Oct. 16, 1934. F. PURDY 1,977,288

ACCELERATING DEVICE

Filed Sept. 29, 1931 2 Sheets-Sheet 1

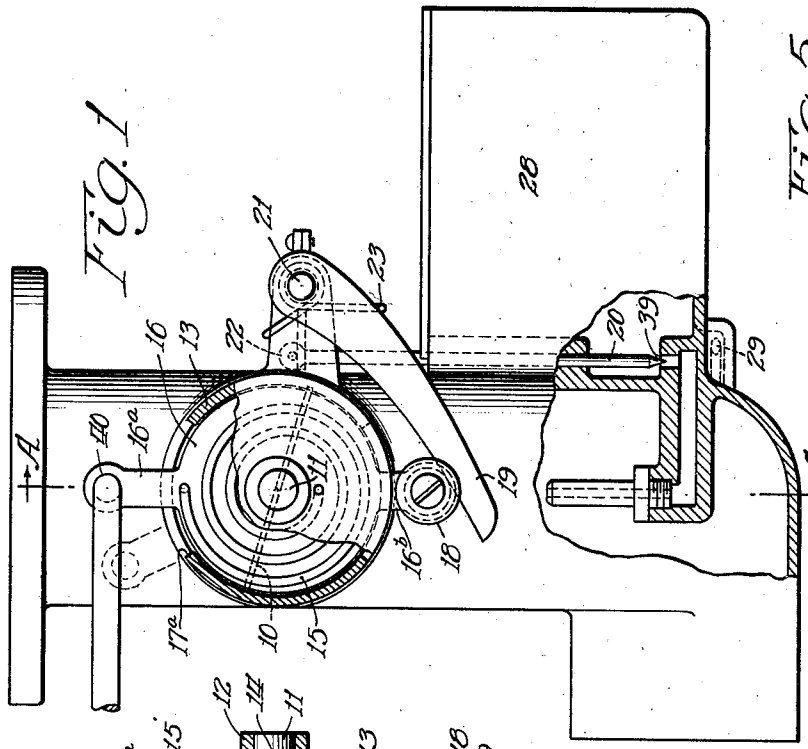

Fig. 1

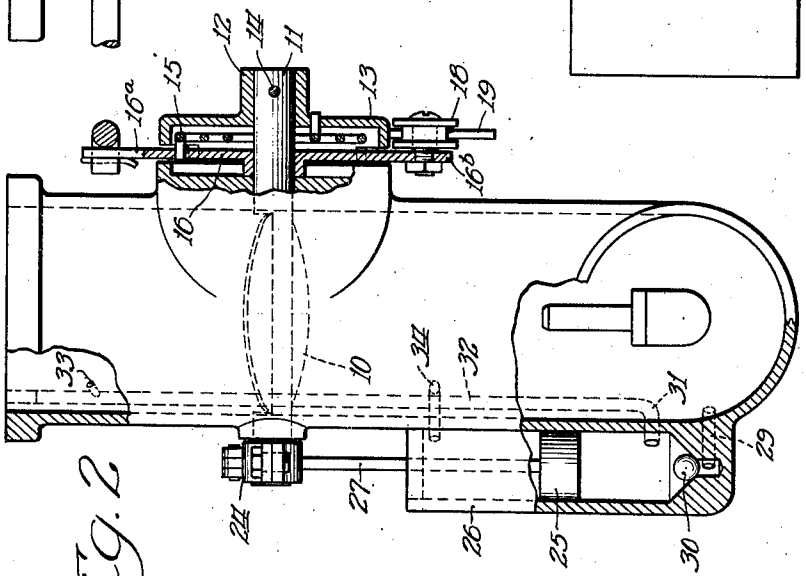

Fig. 2

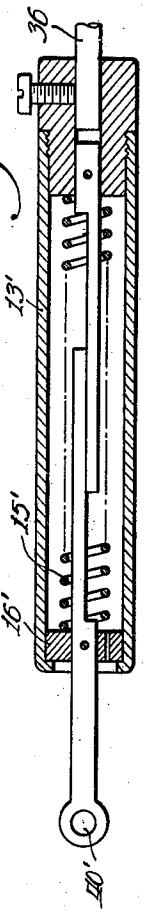

Fig. 5

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Fig. 3

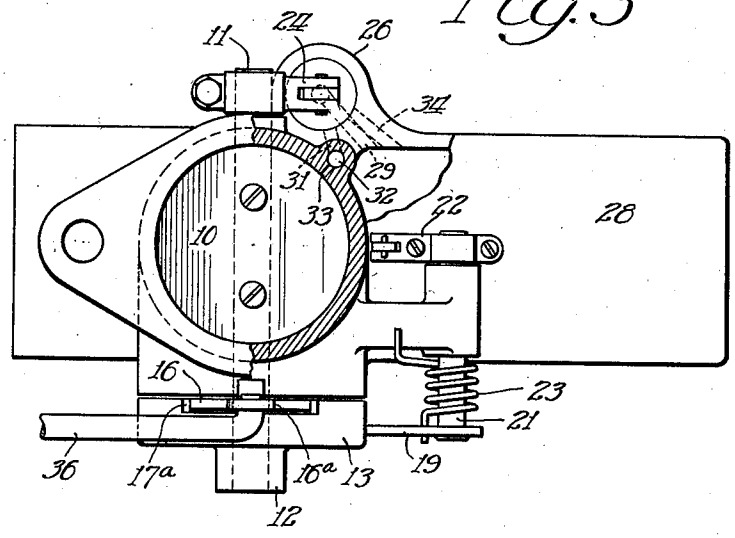
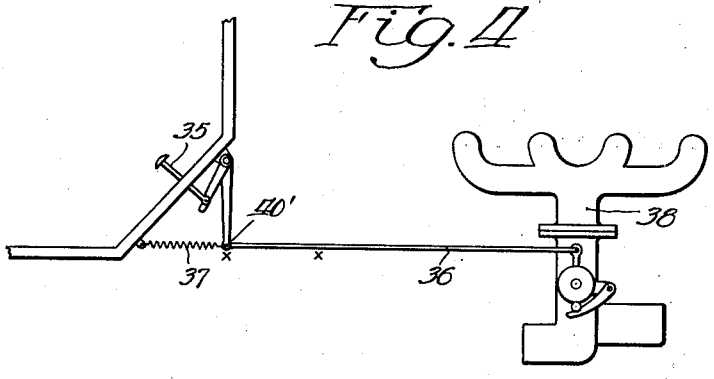


Fig. 4



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1,977,288

ACCELERATING DEVICE

Frederick Purdy, Batavia, Ill.

Application September 29, 1931, Serial No. 565,731

11 Claims. (Cl. 261—34)

This invention relates to accelerating devices for automotive vehicles and has for one of its objects to accomplish acceleration of the speed of the engine as rapidly as inertia and load will permit while, at the same time, preserving the depression existing in the manifold while the engine was running under the restraint of a nearly closed throttle before acceleration was attempted.

It is well known among those skilled in the art that: with other factors, as for example temperature, remaining constant, the vaporization of gasoline is greatly facilitated when the absolute pressure of the surrounding air is low and it is equally well known that when the throttle of a carbureter is suddenly opened preparatory to accelerating the engine speed, there is an interval of infinitesimal increment to the speed during which the pressure in the manifold is substantially atmospheric and, unless the temperature is undesirably high, the gasoline content remains liquid and subject to the inopportune effects of inertia in much greater degree than if it were vapor.

To insure sufficient usable vapor to accomplish the desired end it has been necessary to introduce more gasolene than can be immediately utilized efficiently and when an appreciably higher engine speed has been achieved and, as a consequence, the manifold depression has been partly restored there is a temporary over-enrichment of the cylinder charge only partly vaporized and if there are many and frequent acceleration periods, as in congested city driving, the over-enrichment becomes a factor of importance, both in operating cost and engine upkeep.

Inertia, friction, load and absence of suction to generate and deliver the charge to the cylinder combine to make acceleration a matter of relatively slow beginning; but as the suction increases, the force to overcome the opposing factors is increased and the destined speed is ultimately reached with relative rapidity.

This period of relatively slow activity in the process of accelerating an automotive vehicle varies with different vehicles according to the values of the several components and is a measurable factor which can be taken into account when the carbureter used on any model is designed so as to insure perfect co-ordination in practice.

It has been customary to attach to an arm on the throttle shaft of an ordinary carburetor, a pump which supplies a super charge to the carbureter on the opening of the throttle or a cam or other device is used to achieve the same result. In some instances it is found desirable to prolong the pumping effect beyond the period occupied in opening the throttle and several devices are employed to accomplish this result, but in no instance so far as I am able to learn has there been any recognition of the fact that the rapidity of throttle opening made an augmented and prolonged pumping effect necessary.

I have found that, if the time occupied in opening the throttle coincides approximately with the time necessary for any given vehicle to accelerate from any low speed to a higher one, the time required for acceleration could be materially shortened and that hesitations and irregularities so frequently developed when ordinary methods of acceleration are employed, were absent and I have attributed this result to the fact that in the former case the depression above the throttle was of considerable value in vaporizing any fuel that passed the throttle or arrived at a point above it by any other route and I have provided means by which this result can be obtained automatically and without the conscious effort of the driver of a vehicle equipped with my invention.

In the act of pumping there is a resistance to the movement of the piston which tends to retard the mechanism connected therewith and is commonly known as a dash pot effect and it is the utilization of this effect that constitutes an important feature of my invention as it provides means to prevent the opening of the throttle faster than the engine can respond to the stimulus of additional fuel and thus preserves, to a considerable extent, the depression existing in the manifold just prior to the demand for increased speed as expressed by the sudden pressure on the accelerator pedal and thereby insures a greater degree of vaporization of the entering fuel.

Referring to the drawings in which numerals of identification are alike for like parts in all figures will make my invention clear to those skilled in the art.

Fig. 1 is an elevation, partly in section, of a conventional carburetor to which my invention has been applied.

Fig. 2 is a partial vertical section of Fig. 1 on line A—A.

Fig. 3 is a plan view of Fig. 1 partly cut away to show the location of certain canals.

Fig. 4 is a diagrammatic view to show the association of the carbureter and the means under the driver's control for operating it.

Fig. 5 represents a mechanism wherewith my invention may be applied to an automobile equipped with one of certain kinds of carbureters without material changes therein.

10 is a throttle supported on and rotated by

shaft 11 which is pinned to hub 12 of cup 13 by pin 14.

Cup 13 serves as a housing for spiral spring 15 which constitutes a resilient connection between it and operating disc 16 which oscillates on shaft 11 but is loosely attached thereto. Spring 15 normally biases the cup and disc into contact at 17*a* which is one edge of an extension from the side of the cup 13, the contacting part of the disc 16 being one edge of the radial arm 16*a* extending therefrom, by which the operator of an automobile controls the throttle.

Integral with and extending from the lower edge of the disk 16 is arm 16*b* on which a grooved roller 18 is mounted. Rigidly attached to the arbor 21 is arm 19 which is contoured to function as a cam and cooperates with roller 18 to give a turning movement to arbor 21 as the disk 16 is turned to tension the spiral spring 15 which is attached to the cup 13, which through hub 12—pin 14 and shaft 11 serves to open the throttle 10. Contact of arm 19 with roller 18 is maintained by helical spring 23 which biases the arm 19 to move upwardly as the disk 16 is moved to induce opening of the throttle and yields to permit the arm 19 to move downwardly as the disk is moved to close the throttle. Crank 22 is rigidly attached to arbor 21 and partakes of its motion and on its opposite end is supported valve stem 20 which is lifted as the throttle is being opened and lowered as the throttle is being closed and as the lower end of valve stem 20 is tapered and co-operates with the passage way 39 to variably restrict the flow of fuel into the carbureter the passage way is effectively enlarged as the throttle is opened and reduced as the throttle is closed. The contour of the arm 19 determines the effective size for every position of the roller 18.

Attached to the shaft 11 on the other side of the carburetor is lever 24 which operates piston 25 in cylinder 26 by way of connecting rod 27 when the throttle 10 is moved. During the closing movement of the throttle the piston is lifted and draws gasoline from the float chamber 28 by way of canal 29 past check valve 30 and on the opening movement the gasoline is expelled into the carbureter through canals 31 and 32 and jet 33. The canal 34 leading into the float chamber from the upper part of the pump cylinder is for the purpose of draining off any fuel that may pass by the piston.

The accelerator pedal 35 within reach of the driver's foot and the associated mechanism actuates the operating rod 36 by which the carbureter throttle is controlled, the retracting spring 37 returning the parts to their primitive position after use.

The carbureted air generated in the carbureter is conducted to the several cylinders of the engine through manifold 38.

When the throttle is at rest prior to the operation about to be described, an edge of arm 16*a* and the edge of cup extension 17*a* are in contact because the spiral spring 15 which forms a resilient connection between cup 13 and disc 16 is biased to produce this effect, but on sudden movement being given to the disc 16 by the train of mechanisms between it and the driver's accelerator pedal, the cup lags behind because it is connected to the pump piston 25 by another train of mechanisms and although some movement and some pumping begins at once, the rate of movement is relatively slow and as the throttle 10 is inflexibly associated with the cup 13, it also partakes of the same speed. Thus cup, throttle and piston move together through a relatively prolonged time interval.

The needle valve 20 is operated by the movement of the disc 16 and therefore the passage way for fuel 39 is immediately enlarged to accommodate an increased flow whenever the relatively slower moving throttle produces the demand by an augmented air flow.

To whatever position in its travel the disc 16 comes to rest the cup 13 and its edge 17*a* will eventually come to the same position, relative thereto, that they occupied in the previous state of rest and can be forcibly retracted towards a closed throttle position in the same manner as ordinary carbureter throttles are controlled.

In Figures 1, 2 and 3 the disc is shown as though it had been suddenly moved through half its complete excursion, while the cup throttle and piston have scarely begun to move, though the increased tension of spring 15 produces a strong and steady urge against the dash pot effect of the pump and will shortly re-establish the primitive relationship of the cup and disc after the motion of the disc has ceased.

The structure shown in Fig. 5 may be used to accomplish some of the results obtainable by the figures heretofore described when an ordinary carbureter having a throttle operated pump for acceleration is already installed in an automotive vehicle. In Fig. 4 the operating rod 36 has two points marked X. And if a piece of the rod is removed and the device of Fig. 5 is inserted between these points X a resilient connection between the accelerating pedal and the throttle will be established. Such a combination is contemplated by my invention.

The analogy of the two devices will be apparent when it is pointed out that eye 40′ of Fig. 5 corresponds to eye 40 of Figs. 1 and 2. Spring 15′ is the equivalent of spring 15 of Figs. 1 and 2. Rod and guide 16′ are the equivalent of disc 16 and the shell with its end and rod 13′ perform the function of cup 13 and its train of mechanisms to the pump and throttle included in the carbureter already installed.

Having thus described my invention I claim:

1. In an automotive vehicle having a carbureter, a throttle in said carbureter, means to retard the opening movement of said throttle, means within the reach and responsive to the effort of the driver of said automotive vehicle to control its movement, means to permit a speed differential between said driver controlled means and said throttle and means to insure a coincident closing movement of said throttle and said driver controlled means.

2. In an automotive vehicle having a carbureter, a throttle in said carbureter, resilient means to open said throttle, driver operated means to tension said resilient means and pumping means to retard the opening of said throttle, said pumping means assisting to move the fuel in said carbureter.

3. In an automotive vehicle including a carbureter and a float chamber to supply fuel to said carbureter, a throttle in said carbureter, means to open said throttle, means operable by the driver of said automotive vehicle to control its speed, resilient means interposed between said throttle opening means and said speed control means and means operating in synchronism with said speed control means to regulate the efflux from said float chamber.

4. In an automotive vehicle including a carbureter, said carbureter having a throttle with

means to open it, means operable by the driver of said automotive vehicle to control its speed, resilient means interposed between said speed control means and said throttle opening means, and pumping means to retard the opening of said throttle and augment the flow of fuel to aid in the acceleration of said automotive vehicle.

5. In an automotive vehicle including a carbureter, said carbureter having a throttle with means to open it, means operable by the driver of said automotive vehicle to control its speed, resilient means interposed between said speed control means and said throttle opening means, pumping means to retard the opening of said throttle, said pumping means operable in synchronism with said throttle to augment the fuel supply for acceleration.

6. In an automotive vehicle including a carbureter, a throttle to control the flow of mixture from said carbureter, resilient means to open said throttle, means within the reach of the driver of said automotive vehicle to tension said resilient means to thereby induce the opening of said throttle and an inelastic retardant to oppose the rapid relaxation of said resilient means.

7. In an automotive vehicle including a carbureter, a throttle to control the flow of mixture from said carbureter, resilient means to open said throttle, means within the reach of the driver of said automotive vehicle to tension said resilient means to thereby induce the opening of said throttle and a retardant unresponsive to suction to oppose the rapid relaxation of said resilient means.

8. In an automotive vehicle, including an engine, said engine having an intake conduit, a carbureter attached to said conduit, a throttle to control the flow of mixture from said carbureter, resilient means to open said throttle, means within the reach of the driver of said automotive vehicle to tension said resilient means to thereby induce the opening of said throttle and a retardant isolated from and immune to the suction within said intake conduit to oppose the rapid relaxation of said resilient means.

9. In an automotive vehicle having a carbureter, a throttle in said carbureter, an inelastic retardant, means within the reach of the driver of said automotive vehicle to control its speed and means to permit said retardant to prolong the time interval in opening said throttle beyond the time occupied in operating said speed control means.

10. An accelerating system for an automobile comprising an operating pedal, a throttle, means to operate said throttle by the movements of said pedal, said means being so arranged that the throttle movement time interval may be longer than the pedal movement time interval when the throttle is being opened but co-extensive when being closed.

11. An accelerating system for an automotive vehicle comprising a mixture supply conduit, a throttle in said conduit, a shaft on which said throttle is mounted and by which it is oscillated to open and close said conduit, a pump adapted to supply accelerating fuel to said conduit and comprising a piston and cylinder immune to the varying pressure in said conduit and connected with said shaft in such manner that the opening movement of said throttle is impeded thereby, a spring operatively engaged with said shaft to turn it and means operable by the driver of said automotive vehicle to tension said spring in the act of opening said conduit, whereby the relative velocity of said driver operable means and said throttle may be varied while the relative extent of movement may remain constant.

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