

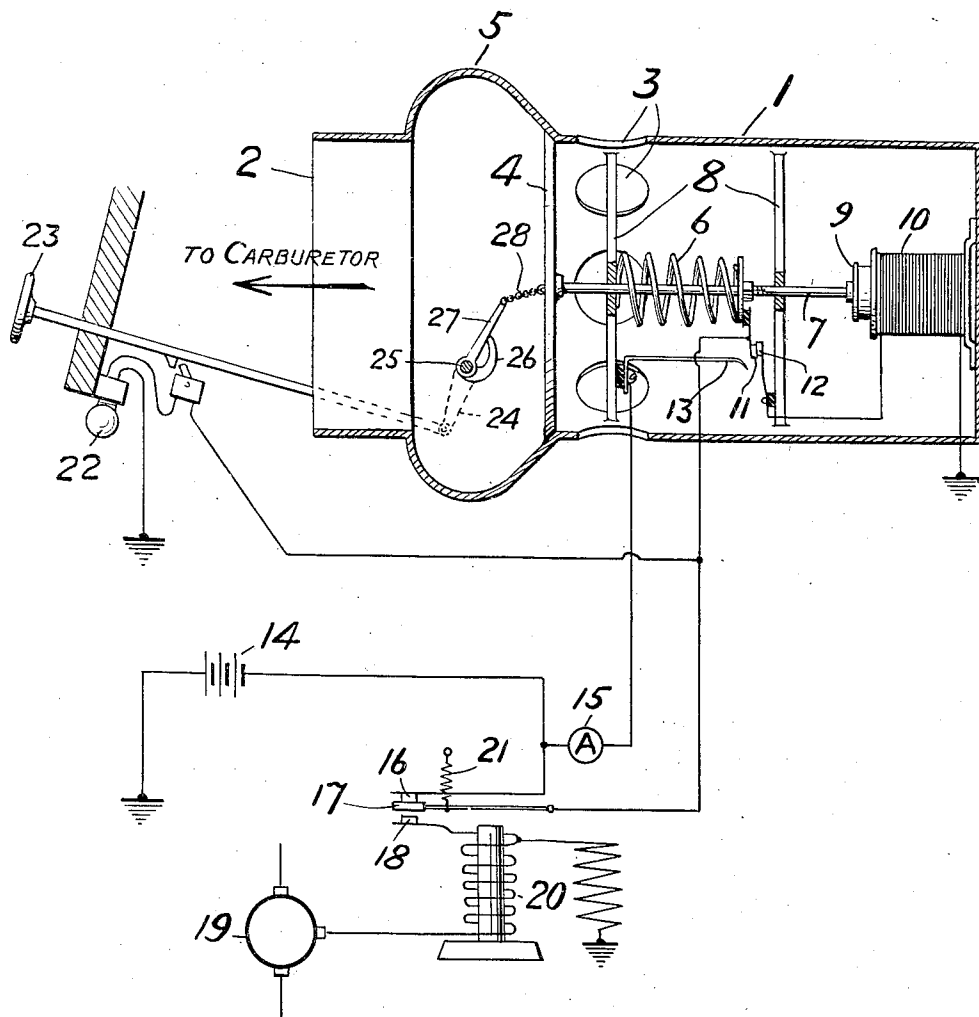
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AUTOMATIC CHOKE

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WITNESS:

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AUTOMATIC CHOKE

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The subject of our invention is an automatic choke for internal combustion engines which regulates the air supply to the carburetter of an internal combustion engine in response to the speed of rotation of said engine on starting.

Our device consists of a valve controlling the air supply to the carburetter, a spring urging said valve to closed position, an electromagnet operating on said valve, means for connecting said electromagnet to a storage battery when the engine is stopped and about to start, means for connecting the electromagnet to the generator of the engine when the engine has started so that the electromagnet varies in the intensity with which it urges the valve to closed position in accordance with the speed of rotation of the engine, a switch for disconnecting said magnet, and a choke button for manually opening said valve.

For a further exposition of our invention reference may be had to the annexed specification and drawings at the end whereof our invention will be specifically pointed out and claimed.

In the drawing,

Our device is shown diagrammatically and in cross section through the valve casing.

As disclosed in the embodiment of our invention, chosen for illustration in the drawing, our device consists of a casing 1 adapted to fit with the air connection to the carburetter of an internal combustion engine. The casing 1 has an opening 2 at one end which is open to the carburetter and also has air inlets 3 therein. Between the air inlets 3 and the carburetter there is located a valve 4 which is adapted to seat firmly against the casing 1. Casing 1 is provided with a bulge 5 beyond valve 4 so that when valve 4 is open the air inlet 2 to the carburetter is not restricted by the valve 4 nor by the air inlets 3 since these latter elements provide passages of area equal to or greater than that of opening 2.

Valve 4 is stressed to closed position by spring 6 which operates on valve stem 7 which is carried in guides 8. Valve stem 7 also carries armature 9 which is responsive to

the flux of electromagnet 10. Valve stem 7 also carries insulated therefrom movable switch element 11 which cooperates with switch element 12 which is mounted for limited movement and with switch contact 13 for purposes which will be explained below.

Our device is customarily used with automobiles which are provided with a storage battery. We, therefore, prefer to provide a storage battery 14 which is connected through ammeter 15 to stationary contact 13. Storage battery 14 is also connected to stationary contact 16 which is adapted to be engaged by movable switch contact 17 which also may contact with stationary contact 18.

There is connected to the engine an electrical generator 19 so that the generator is responsive to the speed of rotation of the engine. Generator 19 is connected to generator relay 20 which controls movable switch contact 17. Switch contact 17 is normally stressed into contact with stationary contact 16 by spring 21 or other convenient means.

In circuit with generator 19 there may be provided a lamp 22 in convenient position to be observed by the operator of the engine who will thereby be warned whether the automatic choke is in operative condition.

We also provide manual means for opening valve 4 when the motor is sufficiently warm or when the automatic choke is inoperative for any reason. These means consist of a choke button 23 which is mechanically connected to arm 24 on shaft 25 which passes through casing 1. Shaft 25 has fast thereon arm 26 which is curved so as to contact with arm 27 which is loosely pivoted on shaft 25 and which is connected at its opposite end by flexible connection 28 to valve 4.

The operation of our device is as follows: When the operator desires to start the internal combustion engine when it is cold he pulls out choke button 23 which draws arm 26 away from arm 27 and permits valve 4 to close under the stress of spring 6. This closes the contact 11 against stationary contact 12 and, since contact 17 is in contact with stationary contact 16, electromagnet 10 is connected to storage battery 14 and urges valve 4 to closed position with an approxi-

mately constant force. The engine is then cranked either manually or mechanically. Since the air inlet to the carburetter is closed by valve 4 a very rich mixture is drawn into the engine cylinders and the engine will start promptly if otherwise in proper condition. When the explosive mixture in the engine fires and the engine starts a suction is created on valve 4. When this suction reaches a predetermined amount it overcomes the force of spring 6 and of electromagnet 10 and pulls the valve open to an amount depending upon the force of suction exerted. Simultaneously, when the engine starts, generator 19 is operated and relay 20 responsive thereto draws switch contact 17 into contact with the stationary contact 18 and thereby connects magnet 10 with generator 19. The force exerted by magnet 10 upon valve 4 therefore depends upon the speed of rotation of the engine, so that if the engine fails to start valve 4 closes again. If, however, the engine starts and runs properly its suction is sufficient to open valve 4 further. This movement causes movable contact 11 to break contact with stationary contact 12 and to close contact between contacts 11 and 13 so that battery 14 is now connected to generator 19 so as to be charged thereby. Electromagnet 10 is disconnected and exerts no further pull on valve 4. When the engine is properly warmed choke button 23 is pushed in causing arm 26 to lift arm 27 and to thereby pull valve 4 to full open position.

We do not intend to be limited in the practice of our invention save as the scope of the prior art and of the attached claims may require.

We claim:

1. An automatic choke for an internal combustion engine comprising a valve controlling the air supply to the carburetter of said engine, means urging said valve to closed position, second means urging said valve to closed position with substantially constant force when said engine is stopped, means for varying the force with which said second means urges said valve to closed position in response to the speed of rotation of said engine, and means for suspending the operation of said second means on said valve.

2. An automatic choke for an internal combustion engine comprising a valve controlling the air supply to the carburetter of said engine, means urging said valve to closed position, second means urging said valve to closed position with substantially constant force when said engine is stopped, means for varying the force with which said second means urges said valve to closed position in response to the speed of rotation of said engine, means for suspending the operation of said second means on said valve, and manually controlled means for opening said valve.

3. An automatic choke for an internal com-

bustion engine comprising a casing fitting with the air supply means to the carburetter of said engine, an air inlet to said casing, a valve in said casing between the air inlet and the carburetter, a spring urging said valve to closed position, an electromagnet urging said valve to closed position, a storage battery, a circuit connecting said electromagnet to said battery when the engine is stopped, an electrical generator responsive to the speed of rotation of said engine, a relay operated by said generator, a second circuit connecting said electromagnet to said generator, a switch operated by said relay to break said first circuit and to close said second circuit, a second switch operated by said valve to disconnect said electromagnet when said valve opens to a predetermined position and to connect said battery to said generator when said valve opens to a predetermined position, and a choke button manually operated to open said valve.

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