

March 23, 1937.

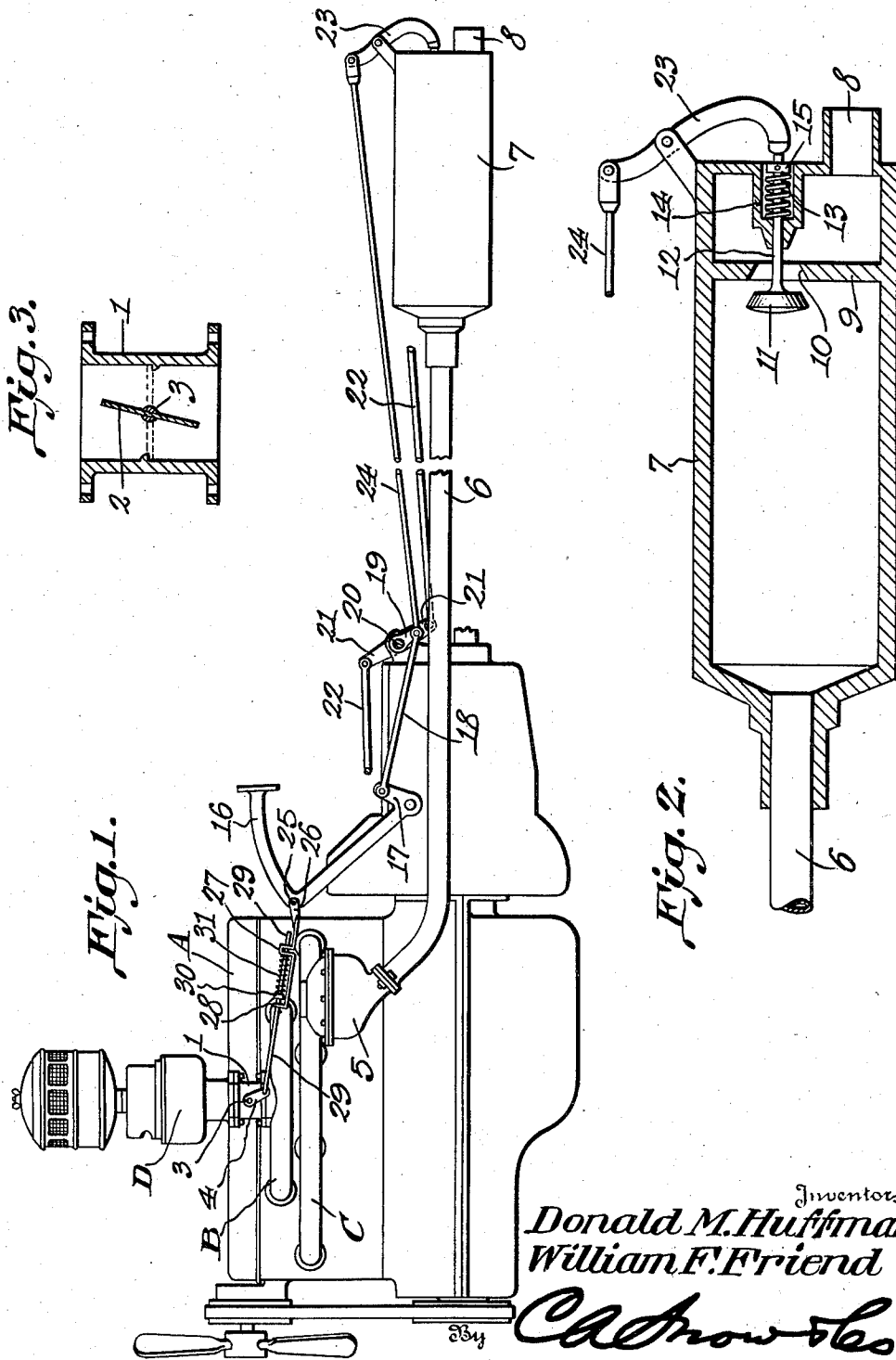
D. M. HUFFMAN ET AL

2,074,651

BRAKE

Filed March 26, 1936

2 Sheets-Sheet 1



UNITED STATES PATENT OFFICE

2,074,651

BRAKE

Donald M. Huffman and William F. Friend,
Keyser, W. Va., assignors of one-third to John
H. Massie, Jr., Edinburg, Va.

Application March 26, 1936, Serial No. 71,030

3 Claims. (Cl. 188—99)

This invention relates to brakes designed primarily for use on motor vehicles utilizing internal combustion engines.

It is an object of the invention to utilize vacuum and compression as a means for retarding the movement of the vehicle on down grades, said means being employed when desired, to supplement the usual friction brake.

Another object is to provide a brake of this type which will not over-heat and will not set up any undesirable vibrations while it is in action.

A further object is to provide a brake which is especially useful in connection with trucks or other heavy vehicles used on mountain roads or wherever steep and dangerous grades are encountered.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings

Figure 1 is a side elevation showing an internal combustion engine and the present improvements combined therewith.

Figure 2 is an enlarged section through the compression cylinder and showing its relief valve.

Figure 3 is a section through the connection between the carbureter and the intake manifold, the valve therein being shown in section.

Figure 4 is a view partly in section and partly in elevation showing the brake mechanism in normal position.

Figure 5 is a similar view showing the brake fully applied.

Figure 6 is an elevation of the yieldable, lost motion connection between the brake pedal and the choke valve.

Referring to the figures by characters of reference A designates an internal combustion engine with the usual intake manifold B and exhaust manifold C. Interposed between the carbureter D and the intake manifold B is a tubular valve casing or sleeve 1 in which a supplemental or auxiliary valve 2 is mounted to move about a central transverse axis 3. This valve is used in addition to the usual carbureter control valve. An arm 4 is located outside of casing 1 and moves with valve 2.

An expansion chamber 5 is located adjacent to and in communication with the exhaust manifold C and extending from this expansion chamber is an exhaust pipe 6 the back end of which opens into a compression cylinder 7. An outlet 8 is provided in the back end of this cylinder and extending across the cylinder is a partition 9 having a valve seat 10. A valve 11 has a stem 12 guided in the back end of cylinder 7 and a spring 13 which is mounted on this stem and within a socket 14 in the end wall of the cylinder, thrusts against a nut 15 or the like on stem 12 and serves to hold the valve normally closed against seat 10.

The usual foot pedal of a vehicle brake has been indicated at 16 and has an arm 17 movable therewith for pulling through a rod 18 upon an arm 19 extending from a transverse shaft 20. This pedal is yieldingly supported in the usual manner. Arms 21 carried by this shaft have rods 22 extending to the usual mechanical brakes, not shown.

A lever 23 is fulcrumed adjacent to cylinder 7 and one arm thereof is adapted to swing against stem 12 to unseat valve 11, while the other arm is connected by a rod 24 to arm 19.

Pivotally connected to the brake pedal 16 at 25 is a thrust member 26 having an intermediate offset portion 27 constituting a guide ear while another guide ear 28 is formed by offsetting one end of the thrust member. A rod 29 is slidable in these ears and pivotally connected at one end to the arm 4 of the valve 2. A collar 30 is secured to this rod between the ears and receives thrust from one end of a coiled spring mounted on the rod, the other end of the spring bearing against ear 27. Normally the collar 30 is thrust against ear 28 as shown in Figure 6.

When the engine is operating, fuel will be drawn through casing 1 into manifold B while spent exhaust gases will be discharged into chamber 5 and thence into pipe 6 and cylinder 7. Normally the lever 23 holds valve 11 open so that the gases can escape through the outlet 8.

To apply the brake, the foot is removed from the accelerator as usual and pedal 16 is thrust forward a short distance so as to release valve 11 for movement toward its seat. Gas and/or air sucked into the cylinders of the engine, thus will be forced out into the exhaust manifold C and thence to chamber 5, pipe 6 and cylinder 7 where it will be compressed quickly by the rapidly reciprocating engine pistons, the degree of compression depending upon the position of the valve 11 relative to its seat. Further forward move-

ment of pedal 16 will result in complete closing of the valve 11 and this will be followed by offset 27 pressing against and compressing spring 31, thereby closing valve 2. Consequently subsequent reciprocations of the engine pistons will create vacuums between them and the closed valve 2 as well as compression of the air and/or gas already compressed between the pistons and the valve 11.

10 It has been found in practice that this double retarding action set up by compression and vacuum or suction, as explained, will enable a vehicle to be kept under complete control when descending any grade. Therefore the invention 15 is especially useful in those localities where steep grades frequently are encountered.

What is claimed is:

1. The combination with an internal combustion engine having an exhaust manifold and an 20 intake manifold, of mechanical brake mechanism including an operating element, and a compression brake mechanism comprising a compression cylinder communicating with the exhaust pipe and having an outlet, a valve in the 25 cylinder, means connected to the operating element for holding the valve open, said means being shiftable by said element to release the valve, and means for closing the valve automatically when released to prevent flow of gases from the 30 outlet of the cylinder.

2. The combination with an internal combustion engine including a carbureter, of mechanical

brake mechanism including an operating element, and compression brake mechanism including a compression cylinder in communication with the exhaust manifold of the engine, a valve in the 5 cylinder, a normally open valve between the intake manifold and the carbureter and separate from the carbureter for controlling the flow of air and/or gas to the engine, means operated by the said element for holding the cylinder valve 10 open and for releasing said valve, means for closing said cylinder valve when released to shut off the escape of gases from the cylinder, and means operated by said operating element for effecting a delayed actuation of the air control valve.

3. The combination with an internal combustion engine having a carbureter and intake and exhaust manifolds, of an auxiliary valve for controlling the flow of air and/or gas to the intake manifold from the carbureter, a compression cylinder communicating with the exhaust manifold 20 and having an outlet, a normally open valve in the cylinder for controlling the escape of air or gas through the outlet, a normally restrained spring for closing the cylinder valve, brake mechanism, a foot pedal movable in one direction to 25 actuate said mechanism, and separate means operated by said pedal for releasing the spring to close the cylinder valve and thereafter closing the auxiliary valve.

DONALD M. HUFFMAN.
WILLIAM F. FRIEND.