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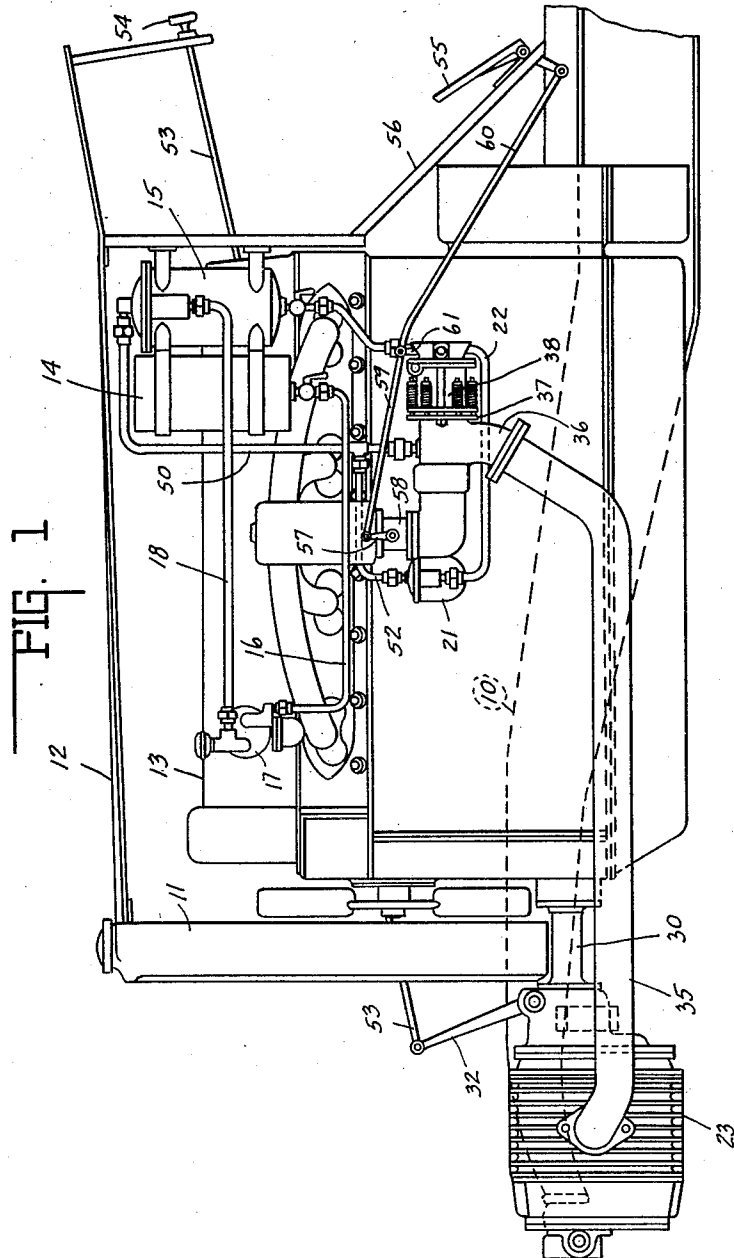
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SUPERCHARGING APPARATUS FOR INTERNAL COMBUSTION ENGINES

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SUPERCHARGING APPARATUS FOR INTERNAL COMBUSTION ENGINES

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This invention relates to a supercharging system for internal combustion engines and particularly to a system wherein the supercharger may be selectively placed in or out of service during the operation of the engine.

One feature of the invention resides in a novel form of relief valve and controlling mechanism therefor for relieving excess pressures in the carburetor air intake pipe caused by back-firing or sudden closing movements of the throttle valve at high speeds.

Other features of the invention and the full nature thereof will be apparent from the attached drawings and the following specifications and claims:

Fig. 1 is an elevational view of an internal combustion engine for an automobile showing the location of the various parts of the supercharger system. Fig. 2 is a sectional view of the relief valve and the pipe connections associated therewith. Fig. 3 is an end view of the said valve. Fig. 4 is an elevational view of the same valve. Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4.

In the drawings an automobile chassis member 10 is shown supporting the usual radiator 11, hood cover 12 and internal combustion engine 13. A common form of vacuum tank 14 is used to draw gasoline from a main supply tank not shown in the drawings and which is assumed to be at a lower elevation than the carburetor. An auxiliary gasoline tank 15 is provided adjacent the vacuum tank and is supplied with gasoline from the said tank by means of pipe line 16, fuel pump 17, and pipe line 18. The fuel pump 17 is herein shown positioned on the upper part of the engine and is assumed to be driven by the cam shaft of the engine. The tank 15 is provided with a float operating a needle valve to control the supply of fuel from the pipe line 18 to maintain a substantially constant fuel level within the said tank in a well known manner. The pump 17 is provided with a by-pass relief of a suitable type to prevent excess pressure in the line 18 when the needle valve in tank 15 is closed. The fuel is supplied from the tank

15 to the carburetor 21 by means of a pipe line 22.

Mounted on the forward end of the chassis frame 10 is a supercharger 23 preferably of the rotary form.

The supercharger 23 is driven from the main crank shaft of the engine by means of a driving connection contained in the housing 30 and a clutch mechanism operated by a lever 32 and a rod 53 extending to a control button 54 located on the instrument board of the car.

The discharge of the supercharger is connected by a pipe line 35 with the air intake of the carburetor 21. Included in the pipe line 35 is a fitting 36 having a flange 37 to which is fastened a pressure relief valve generally indicated by the numeral 38 and illustrated in detail in Figs. 2 to 5, inclusive.

The valve consists of a housing portion 39 having a flange 40 mating with the flange 37. A plurality of studs 41 are fastened in the flange 37 and project through openings in the flange 40. Each of the studs 41 is surrounded by a helical compression spring 42 abutting at one end against the flange 40 and at the opposite end against a washer 43 held in position on the stud 41 by a cotter pin 44.

The housing 39 carries a pin 45, in turn pivotally carrying a swinging air valve 46. The valve 46, when in the position shown in Fig. 2, is adapted to close an air intake opening 47 and thereby prevent the escape of air through the said opening from the housing 39. The interior of the housing 39 is connected with the interior of the fitting 36 by mating openings 48 in the flanges 37 and 40.

By this construction the operation of the supercharger by raising the pressure in the fitting 36 slightly above atmospheric pressure causes the valve 46 to close the opening 47 to prevent the escape of air therethrough. Further increase of the pressure in the fitting 36 due to increased speed of the supercharger, backfiring of the engine or sudden closing of the engine throttle at high speed causes the compression of the springs 42 thereby removing the flange 40 from its seat on the flange 37 and allowing the escape of

air between the said flanges. This escape of air quickly relieves any excess pressure which may build up in the carburetor air intake.

5 The springs 42 are made with an extremely low compression constant and are initially compressed to the amount necessary to allow the escape of air at a predetermined excess pressure. The low compression constant
10 permits the instant opening of the relief valve to its fullest extent upon reaching the said predetermined pressure.

In the upper portion of the fitting 37 is an opening 49 to which is connected an
15 equalizing pipe 50, in turn connected to an opening 51 in the top of the auxiliary gasoline tank 15. The equalizing pipe 50 has a branch 52 connecting with the float chamber of the carburetor 21. By means of this equal-
20 izing pipe the gasoline supply tank and the carburetor float chamber are maintained at the same pressure as the carburetor air intake when the supercharger is in operation. When the clutch lever 32 has been operated
25 to stop the supercharger, the valve 46 is immediately opened by the suction produced in the carburetor air intake and permits the entrance of air at atmospheric pressure to the carburetor. In this case the equalizing
30 pipes immediately allow the fuel tank and the carburetor float chamber to assume atmospheric pressure. Thus, the proper functioning of the carburetor is assured whether or not the supercharger is in operation.

35 In Fig. 1 a foot throttle 55 is carried on the foot board 56 of the car. The foot throttle operates the lever 57 of the usual type butterfly throttle valve in the intake manifold 58 by means of rods 59 and 60. The rod
40 60 is attached to a lever 61 carried upon a pin 62 in turn rotatably mounted upon a portion of the relief valve housing 39.

A pair of eccentric cams 63 are carried on the pin 62 and are adapted to engage
45 the ends of a pair of pins 64 which are fixedly mounted on the flange 37. The movement of the rod 60 in the closing of the butterfly throttle valve causes the engagement of the cams 63 and the pins 64, thus mov-
50 ing the valve housing 39 against the pressure of the springs 42 to permit a partial opening of the relief valve. By this means the chattering of the relief valve which would normally occur at the release of the foot
55 throttle is prevented. With the relief valve in the partially opened condition a sudden increase of pressure in the fitting 37 may still cause further movement of the valve to allow complete relief of pressure when neces-
60 sary.

In the foregoing description the invention has been described as applied to a system wherein a main gasoline reservoir is located
65 below the level of the carburetor and wherein the fuel is supplied therefrom by means

of the vacuum tank. However, the invention is not to be limited by such description since it is equally applicable to a gravity supply system or to a system wherein a pump supplies gasoline directly from a low placed
70 main reservoir to the carburetor float chamber. In each of these cases the pump 17, the vacuum tank 14 and the auxiliary tank 15 may be omitted. The equalizing pipe 50 will then be connected directly to the top of the
75 main fuel supply tank and the common pin-hole air vent in the fuel tank will be omitted.

The invention claimed is:

1. The combination with an internal combustion engine having a carburetor, of a
80 supercharger, a conduit for conducting air from said supercharger to said carburetor, a pressure operable relief valve associated with said conduit for automatically relieving excess pressure therein, a throttle for
85 controlling the amount of fuel mixture delivered to said engine, and a connection between said throttle and said relief valve for partially opening said relief valve to prevent chattering thereof when said throttle is in a predeter-
90 mined position.

2. The combination with an internal combustion engine having a carburetor, of a
95 supercharger, a conduit for conducting air from said supercharger to said carburetor, a pressure operable relief valve associated with said conduit for automatically relieving excess pressure therein, a throttle for controlling the amount of fuel mixture delivered
100 to said engine, and a connection between said throttle and said relief valve for partially opening said relief valve to prevent chattering thereof when said throttle is in position for minimum admission of fuel mixture.

3. The combination with an internal combustion engine having a carburetor, of a
105 supercharger, a conduit for conducting air from said supercharger to said carburetor, a valve associated with said conduit for permitting and preventing escape of air therefrom, one or more springs normally urging
110 said valve into closed position against the pressure of air in said conduit, a throttle for controlling the amount of fuel mixture delivered to the engine, and a connection between
115 said throttle and relief valve for partially opening said valve against the pressure of said springs to prevent chattering of said valve when said throttle is in position for minimum admission of fuel mixture.

In witness whereof, I have hereunto affixed my signature.

CHARLES R. GREUTER.