

Feb. 17, 1959

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ENGINE CONTROL DEVICE

2,873,731

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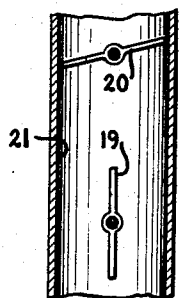
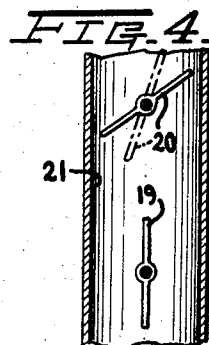
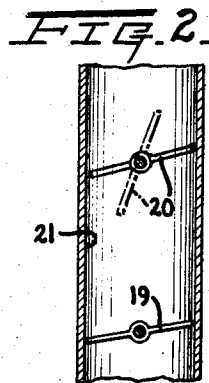
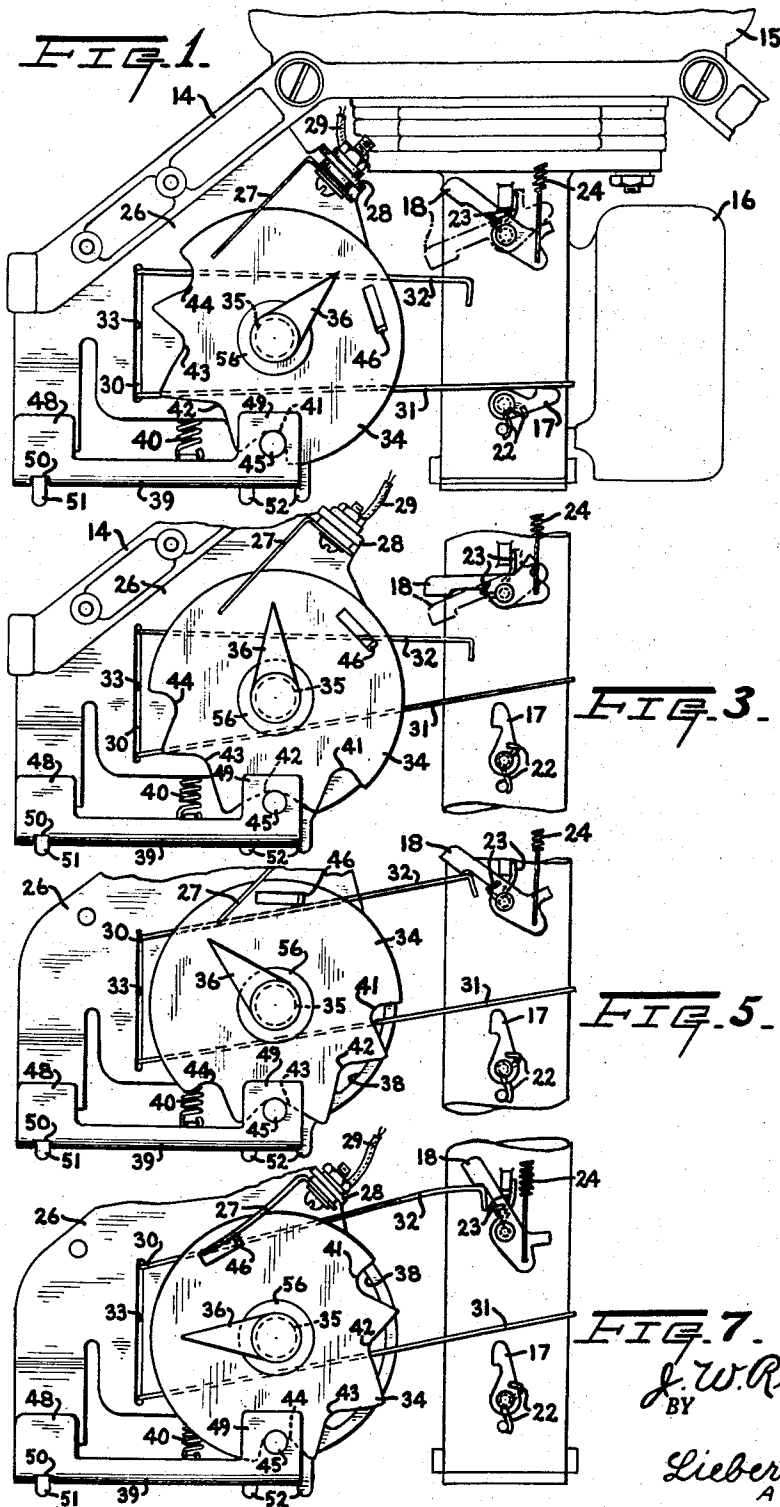


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2 Sheets-Sheet 2

FIG. 8.

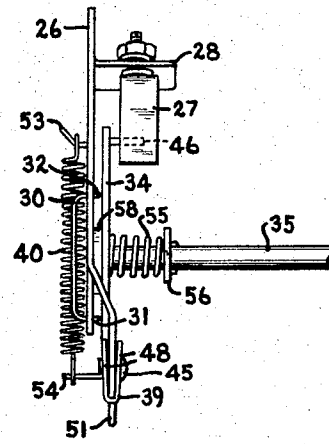
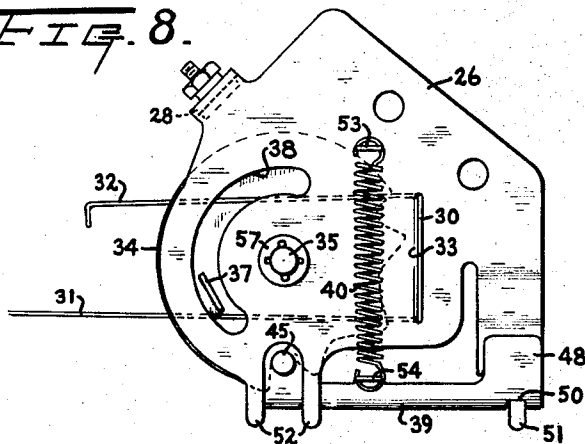


FIG. 9.

FIG. 10.

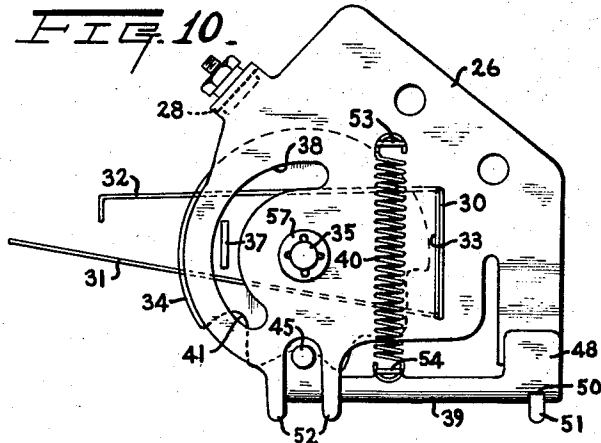
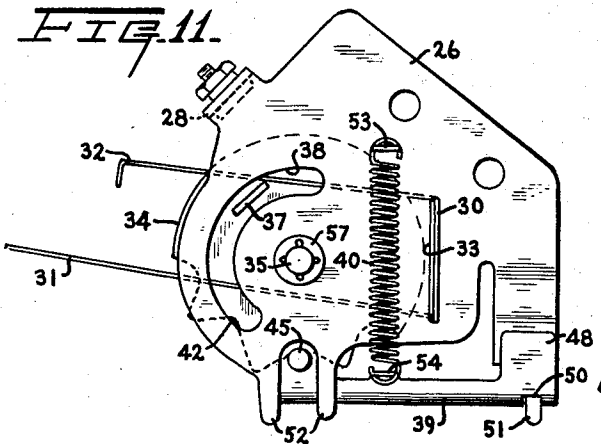


FIG. 11.



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2,873,731

ENGINE CONTROL DEVICE

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Application February 27, 1956, Serial No. 567,992

14 Claims. (Cl. 123—99)

The present invention relates generally to improvements in internal combustion engines, and relates more particularly to improvements in the construction and operation of devices for selectively controlling the starting, running, idling and stopping of gasoline engines from a single station.

A primary object of this invention is to provide an improved engine control device which is extremely simple, compact and durable in construction and which is moreover highly efficient and economical in operation.

In the production of internal combustion engines particularly of the fractional horsepower type commonly used for driving lawnmowers, chain-saws and the like, it is customary to provide entirely separate means for choking the engine to facilitate starting, for adjusting the throttle valve for smoother performance in the running and idling of the engine, and for grounding the ignition system for stopping the engine. Such separate control and adjustment means are not only highly inconvenient to the operator but they are also sometimes difficult to manipulate and maintain in proper adjustment and are subject to human error in properly setting and operating the same, especially in the hands of an unskilled mechanic or novice. It is therefore highly desirable to provide a single control mechanism for selectively controlling the choke valve, throttle valve and ground or shut-off in predetermined sequence and in the most simple and positive manner.

It is therefore a more specific object of the invention to provide an improved engine control device which obviates the disadvantages attendant multiple station control systems and which embodies all of the advantages desired of a single station control mechanism.

Another specific object of my invention is to provide an improved device adapted to be manually manipulated in a simple and expeditious manner by means of a single control member to positively selectively control the action of the engine choke and throttle valves for the desired engine performance as well as to stop the engine.

Another specific object of this invention is to provide an improved control device for internal combustion engines which is of unitary construction and which may be readily mounted as a self-contained unit on the engine in proximity to the carburetor and the choke and throttle valves.

Still another specific object of my present invention is to provide an improved single station control device for internal combustion engines which is comprised of relatively few parts, all of which may be readily produced and assembled and which are easily accessible for inspection, replacement or repair.

An additional specific object of the present invention is to provide an improved engine control device in which a single element may be manually rotated in sequence to positive selected positions to control the operation of the engine, the control element being positively retained against displacement in its several selected positions.

These and other specific objects and advantages of the

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invention will become apparent from the following detailed description.

A clear conception of the several features constituting the present invention, and of the mode of constructing and of utilizing control devices embodying the improvements in conjunction with a typical internal combustion engine, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a fragmentary top view of the carburetor and adjacent housing portion of a typical gasoline engine with one of the improved control devices mounted thereon and showing the control element thereof in "choke" or start position;

Fig. 2 is a more-or-less diagrammatic section through the air and gas inlet port showing the positions of the choke and throttle valves when the control element is in the position shown in Fig. 1;

Fig. 3 is a fragmentary top view of the device but with the control element rotated to "run" position;

Fig. 4 is another diagrammatic section through the fuel inlet port showing the positions of the choke and throttle valves when the control element is in the position of Fig. 3;

Fig. 5 is a fragmentary top view of the control device similar to Figs. 1 and 3 but with the control element rotated to "idle" position;

Fig. 6 is still another section through the inlet port diagrammatically showing the positions of the choke and throttle valves when the control element is in the position shown in Fig. 5;

Fig. 7 is another fragmentary top view of the improved device with the control element rotated still further to "stop" position wherein the ignition system is grounded or short circuited;

Fig. 8 is a bottom view of the control device with the control element in "choke" position as shown in Fig. 1;

Fig. 9 is a fragmentary end view of the device;

Fig. 10 is another bottom view of the device but with the control element rotated to "run" position as in Fig. 3; and

Fig. 11 is still another bottom view of the device with the control element in "idle" position as in Fig. 5.

While the invention has been particularly shown and described herein as being especially applicable to small gasoline engines such as used in driving lawn mowers, chain saws and the like and for selectively controlling the choke and throttle valves and the ignition system in a particular sequence; it should be understood that it is not desired or intended to limit the scope or utility of the improvements by virtue of such specific embodiments since the improved device may have a wider application and may be readily modified to operate in any desired sequence. It should also be understood that certain specific descriptive terms used herein shall be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawings, the improved control device has been shown therein, for purposes of illustration, as being mounted by means of a bracket 14 or the like on a convenient portion of the engine housing 15 in the vicinity of the carburetor 16 and the choke and throttle valve levers 17, 18 respectively which are operatively connected with the respective choke and throttle butterfly valves 19, 20 located within the fuel and air supply passageway 21, the choke lever 17 being normally urged to valve open position as by means of a coil spring 22, and the throttle lever 18 being normally urged to valve closed position as by means of a coil spring 23 but also being connected to the engine governor, not shown, as by means of a spring 24 or other suitable reaction

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member whereby the force of the spring 23 is overcome at certain engine speeds so as to swing the lever 18 toward valve open position to a greater or lesser extent as shown in Figs. 1 to 4 inclusive by means of dot-and-dash lines.

The improved control device shown in the drawings as embodying the invention comprises, in general, a supporting member 26 secured in any suitable manner to the bracket 14; a contact 27 mounted on the support 26 and connected by means of electrical conductors 29 with an element of the engine ignition system such as the magneto, not shown, adapted to interrupt or prevent occurrence of a spark at the spark plug upon completion of a circuit through the contact 27, the contact 27 being conveniently mounted on an upstanding ear or flange 28 formed on the support 26 and being insulated therefrom in a usual manner by fiber washers or the like; a U-shaped spring 30 or the like carried by the support 26 with its legs 31, 32 forming elongated members extending laterally from the support into proximity with the choke and throttle levers 17, 18 respectively, the spring 30 being retained in position on the support 26 as by means of a slot 33 formed in the support for receiving the transverse portion of the spring and the legs 31, 32 of the spring being freely swingable and biased toward each other so as to normally lie in a position out of operative contact with the levers 17, 18 as shown in Fig. 3; a manually rotatable disc-shaped control element 34 having a shaft 35 mounted on the support 26 in a suitable manner and extending between the legs 31, 32 of the spring 30, the shaft 35 preferably extending upwardly from the element 34 and having a manipulating handle 36 at its upper end to facilitate manual rotation of the control element to desired positions; means such as a depending lug 37, Figs. 8 to 11 inclusive, formed on the control element 34 and cooperable with the spring legs 31, 32 upon rotation of the element 34 for selectively swinging the legs 31, 32 out of their normal positions and into operative contact with the choke and throttle levers 17, 18 respectively, the lug 37 being located between the legs 31, 32 and being swingable within an arcuate slot 38 formed in the support 26; means such as a swinging arm or lever 39 fulcrumed at one end on the support 26 and constantly resiliently urged as by means of a spring 40 under tension toward the periphery of the control element 34 for resisting rotation thereof, the control element 34 being provided with a series of peripheral notches 41, 42, 43, 44 and the free end of the lever 39 preferably having a roller or circular lug or pin 45 cooperable with the peripheral notches of the element 34 for defining the selected positions of operation; and means such as an upstanding lug 46 forming a movable contact carried by the control element 34 for movement into engagement with the contact 27 upon rotation of the element 34 to a selected position to thereby establish the connection with the magneto and arrest the spark.

The support 26 may be readily formed of suitable sheet material with the aid of punches and dies with the fixed contact receiving lug 28 being formed integral therewith, and the disk-shaped control element 34 may also be formed of sheet material in like manner with the lugs 37, 46 being formed integral with the element. While the lever 39 may be formed as a flat piece pivotally secured to the support 26, it has been found expedient to form the lever of U-shaped cross-section with lateral extensions 48, 49 at the fulcrumed and swinging ends respectively, the extended wall portions 48 lying on opposite sides of the support 26 and the extended wall portions 49 lying on opposite sides of the control element 34 to thereby aid in guiding the lever in its swinging movement; and to positively position and aid further in guiding the lever 39, the base or transverse wall thereof at the fulcrumed end is formed with an aperture 50 adapted to receive a lateral projection 51

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provided on the support 26 and the support is also formed with a pair of spaced laterally projecting fingers 52 forming a guideway between which the lug or pin 45 of the lever may swing. The spring 40 may be secured at one end to the support 26 and at the opposite end to a medial portion of the lever 39 in any suitable manner as by means of the lugs or ears 53, 54 respectively, and the spring 30 and control element 34 may be retained in properly assembled condition on the support 26 by means of a compression spring 55, Fig. 9, surrounding the shaft 35 and cooperating with fixed washers 56, 57 and with a spacer 58 all carried by the shaft to thereby retain the parts in position. The fixed contact 27 is preferably formed of resilient electrical conducting material and spans the control element 34 at a tangent to an imaginary circle circumscribing the axis of the element 34 so that the lug 46 will wipe or sweep the surface of the contact when the control element is rotated counterclockwise to the position shown in Fig. 7, and a dial, not shown, may be provided about the shaft 35 for convenience in directing the operator as to the sequence of operations.

In operation, the control element 34 is rotated by means of its handle 36 to the position shown in Fig. 1 wherein the lug 54 of the lever 39 is disposed within the peripheral notch 41 in order to start the engine. With the control element 34 in such position, the spring leg 31 is urged from its normal position by means of the lug 37 into operative contact with the choke lever 17 to close the choke butterfly valve 19, and the throttle lever 18 is free to move against the action of the spring 23 in response to the spring 24 connected with the governor so that the throttle valve 20 will assume various positions depending upon engine demands. After the engine has been started, the control element 34 is rotated by means of the handle 36 in a counter-clockwise direction against the resistance of the lever 39 and spring 40 until the lug 45 of the lever is positioned within the notch 42 of the control element. This is the run position of the control element wherein the lug 37 thereof is entirely out of operative contact with both of the legs 31, 32, of the spring 30 so that the choke lever 17 is swung with the valve 19 in open position by means of the spring 22 with the throttle lever 18 and its valve 20 being free to move in response to engine demands. When it is desired to permit the engine to idle, the control element 34 is rotated still further in a counter-clockwise direction by means of its handle 36 until the lug 45 of the lever 39 is positioned within the notch 43 of the control element. In this position, the spring leg 31 remains in its normal position out of contact with the choke lever 17, as shown in Fig. 5, but the lug 37 of the element 34 coacts with the leg 32 of the spring 30 to move this leg out of its normal position and into operative contact with the throttle lever 18, thereby positively holding the lever 18 so that the throttle valve 20 is in closed position. To stop the engine, the control element 34 may be rotated still further in a counter-clockwise direction by means of the handle 36 until the lug 45 of the lever 39 rests within the peripheral notch 44 of the element 34, and when the control element is rotated to such extent, the upstanding lug 46 carried thereby positively engages the fixed contact 27 to complete the circuit to the magneto and thereby ground the same to prevent a spark from occurring at the spark plug thus stopping the engine through its ignition system.

From the foregoing detailed description, it is believed apparent that the present invention contemplates the provision of an extremely simple and compact engine control device of unitary construction. The various parts of the improved control may be readily produced from suitable sheet material and may be assembled and readily mounted on an internal combustion engine at exceptionally low cost. The improved device provides a single station manual control which eliminates guesswork and aids the operator in most effectively operating the engine

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without necessitating change in engine design and without appreciably increasing the cost thereof. As indicated, all parts of the improved control are mounted on the support 26 which in turn may be readily secured as by means of a suitable bracket 14 to a portion of the engine housing and these improved unitary devices may be sold for application to existing internal combustion engines or they may be embodied directly in new engines. The improved unitary control devices may, of course, be modified so as to operate in any desired sequence, but the sequential operation of the mechanism to the selected positions shown and described follows the usual pattern of engine operation, particularly with respect to power operated lawn-mowers. Also, while the U-shaped spring 30 may be somewhat modified, it is important that the legs or elongated members 31, 32 be flexible in order to compensate for manufacturing tolerances and possible discrepancies in the assembly; and to obtain proper idle and run speeds, it has been found that the members 31, 32 for moving the choke and throttle valve levers should preferably be flexible. The improved devices have proven highly satisfactory in actual operation, and despite their simplicity, these devices are extremely durable.

It should, of course, be understood that it is not desired or intended to limit this invention to the exact details of construction or to the precise mode of use herein shown and described, since various modifications within the scope of the appended claims may occur to persons skilled in the art to which this invention pertains.

I claim:

1. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a pair of elongated members extending from said support into proximity with the choke and throttle levers, said members being normally biased toward a position away from the lever shafts, and a control element rotatably mounted on said support and cooperable with said members upon rotation for selectively moving the same out of their normal positions to actuate the choke and throttle levers.

2. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a pair of elongated members extending in spaced relation from said support into proximity with the choke and throttle levers, said members being normally biased toward each other in a direction away from the levers, and a control element rotatably mounted on said support and having a lug cooperable with said members upon rotation for selectively moving the same out of their normal positions and in a direction to actuate the choke and throttle levers.

3. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a pair of elongated members extending in spaced relation from said support into proximity with the choke and throttle levers, said members being normally biased toward each other in a direction away from the levers, and a rotatable control element having a shaft mounted on said support and extending between said members, said control element being formed with a lug cooperable with said members upon rotation for selectively moving the same out of their normal positions and in a direction to positively actuate the choke and throttle levers.

4. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a U-shaped spring mounted on said support with its legs extending therefrom into proximity with the choke and throttle levers, the legs of said spring being normally biased toward each other, and a rotatable control element having a shaft mounted on said support

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and extending between the legs of said spring, said control element being formed with a lug cooperable with said spring legs upon rotation for selectively moving the legs out of their normal positions and in a direction to actuate the choke and throttle levers.

5. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a pair of elongated members extending from said support into proximity with the choke and throttle levers, said members being normally biased away from the levers, a control element mounted for manual rotation on said support and cooperable with said members upon rotation for selectively moving the same out of their normal positions and into operative contact with the choke and throttle levers, and means cooperable with said control element for resisting rotation thereof from any selected position.

6. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a pair of elongated members extending from said support into proximity with the choke and throttle levers, said members being normally biased away from the levers, a control element mounted for manual rotation on said support and cooperable with said members upon rotation for selectively moving the same out of their normal positions and into operative contact with the choke and throttle levers, said control element having a series of peripheral notches, and means constantly resiliently biased toward the periphery of said control element and cooperable with said notches for resisting rotation of said control element.

7. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a U-shaped spring mounted on said support with its legs extending laterally therefrom into proximity with the choke and throttle levers, the legs of said spring being normally positioned out of operative relationship with the levers, a manually rotatable control element having a shaft mounted on said support and extending between the legs of said spring, said control element being formed with a lug cooperable with said spring legs upon rotation for selectively moving the legs out of their normal positions and into operative relationship with the choke and throttle levers, and resilient means mounted on said support and cooperable with said control element for resisting rotation thereof from any selected position.

8. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a U-shaped spring mounted on said support with its legs extending laterally therefrom into proximity with the choke and throttle levers, the legs of said spring being freely swingable and normally lying out of operative contact with the levers, a manually rotatable control element having a shaft mounted on said support and extending between the legs of said spring, said control element being formed with a lug cooperable with said spring legs upon rotation for selectively swinging the legs out of their normal positions and into operative contact with the choke and throttle levers, said control element having a series of peripheral notches, and a lever fulcrumed on said support and constantly resiliently urged toward the periphery of said control element for cooperation with said notches for resisting rotation of said control element.

9. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers and for stopping the engine through its ignition system, said device comprising, a support, a contact mounted on said support and connected with the ignition system, a pair of elongated

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members extending from said support into proximity with the choke and throttle levers, said members being normally biased away from the levers, a control element rotatably mounted on said support and cooperable with said members upon rotation for selectively moving the same out of their normal positions and into operative engagement with the choke and throttle levers, and means carried by said control element for movement into engagement with said contact.

10. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers and for stopping the engine through its ignition system, said device comprising, a support, a contact mounted on said support and connected with the ignition system, a pair of elongated members extending in spaced relation from said support into proximity with the choke and throttle levers, said members being normally biased toward each other and away from the levers, and a control element rotatably mounted on said support and cooperable with said members upon rotation for selectively moving the same out of their normal positions and into operative engagement with the choke and throttle levers respectively, said control element being formed with a lug movable therewith into engagement with said contact.

11. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers and for stopping the engine through its ignition system, said device comprising, a support, a contact mounted on said support and connected with the ignition system, a pair of elongated members carried by and extending in spaced relation from said support into proximity with the choke and throttle levers, said members being normally biased toward each other and away from the levers, a control element rotatably mounted on said support and cooperable with said members upon rotation for selectively moving the same out of their normal positions and into operative engagement with the choke and throttle levers respectively, said contact spanning said control element tangentially of a circle circumscribing the axis of said control element, and a lug carried by said control element for movement therewith into engagement with said contact.

12. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers and for stopping the engine through its ignition system, said device comprising, a support, a resilient contact mounted on said support and connected with the ignition system, a U-shaped spring mounted on said support with its legs extending laterally therefrom into proximity with the choke

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and throttle levers, the legs of said spring being freely swingable and normally lying out of operative contact with the levers, a manually rotatable control element having a shaft mounted on said support and extending between the legs of said spring, said control element being formed with a lug cooperable with said spring legs upon rotation for selectively swinging the legs out of their normal positions and into operative contact with the choke and throttle levers respectively, said control element having a series of peripheral notches and said contact spanning said control element tangentially of a circle circumscribing the axis of said element, a lever fulcrumed on said support and constantly resiliently urged toward the periphery of said control element for cooperation with said notches for resisting rotation of said control element from any selected position, and another lug carried by said control element for movement therewith into engagement with said contact.

13. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a pair of arms mounted on said support and having corresponding swinging ends extending into proximity with the choke and throttle levers respectively, said arm ends being normally biased toward each other, and a control element rotatably mounted on said support and cooperable with said arms upon rotation for selectively swinging said arm ends out of their normal positions to actuate the choke and throttle levers.

14. A device for selectively controlling the positions of the choke and throttle valves of an internal combustion engine through their respective levers, said device comprising, a support, a pair of elongated members mounted on said support and having corresponding swinging ends extending into proximity with the choke and throttle levers respectively, said member ends being normally biased toward each other, and a control element mounted on said support for movement relative thereto and being cooperable with said members upon movement thereof for selectively swinging said member ends out of their normal positions to positively actuate the choke and throttle levers.

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