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CARBURETOR MECHANISM

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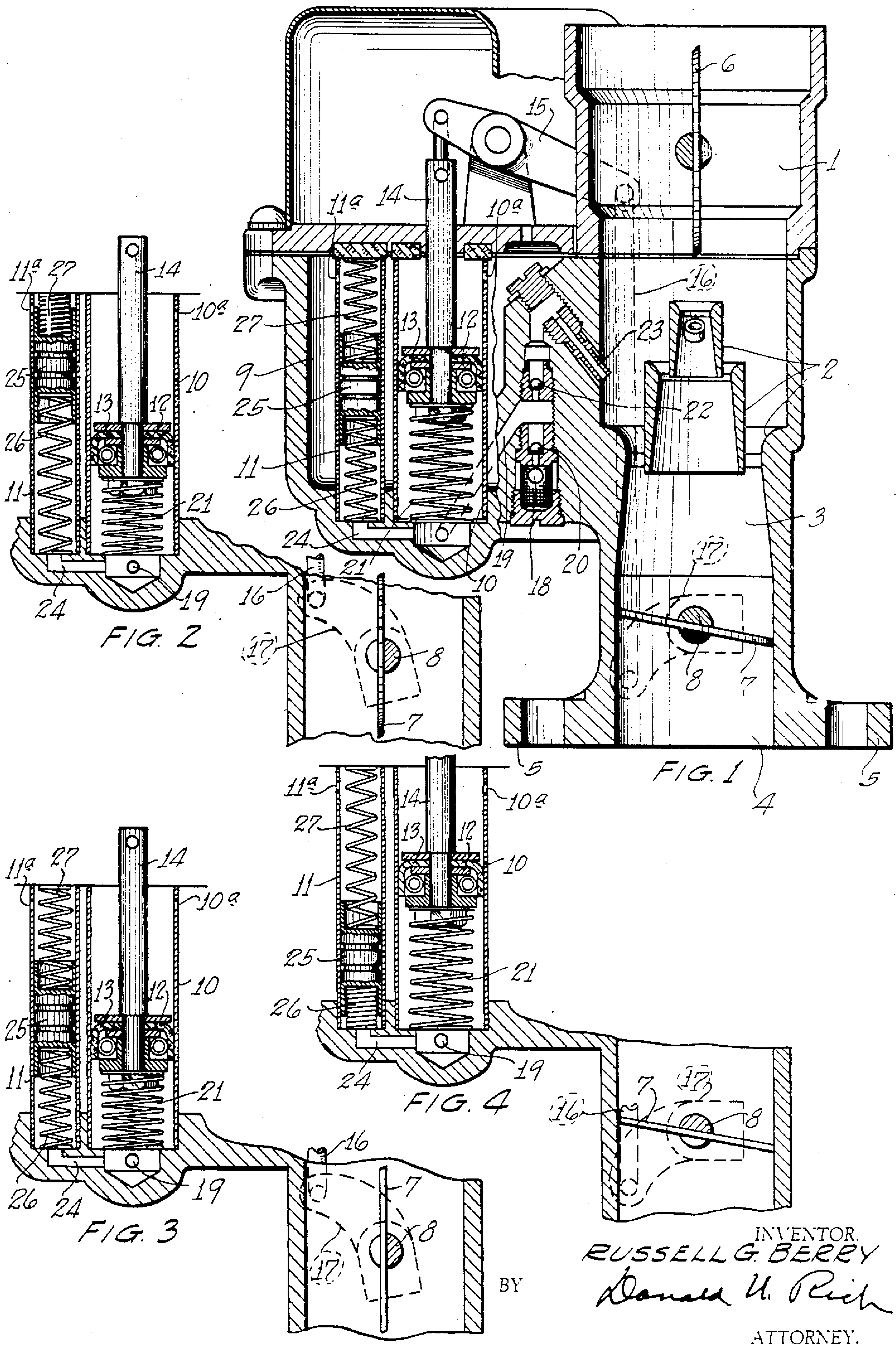

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CARBURETOR MECHANISM

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3 Claims. (Cl. 261—34)

This invention relates to carburetors for internal combustion engines and consists particularly in novel accelerating pump mechanism and throttle retarding means therefor.

Carburetor accelerating pumps, particularly of the type utilizing flexible piston material, are frequently subject to the defect or disadvantage that excessive quantities of air pass the piston during rapid charging strokes thereof, which air may be forced into the mixture conduit so as to improperly dilute the accelerating charge. Also, particularly where the piston material has become worn or is otherwise defective, fuel in the pump cylinder may leak past the piston during rapid discharge with the result that the accelerating charge is inadequate.

In addition to the accelerating pump, carburetors for automobile engines are frequently provided with dash pot mechanism for retarding at least a portion of the closing movement of the throttle so as to prevent unpleasantness due to too rapid deceleration. Heretofore the dash pot has not been combined with the accelerating pump, so far as applicant is aware.

An object of the present invention is to provide novel means for substantially reducing or eliminating the accelerating pump defects mentioned above due to leakage of air and liquid fuel past the accelerating pump piston.

Another object is to provide means for insuring continued discharge from the accelerating pump after effective rapid discharge movement of the pump piston.

Another object is to provide novel structure for retarding closing movement of the throttle.

Still another object is to provide accelerating pump and throttle retarding mechanism in a compact, jointly operated unit.

These objects and other more detailed objects hereafter appearing are attained by the structure illustrated in the accompanying drawing in which

Figure 1 is a vertical sectional view of a carburetor embodying the invention, and

Figures 2, 3 and 4 are detail sectional views showing operative parts in different positions.

The carburetor shown has a downdraft mixture conduit including air inlet horn 1, venturis 2, mixing chamber 3 and outlet portion 4 flanged as at 5 for attachment to the intake manifold (not shown) of an associated internal combustion engine. A choke valve 6 is pivotally mounted in the air horn and throttle valve 7 is carried by shaft 8, near the outlet portion of the carburetor. Adjacent the mixture conduit is a bowl 9 within which fuel is maintained at a substantially constant level by the usual needle valve mechanism (not shown).

Also within the main fuel chamber or bowl 9 is an accelerating pump cylinder 10 and an auxiliary chamber 11 having vents 10*a* and 11*a* to the air space at the top of the fuel bowl which is substantially at atmospheric pressure. Piston 12 in pump cylinder 10 has leather cylinder-engaging structure 13 and is connected by means of piston rod 14, rock lever 15, and link 16 to a crank 17 rigid with throttle valve shaft 8. During closing movement of the throttle valve, piston 12 is moved upwardly drawing fuel from the bowl into the pump cylinder through passages 18 and 10 and past inlet check 20. During opening of the throttle, piston 12 is moved downwardly, compressing coiled spring 21 and forcing an accelerating charge past outlet check 22 and through nozzle 23 into the mixture conduit adjacent venturis 2.

Auxiliary chamber 11 communicates with the pump cylinder through a passage 24. Slidable within chamber 11 is a plunger 25 normally maintained in an intermediate rest position in the chamber by opposing coiled springs 26 and 27. Chamber 11 does not communicate with the fuel bowl except through passage 24, 18, and 19.

The operation of the device is as follows:

Figure 1 shows the throttle valve closed with pump piston 12 in charged position and plunger 25 at rest. Opening of the throttle valve to the position shown in Fig. 2 moves piston 12 downwardly expelling an accelerating charge into the mixture conduit through passage 19 and nozzle 22. A portion of the fuel in the pump chamber will also be directed through passage 24 into the auxiliary chamber 11 so as to force plunger 25 upwardly, compressing coiled spring 27, as shown. The portion of the accelerating charge by-passed into the auxiliary chamber depends on the rapidity of the discharging stroke of piston 12 and the relationship between the resistance in the bypass and the regular discharge passages. These passages are preferably constructed so that when the throttle is opened slowly, very little additional fuel will pass into the auxiliary chamber. In case of rapid pump discharge, a substantially greater quantity of fuel will be stored in the auxiliary chamber. At the end of the effective accelerating stroke of piston 12, spring 27 will expand, again moving plunger 25 to the rest position, as shown in Figure 3, this movement of the plunger continuing the discharge through accelerating nozzle 23.

When plunger 25 is at rest, the fuel in the bowl and the plunger are both exposed to atmospheric pressure. Assuming inlet passages 18 and 19 and passage 24 are of comparable sizes, during charging of the pump, fuel will be drawn more readily into the pump cylinder through the inlet passages than through passage 24. A somewhat similar effect, in this respect, may be obtained by making passage 24 smaller than passage 19. Thus if the charging movement of the piston is slow, the usual intake passages will be adequate to keep the pump chamber filled and very little, if any, fuel will be drawn from the auxiliary chamber through passage 24. However, if the throttle is closed rapidly, as when it is released to be closed by the usual throttle return spring (not shown), a portion of the pump charge will be supplied from the auxiliary chamber, thus reducing the pressure beneath plunger 25 and causing the same to move downwardly under the influence of coiled spring 27. Immediately at the termination of the charging stroke of piston 12, plunger 25 is returned to its rest position by spring 26 drawing a new charge into the auxiliary chamber through passages 24, 19, and 18 and past the inlet check valve.

Atmospheric pressure above plunger 25 functions to force the same downwardly when the pressure therebeneath is reduced during rapid charging strokes of the pump piston. The resistance of spring 26 to such movement of the plunger increases and also the expansive force of spring 27 increases as the plunger is depressed and this, in turn, progressively reduces the supply of fuel charge to the pump cylinder from the auxiliary chamber. Thus comparatively little resistance will be offered to movement of the pumping piston during the first part of the rapid charging stroke thereof but this resistance becomes substantial during the last part of such movement. This is due to the fact that charging fuel is supplied to the pump cylinder substantially less freely when plunger 25 has been depressed permitting substantial reduction of the pressure beneath the pump piston so that during the last part of the charging stroke, the pump functions as a dash pot.

The expansible feature of chamber 11 substantially reduces the likelihood of fuel leaking past the pump leather during the discharging movement of the piston. Obviously, the accelerating system, including the auxiliary chamber, must be calibrated to provide the proper accelerating charge. Due to the provision of the expansible auxiliary chamber, the pump discharge will be substantially more uniform than where no such chamber is provided and the efficiency of the pump leather alone is relied upon to maintain uniformity of the charge. The resiliently contractible feature of the auxiliary chamber functions effectively to provide for more uniform charging of the pump cylinder during closing of the throttle and also to retard the last portion of the closing movement of the throttle when spring 26 has been substantially compressed.

Various features of the carburetor and accelerating pump system are well known in the art and, in themselves, do not constitute the present invention. Also various features of the invention may be used exclusively of others such for instance, as the contractible and expansible auxiliary chamber features. The exclusive use of all such modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In a carburetor, a main fuel chamber, an accelerating pump comprising a cylinder having a restricted communication with said chamber and a piston therein, a restricted outlet nozzle for said pump, an auxiliary cylinder communicating with said pump cylinder, a plunger in said auxiliary cylinder, and opposing springs normally maintaining said plunger in an intermediate rest position in said auxiliary cylinder, said plunger and auxiliary cylinder forming a resiliently expansible chamber for receiving a part of the normal pump discharge and for producing a delayed discharge therefrom and also forming a contractible chamber for supplying fuel to said pump cylinder during rapid charging movement of said piston.

2. In a carburetor, a throttle, a main fuel reservoir, an accelerating pump including a cylinder and a piston therein exposed to atmosphere and connected to said throttle valve, said cylinder having a restricted inlet communication with said main fuel reservoir, and an auxiliary chamber freely communicating with said pump and having a movable wall normally urged toward and resiliently maintained in a predetermined rest position whenever said piston is at rest regardless of the position thereof, said auxiliary chamber having substantial capacity when said movable wall is in said predetermined rest position whereby said auxiliary chamber may supply part of the charge to said pump when said inlet communication is inadequate to fully supply fuel thereto during rapid charging of the pump.

3. In a carburetor, a main fuel reservoir, an accelerating pump, including a cylinder and a throttle operated piston, a conduit connecting the pump to said reservoir adequate to charge the pump at a normal rate, a compensating chamber comprising a fuel well, a partition member therein, means normally and resiliently urging the partition into an intermediate position in said well, the space on one side of said partition freely communicating with the pump cylinder whereby abnormally rapid charging movement of the piston is partially satisfied by flow from said well.

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