

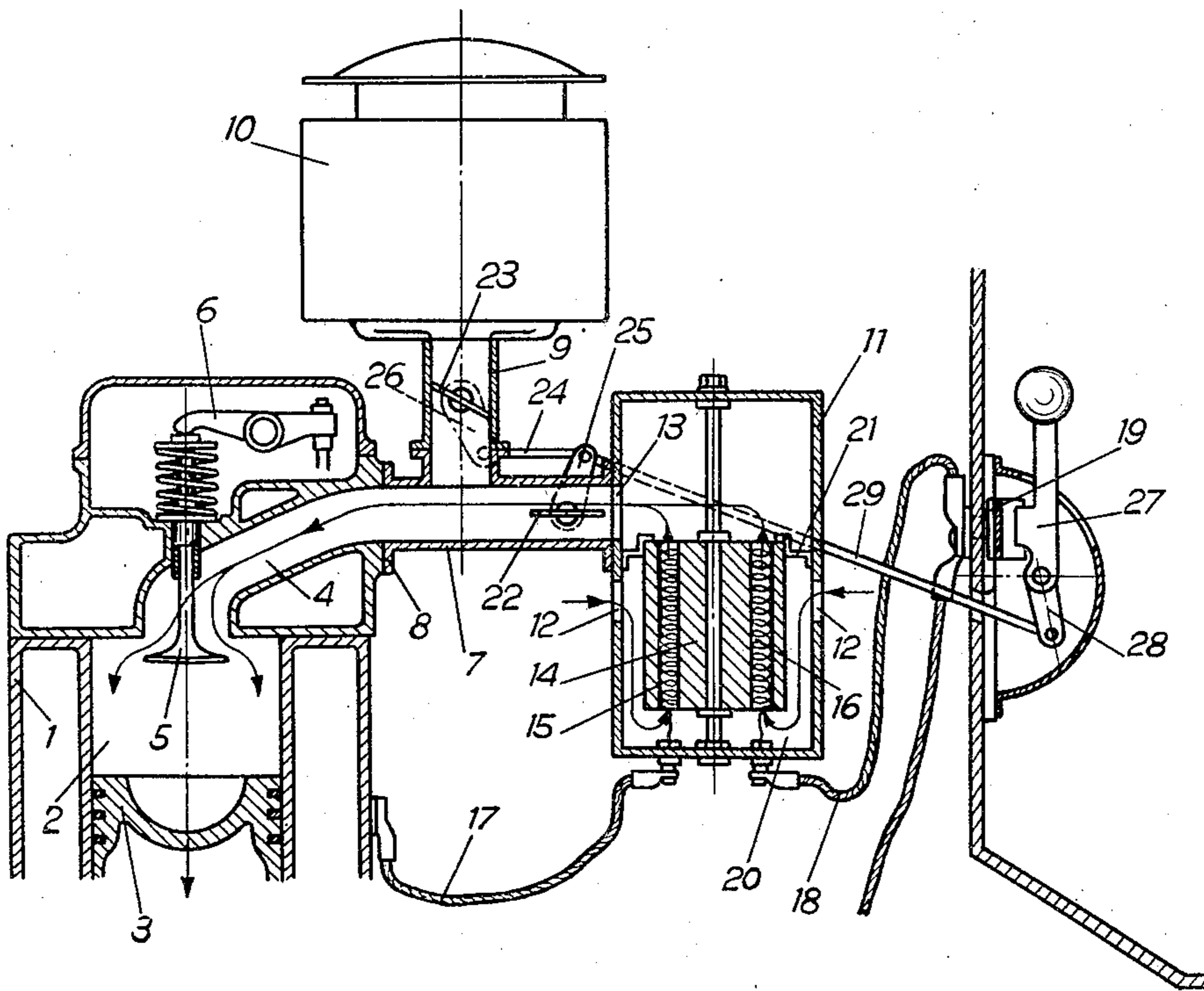
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HEATING DEVICE FOR ENGINES

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HEATING DEVICE FOR ENGINES

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2 Claims. (Cl. 123—142.5)

1

This invention relates to the starting of internal combustion engines and has for its object means for facilitating said starting at low surrounding temperatures by heating the air which is utilized for combustion in the engine.

The invention comprises in the first place a method by means of which the air which is introduced directly into the cylinder for the combustion of the injected fuel or the air which is employed to form the combustible mixture which is to burn in the cylinder is heated to a high temperature.

In both cases the air is caused to pass through an accumulation heater which is heated previously to a sufficiently high temperature to effect the required heating of the air.

The invention also comprises a device for carrying out such a method for facilitating the starting of an internal combustion engine at low temperature.

The accompanying drawing shows diagrammatically, by way of example, a form of embodiment of a device according to the invention in its application to a Diesel engine, the various parts being shown in section.

In the figure, 1 is the engine, which may be of any desired construction, and of which a cylinder is shown at 2 and a piston at 3, while 4 is the suction duct which leads to the cylinder 2 and is controlled by a valve 5 operated by means of a rocker 6 in the usual manner.

The device, according to the invention, for facilitating the starting of the engine is applied to this engine by means of a sleeve 7 which is connected at one end by a flange 8 to the mouth of the suction duct 4 and comprises a branch 9 to which an air filter of known design, indicated at 10, is joined.

The flange 8' at the other end of the sleeve 7 is secured to the wall of a receptacle providing an opening 13 for the communication with said sleeve and one or more apertures 12 for its communication with the atmosphere.

The receptacle 11 contains a heating body constituted by a block 14 of refractory material provided with passages 15 in each of which a wire 16 of high electric resistance is located. In the example shown these resistances, which are connected in series with each other, are connected to earth through a conductor 17 and through a conductor 18 to a source of electric current (not shown), through the intermediate of a switch 19.

In the example shown the receptacle 11 is in the form of a cylinder with vertical axis and the block 14 located therein is also of cylindrical form and

2

has a smaller diameter so that there exists between the outer surfaces of the said element and the wall of the receptacle an annular space 20 communicating with the atmosphere through the aperture or apertures 12.

The receptacle 11 could be of any other form and the heating block 14 could also be of different form and could be arranged in a different manner inside the receptacle 11. In any case, the space 20 existing between the heating block 14 and the wall of the receptacle 11 and communicating with the atmosphere through the apertures 12 is limited at the top by a partition 21 which separates it from the interior of the receptacle into which the opening 13 communicating with the sleeve 7 opens.

Consequently, the air passing through the apertures 12 into the interior of the receptacle 11, in order to reach the sleeve 7, is forced to pass through the annular space (between the inner block 14 and the wall of the receptacle 11) and through the passages 15.

The receptacle 11, together with the inner block of refractory material in which electric resistances are arranged, constitutes one example only of the heating element which can be employed. In general, any other type of apparatus suitable for heating air and utilizing the heating produced by electrical or any other means, by the aid of a refractory block having a substantial surface of contact with the air and adapted to be heated to a sufficiently high temperature, may be employed.

In order to start the engine, the internal body of the heating apparatus is first heated, this being effected in the embodiment described by closing the circuit of the resistances 16 by means of the switch 19. When the block 14 has reached a sufficiently high temperature, the engine crankshaft is rotated by any suitable means.

The air which is thus drawn in by the suction of the engine is forced to pass through the receptacle 11 and becomes heated in contact with the block 14 and through the passages 15 of said block, and thus passes into the cylinders of the engine at a sufficiently high temperature to establish normal conditions for the ignition of the liquid fuel employed.

The sleeve 7 and the branch 9 leading to the filter 10 preferably comprise butterfly valves 22 and 23 so that the filter 10 may be excluded from the operation when the starting device is in action, and conversely the starting device can be excluded from the operation when the engine is functioning normally.

3

The two butterfly valves 22 and 23 are connected together by means of a connecting rod 24 and by cranks 25 and 26, the angular positions of which are such that when one of the valves is opened the other is closed.

The switch 19 controlling the feed of the electric current to the resistances 16 of the heating element 14 is preferably connected to the system comprising the two valves 22 and 23, so that when the circuit is closed, that is to say when the starting arrangement is in operation, the valve 23 controlling the communication with the filter is closed, as is shown in the figure.

For this purpose, the switch 19 is a lever switch, the lever 27 of which has an extension 28 connected by a rod 29 to the crank 25 of the valve 22.

In this way, when the lever 27 of the switch is moved in one direction, the two butterfly valves 22 and 23 are correspondingly displaced.

What I claim is:

1. A device for facilitating the starting of internal combustion engines at low temperatures comprising a receptacle, a refractory body in said receptacle leaving a free space, said body providing passages, electrical heating resistances in said passages, a source of electric current, a switch controlling the communication between heating resistances and source of electric current, means providing the communication of the receptacle with the atmosphere, a sleeve connecting said receptacle with the suction duct of the engine, an air filter branched on said sleeve, valves for controlling communication between the receptacle on one side and suction duct or filter on other side, and means connecting said valves in such a manner that one is closed when the other is open.

4

2. A device for facilitating the starting of internal combustion engines at low temperatures comprising a receptacle, a refractory body in said receptacle leaving a free space, said body providing passages, electrical heating resistances in said passages, a source of electric current, a switch controlling the communication between heating resistances and source of electric current, means providing the communication of the receptacle with the atmosphere, a sleeve connecting said receptacle with the suction duct of the engine, an air filter branched on said sleeve, valves for controlling communication between the receptacle on one side and suction duct or filter on other side, and means connecting said valves in such a manner that one is closed when the other is open and means connecting said valves with said switch.

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