May 6, 1930. M. K. BARNARD 1,757,353

SAFETY ATTACHMENT FOR INTERNAL COMBUSTION ENGINES

Filed Nov. 30, 1927 2 Sheets-Sheet 1

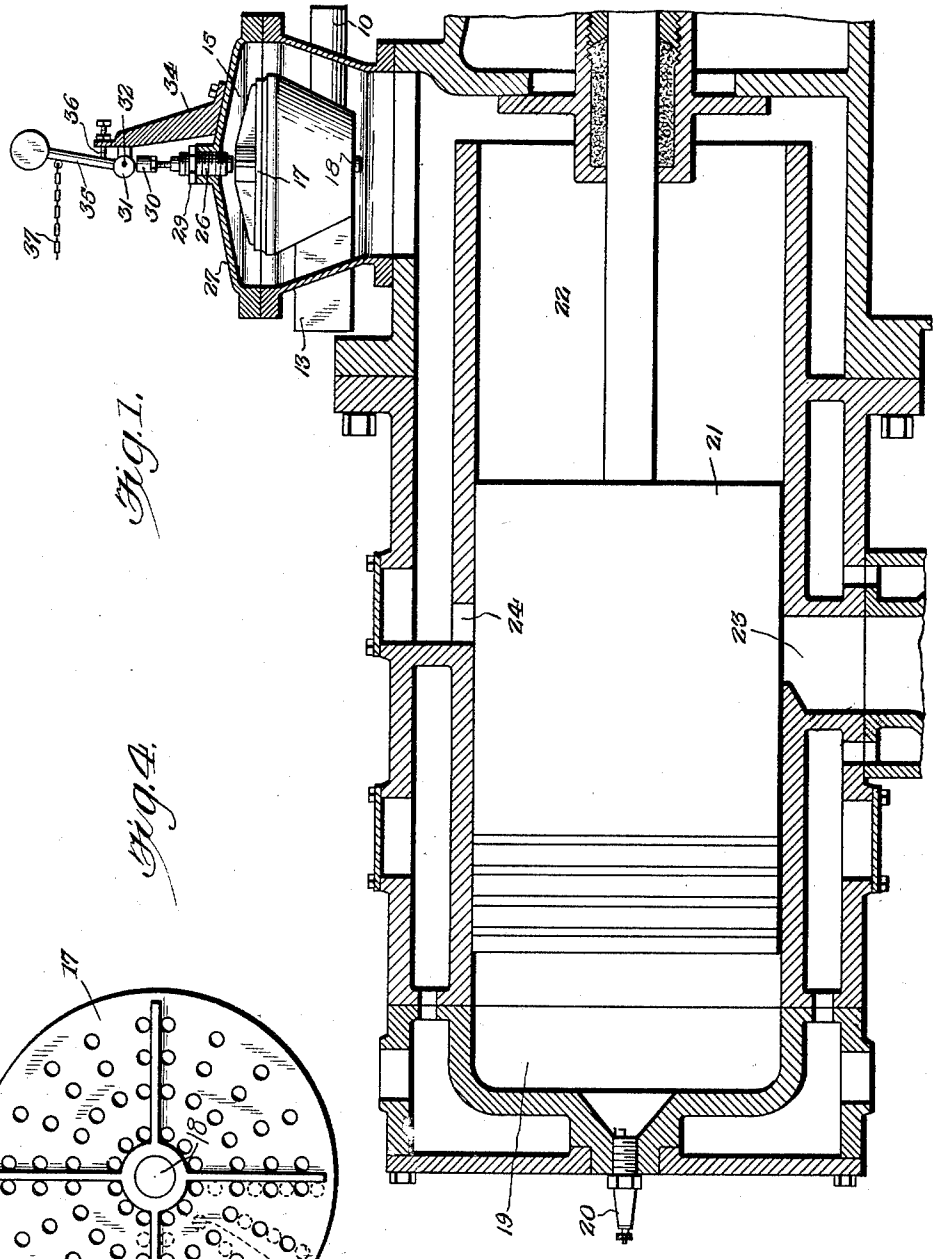


Fig. 1.

Fig. 4.

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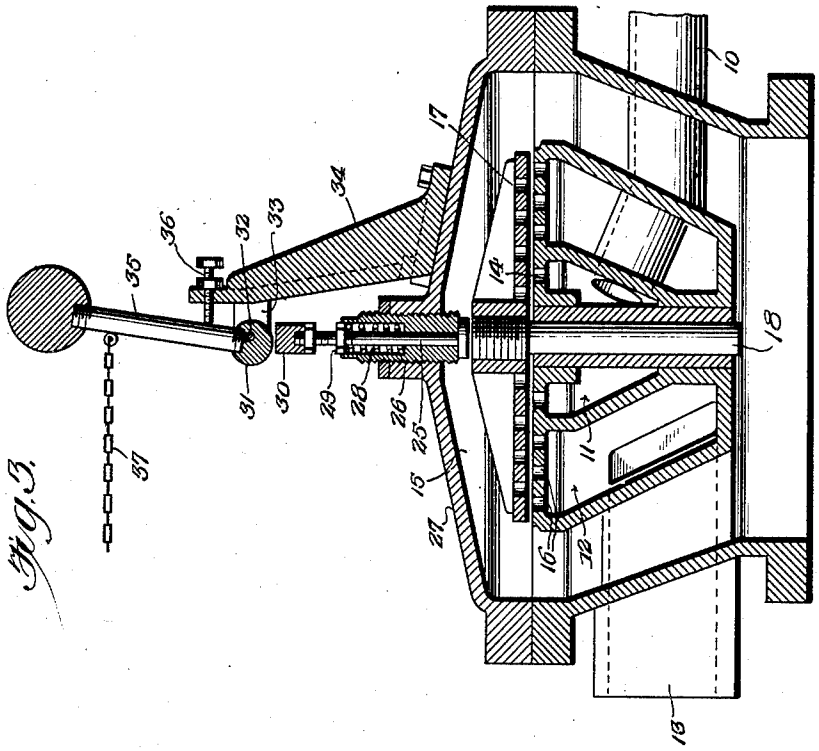


Fig. 3.

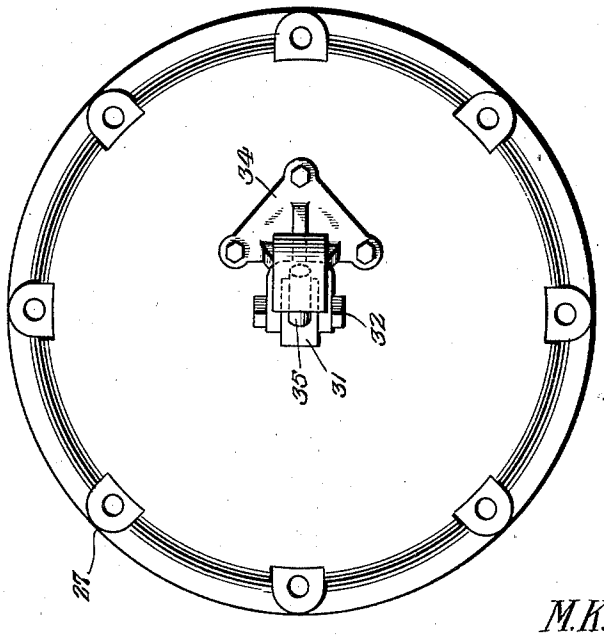


Fig. 2.

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UNITED STATES PATENT OFFICE

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SAFETY ATTACHMENT FOR INTERNAL-COMBUSTION ENGINES

Application filed November 30, 1927. Serial No. 236,811.

This invention relates to improvements in internal combustion engines and particularly to a safety device for controlling the operation of said engine.

While the invention is applicable to various types of engines, the present illustration of a two-cycle gas engine will suffice for purposes of fully disclosing the preferred embodiment of the invention.

When an engine is operating in locations where gas or gasoline vapors are present in the atmosphere, the engine may rather readily develop excessive speed due to an explosive mixture entering the chamber in which the fuel is mixed preparatory to being delivered to the engine cylinder. This may even occur when the gas line has been closed or the ignition system rendered inoperative as the high temperature created by the compression of the gas in the cylinder will effect an explosion or ignition thereof. Such incidents or conditions often occur and have resulted in rather serious accidents so that it may be said that in the absence of means for controlling the flow of explosive mixture to the cylinders and the development of excessive engine speeds, life and property are endangered.

An object of the present invention, therefore, is the provision of means for cutting off the flow of gaseous mixtures to the engine cylinders when the engine operates above a predetermined speed. Such means, in the present instance, preferably close not only the gas supply line but they also prevent explosive mixtures gaining access to the cylinders through the air intake pipe or line of the fuel mixing chamber of the engine.

More specifically, the invention contemplates normally inoperative means sensitive to the vibrations of the engine for closing both the air and gas inlets of the mixing chamber, said means being adjustable whereby they may be rendered operative whenever the engine operates in excess of a predetermined speed.

With these and other objects in view the invention consists in certain novel details of construction and combinations and arrangements of parts all as will hereinafter be more fully described and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawings,—

Figure 1 is a sectional view longitudinally of the cylinder of a commercial type of two cycle gas engine, parts of the engine proper being shown diagrammatically.

Fig. 2 is a top plan view of the cover of the fuel mixing chamber;

Fig. 3 is a vertical sectional view through the mixing chamber;

Fig. 4 is a plan view of the valve in said chamber.

In the type of engine illustrated, fuel is supplied by the gas pipe 10 to a gas chamber 11 and air is supplied to a chamber 12 through pipe 13. Through ports 14 the gas escapes to the mixing chamber 15 and air flows to said chamber from air chamber 12 through ports 16. The flow of gas and air through said ports may be controlled by separate valves or closures but in the present instance such closures are formed integrally with one another, constituting one unitary valve 17 carried on a valve stem 18 slidable in a bore centrally of the gas chamber 11.

As the operation of the engine proper is well understood, suffice it to say that assuming that the mixture in explosion chamber 19 of the cylinder has just been exploded by a spark from spark plug 20, piston 21 is driven toward the opposite end 22 of the cylinder, compressing the air-gas mixture which has been drawn through the ports 14, 16, the suction created by the previous movement of piston 21 to compress the mixture in explosion chamber 19 prior to its ignition having elevated valve 17 to open ports 14, 16. Piston 21 moves toward end 22 of the cylinder, first uncovering exhaust port 23 allowing the expanded burnt gases to escape to atmosphere. Inlet port 24 is then uncovered allowing a fresh charge of the fuel mixture to rush from end 22 of the cylinder, where it has been compressed, to explosion chamber 19. This flushes the chamber 19 of the burnt gases and fills it with the fresh charge which is then compressed upon the return movement of the piston and exploded.

Referring now to the mixing chamber and valve 17 therein, it should be stated that the supply of gas through pipe 10 is usually controlled by any ordinary type of governor (not shown) but, even with such a governor for the normal gas supply, it will be apparent that when the engine is operating in locations where gas or gasoline vapors are present in the atmosphere such vapors can gain access to the engine cylinder through air supply pipe 13 so that the speed of the engine will become abnormal or, as before mentioned, may continue to operate even though the normal gas supply has been cut off by the governor or the spark rendered inoperative.

For these reasons, means are provided in the present instance for closing both ports 14 and 16 whenever the engine operates above a predetermined speed. Such means preferably consist of a plunger 25 slidably secured in a screw plug 26 in cover 27 of the mixing chamber, the inner end of said plunger being alined with, but normally held spaced slightly from, valve stem 18 by a spring 28 seated in said screw plug and engaging a collar or washer 29 on said plunger. At its exterior end plunger 25 has a nut or head 30 adjustable longitudinally thereof and immediately above said head is a cam 31 rotatable on a horizontal axis, being mounted on a shaft 32 journaled in arms 33 of a bracket 34 mounted on cover 26.

Cam 31 carries a weighted arm 35 which is normally held by a screw 36 in bracket 34 above the cam and just to one side of the vertical plane in which shaft 32 is located so that when abnormal vibrations are created by the engine operating in excess of a predetermined speed, arm 35 will be jarred or moved past said vertical plane and drop on the opposite side of said plane by gravity. This movement of said arm will rotate cam 31 and depress plunger 25 so that the latter, by engagement with valve stem 18, will prevent valve 17 opening. In this way nothing, either air or gas, or an air-gas mixture, can gain access to the cylinder through the air or gas pipes 10, 13. In this way, the flow of explosive mixtures to the explosion chamber is automatically cut off when the engine exceeds a predetermined speed and the engine cannot be again operated until arm 35 is manually elevated.

Should it be desired to manually move arm 35 past the vertical plane of shaft 32 from a point remote from the engine so as to render the latter inoperative, a chain 37 or other form of connection could be attached thereto and extended to any desirable point.

By the provision of adjustable nut 30 on plunger 25 and screw 36 in bracket 34, the positions of the several parts may be so regulated as to render the mechanism very sensitive to the vibrations of the engine.

What I claim is:

1. In an actuating mechanism for the valve controlling the supply of fuel to an engine, means normally disengaged from said valve and including a weighted pivoted arm operable by vibrations of the engine for effecting engagement of said means with the valve for closing and holding said valve closed by gravity upon operation of the engine above a predetermined speed.

2. In an actuating mechanism for the valve controlling the supply of fuel to an engine, the combination of a reciprocatory support for said valve adapted to reciprocate to open and close said valve, a plunger normally disengaged from said reciprocatory support, and a pivoted arm operable by the vibrations of the engine for actuating said plunger to engage said reciprocatory support and move the valve to its closed positions when the engine operates above a predetermined speed.

3. In an actuating mechanism for a valve controlling the fuel supply of an engine, the combination of a reciprocatory support for said valve and adapted to reciprocate to open and close said valve, a plunger normally disengaged from said reciprocatory support, a cam rotatable about a horizontal axis adjacent one end of said plunger, and an arm carried by said cam normally positioned to one side of the vertical plane of the axis of rotation of said cam and adapted to be moved past said vertical plane by vibrations of the engine when the latter operates above a predetermined speed, movement of said arm permitting it to fall by gravity and rotate said cam to reciprocate said plunger and valve support.

4. In an actuating mechanism for the valve controlling the supply of fuel to an engine, the combination of a reciprocatory support for said valve adapted to reciprocate to open and close said valve, a plunger normally disengaged from said reciprocatory support, a cam rotatable about a horizontal axis adjacent one end of said plunger, and an arm carried by said cam normally positioned to one side of the vertical plane of the axis of rotation of said cam and adapted to be moved past said vertical plane by vibrations of the engine when the latter operates above a predetermined speed, movement of said arm permitting it to fall by gravity and rotate said cam to reciprocate said plunger and valve support, and means for adjustably varying the normal position of said arm with respect to said vertical plane.

5. In an actuating mechanism for the valve controlling the supply of fuel to an engine, the combination of a reciprocatory support for said valve and adapted to reciprocate to open and close said valve, a plunger normally disengaged from said reciprocatory support, a cam rotatable about a horizontal axis adjacent one end of said plunger, means for adjusting said plunger with respect to the cam

surface of said cam, and an arm carried by said cam normally positioned to one side of the vertical plane of the axis of rotation of said cam and adapted to be moved past said vertical plane by vibrations of the engine when the latter operates above a predetermined speed, movement of said arm permitting it to fall by gravity and rotate said cam to reciprocate said plunger and valve support.

6. In an actuating mechanism for the valve controlling the supply of fuel to an engine, the combination of a reciprocatory valve stem on which said valve is mounted, a plunger, a spring yieldingly holding one end of said plunger spaced from said valve stem, a cam rotatable about a horizontal axis at the opposite end of said plunger, and a weighted arm carried by said cam and normally held in substantially vertical position above said cam and to one side of the axis of rotation thereof, said arm being free to be moved past said axis of rotation by vibrations of the engine when the latter operates above a predetermined speed whereby said cam will be rotated to actuate said plunger and valve stem and move the valve to its closed position.

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