutch is secured to the mainshaft of a gearbox, which carries the clutch operating rod.
- 50 A castellated edged clutch plate with frictional material inserts, is disposed between two parts of the inner clutch member, its castellations registering into slots in the outer clutch member. The clutch plate is held rigidly between two parts of the inner member by a number of clutch springs.
- 55 The clutch is operated to free the inner member from the outer by arranging for the clutch operating rod to free the spring loaded inner clutch member part by an axial movement of the clutch operating rod.
- 60 Parallel to the cylinder of the engine and forming the second limb of the U is a gearbox, having its input shaft and output shafts parallel to each other and to the bridge of the U.
- 65 A further parallel shaft is arranged to project outside the gearbox, such shaft projection being splined to locate a kick starter and/or hand starter lever.
- 70 The output shaft of the gearbox carries and drives a sprocket, exterior to the gearbox, but on the inner side of the U-form. The sprocket drives a chain driving the rear wheel of the motor-cycle.
- 75 Wheel spindle mounting members are formed as extensions of, and are secured to, the engine and gearbox, and are formed with slots to allow of adjustment of position of the wheel spindle. The road wheel of the vehicle is thus carried between the arms of the U-formation.
- 80 Such an arrangement as herein described affords a convenient compact balanced assembly of engine, transmission and attendant parts, such that it is particularly suitable for a lightweight motor cycle or scooter.
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NORMAN H. BUCKLEY,
Agent for the Applicants.

Fig. 1.



811783 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of
the Original on a reduced scale
Sheet 1



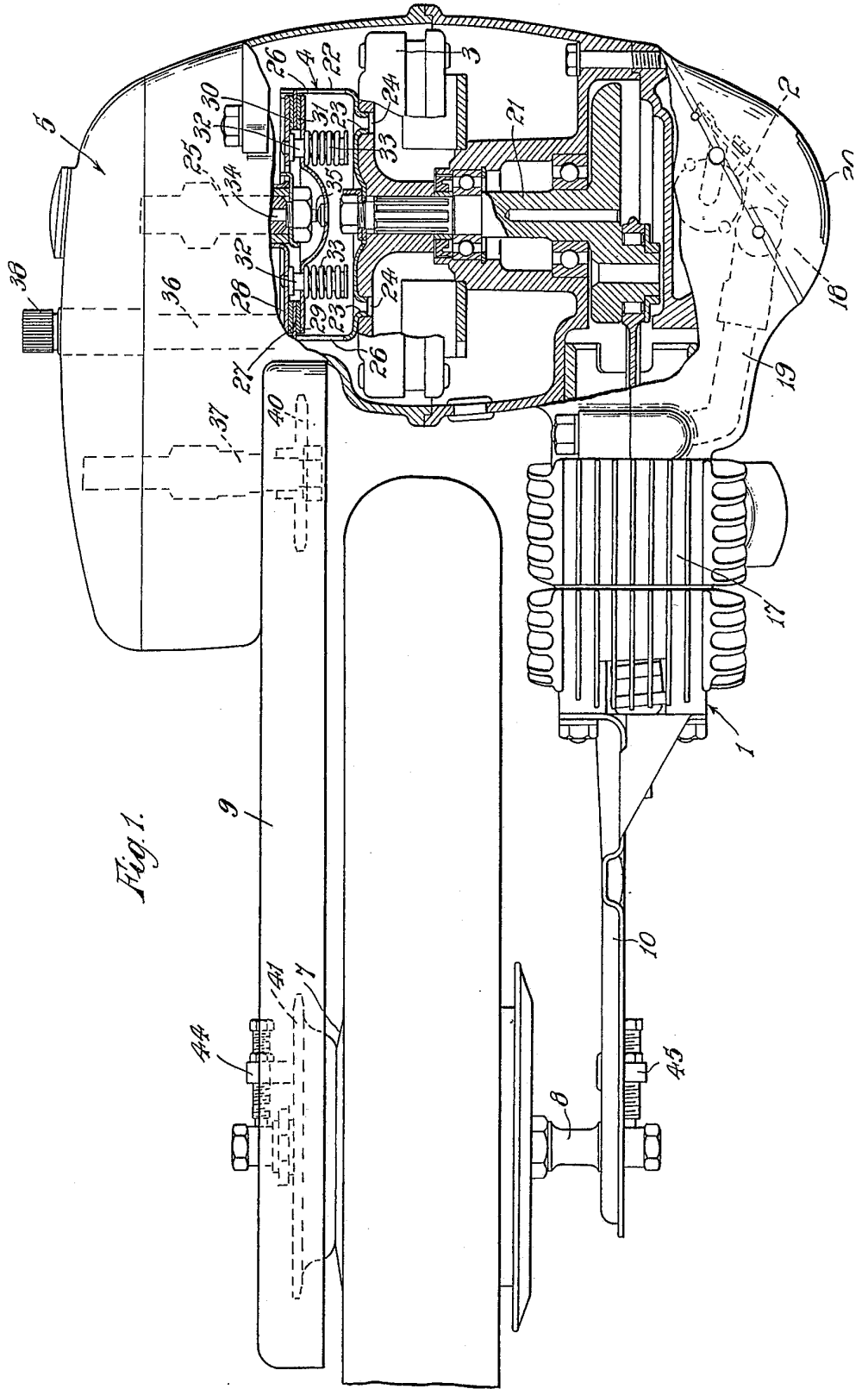


Fig. 1.

