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Fig. 1

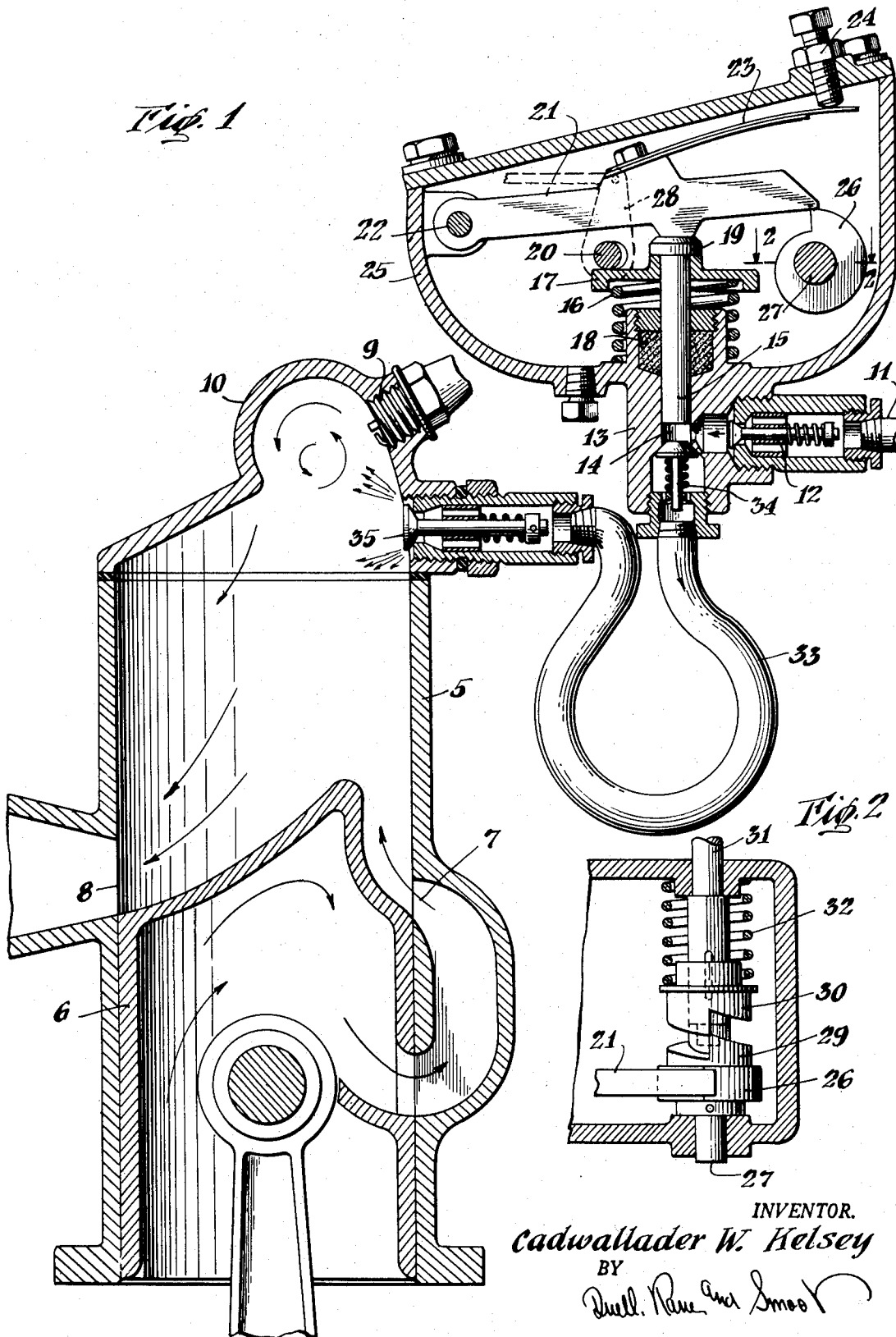
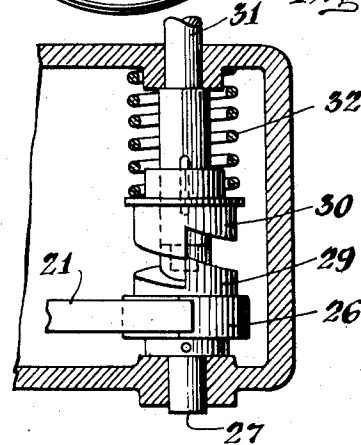


Fig. 2



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1 Claim. (Cl. 123—25)

This invention relates to a structurally and functionally improved motor mechanism of the internal combustion type.

It is a well appreciated fact that numerous attempts have been made to inject water into the cylinder of an internal combustion engine in order to absorb excess heat as well as to create a more desirable explosion, etc. These attempts have been unsuccessful largely because the introduction of the water has been improperly attempted. Quite aside from failures incident to introduction at improper points of the operating cycle, the main cause of failure has been because the particles have been too large and hence incapable of substantially instantaneous vaporization.

Thus, it is an object of the invention to furnish a unit of this character and in which a vapor of extremely minute water particles is introduced at a proper instant into the firing chamber of an engine of the explosive type. Accordingly, excess motor heat will be absorbed and the power of the motor will be increased without increase in fuel consumption.

Another object is that of providing a mechanism of this type and which may be controlled with accuracy to produce exactly the results which are desired and under most efficient operating conditions of the motor.

Still another object is that of furnishing a motor mechanism which will embody relatively few parts, each individually simple and rugged in construction, these parts cooperating over long periods of time with freedom from all difficulties.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating one practical embodiment of the invention, and in which:

Fig. 1 is a somewhat diagrammatic sectional side view taken through one cylinder of a motor and showing the mechanism in association therewith; and

Fig. 2 is a sectional plan view taken along the lines 2—2 and in the direction of the arrows as indicated in Fig. 1.

It is primarily to be borne in mind that the illustrated embodiment is a somewhat diagrammatic representation of one form of the invention and that the parts of the mechanism have been deliberately separated to some extent to clarify and simplify the illustration. Likewise, the invention has been shown as being employed in connection with a motor of the two-cycle type. As will be hereinafter apparent, the inven-

tion will be of equal value when employed in conjunction with a motor of the four-cycle type. Also, in any event, it is preferred that the motor embrace a number of cylinders contrary to the illustration of a single cylinder as occurring in the drawing. Therefore, the illustration is to be taken in an interpretive rather than in a limiting sense.

Thus, the numeral 5 indicates the cylinder of a motor within which a piston 6 reciprocates. This cylinder is provided with an inlet port 7 and an outlet port 8. An igniting unit such as a spark plug 9 may be mounted in the head 10 of the motor. Obviously, however, any other form of mixture-igniting unit, located in any other desired position, might be employed in lieu of this spark plug.

Associated with the motor cylinder is a liquid-injecting mechanism which takes the form of a tube 11 connected to a suitable source of liquid supply (not shown). Connected to this tube is a spring-pressed check valve 12 which will permit the liquid to flow into the casing 13 and more especially the cylinder chamber 14 of the same.

Within the latter, a piston 15 is reciprocable. This piston is normally urged in an upward direction—as viewed in Fig. 1—by means of a spring 16. To this end, the upper portion of the piston may support a cap 17 against which the spring bears. The piston also passes through packing 18 which serves to isolate the interior of the cylinder 14 and prevent an undesired flow of liquid from the same. The upper end of the piston may conveniently terminate in a head 19, and a cam 20 may cooperate with the cap 17 in order to limit the upward movement of the same and the piston under the urging of spring 16.

A hammer 21 in the form of a lever pivotally mounted as at 22 cooperates with the head 19 in order to deliver a blow to the same. A spring assembly 23 may be connected to the lever in order to urge the same into contact with the head 19. A set screw or other adjusting member 24 may cooperate with the spring assembly in order to tension the same to a greater or lesser extent and thus vary the value of the blow delivered by the hammer or lever 21. This set screw may be mounted by a casing 25 which conveniently encloses the several parts just described.

A cam 26 is fixedly secured to a shaft 27. The latter may be rotatably supported by the casing 25. This cam cooperates with the outer end of lever 21 which acts as a follower. It is apparent that as the cam rotates it will periodically cause

the lever or hammer 21 to violently engage or strike the head 19 of the piston. As shown in Fig. 1, this head and hammer are in engagement. However, it will be appreciated that by adjusting cam 20, the cap 17 together with the piston

will not assume a position as elevated as that illustrated. According to the distance to be traversed between that portion of the lever which engages the head 19 of the piston, the force of the blow delivered will be varied.

The cam 20 or its equivalent may be connected by linkage 28 or in any other suitable manner to a proper control. The latter has not been shown but may be the linkage governing the control of the throttle or butterfly valve of the engine. As will also be observed, with especial reference to Fig. 2, there extends from the cam member 26 an actuating element 29 in the form of an annular pawl and against which a similar member bears. The member 30 is slidably mounted upon a shaft 31 and a spring 32 serves normally to cause the face of this member to frictionally engage member 29. It follows that, if shaft 31 is driven by being suitably connected to the crank shaft of the motor, such rotation—which will be in a clockwise direction—will cause the member 29 and cam 26 to be similarly rotated. However, if shaft 31 should rotate in an opposite direction (as, for example, because of a back-fire) all that will occur will be that member 30 will have its face cam against the adjacent face of member 29 and the parts will reach the positions shown in Fig. 2. Accordingly, no rotative force will be imparted to member 29 or to cam 26 and, accordingly, no damage will occur to the elements cooperating with this cam.

The cylinder 14 is connected by means of a tube 33 with what might be termed the injector nozzle of the motor. This connection contemplates the use of a spring-pressed valve 34 interposed between the tube and the cylinder. The value of the spring employed in this connection should be such that the valve will remain seated despite any normal pressure of the liquid entering through tube 11 and flowing past valve 12.

The nozzle connected to the cylinder may again take the form of a spring pressed valve 35; the column of liquid extending from the body of this valve through to and including the cylinder 14.

It follows that, as the piston 6 reciprocates, it will cause a rotation of cam 26. With the cam 20 suitably controlled, the lever 21 will periodically strike against the head 19 of the piston 15. The force of this engagement will be varied according to the distance existing between the lever and the upper end of the piston—this being controlled by the cam or eccentric last referred to. As a consequence of the spring 16, the piston 15 will rise between each stroke of the lever or hammer 21. Consequently, liquid will enter from tube 11 and flow past pipe 12 into the cylinder 14.

Now, as the lever 21 strikes the head 19 or any equivalent structure, a violent blow is transmitted to the liquid column by the piston. The valve 12 will prevent a reverse flow toward the tube 11. With such force hydraulically transmitted, the valves 34 and 35 will unseat. A mist of particles will be injected into the cylinder and will be dispersed throughout the contained gas mass. It should again be borne in mind that the

particles so dispersed are so infinitely minute that they, in effect, provide a vapor. Therefore, being dispersed throughout the exploding charge, they will immediately be converted and the desired benefits will result. At the same time, it is to be remembered that the vapor is not steam and is hence heat-absorptive.

While, of course, this injection may occur at any desired point in the firing stroke, it is preferred that it start directly after full ignition of the charge has occurred. Under these circumstances, it will be found that the particles composing the water mist which is injected are intimately co-mingled throughout the mass of the burning gas and are, therefore, quickly converted into steam.

As a consequence of their conversion into steam, it follows that excess heat within the cylinder is absorbed, thus making for greater operating efficiency of the engine because of the cooling effect. Additionally, however, the expansive force of the steam will contribute materially to the power stroke of the engine. This is aside from the fact that a more thorough combustion of the exploding mixture will occur which will have the advantage of greater economy of operation, freedom from carbon deposits, etc., etc.

According to the position of the cam 20, a greater or lesser amount of water in mist form will be injected into the cylinder. The volume of such delivery may also be varied by adjusting the screw 24. Accordingly, it is feasible for the operator to control the functioning of the motor with extreme accuracy.

From the foregoing, it will be appreciated that, among others, the several objects of the invention as specifically afore noted are achieved. Obviously, numerous changes in construction and rearrangements of the parts might be resorted to without departing from the spirit of the invention as defined by the claim.

I claim:

In an internal combustion motor having a relatively movable piston and cylinder, a mechanism for injecting water vapor into said cylinder and substantially during the period when the combustible mixture within the same is burning, said mechanism being substantially independent of the fuel charge forming and conducting units of said motor and comprising a tube extending from a source of water supply to said cylinder, a member providing a chamber connected to said tube intermediate its extremities, a plunger reciprocable within said chamber and extending beyond the same, a spring for normally retracting said plunger within said chamber, a hammer element adapted to strike against said plunger and to expell water from said chamber into said tube and through the latter into said cylinder, a spring cooperating with said element for projecting the latter into contact with said plunger, engine-driven means for periodically lifting said element out of contact with said plunger and thereupon freeing the former to strike against the latter as the engine operates in a predetermined manner, and means for automatically disconnecting said last named means upon said engine operating in reversed rotation.

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