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(54) **Explosion motor fueled with gasoline mixture particularly for application in powered tools the operational weight of which is borne by the user**

(57) The motor is the type fueled with gasoline mixture and synthetic oil for application in powered tools whose weight when operating is borne by the user whereby the sparking plug (1b) is the type with incandescent filament, the powering current of the plug (1b)

is delivered only in the motor starting phase, and the compression ratio is such as to ensure that the temperature of the sparking plug filament (1b) at the end of an explosion reaches a value so high as to preserve the incandescence of the filament until the next explosion.

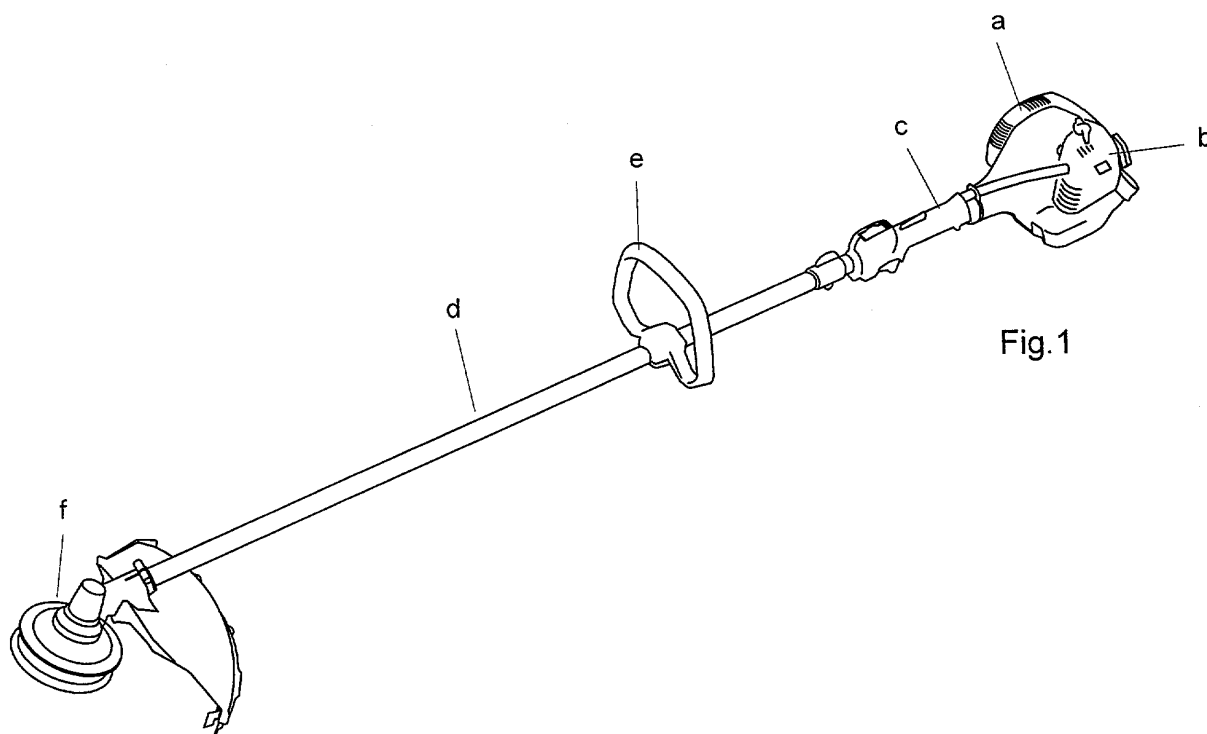


Fig.1

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Description

[0001] The subject of the present invention is an explosion motor with improved characteristics as regards cost, weight, dimensions, reduction and simplification of components with particularly useful application in powered tools the weight of which when operating is born by the user.

BACKGROUND

[0002] Tools are known equipped with endothermic motor of sparking plug ignition type fueled with gasoline and synthetic oil mixture whose weight when operating is born by the user, such as gardening tools, bush cutters, blowers, atomizers, hedge trimmers, power saws et cetera. Such tools display as desirable characteristics good ease of handling, reduced weight and dimensions and low purchase or maintenance costs. A brief description of one of such tools is given below with reference to FIGS 1 and 2.

[0003] Airplane modelling motors are also known equipped with a sparking plug with incandescent filament running only with mixtures containing methyl alcohol (and synthetic or castor oil) in which the plug filament for the entire duration of operation of the motor or during the starting phase is kept incandescent by feeding with battery-delivered direct current.

OBJECTS OF THE INVENTION

[0004] The general purpose of the present invention is realization of an explosion motor for application in powered tools whose weight when operating is born by the user and having improved characteristics as regards weight, dimensions, reduction and simplification of components, reduction of purchase, operating and maintenance cost.

SUMMARY OF THE INVENTION

[0005] The explosion motor in accordance with the present invention is the type fueled with gasoline and synthetic oil mixture particularly useful in applications in powered tools whose weight when operating is born by the user and is characterized in that:

- the sparking plug is the type with incandescent filament,
- the powering current of the plug is delivered only in the motor starting phase, and
- the compression ratio is such as to ensure that the temperature of the sparking plug filament at the end of an explosion reaches a value so high as to preserve the incandescence of the filament until the next explosion.

DRAWINGS

[0006] The characteristics and advantages of the present invention are clarified by the following description made with reference to the annexed drawings illustrating an example of a trimmer with a conventional motor. In particular the FIGS in the drawings show:

FIG. 1: an overall perspective view of a conventional trimmer, and

FIG 2, an exploded view of some components of the same trimmer.

DESCRIPTION OF THE INVENTION

[0007] FIG 1 shows an overall perspective view of a conventional trimmer. In its essential parts it consists of:

- a case "a" for housing a 2-stroke motor and its component parts such as the flywheel, ignition coil et cetera,
- a tank "b" for the mixture,
- a control grip "c",
- a tubular rod "d" for housing the transmission shaft,
- a supporting knob "e",
- a grass cutting disk "f".

[0008] FIG 2 shows an exploded view of the motor housed in the case "a" and some of its component parts. In particular it shows the following parts:

1. cylinder with cooling fins 1 a, sparking plug 1 b and internal cylindrical chamber 1c;
2. piston;
3. connecting rod, crank, and drive shaft;
4. flywheel fitted at the drive shaft outlet composed of a fan 4a, cylindrical segments 4b hinged at one end to pins of the fan and capable with the motor running of creating a clutch coupling with a cylindrical cup 4c in which they are fitted and which is keyed to the propeller shaft 4d which transmits motion to the grass cutting disk;
5. box located near the flywheel 4 for housing the sparking plug ignition coil 1b; and
6. mechanical device for manual starting with starting performed by a pull of the starting rope 6a.

[0009] The structure of the flywheel 4 is rather costly and complicated because it is made of die-cast aluminum and the fan 4a also includes permanent magnets designed to create a rotating magnetic field for excitation of an induced winding (not shown in FIG 2) of the current generator which feeds the ignition coil.

[0010] The innovative solution which the present invention represents compared with the conventional explosion motor illustrated above is discussed below.

[0011] The solution idea underlying the present invention consists of effecting ignition of the motor with an

incandescent filament sparking plug of the type used in airplane modeling motors, for example a sparking plug of the O.S. brand type F with anomalous feeding procedure compared to the conventional procedure of powering motors with incandescent filament sparking plug to obtain considerable advantages.

[0012] Indeed, for correct operation of said motors with incandescent filament sparking plugs, mixtures not with gasoline but with methyl alcohol are normally used.

[0013] But the innovation of the present invention calls for feeding the motor with a mixture of gasoline and feeding of the ignition plug filament limited to the starting phase of the motor because said filament is kept permanently incandescent after the starting phase of the motor by an appropriate choice of the compression ratio.

[0014] The appropriate choice of the compression ratio in order to obtain permanent incandescence of the sparking plug filament is secured by progressively increasing said ratio compared with the conventional values until the temperature of the filament at the end of an explosion reaches a value high enough to preserve the incandescence until the next explosion.

[0015] Taking as an example a known 2-stroke trimmer-motor having a piston displacement of 30.5 cm³ and a compression ration of 7.5 it is observed that if the relative conventional sparking plug is replaced by a plug with incandescent filament such as the trademark O.S. type F, it is sufficient to increase the compression ration to 12.3 while creating for example a swell on the piston head to ensure permanent incandescence of the sparking plug filament even without powering it.

[0016] An explosion motor in accordance with the innovative solution described above brings considerable advantages. Indeed:

- use of the sparking plug with incandescent filament allows elimination of the ignition coil and realization of a less complicated and lighter flywheel without permanent magnets and realizable of less costly materials than cast aluminum because it must fulfill only cooling functions and the flywheel effect;
- from tests performed on a known trimmer motor modified in accordance with the present invention there was surprisingly observed for equal performance the possibility of reducing fuel consumption by more than 30% with the advantage both of lower operating cost and less atmospheric pollution;
- elimination of the permanent magnets in the flywheel results in a smaller manual effort for pulling the starting rope not only because of the smaller mass of the flywheel but also because the rotating inductor magnetic field and the induced magnetic field and resistance to rotation of the latter exerted on the former are eliminated. In addition, the reduced mass of the flywheel and the absence of said resistance allows less motor power for equal rpm. Elimination of magnetic fields also avoids the danger of any interference or disturbances caused by

them on nearby electronic equipment;

- elimination of the ignition coil and the possibility of realizing a less complex and costly flywheel translates not only into reduction of motor production and maintenance costs but also less weight and smaller dimensions thereof with resulting greater handiness, maneuverability and comfort in the use of the tool on which the motor is installed; in addition, simplification of the ignition system allows starting and operation of the motor in accordance with one or the other of the two possible rotation directions of the drive shaft;
- powering the sparking plug limited to the motor starting phase allows use of the powering batteries which, while ensuring long life, are smaller in size and weight such as for example two penlight batteries already in trade of 1.5 V type AA.

[0017] The means adoptable for obtaining feeding of the sparking plug limited to the starting phase can consist merely of a switch fitted in the feeding circuit of the sparking plug and positionable in closed condition by a control button located on the grip of the powered tool, a button which the user must keep pressed during the entire starting phase.

[0018] Shutting down the motor can also be obtained merely by means of a control on the grip designed to shut off delivery of fuel to the motor.

[0019] As mentioned above, the batteries usable for powering the sparking plug can be penlight batteries already in trade either of the throwaway or the rechargeable type. Considering this latter possibility, an embodiment version of the powered tool can include a recharging apparatus for the batteries so as to simplify the recharging operations for the user.

[0020] Naturally numerous modifications, adaptations, variants and replacements of members by others functionally equivalent can be made to the above mentioned embodiments without abandoning the scope of the following claims.

[0021] Thus, for example, powering of the sparking plug limited to the motor starting phase could be obtained by means of a switch controlled not by a button but by a timer operating automatically when pulling the starting rope.

[0022] It is also observed that the usefulness of the present invention was underscored above by taking as a reference a conventional trimmer but that obviously its possibilities of useful application are not limited to this type of powered tool but may be extended to other types of tool or to other types of powered means such as for example motorcycles.

Claims

1. Explosion motor fueled with gasoline and synthetic oil mixture particularly useful in applications in pow-

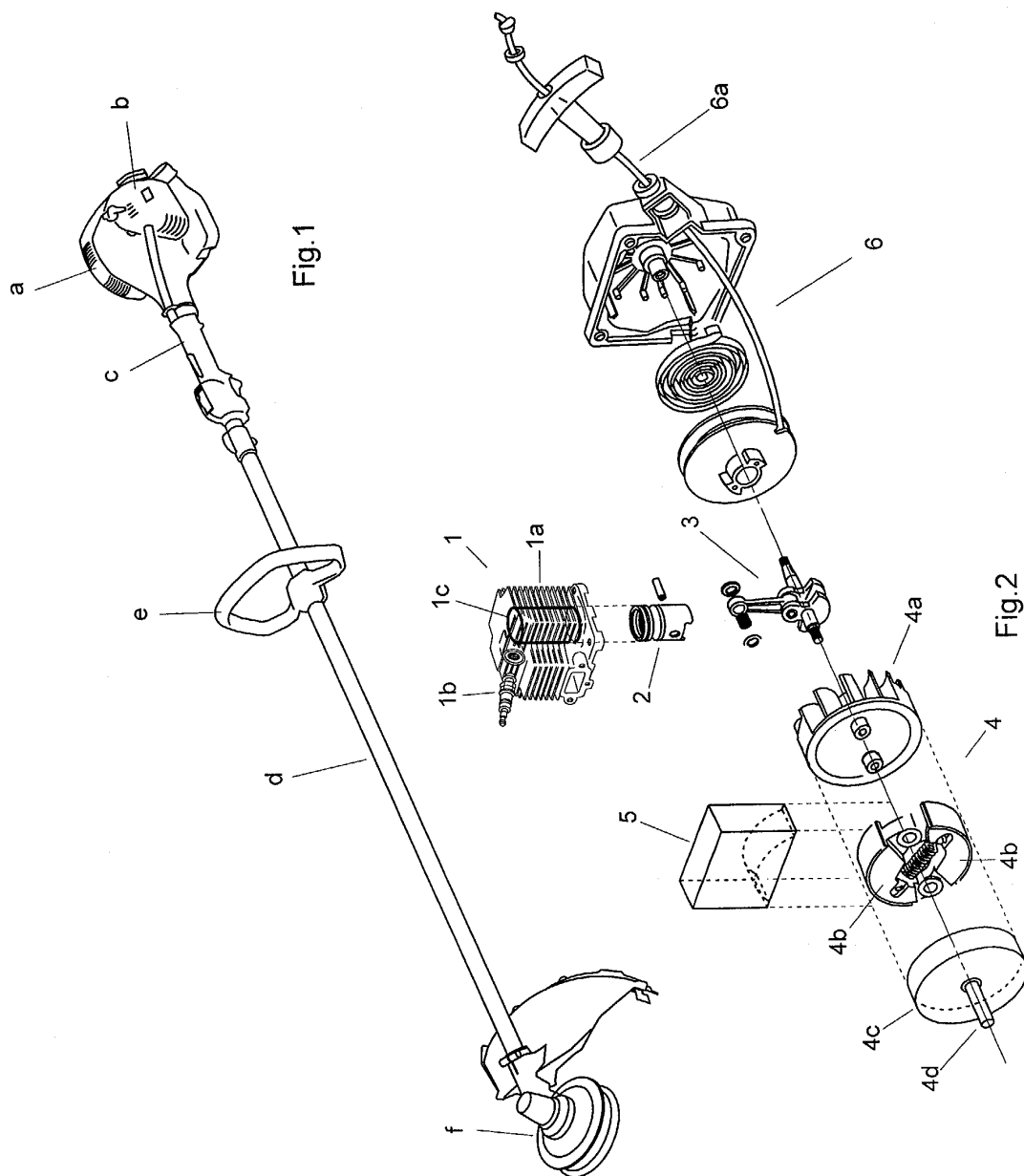
ered tools whose weight when operating is born by the user, **characterized in that:**

- the sparking plug is the type with incandescent filament, 5
 - the powering current of the plug is delivered only in the motor starting phase, and
 - the compression ratio is such as to ensure that the temperature of the sparking plug filament at the end of an explosion reaches a value so high as to preserve the incandescence of the filament until the next explosion. 10
2. Explosion motor in accordance with claim 1 **characterized in that** the means used for obtaining powering of the sparking plug limited to the motor starting phase consist of a switch fitted in the power circuit of the sparking plug and positionable in closed condition by use of a control button which the user must keep pressed during the entire motor starting phase. 15 20
3. Explosion motor in accordance with claim 1 **characterized in that** the incandescent filament sparking plug is a sparking plug of the O.S. brand type F. 25
4. Explosion motor in accordance with claim 1 **characterized in that** extinguishing the motor is obtained by use of a manual control designed to interrupt delivery of fuel to the motor. 30
5. Explosion motor in accordance with claim 1 **characterized in that** the current powering the sparking plug is delivered by penlight batteries of the throw-away or rechargeable type. 35
6. NormaleExplosion motor in accordance with claim 5 **characterized in that** it includes an apparatus for recharging the batteries. 40

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Application Number
EP 03 42 5489

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EUROPEAN SEARCH REPORT

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