Nov. 18, 1924. 1,515,830

W. J. BURCHETT

CARBURETOR CONTROL

Filed Jan. 14, 1921 3 Sheets-Sheet 1

Fig. 1.

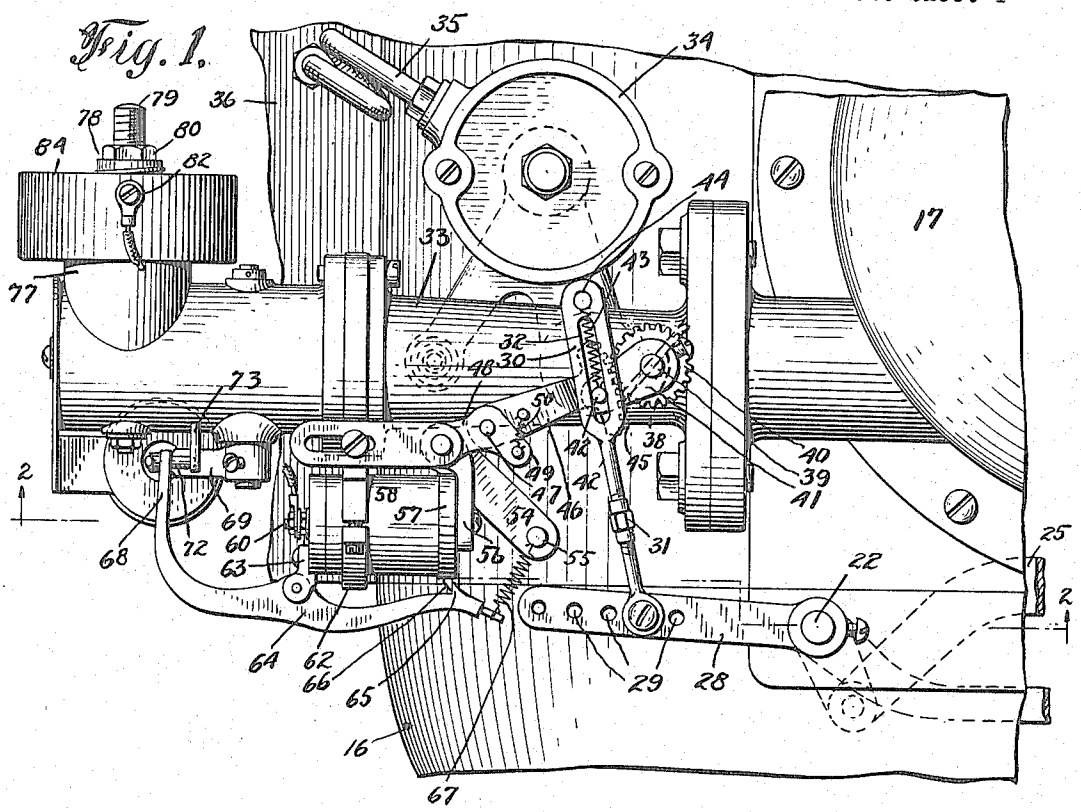

Fig. 2.

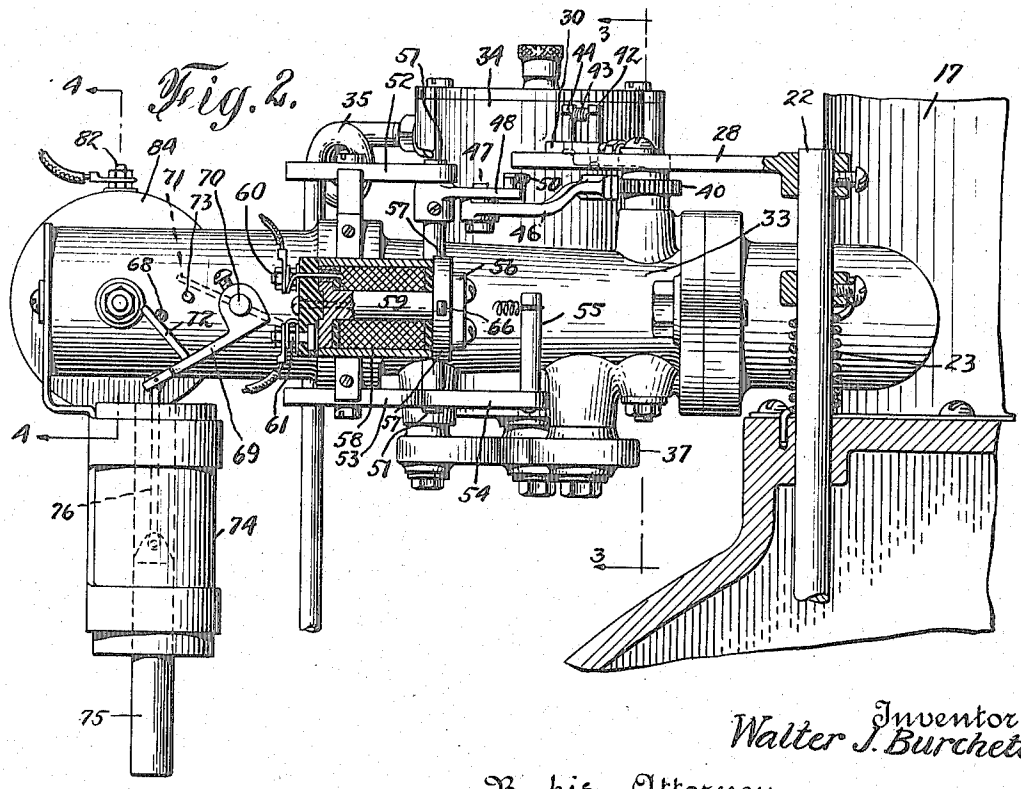

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Fig. 3.

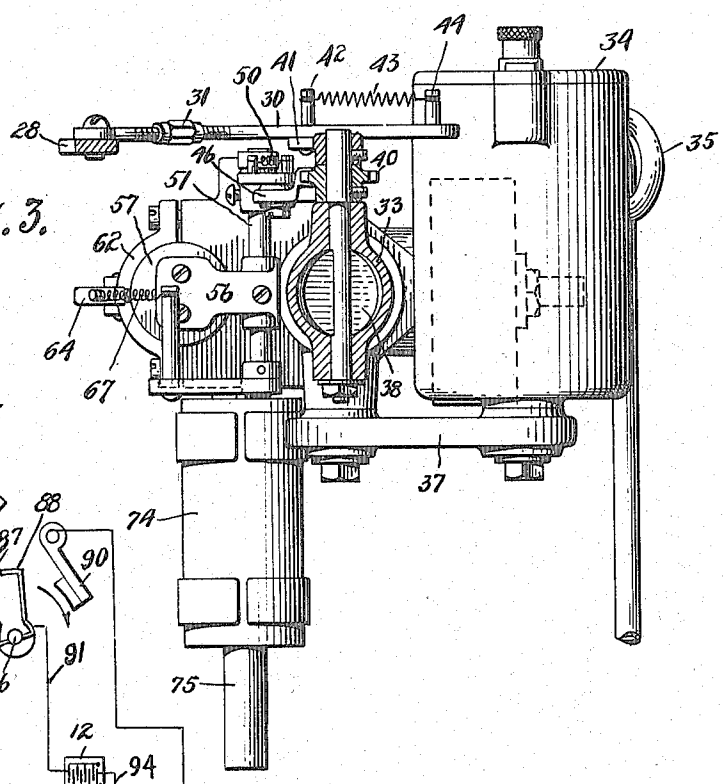


Fig. 7.

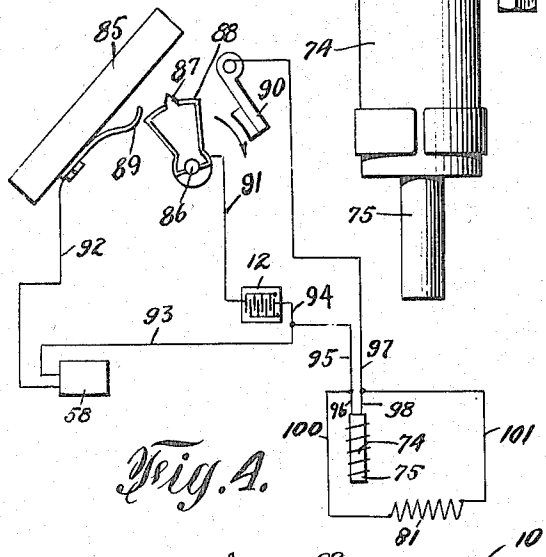


Fig. 4.

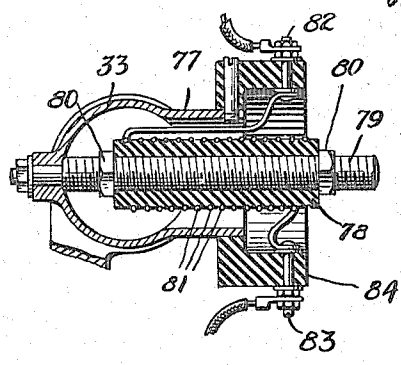
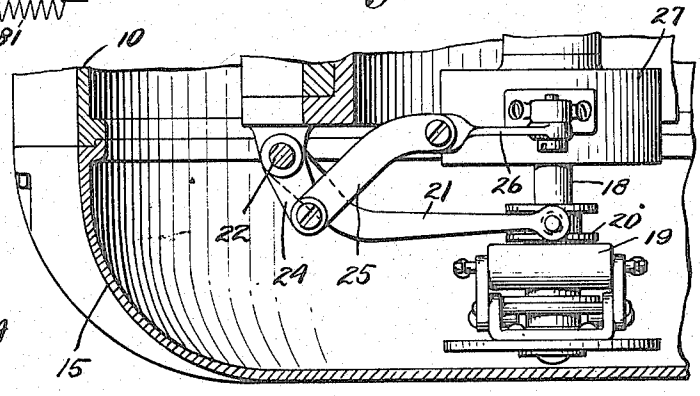


Fig. 5.



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3 Sheets-Sheet 3

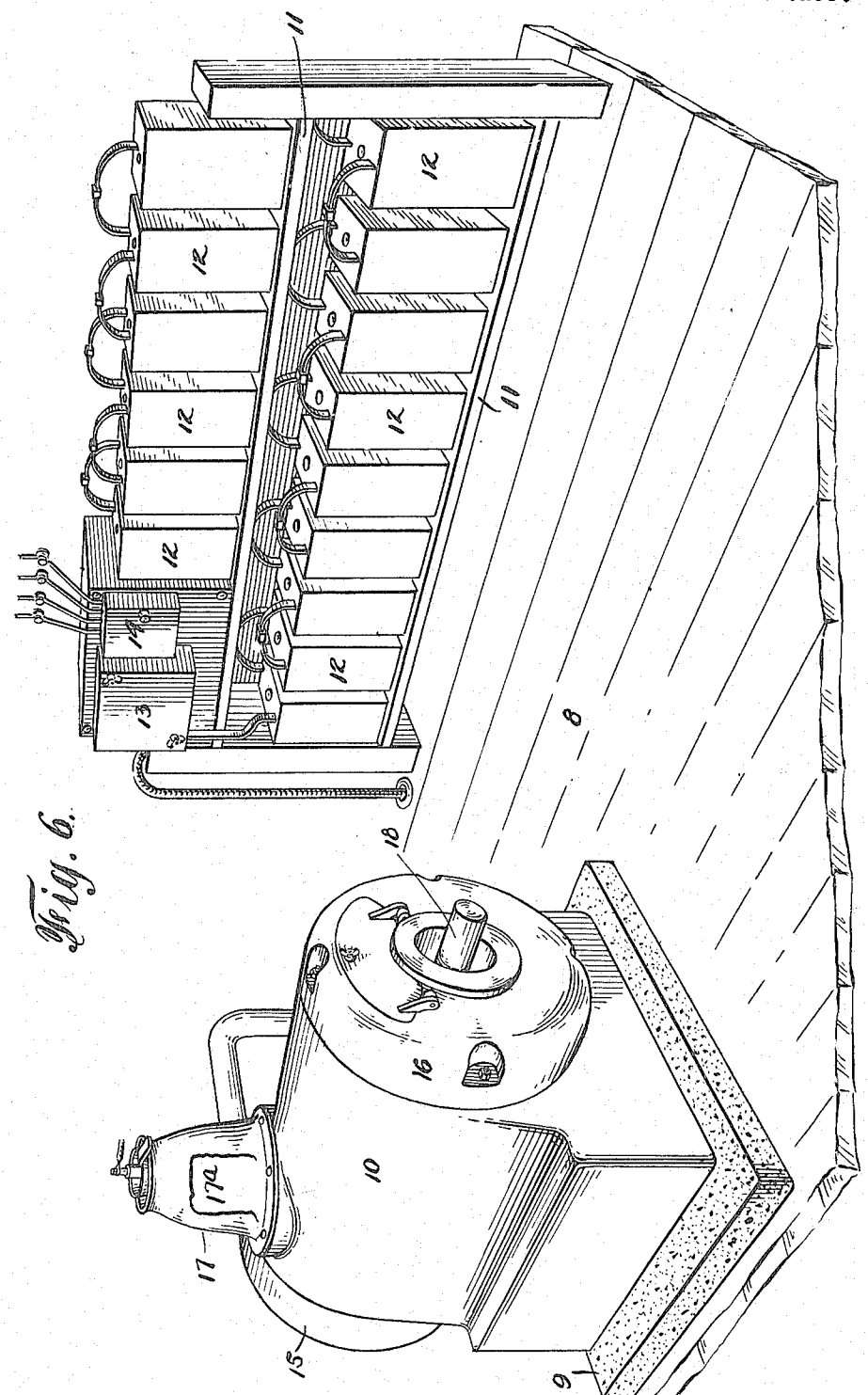

Fig. 6.

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Patented Nov. 18, 1924. 1,515,830

UNITED STATES PATENT OFFICE.

WALTER J. BURCHETT, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SIMPLEX UTILITIES CORPORATION, A CORPORATION OF DELAWARE.

CARBURETOR CONTROL.

Application filed January 14, 1921. Serial No. 437,166.

To all whom it may concern:

Be it known that I, WALTER J. BURCHETT, a citizen of the United States, residing in East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Carburetor Controls, of which the following is a full, clear, and concise description.

My invention relates to carburetor controls for general use but is more especially applicable to carburetor controls of the kind suitable for use in connection with internal combustion engines combined with generators in the so-called automatic units for supplying electric current as the latter is used, and which are controllable, as to stopping and starting, by the condition of the apparatus, thus requiring a minimum of attention.

More particularly stated, my invention relates to the inlet valve, for admitting the explosive mixture into the engine, and the air valve or choker valve for admitting air to be incorporated into the explosive mixture, the purpose of my improvement being to provide for the control of these two valves, so as to leave the inlet valve subject to the action of the governor mechanism of the engine and yet to effect the proper opening and closing of each of these valves by devices working automatically and independently of the presence or absence of the operator.

Reference is made to the accompanying drawings forming a part of this specification, and in which like reference characters indicate like parts throughout the several figures.

Figure 1 is a fragmentary plan of a carburetor adapted for use with my invention, and mounted upon the casing of a combined engine and generator.

Figure 2 is a section on the line 2—2 of Figure 1, looking in the direction indicated by the arrows.

Figure 3 is a section on the line 3—3 of Figure 2, looking in the direction indicated by the arrows.

Figure 4 is a section on the line 4—4 of Figure 2, looking in the direction indicated by the arrows.

Figure 5 is a fragmentary horizontal section through the casing, and shows the governor and parts immediately associated therewith.

Figure 6 is a perspective of various parts, including the combined engine and generator, the storage battery and certain controlling devices.

Figure 7 is a fragmentary diagram of the wiring used in connection with the carburetor control.

Referring more particularly to Figure 6 a floor is shown at 8, and resting upon it is a concrete base 9, supporting the casing 10 in which is located the combined engine and generator.

Resting upon the floor 8 is a rack 11, supporting a storage battery 12, a control box 13 and a switch box 14. The casing 10 is provided with casing heads 15, 16. A two cycle engine is shown at 17^a, and is enclosed within a cooling jacket 17, through which a stream of air flows constantly while the engine is in action, for the purpose of keeping down the temperature of the engine.

Extending axially through the casing is a revoluble shaft 18, serving as both an engine shaft and an armature shaft. This shaft carries a governor 19, operated by centrifugal force, and provided with a collar 20, the latter being movable slightly in the direction of the shaft 18 under the centrifugal action of the governor, in the usual or any desired manner.

Engaging the collar 20 is an arm 21, rigidly mounted upon a vertical shaft 22. Another arm 24, shorter than the arm 21, is also mounted rigidly upon the vertical shaft 22. A bar 25 is journaled upon the outer or free end of the arm 24 and is connected with an arm 26, forming a part of the timer 27 and used for controlling the latter. Connected with the upper portion of the shaft 22 (see Figure 2) is a spiral spring 23 which encircles the shaft 22 and is connected directly with the casing. The spring 23 is at all times under tension, and its tendency is to turn the shaft 22 in clockwise direction according to Figures 1 and 5. Thus when the engine is idle and as a consequence the governor is motionless, the spring 23 by its tension maintains the shaft 22 in such position as to be at the limit of its rotation in a clockwise direction according to Figures 1 and 5.

Mounted rigidly upon the vertical shaft 22 is an arm 28, provided with holes 29 spaced apart as shown in Figure 1. Pivotally connected with the arm 28 is a link 30,

provided with a turnbuckle 31 and with a slot 32. By aid of the turnbuckle the virtual length of the link 30 may within narrow limits be increased or reduced at the will of the operator. By aid of the various holes 29, the connection between the bar 30 and the arm 28 may be shifted to different points along the arm, so as to vary the leverage of the arm, as may be understood from Figure 1.

A carburetor barrel is shown at 33, and in close proximity to it is a float chamber 34, connected by a gasoline pipe 35 with a gasoline tank 36, the latter being conveniently housed within the lower portion of the casing 10. A vaporizer 37 is connected with the float chamber 34, and leads therefrom to the carburetor barrel 33.

The inlet valve is shown at 38, and with the apparatus idle occupies the position indicated by dotted lines in Figure 1—that is the inlet valve is closed while the engine is not running. The valve 38 is rigidly mounted upon a shaft 39. A gear pinion 40 and an arm 41 are also rigidly mounted upon this shaft. The arm 41 carries a pin 42, which extends through the slot 32. A spring 43 is connected with the pin 42 and extends therefrom to the pin 44 carried by the link 30. The purpose of the spring 43 is to communicate motion upon the link 30 to the arm 41, so that while under certain conditions the arm 41 and consequently the valve 38 may be actuated from the arm 28 and consequently from the engine governor, nevertheless the motion transmitted is not quite positive, the thrust of the link 30 being cushioned by the tension of the spring 43.

Engaging the pinion 40 is a rack 45, carried by an arm 46. This arm is mounted upon a pin 47 carried by an arm 48. This arm is provided with a shoulder 49 which extends downwardly a little, into the same plane as the arm 46. A spring 50 extends from the shoulder 49 to the arm 46. This spring tends to hold the arm 46 in contact with the shoulder 49. It also tends to rock the arm 46 in a clockwise direction according to Figure 1, and thus to maintain the valve 38 closed; that is, whenever the arm 46 has freedom of movement allowed it by the position of the shoulder 49, as hereinafter explained. The arm 48 is mounted rigidly upon a shaft 51. This shaft being journaled in bearings 52, 53. Rigidly mounted upon the shaft 51 is an arm 54, carrying a pin 55. The shaft 51 also carries an arm 56, and this arm supports an armature 57. An iron clad magnet is shown at 58, and is adapted to attract the armature 57. The iron clad magnet 58 is provided with a core 59 and with binding posts 60, 61. The iron clad magnet is detachably held in position by a clamp 62. The iron clad magnet 58 carries a bearing 63 and supported upon this bearing a latch lever 64, the general form of which is indicated in Figure 1. The latch lever 64 is provided with a hook 65, so arranged as to engage a bolt 66, carried by the armature 57. A spring 67 extends from the arm 54 to the latch lever 64. The tendency of the spring 67 is to draw the latch lever 64 and the arm 54 toward each other, so that when the apparatus as a whole is idle, the armature is pressed against the magnet and the latch lever holds the armature, by virtue of the hook 65.

With the parts in the positions just indicated, the intake valve 38 is kept tightly closed, because the spring 50 is now maintaining the arm 46 at the limit of its travel in a clockwise direction according to Figure 1; and as stated, the arm 48 is also at the limit of its travel in a clockwise direction according to this figure. Therefore the spring 50 is pulling upon the arm 46, and the rack 45, by its action on a pinion 40, keeps the intake valve 38 closed. However the arm 41 is now at the limit of its travel in a contra-clockwise direction, so that the spring 43 is pulling upon the arm 41, and would open the intake valve except for the latter being held tightly closed, as just described. In other words, the valve remains closed because the spring 50 outpulls the spring 43. This leaves the apparatus in such condition, therefore, that the intake valve 38 will be opened by the tension of the spring 43 whenever the armature 57 is released. As a separate proposition, the intake valve 38 may be opened by action of the governor mechanism. This takes place whenever the lever 28, forming a part of the governor mechanism, is rocked to a sufficient extent, or to the limit of its travel as the case may be, in a clockwise direction according to Figure 1.

The latch lever 64 is provided with a tail portion 68, bent inwardly as indicated in Figure 1. An arm 69 is located adjacent the tail portion 68, and is mounted rigidly upon a shaft 70, this shaft carrying a butterfly valve 71, serving as an air valve and commonly designated as the choker valve of the carburetor. The arm 69 carries a finger 72, which slidably engages the tail portion 68 of the latch lever. A stop pin 73 limits the upward travel of the arm 69.

Located a little below the carburetor barrel is a solenoid 74, provided with a movable core 75, the latter being connected by a rod 76 with the arm 69. Whenever the solenoid is energized, as hereinafter described, the core 75 is raised so as to rock the arm 69 and close the valve 71. Hence with the solenoid 74 de-energized, the valve 71 is open.

Each time the solenoid is energized and the core 75 raised as above described, the

rocking of the arm 69 causes the finger 72 to move the tail portion 68 of the latch lever 64, so that the latch lever is disengaged from the armature 67 of the iron clad magnet 68. This releases the armature 67, and allows the same to swing away from the iron clad magnet. The carburetor barrel 33 is provided with a chamber 77 extending laterally from it and serving as a heating chamber. Located centrally within the heating chamber is a heating unit 78, of the form shown more particularly in Figure 4. This heating unit consists of a tubular member of slate, mounted upon a threaded rod 79 and adjustably held in position by nuts 80. A winding 81 of resistance wire is mounted upon the member 78 and is connected with binding posts 82, 83, these binding posts being carried by a ring 84 of insulating material. When air is drawn into the carburetor barrel, the air passes through the heating chamber and its temperature is thus raised.

A diagram of the wiring immediately associated with the mechanism above described and of the controlling mechanism associated with said wiring is shown in Figure 7.

A control board appears at 85, and is mounted within the switch box 13 shown in Figure 6. A revoluble shaft 86 is supported by the control board, and carries a contact point 87 and a contact sector 88, these two parts being made of metal and connected directly together so that both are rotated by the shaft 86.

A contact spring 89 is mounted upon the control board 85, and disposed partially in the path of travel of the contact point 87, so that the spring is touched momentarily by the contact point 87 during each revolution of the shaft 86. Another contact member 90, supported by the contact board 85, is also located partially within the path of travel of the sector 88, these parts being so portioned and arranged that a contact having a duration of twenty or thirty seconds takes place between the contact sector 88 and the contact member 90, during each revolution of the shaft 86. A wire 91 leads from the storage battery 12 to the shaft 86. A wire 92 leads from the contact spring 89 to the iron clad magnet 58. A wire 93 is connected with this magnet and with a wire 94 which leads to the storage battery 12. A wire 95 is connected with the wires 93 and 94 and also with a wire 96, the latter leading to the solenoid 74. A wire 97 is connected with the contact member 90 and with a wire 98, the latter being connected with the solenoid 74. A wire 100 is connected with the wires 95 and 96, and leads therefrom to the heating coil with this winding 81. A wire 101 is connected with the heating coil, and also with the wires 97, 98.

It will be noted that the contact consisting of the contact point 87 and the spring 89 is in series with the iron clad magnet. It will also be noted that the solenoid and the heating coil are in parallel with each other, with reference to the contact consisting of the sector 88 and the contact member 90. It is obvious, therefore, that during each revolution of the shaft 86 the iron clad magnet 58 is energized momentarily; also that the solenoid and the heating coil are energized for a period of from twenty to thirty seconds.

I do not deem it necessary to describe the general operation of the unit as a whole, as this forms no part of my invention.

The operation of my device is as follows:

I will assume, first, that the apparatus is idle, and that as a consequence the various movable parts occupy the respective positions indicated for them in the drawings.

The core of the solenoid is now down, because the circuit for energizing the solenoid is open. The air valve 71, known as the choker valve, is open. The heating coil is cold, the circuit for energizing it being open. The iron clad magnet is de-energized, its armature is pressed against it, and held firmly by the latch lever. The circuit for energizing the iron clad magnet is open. The intake valve 38, for controlling the flow of the explosive mixture, is closed and virtually locked.

The generator is de-energized, the engine is idle and the governor is motionless. The governor lever 28 is at the limit of its travel in a clockwise direction according to Figure 1, so that the spring 43 is under its maximum tension.

The spring 50 is holding the intake valve tightly closed.

Suppose, next, that the shaft 86 within the control box, slowly makes one complete revolution. The sector 88 engages the contact member 90 for an interval of twenty to thirty seconds. During this interval, the solenoid and the heating coil are both energized.

The circuit through the solenoid may be traced as follows: storage battery 12, wire 91, shaft 86, sector 88, contact member 90, wire 97, wire 98, solenoid 74, wires 96, 95 and 94, back to storage battery 12.

The circuit through the heating coil may be traced as follows: storage battery 12, wire 91, shaft 86, sector 88, contact member 90, wire 97, wire 101, winding 81 of heating coil, wire 100, wires 95, 94, back to storage battery.

Thus the heating coil does its work and heats the air which now begins to enter the carburetor barrel by flowing in through the heating chamber.

The solenoid being energized, its core 75 is raised, the arm 69 is rocked, the latch lever 64 is actuated by the finger 72, the

armature 57 of the iron clad magnet 68 is released, and the spring 43 thereupon rocks the arm 41 in a clockwise direction according to Figure 3, so as to open the intake valve 38. This allows the explosive mixture, in which the heated air entering through the heating chamber is incorporated, to be drawn into the engine. The apparatus, therefore, continues in action until the rotation of the shaft 86 (Figure 7) causes the contact point 87 to engage the contact spring 89 and thus close the circuit through the iron clad magnet 58, as above described.

When this takes place, and the iron clad magnet 58 is as a consequence energized momentarily, the following actions take place:

The armature 57 is forcibly attracted by the iron clad magnet, and closes against the same. The latch lever 64, being now free except for the spring 67 but under control of this spring, swings into such position that the hook 65 locks the armature 57 against the iron clad magnet. This closing movement of the armature 57, by actuating the arms 48 and 46, and by moving the rack 45 as above described, turns the pinion 40 and causes the intake valve to close, as above described with reference to Figure 1. The solenoid 74 is now de-energized, as its circuit is open. Hence the arm 69 occupies the position indicated for it in Figures 1 and 2.

Thus the apparatus as a whole is now in the condition indicated in the figures, and above described.

The intake valve 38 is under control of the governor mechanism also, because the governor arm 28, in swinging back and forth, pushes and pulls the link 30. This link is movable in the general direction of its length, and can rock the arm 41 whenever the link is moved to such an extent that the pin 42 occupies either end of the slot 32. In other words the link 30 has a certain amount of lost motion relatively to the pin 42, but beyond the limits of this lost motion the pulling and pushing of the link 30 must rock the arm 41 and by so doing must open or close the intake valve 38. Therefore, the intake valve 38 is under control of the governor and is under control of the solenoid 74 and iron clad magnet 58.

In the apparatus above described, there is a very fine regulation of the flow of air into the carburetor, and also a very fine regulation of the flow of the explosive mixture as supplied to the engine. Notwithstanding this refinement in the regulation of the flow of air and of explosive mixture, the action of the governor is quite positive and reliable.

I do not limit myself to the precise mechanism shown and described, as variations therefrom may be made without departing from my invention, the scope of which is commensurate with my claims.

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

1. In a device of the character described the combination, with an engine having a revoluble shaft and a carburetor provided with an intake valve for supplying an explosive mixture to the engine, of a governor mounted upon said revoluble shaft, connections from said governor to said intake valve for enabling said governor to actuate said intake valve, mechanism independent of said governor for closing said intake valve, a magnet provided with a movable armature, said armature being connected with said mechanism independent of said governor, controller mechanism including a source of electricity for energizing and de-energizing said magnet, locking mechanism for holding said armature in a predetermined position while the apparatus is idle, and mechanism connected with said controller mechanism and with said locking mechanism, for enabling said controller mechanism to actuate said locking mechanism.

2. In a device of the character described the combination, with an engine having a revoluble shaft and a carburetor provided with an intake valve for supplying an explosive mixture to the engine, of a governor connected with said revoluble shaft, connections from said governor to said intake valve for enabling the governor to actuate the intake valve, a magnet provided with a swinging armature, connections from said swinging armature to said intake valve for enabling swinging movements of said armature to shift the position of said intake valve, a latch lever for locking said armature in a predetermined position while the engine is idle, said latch lever being provided with a tail portion, a solenoid and connections for actuating said tail portion in order to disengage said latch lever and thus free said armature, and controller mechanism including a circuit connected with said solenoid, for energizing and de-energizing said solenoid.

3. In a device of the character described the combination, with a carburetor having an intake valve for admitting an explosive mixture from the carburetor into an engine, of mechanism including a magnet and connected with said intake valve for opening and closing the same, a choker valve for admitting into said carburetor a supply of air to be incorporated in said explosive mixture, mechanism including a magnetic member and connected with said choker valve for the purpose of closing said choker valve when said magnetic member is energized and of opening said choker valve when said mag-

netic member is de-energized, and controller mechanism, including circuits connected with said magnet and said magnetic member, for the purpose of periodically energizing said magnet and said magnetic member.

4. In a device of the character described the combination, with an engine having a revoluble shaft and a carburetor provided with an intake valve for supplying an explosive mixture to the engine, of a governor connected with said revoluble shaft, connections from said governor to said intake valve for enabling the governor to actuate the intake valve, mechanism including a magnet and connected with said intake valve for opening and closing said intake valve, a choker valve for admitting air to be incorporated in the explosive mixture, a magnetic member and connections therefrom to said choker valve for actuating said choker valve, and controller mechanism, including electric circuits connected with said magnet and with said magnetic member, for energizing and de-energizing said magnet and said magnetic member.

5. In a device of the character described the combination, with a carburetor having an intake valve for admitting an explosive mixture from the carburetor into an engine, of a shaft connected with the intake valve for opening and closing the same, a gear pinion mounted upon said shaft, a rack engaging said pinion, an arm carrying said rack, a second arm upon which said first mentioned arm is journaled, a rocking shaft carrying said second mentioned arm and secured rigidly to said second mentioned arm in order to rock therewith, an armature mounted upon said last mentioned shaft and having a rocking movement, a magnet for actuating said armature and controller mechanism including a circuit connected with said magnet, for energizing and de-energizing the same.

6. In a device of the character described the combination, with an engine having a revoluble shaft and a carburetor provided with an intake valve for supplying an explosive mixture to the engine, of a governor connected with said revoluble shaft, connections from said governor to said intake valve for enabling the governor to actuate the intake valve, mechanism connected with said intake valve for opening and closing said intake valve, a choker valve for admitting air to be incorporated in the explosive mixture, a magnetic member and connections therefrom to said choker valve for actuating said choker valve, and controller mechanism, including an electric circuit connected with said magnetic member, for energizing and de-energizing said magnetic member.

WALTER J. BURCHETT.