J. M. DAYTON.

AIR CONTROLLING MECHANISM FOR CARBURETERS.

APPLICATION FILED NOV. 2, 1909.

976,558. Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

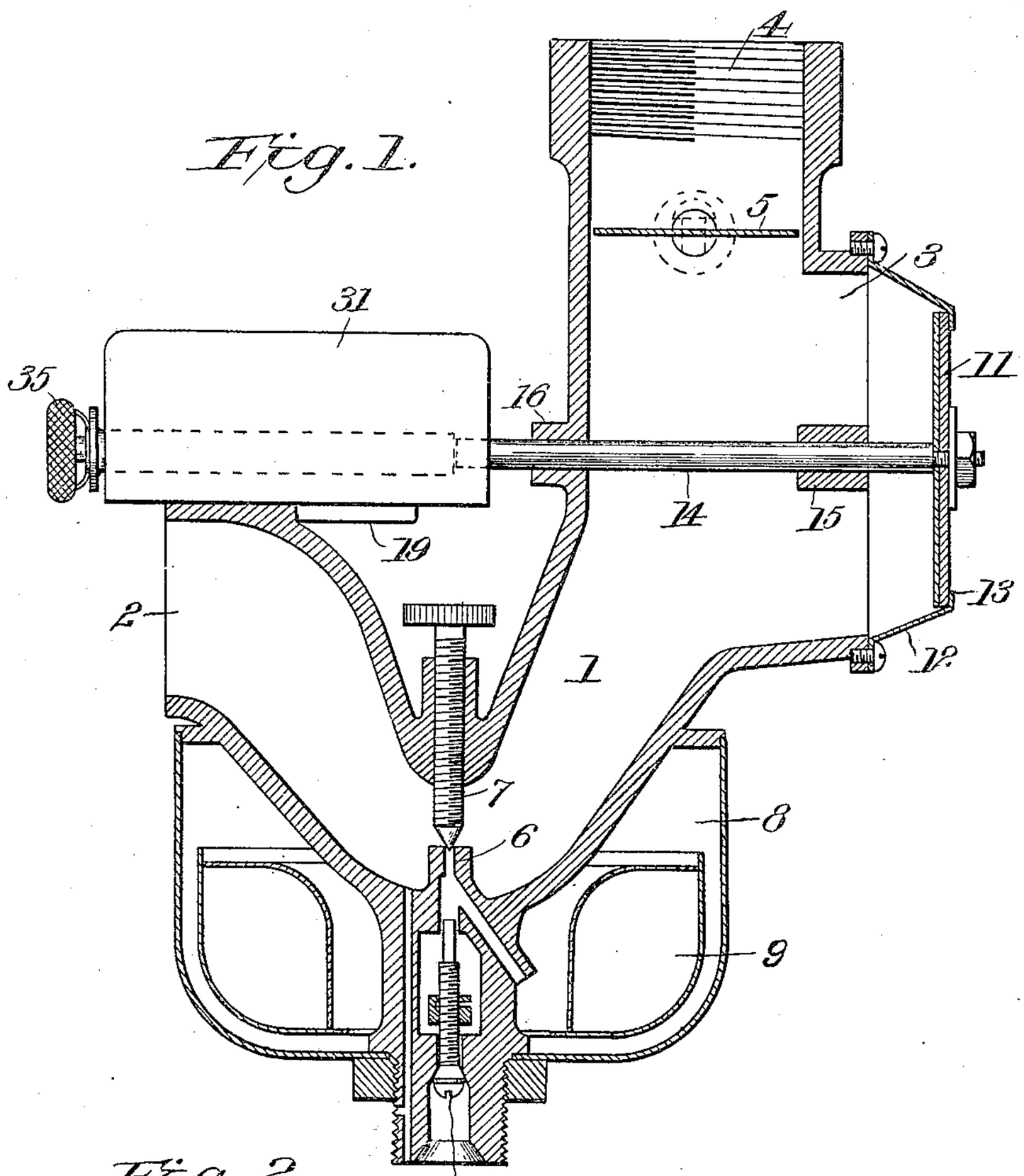

Fig. 2.

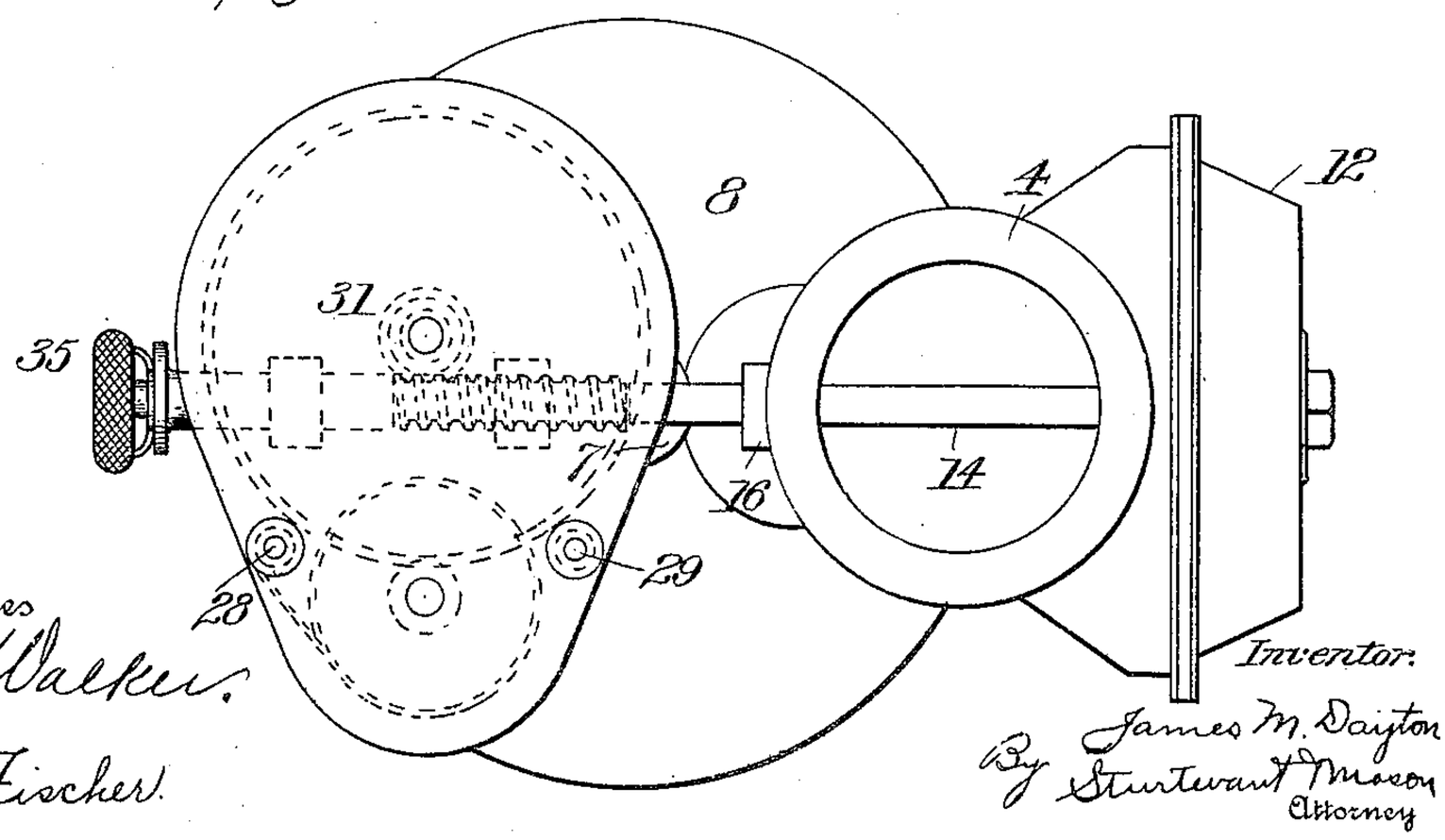

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Fig. 3.

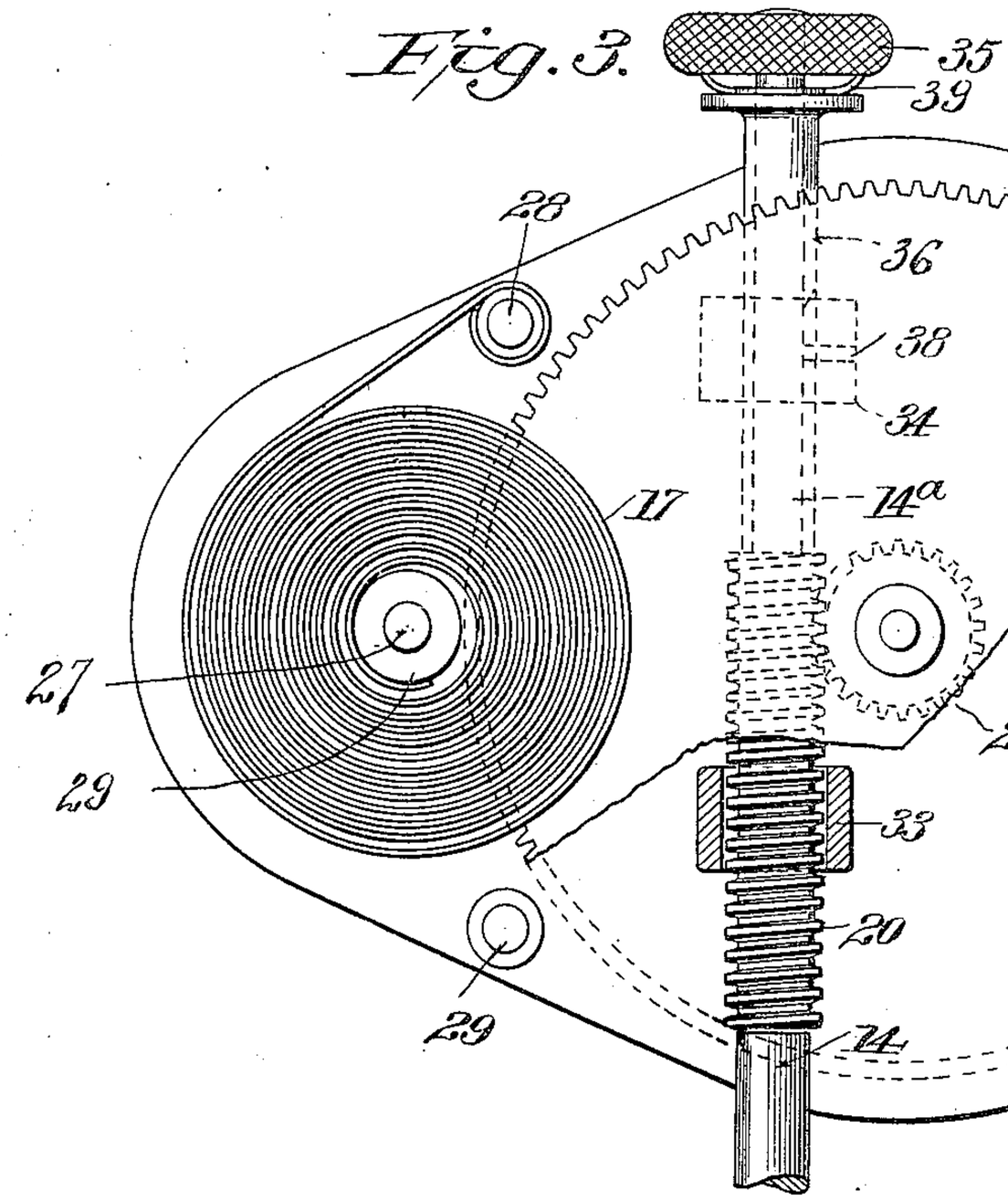


Fig. 4.

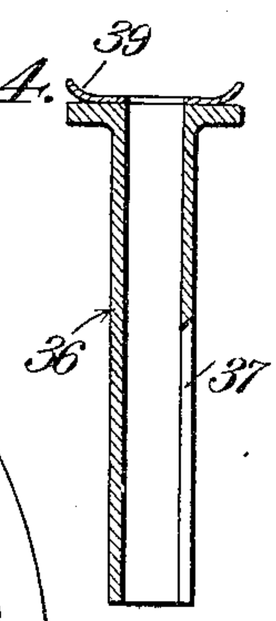
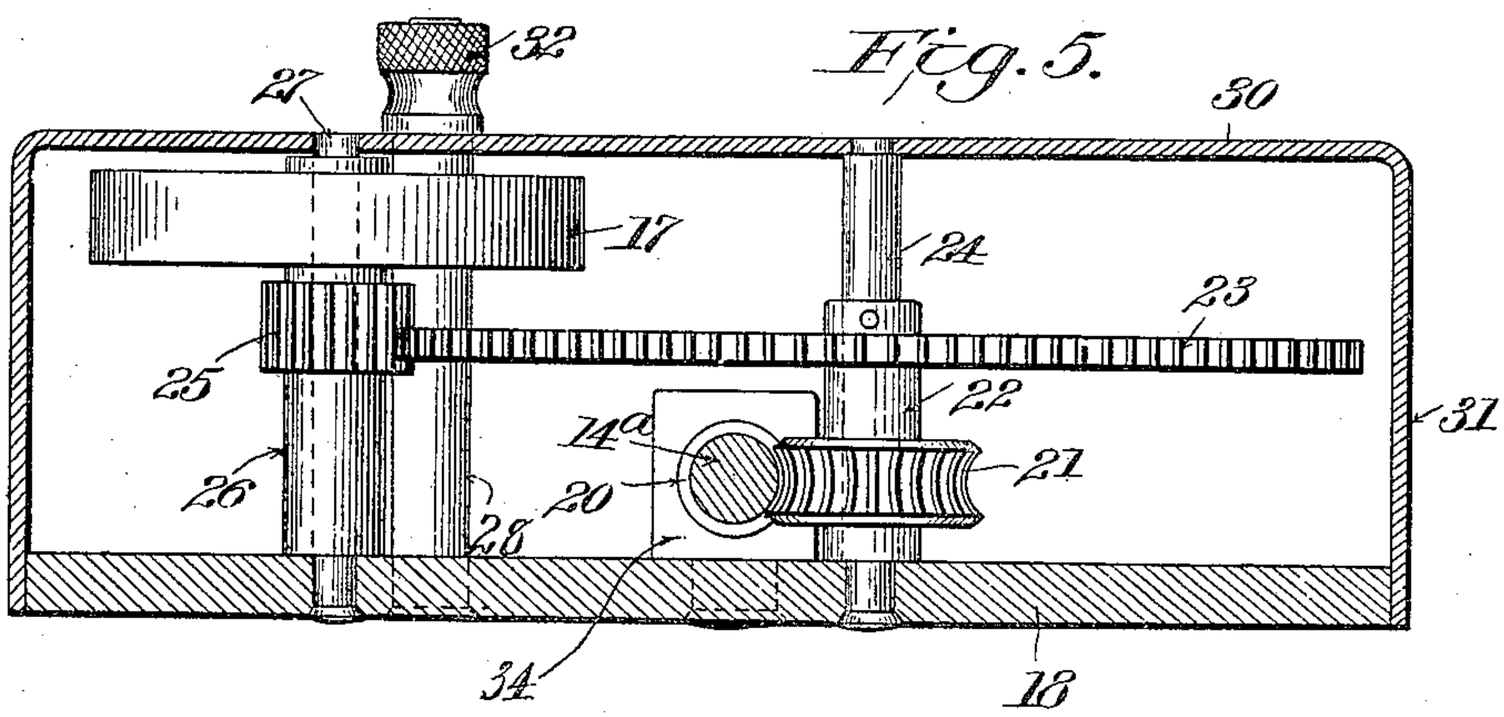


Fig. 5.



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UNITED STATES PATENT OFFICE.

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AIR-CONTROLLING MECHANISM FOR CARBURETERS.

976,558. Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed November 2, 1909. Serial No. 525,941.

To all whom it may concern:

Be it known that I, JAMES M. DAYTON, a citizen of the United States, residing at Torrington, in the county of Litchfield, State of Connecticut, have invented certain new and useful Improvements in Air-Controlling Mechanism for Carbureters, of which the following is a description, reference being had to the accompanying drawing and to the letters and figures of reference marked thereon.

The invention relates to new and useful improvements in carbureters, and more especially to the air controlling mechanism therefor.

An object of the invention is to provide an air valve with controlling mechanism which is so arranged and constructed as to prevent vibrations of the valve in response to the pulsations of the engine, said valve however, responding to the suction of the engine.

A further object of the invention is to provide a spring controlled air valve for a carbureter with mechanism intermediate the spring and the valve, whereby the movements of the valve imparted to the spring are multiplied so that exactly the right amount of movement may be given to the valve for the varying degrees of suction at different speeds.

A further object of the invention is to provide an air valve with controlling mechanism which includes a spring and intermediate mechanism between the spring and the valve, whereby the movements of the valve imparted to the spring are multiplied and to provide means for varying the tension of the spring.

These and other objects will in part be obvious, and will in part be hereinafter more fully described.

In the drawings which show by way of illustration one embodiment of the invention; Figure 1 is a sectional view through the carbureter with the housing for the controlling mechanism shown in side elevation. Fig. 2 is a top plan view of the same. Fig. 3 is a top plan view of the means for controlling the valve. Fig. 4 is a detail showing the sleeve for holding the parts in adjusted positions. Fig. 5 is a sectional view through the casing for the valve controlling mechanism and on a line passing through the center of the arbors for the coil spring, and the intermediate gear, the spiral rack being sectioned and the gears being shown in side elevation.

The carbureter as herein shown, comprises a main casing 1, which has a main air inlet 2, and an auxiliary air inlet 3. Said casing is also provided with an outlet opening 4 through which the mixture passes to the engine. Said outlet 4 is controlled by the usual throttle valve 5. The fuel is supplied through the nozzle 6 which is controlled by the needle valve 7. A float chamber 8 is provided with a float 9 which through the valve 10, controls the supply of the fuel in the float chamber. The valve controlling means herein shown, forms no part of the present invention, and the same is shown, described and claimed in my co-pending application Serial Number 525,942 filed of even date herewith.

The carbureter as herein shown, is operated by the suction stroke of the engine in the well known manner, the main supply of air being drawn through the opening 2 and the fuel being drawn by the suction stroke of the engine through the nozzle 6.

The auxiliary air inlet opening is closed by an air valve 11 which is yieldingly held against its seat. As herein shown, the casing 1 is provided with a cone-shaped cap 12, which has a flange 13 at its outer end, affording a seat for the valve 11. The valve 11 is mounted on the valve stem 14, which slides in a bearing 15, formed in a cross support secured to the main casing 1. Said valve stem also extends through the wall of the main casing 1, which is provided with a projecting bearing 16.

In order to hold the valve normally seated, I have provided a spiral spring 17 (see Fig. 3), which is connected to the valve mechanism through an intermediate train of mechanism. The spring and intermediate mechanism are mounted upon a supporting plate 18, which is carried by a bracket arm 19 formed integral with the main casing 1.

The valve stem 14 abuts against the end of the controlling rod 14^a, which is provided with a helical rack 20 which in turn engages a worm gear 21 carried by a sleeve 22, which also carries a large gear 23. The sleeve 22 is mounted on an arbor 24, which is riveted or secured in any other desired way to the supporting plate 18. The gear wheel 23 meshes with a small gear wheel 25 carried by

a sleeve 26 mounted on an arbor 27, which is also riveted or secured in any desired manner to the supporting plate 18. The spring 17 at its inner end is connected to the sleeve 26, and at its outer end is connected rigidly to a post 28 secured to the supporting plate 18. A second post 29 is also secured to the supporting plate 18.

In order to house the parts, I have provided a cover 30, which has a depending flange 31. The cover 30 rests on the posts 28 and 29 and the flange 31 extends downwardly to the lower edge of the supporting plate 18.

Openings are provided in the cover 30 to receive the upper ends of the arbors 24 and 27. Thumb nuts 32, threaded on to the upper ends of the posts 28 and 29, hold the cover in place. Bearings 33 and 34 are secured to the supporting plate 18, and the controlling rod slides freely through said bearings. It will readily be seen that when the valve 11 is moved away from its seat, the valve stem 14 will press against the end of the controlling rod 14ª and through its helical rack 20 turn the worm gear 21, which will operate the gear 23, and through the gear 25 wind up the spring 17.

The spring 17 will at once return the valve to its seat when the suction of the engine ceases. I am aware that it is very common to use a spiral compression spring for the purpose of controlling the auxiliary air valve, but said springs have been found objectionable, in view of the fact that a spring which is strong enough to hold the valve when the same is fully opened at high suction, is too strong to respond quickly to low suction. This objection is due largely to the extremely small movement of the valve, and a correspondingly small movement of the spring which directly engages the valve. In my present construction, it will be noted that through the intermediate gear 23, I have greatly multiplied the extent of movement imparted to the spring by the valve relative to the extent of movement of the valve and, therefore, the spring may be properly proportioned, so as to allow exactly the right amount of movement in the valve for all degrees of suction in the engine. Furthermore, it will be noted that through the multiplied movement imparted to the spring by the valve, I secure a much greater working length of spring, which greatly facilitates the calibrating of the spring. For example, if the total movement of the valve is three-eighths of an inch, and the spring is geared to wind one and one-half turns on an average circle of one and one-fourth inches in diameter, I have a working length of five and nine-tenths inches for calibration, as against three-eighths of an inch, in case of direct connection between the spring and valve.

By the use of the intermediate train of mechanism between the spring and the valve, I am able to do away with all movements of the valve caused by pulsations of the engine. While I have shown and described a spiral spring, together with intermediate mechanism for multiplying the movements of the valve imparted to the spring, it will be obvious that from certain aspects of the invention, other forms of springs may be used.

The controlling rod 14ª, carrying the rack 20, is provided with a projecting stem which carries on the end thereof a thumb piece 35, which serves as a means for rotating the spiral rack when desired. When the spiral rack is rotated by means of the thumb piece, the roller gear 21 will also rotate, and through the intermediate gears 23 and 25 wind up or unwind the spring 17, depending, of course, upon the direction of rotation of the thumb piece 25.

In order to hold the spiral rack in its various axial adjustments, the collar 36 is fitted over the projecting stem of the rack, and has a slot 37 engaging a pin 38 extending through the bearing 34, which prevents the sleeve 36 from rotating with the spiral rack, but allows said sleeve to move freely longitudinally with said rack.

The lower end of the sleeve 36 rests against a shoulder at the outer end of the spiral rack 20. At the outer end, the sleeve 36 carries spring fingers 39, which are adapted to engage suitable recesses in the thumb piece 35, and prevent the same from accidental movement.

By making the valve stem 14 separate from the spiral rack, it will readily be seen that the spring mechanism may be assembled apart from the carbureter proper, and readily placed on the carbureter in assembled condition. Furthermore, by making the valve stem separate from the controlling rod or spiral rack, the valve may be closed sharply in case of "back firing", without any chance of injuring the controlling mechanism by the shock. In the case of back firing, the explosion in the cylinder, while the inlet valve is open travels down the intake pipe into the carbureter mixing chamber, and closes the auxiliary valve, should the same be open. This free connection between the controlling mechanism and the valve, allows the valve to close quickly and the controlling mechanism operating in a normal manner, moves the controlling rod or spiral rack against the end of the valve stem.

The cone-shaped casing 12 forming the seat for the auxiliary valve, by reason of its tapered construction, allows the opening formed by the movements of the auxiliary valve to gradually increase for equal movements of the auxiliary valve, thus supplying

a slightly greater amount of air as the suction stroke increases.

Having thus particularly described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A carbureter including in combination, an air inlet, a valve for closing the same, a spring for holding said valve normally closed, and a train of gears intermediate said spring and said valve, whereby extent of movements of the valve imparted to the spring are multiplied.

2. A carbureter including in combination an air inlet opening, a valve for closing the same, a spiral spring for normally holding the valve closed, means intermediate the valve and said spiral spring for multiplying the extent of movement imparted to the spiral spring by the valve, said means being connected to one end of said spiral spring, whereby upon the movement of the valve, the spring is wound up or allowed to unwind.

3. A carbureter including in combination an air inlet opening, a valve for closing the same, a spiral spring for controlling said valve, and a train of gearing between said spiral spring and said valve.

4. A carbureter including in combination, an inlet opening, a valve for closing the same, a valve stem connected to said valve, a spiral spring, a gear wheel connected to one end of said spiral spring, a rack movable by said stem, and intermediate gearing between said rack and said first named gear.

5. A carbureter including in combination, an air inlet opening, a valve for closing the same, a spiral spring controlling said valve, an intermediate train of mechanism between said valve and said spiral spring, whereby the extent of movement of the valve imparted to the spring is multiplied, and means operating through said intermediate train of mechanism, for adjusting the tension of said spiral spring.

6. A carbureter including in combination, an air inlet opening, a valve for closing the same, a valve stem secured to said valve, a helical rack movable by said valve stem, a spiral spring, a gear for connecting said spiral spring with said rack.

7. A carbureter including in combination an air inlet opening, a valve for closing the same, a valve stem secured to said valve, a helical rack movable by said valve stem, a spiral spring, a gear for connecting said spiral spring with said rack, means whereby said helical rack may be rotated for varying the tension of said spiral spring.

8. A carbureter including in combination, an inlet air opening, a valve closing the same, a valve stem connected to said valve, bearings for supporting said valve stem whereby said stem may move longitudinally, a spiral spring, means for holding one end of said spiral spring, and means intermediate the other end of said spiral spring and said valve stem for moving said stem longitudinally in its bearings for opening and closing said valve.

9. A carbureter including in combination, an inlet air opening, a valve for closing the same, a valve stem connected to said valve, a helical rack movable by said valve stem, bearings in which said valve stem may slide, a supporting plate, a gear mounted on said supporting plate, and meshing with said helical rack, a second larger gear connected therewith, a spiral spring, means rigidly connected to one end of said spring, and a third gear connected to the other end of said spiral spring, and meshing with said large gear.

10. A carbureter including in combination, an inlet air opening, a valve for closing the same, a valve stem connected to said valve, a helical rack movable by said valve stem, bearings in which said valve stem may slide, a supporting plate, a gear mounted on said supporting plate and meshing with said helical rack, a second larger gear connected therewith, a spiral spring, means rigidly connected to one end of said spring, and a third gear connected to the other end of said spiral spring and meshing with said large gear, and means for rotating said spiral rack, whereby the tension of the spiral spring may be varied.

11. A carbureter including in combination, a main casing, an air inlet opening formed therein, a valve for closing the same, a valve stem connected to said valve and extending through said casing, a supporting plate located on the outside of said casing and connected thereto, a spiral spring mounted on said supporting plate, intermediate gearing mounted on said supporting plate and connecting said spiral spring to said valve stem, a casing for inclosing said spiral spring and said gearing connected to and supported by said supporting plate.

12. A carbureter including in combination, a main casing, an air inlet opening formed therein, a valve for closing the same, a valve stem connected to said valve, a controlling rod in line with said valve stem and freely abutting against the end thereof, and a spring for controlling the movements of said controlling rod.

13. A carbureter including in combination, an air inlet opening, a valve for closing the same, a valve stem connected to said valve, a helical rack movable by said valve stem, bearings in which said valve stem may slide, a supporting plate, a gear mounted on said supporting plate and meshing with said helical rack, a second larger gear connected therewith, a spiral spring, means rigidly connected at one end to said spring, a third gear connected to the other end of said

spiral spring and meshing with said larger gear, a stem projecting from said helical rack, a sleeve loosely mounted on said rack stem, means for holding said sleeve from rotating and allowing the same to move longitudinally with said rack, and means connected to the rack stem and frictionally engaging said sleeve, whereby said rack may be rotated for adjusting the tension of the spiral spring.

In testimony whereof I affix my signature, in presence of two witnesses.

JAMES M. DAYTON.

Witnesses:

DENNIE HILDRETH,

CHAS. M. HIBBARD.