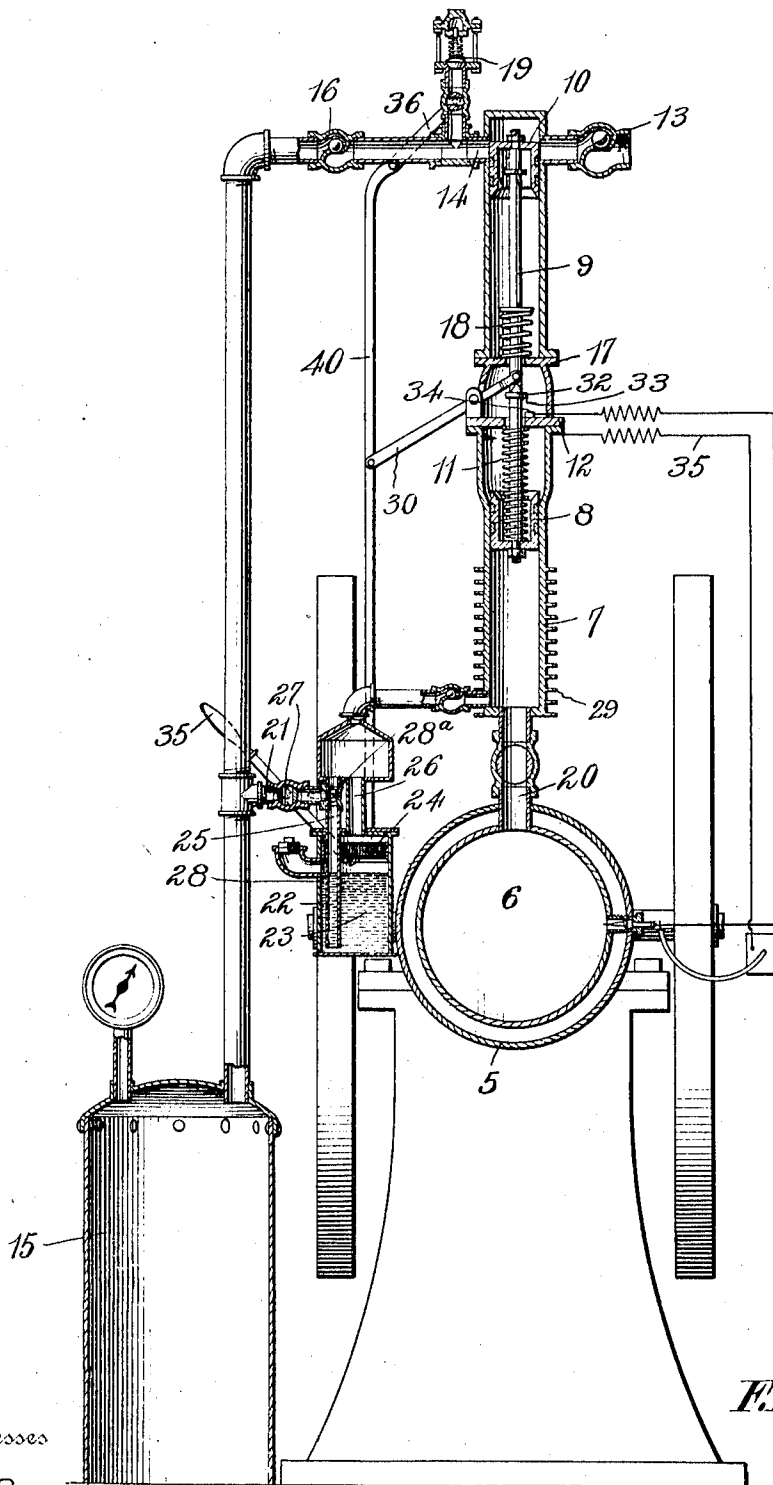


F. H. WALKER.
 STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED DEC. 2, 1909.

969,815.

Patented Sept. 13, 1910.



Witnesses

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UNITED STATES PATENT OFFICE.

FRANK H. WALKER, OF ATWOOD, KANSAS.

STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

969,815.

Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed December 2, 1909. Serial No. 530,954.

To all whom it may concern:

Be it known that I, FRANK H. WALKER, a citizen of the United States, residing at Atwood, in the county of Rawlins and State of Kansas, have invented certain new and useful Improvements in Starting Devices for Internal-Combustion Engines, of which the following is a specification.

My present invention relates to starting devices of the character shown in my Patent Number 882597 issued March 24, 1908, and is an improvement over my said patent with respect to the provision of means, which are in connection with the pump cylinder, for firing the starting charge and at the same time shutting off the starting valve.

In the accompanying drawing, the figure is a side elevation, partly in section, of my improved device.

In this drawing, as in my patent above referred to, 5 denotes the cylinder of an engine, and 6, the explosion-chamber thereof. On top of the cylinder 5 is mounted a cylinder 7 of an air pump, containing a piston 8 connected by a rod 9 to a plunger 10. Around the rod 9 is coiled a spring 11, which is confined between the top of piston 8 and a shoulder 12, formed upon the inner surface of the cylinder 7, and through which rod 9 extends. Above this shoulder 12 is a partition 17 through which rod 9 also passes, and around said rod between said partition 17 and the plunger 10 is coiled a spring 18 to cushion the inward movement of said plunger. Above the plunger 10, the cylinder 7 has an air inlet valve 13, a pop-valve 19 which is cut out except when the engine is being started, and an outlet which is a pipe 14 leading to an air storage tank 15 and having a check valve 16 therein adjacent the cylinder 7 to prevent the return of air thereto. The pump cylinder 7 communicates with the explosion chamber 6 of the engine by a pipe 20, and, adjacent its lower end and the engine, has air-cooling fins 29. The pipe 14 has a branch 21 leading to the explosion chamber 6 of the engine, which branch pipe has a by-pass in which is located a carbureter comprising a tank 22, adapted to contain a quantity of liquid hydro-carbon 23 and provided above the level of said hydro-carbon, with a strainer 24 of suitable structure. This by-pass comprises a pipe 25 extending from pipe 21 into tank 22 below the level of liquid therein, and a pipe 26 extending from the upper

portion of the tank. Pipe 21 also has valves 27 and 28^a respectively located therein upon opposite sides of the junction of by-pass pipe 25, valve 27 being the starting valve 60 which when opened allows compressed air from tank 15 to the engine cylinder with a mixture of oil gathered in its passage through the carbureter, and valve 28 being the regulating valve to control the richness 65 of the charge.

It will thus be apparent that, in the very first instance the engine must be manually started, and that upon every explosion stroke of the engine piston the air pump is operated to suck air in through valve 13 and discharge it into tank 15, and that this operation continues every time the engine is started until the pressure in tank 15 equals that in the engine cylinder minus the frictional resistance and the resistance of spring 11. Further than this, however, the valve 27 and a valve in the pipe leading to pop-valve 19 are provided with levers 35 and 36 respectively having extended vertically between them a reach rod 40 which is moved vertically when said valves are opened, and which is pivotally connected at some point to the outer end of a horizontal lever 30, the inner end of which is bifurcated and extends through the wall of cylinder 7 between shoulder 12 and partition 17. This lever is pivotally secured in the wall of cylinder 7 to swing in a vertical plane and its inner end embraces the rod 9 which, adjacent thereto has a set collar 32. The collar 32 also has a grounded contact piece 33 to engage a contact piece 34 on the shoulder 12 and from which a wire 35 leads to a suitable sparking device in the engine cylinder. Thus, supposing the tank 15 fully charged and the engine about to be started, the valve 27 is opened, as is the valve in the pipe leading to pop-valve 19. This admits a compressed charge to the engine cylinder, and simultaneously causes the inner end of lever 30 to move downwardly into the path of the set collar 32. The opening of the pop-valve 19 of course, relieves pressure above the plunger 10, and thus the charge admitted to the engine cylinder acts against piston 8 and forces the same upwardly until the contact pieces 33 and 34 come together, at which time the charge in the engine cylinder is fired and the engine thereby started. At the same time the collar 32 strikes the inner end of lever 31 and forces it upwardly,

thus closing valve 27 and cutting out pop-valve 19 by closing the valve in the pipe leading to the latter.

I claim:

- 5 1. The combination with an internal combustion engine, of a carbureter, means to generate and store compressed air, a pipe connecting said means with the engine cylinder, having branches extending into and
10 from the carbureter, a starting valve in said pipe, and means actuated by said first named means to automatically close the starting valve when the engine starts.
15 2. The combination with an internal combustion engine, of a carbureter, a source of

compressed air, an automatic air pump to supply air to said source, a pipe connecting said source with the engine cylinder, having branches extending into and from the carbureter, a starting valve in said pipe, an igniting device actuated by said air pump, and means actuated by said pump to automatically close the starting valve when the engine starts.

In testimony whereof I affix my signature 25 in presence of two witnesses.

FRANK H. WALKER.

Witnesses:

ED. L. WALKER,

J. H. BRINEY.