May 18, 1943 G. A. ROBBINS 2,319,264

AUTO GOVERNOR

Filed Aug. 24, 1939 2 Sheets-Sheet 1

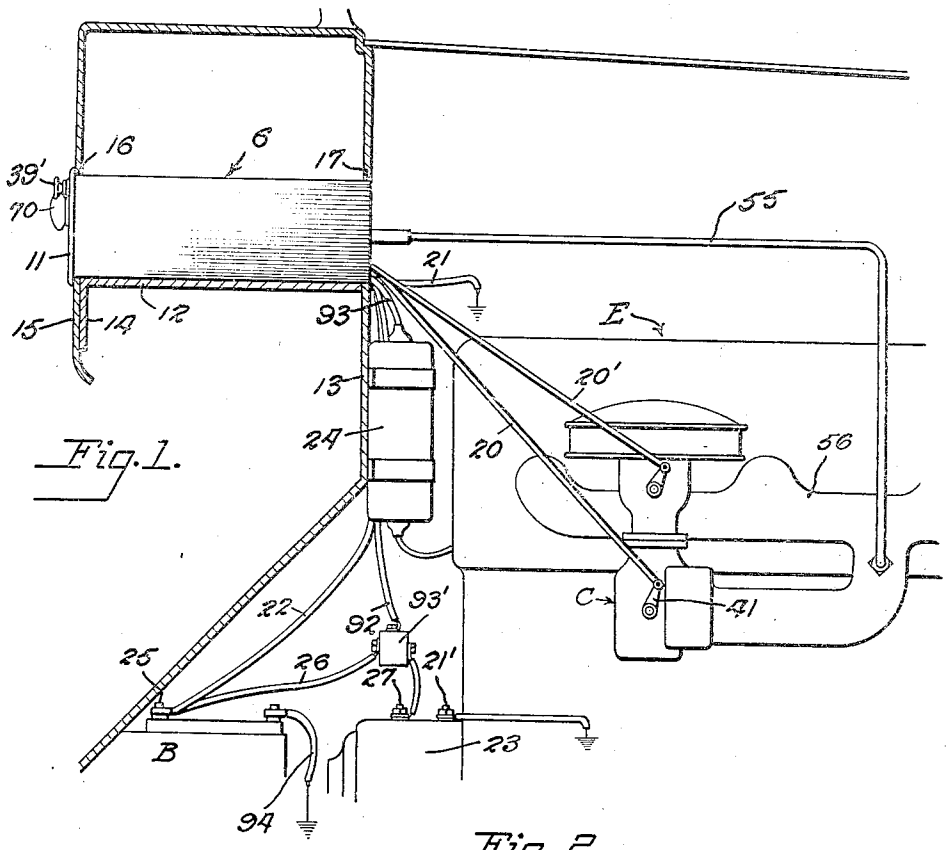


Fig. 1.

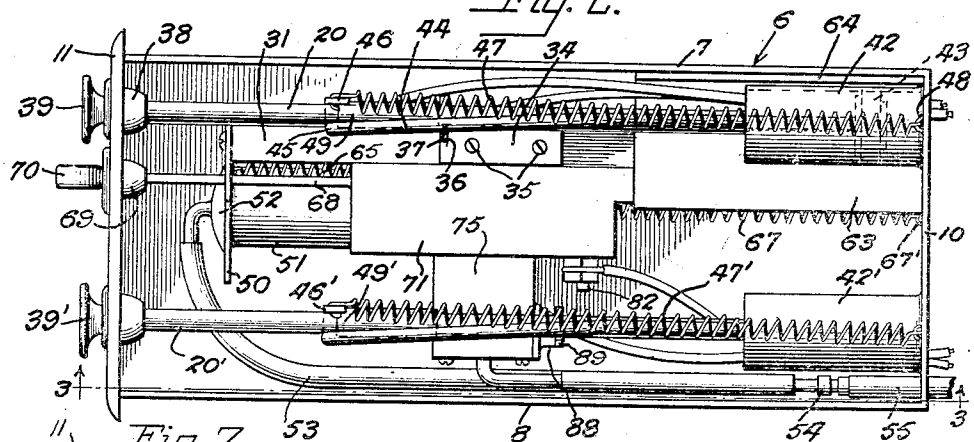


Fig. 2.

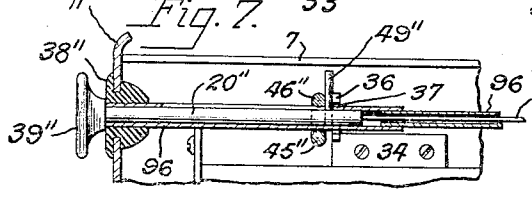


Fig. 7.

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AUTO GOVERNOR

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Fig. 3.

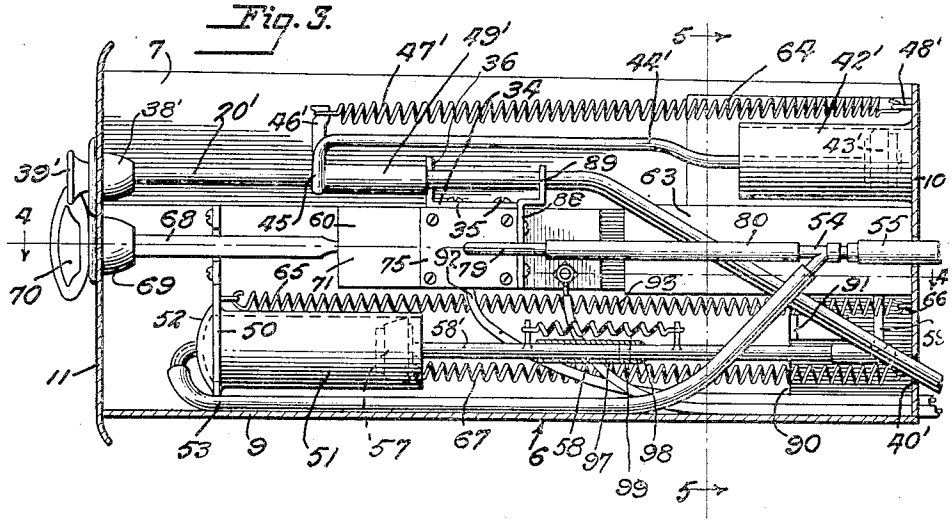
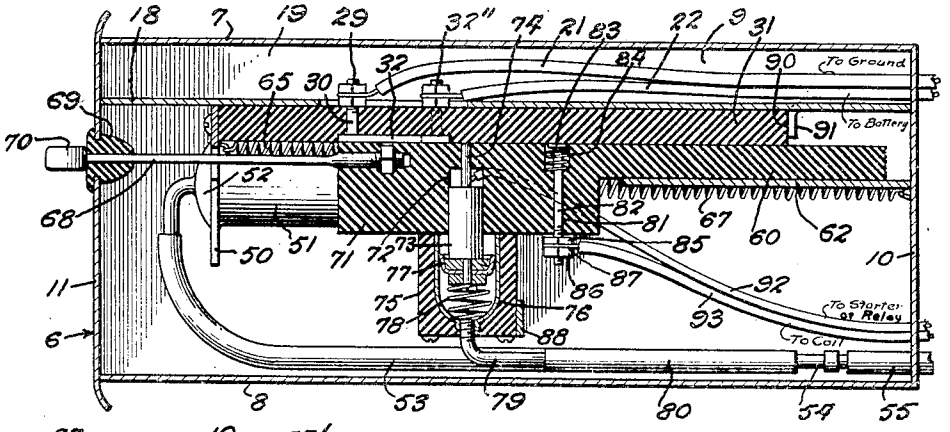


Fig. 4.



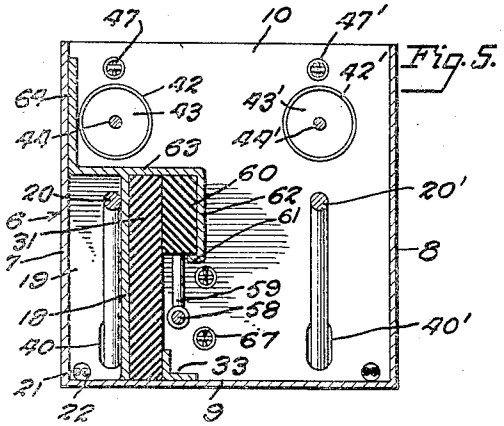


Fig. 5.

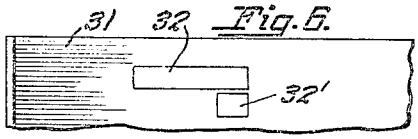


Fig. 6.

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Patented May 18, 1943

2,319,264

UNITED STATES PATENT OFFICE

2,319,264

AUTOGOVERNOR

George A. Robbins, Hilliar Township, Knox County, Ohio

Application August 24, 1939, Serial No. 291,792

27 Claims. (Cl. 290—38)

This invention relates to centralized motor controls generally; and more particularly to a motor control for operating the starting and ignition system as well as the throttle and choke valves of an internal combustion engine from a common control member.

The invention more specifically relates to centralized motor control of internal combustion engines and particularly to motor controls for operation of the starter and ignition systems and for the regulation of the choke and throttle valves by an activating element operating a single operative member which latter, may on occasion, in turn be automatically operated.

The main object of the invention is to provide a centralized motor control in which a single operating member is employed to render the starting motor operative to crank the engine and to close the circuit through the ignition system and automatically cut off the operation of the starting motor as soon as the engine is started in operation under control of the ignition system.

The further object of the invention is to provide a motor control in which a single operating member is employed to operate the starting motor and close the circuit through the ignition system and to operate the choke and throttle of the engine whenever such operation becomes necessary in cold weather.

A further object of the invention is to provide a motor control in which a single operating member is employed to operate the starting motor prior to closure of the ignition current, which method is generally considered preferable for the starting and continued operation of the engine and may be accomplished by a slower movement of the single operating member, and whenever desirable by further movement of the single operating member to operate the choke and throttle but only when necessary on account of weather conditions.

A further object of the invention is to return the choke and throttle controls automatically by a slow movement which is easily adjustable by tightening or loosening of cup plunger assemblies during seasonal changing weather conditions, the choke and throttle control mechanisms being so constructed as to still allow selective manual operation but always eventually being returned automatically to inactive position.

A further object of the invention is to automatically return the single operating member to inoperative position in event the engine is not operating thereby cutting off the circuits to the battery, and inasmuch as such action is caused in both manual and automatic operation of the single operating member the ignition and starting circuits are always cut out except when the engine is operating or being started.

Other objects of the invention will become apparent as the detailed description thereof proceeds.

In the drawings:

Figure 1 is a fragmentary side elevation of an automobile engine and cross section of the dashboard of an automobile showing a centralized motor control in a preferred location and as mounted on the chassis of an automobile;

Figure 2 is a top plan, to an enlarged scale, of the motor control shown in Figure 1;

Figure 3 is a vertical, longitudinal section taken on the line 3—3 of Figure 2;

Figure 4 is a horizontal section taken on the line 4—4 of Figure 3;

Figure 5 is a vertical, transverse section taken on the line 5—5 of Figure 3; and

Figure 6 is a fragmentary detail in elevation of one of the contact elements forming part of this invention; and

Figure 7 is a fragmentary detail showing a wire choke or throttle connection.

As shown in the drawings, the invention comprises a casing 6 preferably in the form of a drawer having side walls 7 and 8 connected at their lower edges by a bottom 9 and having their opposite ends connected by a rear wall 10 and a front wall 11. The drawer 6 is mounted to slide on a horizontal partition 12 extending from the division 13 and bent at its forward edge to form a flange 14 adapted to be suitably secured to the rear face of the instrument board 15. This instrument board 15 and the division 13 are provided with registering apertures 16 and 17 in which the drawer fits snugly.

The front wall 11 of the drawer projects beyond the sides 7 and 8 and below the bottom 9 and above the top edges of the sides 7 and 8 to form a stop flange adapted to contact with the face of the instrument board 15 to limit the inward movements of the drawer 6 in the usual manner. All the parts of this centralized motor control are mounted within the drawer 6 to facilitate the assembly of the parts and to facilitate the mounting of the instrument as a unit in convenient position on the instrument board of the automobile.

The drawer 6 is provided with a partition 18 of less depth than either of the sides 7 and 8 and suitably secured to the ends 10 and 11 and parallel to the side 7 to form a chamber 19 in which

is slidably mounted a throttle rod 20; and which forms a chamber for wires 21 and 22, the wire 21 being grounded and the wire 22 connected to one terminal 25 of a battery B which forms a source of electrical energy. The battery B has its terminal 25 connected by a wire 26 to a terminal of a starter motor relay 93' and through the relay contacts to the starting motor 23. The wire 21 is connected to the terminal 29 on the end of a conducting rod 30 which projects through a main slide plate 31 from a long contact plate 32 embedded in one face of the said plate 31 for a purpose to be described hereafter. The wire 22 is also connected to the terminal 32'' of plate 32'. Although plates 32 and 32' in their preferred form are shown of different lengths they can be made of the same length if that should be desired to operate simultaneously by continuing plate 32' to the right (Figure 6) but the opation is to all purposes practically simultaneous if quickly operated.

The plate 31, preferably of insulating material like a greasy or bearing type plastic (see Figure 5) is of substantially the same depth as the partition 18, and is mounted to slide with one of its faces in contact with the partition 18, a small strap 33 of angle iron being secured to the bottom 9 of the drawer and in contact with the outer face of the plate 31 to hold said plate slidably positioned against the partition 18. The upper edge of the plate 31 has a bracket 34 secured thereto by screws 35, and this bracket has one end 36 upturned and provided with a slot 37 in which is slidably mounted the throttle rod 20.

The throttle rod 20 extends slidably through a bushing 38 suitably secured in an aperture formed in the front wall 11 of the drawer 6. The outer end of the throttle rod 20 is provided with a button 39 by means of which the rod 20 may be moved manually to operate the throttle. The other end of the throttle rod 20 is bent downwardly within the chamber 19 and passes through an aperture 40 formed in the end wall 10 of the drawer 6; and, is pivotally connected at its outer end to a lever 41 for operating the throttle in the carburetor designated generally by the reference numeral C.

A dash pot 42, secured at one end to the end wall 10 of the drawer 6, slidably receives a piston 43 secured to one end of a piston rod 44, the other end of which is bent downwardly to form a U-shaped member having legs 45 and 46 extending on opposite sides of the rod 20, with the central part of this member forming a seat in which the throttle rod 20 is adapted to slide. The upper end of the leg 46 projects above the piston rod 44 and has one end of a tension spring 47 suitably secured thereto, the other end of said spring being detachably connected to an eyelet 48 suitably secured to the rear wall 10 of the drawer 6. It will be obvious from inspection of Figures 2 and 5 of the drawings that the throttle rod 20 may be pulled out manually by means of the button 39 against the tension of the spring 47. When the button 39 is released, the plunger in the dash pot 42 will retard the return of the throttle rod 20 to normal position, which return may obviously be operated freely by manual movement inwardly on the button 39. A spacer 49 is secured to the throttle rod 20 and is of such length that when all the parts of the control are in inoperative position, one end of the spacer will be in contact with the adjacent end of the flange 36 and the other end will be in contact with the U-shaped member embracing the throttle rod 20 and formed by the parallel legs 45 and 46.

A choke rod 20' extends slidably through a bushing 38' on the front wall 11 and is provided with a button 39' to manipulate said rod in the same manner as the throttle rod 20. This choke rod 20' and the operating parts connected therewith as hereinafter described are substantially the same as those connected with the throttle rod 20, the corresponding parts being designated by the same reference numerals primed.

A variation in the detail construction of the throttle or choke control rods is shown in Figure 7 wherein instead of a solid rod, a wire covered choke is used. The rod 20'' has secured at its outer end a control button 39'' and is connected at its opposite end to the choke or throttle operating wire 95. The rod portion 20'' slides through a tubular sleeve or housing 96 which latter is engaged by the bushing or gasket 38'', the latter being seated in an opening in the drawer end wall 11. The yoke comprising legs 45'' and 46'' corresponds to sections of the rod 44 on the throttle or 44' on the choke and continues back to the operating dash pot 42 or 42' respectively. The pin 49'' is secured to the rod 20'', extending transversely therefrom and serves to operate in a manner corresponding to the action of the sleeve or collar 49 providing the spacer function as described in connection with Figure 2. The bracket 36 with its slot 37 is arranged to engage the pin, as a result of outward movement of the handle 70, in a manner similar to the operation described in connection with Figure 3. The wire 95 passing through the conduit 96 serves to operate the throttle lever 41 on the carburetor (or the choke lever) depending upon whether the device is applied to the throttle or choke, respectively.

The outer end of the main slide plate 31 has a head plate 50 suitably secured thereto and extending at right angles therefrom to form a support for a cylinder 51, the head 52 of which is apertured and connected by a flexible tube 53 to a Y-fitting 54 which, in turn, is connected by piping 55 to the intake manifold 56 of the automobile motor or to the vacuum source utilized. The cylinder 51 forms a vacuum controlled dash pot in which is slidably mounted a leather piston 57 secured to one end of the piston rod 58—58' which at its other end, is fixed to an elbow pin 59 depending from a second slide 60 of insulating material and mounted so that its upper edge slides substantially flush with the top edge of the main slide plate 31. This slide 60 (see Fig. 5) is supported to slide on a flange 61 turned inwardly from the vertical flange 62 of a casing-plate 63 secured to the top edge of the partition 18, and secured by its flange 64 to the side 7 of the drawer 6.

A tension spring 65 is detachably secured at one end to the head plate 50 and has its other end detachably secured to an eyelet 66 fixed in turn to the rear end 10 of the drawer 6. Obviously, this tension spring 65 is intended to resist the sliding movement of the main slide plate 31 outwardly in the drawer 6. A second tension spring 67 is secured at one end to the end wall 10 of the drawer 6 and at its other end is secured so as to act on the rod or the piston 57. It will be apparent from inspection of Figure 3 of the drawings that the tension spring 67 is intended to resist the movement of the piston 57 along with its cylinder 51, and to resist the

outward movement of the second slide 60, the outer end of which is connected to a rod 68 extending through a bushing 69 and provided at its outer end with the manipulating handle 70.

The contact plate 32 is set into a recess formed on the outer face of the main slide plate 31 and substantially flush with that face. The outer end of the second slide 60 is laterally enlarged, and this enlargement 71 is transversely bored to provide a cylinder 72 in which a piston 73 (preferably of insulating material) is mounted to reciprocate. The head of the cylinder 72 is bored to receive slidably a contact rod 74 connected by the wire 92 first to the starting motor relay 93' and onto the starting motor 23. A casing 75 is secured to the enlargement 71 and is bored to form a cylinder 76 in which a leather piston 77 is suitably secured to the outer end of the piston 73. A spring 78 within the cylinder 76 engages the head of the leather piston to force the end of the contact rod 74 normally into contact with the outer face of the main slide 31 and in position to engage slidably the face of the contact plate 32.

The outer end of the casing 75 is apertured to receive an elbow fitting 79 connected by a flexible tube 80 to the Y-fitting 54, which, as already described, is connected by a tubing 54, through the piping 55, to the source of vacuum utilized. This construction is intended to withdraw the piston 73 and its contact rod 74 out of electrical contact with the plate 32 when the engine itself is operating, the contact 74 being intended to control the operation of the starter motor only and to remain in contact with the plate 32 for such time only as may be necessary to effect the starting of the motor. The rod 74 is connected to wire 92 which leads to the relay and on to the starting motor.

The enlargement 71 is also provided with a transverse aperture 81 in which is mounted a conducting rod 82 spaced from rod 74 and provided at one end with a head 83 adapted to be held by a spring 84 in constant yielding contact with the face of the main slide 31. It is arranged in turn to engage a second contact plate 32' on the end of a conducting rod 32'' which latter extends through the plate 31. The outer end of the contact rod 82 is screw-threaded to receive the nuts 85 and 86 for clamping thereto a terminal connection 87 on the end of the wire 93 which connects the rod 81 to the coil 24.

A stop bracket 88 is fixed to the rear side of the head 75 and is provided at its upper end with a stop member 89 slotted to straddle the choke rod 20'. The member 89 is so located that it will not contact with the end of the spacer 49' until the end of the second slide 60 is in contact with the head plate 50 which projects laterally from the end of the main slide 31.

When all the parts are in normal inoperative position, the inner end 90 of the main slide 31 is in contact with the stop 91, stamped out from partition 18 for this purpose. In starting the engine, the operator merely pulls on the knob 70 until it is stopped by contact of the enlarged end of the second slide 60 with the laterally projecting head 50. During this movement, the contact rod 74 comes into sliding contact with the contact plate 32, and closes the circuit through wire 21, which is grounded, wire 92 to starter relay 93', wire 26, terminal 25, to one side of battery B and back to ground by lead 94 thus operating the starting motor relay 93', and in turn the starting motor 23 by circuits; 94—B—25—26—93'—27—23—21' in ground. It will be understood that the starting motor may be operated directly without a relay, if it is arrangeable. Next, the ignition contact 83 slides onto the contact plate 32' and closes the circuit from the battery B through the wire 93 to the ignition coil 24. As soon as the motor starts under control of the ignition system, the vacuum induced by the operation of the motor operating through conduit 55—79 retracts the piston 73 and its contact rod 74 to cut the starter motor out of operation.

The operation just described is all that is necessary during warm weather or when the engine is hot. With a cold engine, it is usually necessary to operate the choke and throttle. The choke and throttle are set in operation by continuing the pull on the handle 70 after the enlarged end 71 of the second slide 60 has engaged the laterally extending plate 50. When the handle 70 is pulled out to its limit, it pulls out the main slide 31 against the resistance of the spring 65. At the same time, the stops 36 and 89 engage the spacers 49 and 49' on the throttle and choke rods 20 and 20', respectively.

Upon release of the handle 70, the main slide 31 is snapped back against the stop 91 by the tension of the spring 65 and 67. However, the outer end of the second slide 60 remains in engagement with the head plate 50 (on the main slide 31) as a result of the vacuum exerted on the piston 57 in the cylinder 51 which opposes the restoring action of spring 67. It will be obvious that when the slide 60 was pulled by the handle 70, the piston 57 was forced into the cylinder 51 against the tension of the spring 67. When the engine stops and the vacuum in the cylinder 51 is thereby broken, the tension of the spring 67 immediately pulls the piston 57 and the rod (connected by the pin 59 to the second slide 60), to restore the parts to initial inoperative position.

Since the vacuum acting on the piston 57 maintains the slide 60 in such a position as to preserve the ignition circuit through the contacts 32' and 83', it becomes necessary to break this circuit when it is desired to manually shut off the engine. A lost motion connection is provided on the rod 58 to accomplish this result. A sleeve 97 is secured to the rod 58 by welding 98 or some other appropriate type of fastening. This sleeve is concentric with the rod 58 and provides a sleeve bearing for the portion of the rod 58' which is secured to the piston 57. A spring 99 tends to hold 58'—58'' together.

In the manual starting of the engine, the rod 58 is drawn to the left as viewed in Figure 3, since it is connected to the slide 60 by the arm 59. This movement is against the action of spring 67. When the parts have moved to the limit necessary and the engine is placed in operation the vacuum acting in cylinder 51 will continue to act on piston 57 and counteract the restoring action of the spring 67. It will be observed that by manually returning the handle 70 to the right in Figure 3, the rod 58 will move to the right without interfering with the vacuum action on the piston 57 due to the sliding sleeve connection 97—58'. However, as soon as the slide 60 is moved to the right, the connection between the contacts 83 and 32' will be broken thereby breaking the ignition circuit to the engine. This will stop the operation of the engine resulting in the loss of vacuum which in turn will release the piston 57 and allow the spring 67 to restore the parts 58 and 58' of the rod to their close engagement as seen in Figure 3.

The pistons in the dash pots 42 and 42' cause

the rods 44 and 44' to pull the throttle and choke rods 20 and 20' back slowly to inoperative position. However, the throttle and choke rods may obviously be moved quickly to any position by the operating buttons 39 and 39'.

The various pistons 43, 43', 77, etc., have been preferably constructed by using a leather cup which is secured to the piston rod or piston proper by means of screw threaded metal elements with interposed leather washers. This construction is such that by reducing the tension applied to the cup by the washers by means of the screw threaded nuts, a greater or lesser amount of air leakage is permitted about the stem of the piston rod. In this manner, the action of the dash pots can be accurately regulated to provide a controlled dash pot action without the need for separate valves or valve mechanism.

Spring 65 is not considered as a part of the device for the automatic return of the common manual means to inoperative position, and is only used when either the choke or throttle mechanisms or both of them are included in the governor, as otherwise plate 31 is not required to slide. Spring 65 is primarily required to cause the retention of plate 31 in its normal inoperative position against stop 91 as the operation of plate 60 might displace it.

Spring 65 is secondarily required to promptly return both plates 31 and 60 from choke and throttle operative position to normal position for operation of the engine.

If the throttle control is dispensed with and the choke is retained the throttle control will suffice to operate the choke and make a better installation. When both are dispensed with plate 31 would be stationarily attached to 12.

Although the ignition line 22 and starter line 92 supplying current to the governor are not shown as passing through an intervening locking switch on their way to the governor, the locking switch is common with all automotive vehicles and such wiring is advantageous for this governor's use and allows the common manual means to be returned to inoperative position by turning off the independent switch and such means is obviously allowable for use with this governor and is described in the alternative plan for construction of the governor.

What I claim is:

1. A control for an internal combustion engine having starter motor and ignition systems with normally open circuits, and choke and throttle valves for controlling the fuel intake of said engine, said control comprising: common manual means operable by movements through a distance for closing said motor and ignition system circuits, and operable by further movement through an additional distance for operating the throttle and choke valves of said engine, means controlled by the operation of the engine after the starting thereof to open the circuit through said starting motor and maintain the circuit broken so long as the engine is in operation, and means operable upon the release of said common manual means for moving the choke and throttle valves to normal position.

2. The combination with the control set forth in claim 1 of yielding means for retarding the movements of the choke and throttle valves from operative to inoperative positions.

3. The combination with the control set forth in claim 1 of yielding means for retarding the movements of the choke and throttle valves from operative to inoperative positions, said choke and throttle valves being operable independently of said yielding means after release of the common manual control.

4. The combination with an internal combustion engine having normally open circuits for the ignition and starting systems, a regulated vacuum force during engine operation and means for obtaining vacuum therefrom, of: a common manual control for closing and opening the circuits, a separate means for vacuum power to open the starter circuit and maintain the said circuit open as long as the engine operates, means for vacuum power to hold the common manual control in operative position, means operable upon the break of vacuum to return the common manual control and thereby break the ignition circuit, means to manually return the common manual control largely avoiding its retention by vacuum force.

5. In a controller for an internal combustion engine having a battery, starter and ignition systems arranged to be energized from the battery, and choke valve arranged to control the air mixture to the engine, common means to energize said circuits from the battery and after determinate movement to effect the operation of said choke valve, retracting and retarding means normally tending to restore the choke valve to its normal position without interfering with the operation of said first named means, and manual means arranged to manually operate the choke valve independently of the common means.

6. A control for an internal combustion engine having a starter motor with normally open circuits and ignition system, and choke valve for controlling the air intake of said engine, said control comprising: a control rod for moving said valve, common manual means operable by movements through a determinate distance for energizing said motor and ignition system circuits, and operable by further movement through an additional determinable distance for operating said control rod and the choke valve of said engine, means retracting said rod and the choke valve of said engine to normal valve position, and means arranged to retard the operation of said retracting means, means controlled by the operation of the engine after the starting thereof to open the circuit through said starting motor and maintain the circuit broken so long as the engine is in operation, and means operable upon the release of said common manual means for allowing said retracting means to move the choke valve against said retarding means to normal position.

7. A control for an internal combustion engine having a starter motor and ignition system with normally open circuits and choke valve for controlling the air intake of said engine, said control comprising: control means for moving said valve, common manual means operable by movements through a distance for energizing said motor and ignition system circuits and operable by further movement through an additional distance for operating said control means and thereby the choke valve of said engine, means retracting said control means to normal valve position, means arranged to retard the operation of said retracting means, means controlled by the operation of the engine after the starting thereof to open the circuit through said starting motor and to maintain said circuit open so long as the engine is in operation, means operable upon the release of said common manual means for allowing said retracting means to move the choke valve to

normal position against said retarding means, and means operable to return the manual means to its inactive position.

8. In an automatic controller for internal combustion engine having a starting motor system, and an ignition system with normally open circuits and a vacuum source governed by the engine and means for obtaining vacuum force therefrom; the combination of common manual control for closing said circuits successively, means operated by the vacuum force for opening the starting motor circuit and maintaining said circuit open during the operation of said engine, and means operable by break of said vacuum to open the ignition circuit.

9. An automatic controller for internal combustion engines comprising in combination a normally deenergized ignition system and engine starting means each having normally ineffective circuits, a common manual control for successively energizing said circuits, means operated in response to vacuum created by operation of the engine for deenergizing the starter means circuit, means responsive to lack of vacuum for opening the ignition circuit, and manual means effective to deenergize the ignition circuit.

10. In an internal combustion engine, means for vacuum power alone during the operation of the engine to hold a part or element in a manually operated position the vacuum power overcoming a spring's force tending to retain it in the position from which it was manually operated, means combined with the first means to largely avoid the vacuum forces in manually returning the part or element to the position from which it was first manually operated.

11. The combination with a governor for a gas engine, the engine having a choking means and a starter breaker and the governor a manual means to energize the engine's starting circuit; of, a choke return control operated by the governor's manual means having retracting and retarding means for the return of the choking means.

12. A controller for a gas engine, comprising in combination; a control rod manual operation of which causes the engine starting and ignition circuit contacts to meet, means operated by the engine's vacuum power directly withdrawing one of the starter contacts and so retaining it during engine operation and the continuation of the ignition contacts in contact position, means operable on lack of vacuum returning the control rod and thereby both breaking the ignition contacts and returning the starter contact to its first position, and manually actuated means to return the control rod, largely independently of means for its retention by vacuum power.

13. In a governor for an internal combustion engine having means for a regulated vacuum force when the engine is operating, the governor having a manual control opposed by a spring and having means to energize and deenergize the engine's circuits; a circuit breaker, comprising in combination, means for vacuum power alone to overcome a spring's force and govern a circuit, combining a rod having a one-way attachment to a manual control and to a vacuum means the rod tending to be held to its broken connection by a spring's force; whereby the entire combination holds the circuit in both closed and open position governed and powered by vacuum force alone and manual deenergization is opposed only by a spring's force.

14. A controller for a gas engine of the automobile type comprising, in combination; a manual means to operate the control having means to energize the engine circuits, means for vacuum power alone to hold the manual means in energized position and to break and hold the starter circuit open, manual means optional to the operator to energize the starter circuit ahead of the ignition to whatever extent seems desirable or to energize both circuits simultaneously accomplished by a stepped or a fast movement respectively, a starter circuit contact being yieldingly installed and set closer to its complementary contact than are the ignition contacts.

15. A manually operated controller for an internal combustion engine having a choke valve and choke rod, the controller having a manual means with means to energize the engine's starter and ignition circuits opposed in movement by a spring's force, means for vacuum power alone during engine operation only to maintain the manual means in energized position, manual means to operate the choke rod by a further movement of the manual means, automatic means to return same slowly, means to close the starter circuit first when the manual means is operated in a stepped movement.

16. In a gas engine of the automobile type having a source of governed vacuum power during engine operation only and a choke valve and choke rod, a manually operated controller having a manual means with a spring opposing its movement with means to energize the engine's ignition and starter circuits, means for vacuum power alone to directly hold the manual means in energized position and to break and hold the starter circuit open, means for further movement of the manual means to operate the choke rod, automatic means to return the choke rod slowly, and means to manually return the manual means largely independent of vacuum force.

17. The combination with a gas engine having starter and ignition circuits, a starter breaker, a choking means and a source of regulated vacuum during engine operation; of, a governor having a common manual control opposed by a spring in movement with means to energize the starter circuit ahead of the ignition by a stepped movement when desirable and to break the contact positions in reverse movement, largely avoiding a means for vacuum force to directly hold the manual control in energized position, manual means operable on further movement of the manual control by a one way connection to operate the choking means, automatic means to retract and retard the choking means, manual means to fully adjust the position of the choking means upon release of the manual control sometimes subject to the retracting means but avoiding the retarding means by a one way connection.

18. A governor for an internal combustion engine having starting and ignition systems with normally open circuits, and a choke valve connected by a choke rod to a manual choke knob, the governor comprising in combination: a sliding control rod for closing and opening the circuits in a first movement and operating the choke rod in a further movement—retracting means to return the choke rod to normal position opposed by a slow regulatable yielding means, means to manually operate the choke rod on release of the manual means independently of the yielding means.

19. The combination with a governor for a gas engine having a manually operated choking means, the governor having a manual means

with means to energize the engine's starter circuit; of, a choke return control operated by the governor's manual means having retracting and retarding means with means to manually operate the choking means independently of the manual means after the release of same.

20. The combination only with a governor for a gas engine having starter and ignition systems with normally open circuits and means to obtain vacuum force and a choke means, the governor having a common manual means to energize the circuits by movement through a distance: of a choke control operated by a further movement of the common manual means, having retroactive and retarding means:—means to manually operate the choke independently of the common manual means upon releasing same: the retarding means being governed by a slow escape of air from a closed end dash pot chamber through a plunger cup assembly on a rod urged by the retracting means.

21. In a control for a gas engine having ignition and starting systems with normally open circuits and a means for regulated vacuum force: a manual rod directly carrying contacts for both circuits, energizing and deenergizing the circuit, a starter breaking means operated by vacuum suction, means for vacuum suction power only to hold the common manual rod in operating position, manual means to return the common manual rod largely avoiding the last means.

22. In a governor for an internal combustion engine, a common manual control rod having means to energize the engine's starter circuit ahead of the engine"s ignition circuit when operated (slowly or by a stepped movement) only, and a starter breaker in the starter circuit having means for vacuum power alone to both break and hold the starter circuit open during engine operation.

23. A governor for a gas engine having a manual control rod for energizing the engine's circuits and a choking means and choke rod, means for the manual control rod to operate the choke rod, retracting and retarding means to return the choke rod slowly and means to operate the choke rod manually upon the release of the manual control rod independently of same and also of the retarding means.

24. In a controller for an internal combustion engine having a starter motor, starting system, electric circuit therefor and an ignition circuit, each of which being normally open, said controller having common manual means for energizing the circuits and capable of operation by a slow movement; a switch with a more extensive contact for the starter circuit and arranged to come into contact by the first movement of the common manual means, and subsequently the ignition circuit contacts.

25. The combination with an internal combustion engine having normally open circuits for the ignition and starter motor systems and having an intake manifold and means for obtaining vacuum power therefrom of a common manual control for closing the circuits which if moved slowly energizes the starter first and then energizes the ignition circuit, separate means operated by vacuum power to open the starter motor circuit and maintain the said circuit open as long as the engine operates, manual means to return the common manual control to normal inoperative position thereby breaking the ignition circuit and causing the separate means to assume its first position.

26. In an automatic controller for internal combustion engine including a starting motor and an ignition system having normally open circuits, the combination of a common manual control closing said circuits, means operated by the intake vacuum for opening the starting motor circuit and maintaining said circuit open during the operation of said engine, means operable by break of said vacuum to open the ignition circuit, and manually actuated means for opening the ignition largely independently of said last named means.

27. The combination with a governor for a gas engine having a choking means and the governor a manual means; of a choke return control operated by the governor's manual means having means for a slow return of the choke and means to operate it independently of the governor's manual means upon the manual release of same.

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