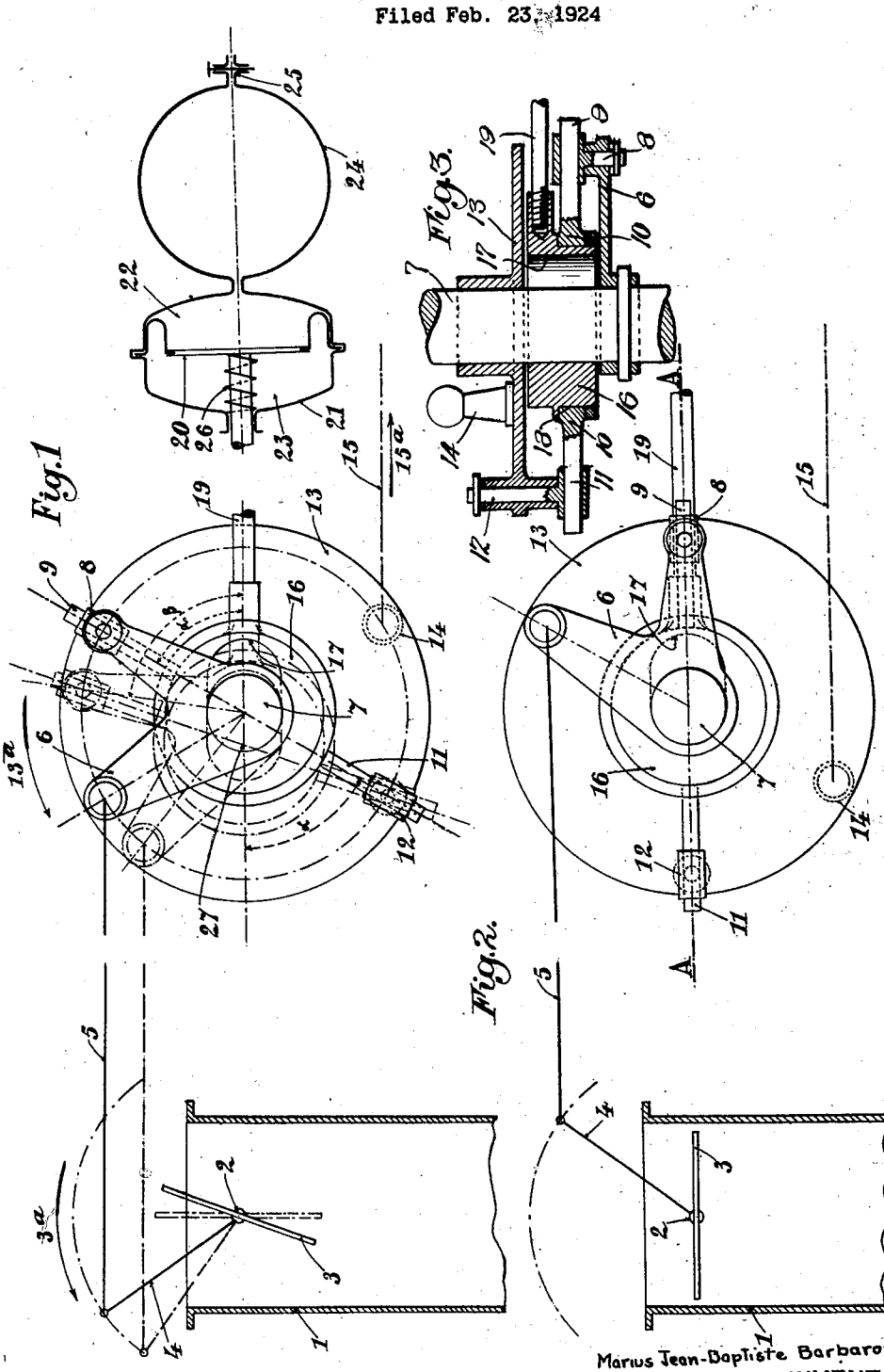
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CONTROL OF CARBURETORS FOR INTERNAL COMBUSTION ENGINES

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CONTROL OF CARBURETORS FOR INTERNAL-COMBUSTION ENGINES.

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To all whom it may concern:

Be it known that I, MARIUS JEAN-BAPTISTE BARBAROU, citizen of the French Republic, residing at Paris, in the French Republic, have invented new and useful Improvements in the Control of Carburetors for Internal-Combustion Engines, of which the following is a specification.

It is known that when an internal combustion engine is to work at variable altitudes, as it is the case for example for aviation engines, or engines for vehicles which are to travel in the mountains, it is advantageous to be able to increase the compression in the engine according as the engine rises. This increase of compression may be obtained by increasing the quantity of gas admitted into the power cylinder per revolution of the engine, and this is done by acting on the throttle of the carburetor. But it is readily understood that if in order to operate the engine at a high altitude, the carburetor throttle is fully open, the full opening of the latter must be prevented when the engine is working at mean or low altitudes, for the compression would then be much too high, and this could cause serious damage to the engine.

The present invention has for its object a control device for the automatic regulation of the maximum opening of the throttle of the carburetor of an internal combustion engine, according to the altitude at which the engine is working. One feature of the device according to the invention resides in that it comprises an elastic membrane or like member, subjected on one side to a predetermined constant pressure, and on the other side to the surrounding atmospheric pressure, said membrane being operatively connected with one joint of the rod and link gear connecting the control member to the carburetor throttle, so as to change the angular position of said joint, and consequently to change the angular position of said throttle, according to the altitude at which the engine is working.

In the appended drawing which shows by way of example two forms of construction of the carburetor control according to the invention:

Fig. 1 is a diagrammatic front view of one form of construction of the device; the position of the elements for the maximum possible opening, in the case in which the engine operates at the ground level is shown in full lines, and the position of the same elements for the maximum possible opening when the engine operates at the maximum altitude for which the control has been designed is shown in full and dotted lines.

Fig. 2 shows the position of the parts for the slow speed working of the engine when on the ground.

Fig. 3 is a section on A—A of Fig. 2.

In the construction shown in Figs. 1 to 3, the pipe 1, which supplies to the engine the gases coming from the carburetor, carries a shaft 2 on which is movable the throttle 3. The throttle 3 is secured to a lever 4 to which is attached one end of a link 5 connected at its other end with one arm of a bell-crank lever 6 keyed to a shaft 7.

To the other arm of the lever 6 is pivoted a piece or stud 8, in which is slidably mounted one of the arms 9 of a ring 10, the other arm 11 whereof, diametrically opposite the arm 9, is adapted to slide in a piece 12 pivoted to a disc 13 mounted loose on the shaft 7 and provided with a stud 14 upon which is mounted, through the medium of a ball-and-socket joint, the rod 15 connected to the control member within reach of the driver or pilot.

The shaft 7 carries a piece 16 having an aperture 17 of the shape illustrated in the drawing and whose width is equal to the diameter of the said shaft. This piece 16 carries a circular hub 18 on which is mounted the ring 10. A rod 19 is secured at one end to the piece 16, while at the other said rod is attached to an elastic diaphragm 20 contained in a receptacle 21. This diaphragm 20 divides the receptacle 21 into two chambers 22 and 23; the chamber 22 is connected with a hermetically closed chamber 24 provided with a conduit 25 adapted to allow in the chamber 22 a pressure of a well-determined value; the chamber 23 is open to the atmosphere. The diaphragm 20 is on the other hand subjected to the action of a spring 26 which is properly adjusted with respect to the pressure in the chamber 22, so as to only allow the motion of said diaphragm when the outside pressure prevailing in the chamber 23 shall be below a stated value.

The operation of the apparatus is as follows: To open or close the carburetor throttle 3 the driver or pilot acts on the lever or

like control member, which is within his reach. This action, through the medium of the rod 15 will cause the disc 13 to rotate. The latter, through the medium of the piece 12, will actuate the arm 11 of the ring 10 which, when turning on the hub of the piece 16, will act by its arm 9 on the piece 8 and will thus rotate the bell-crank lever 6 which, through the medium of the link 5 and the lever 4, will move the carburetor throttle. If the pilot pulls on the rod 15 in the direction of the arrow 15^a, the disc 13 and the bent lever 6 are rotated in the direction of the arrow 13^a, which causes the opening of the throttle of the carburetor in the direction of the arrows 3^a.

If the engine is working at low altitudes, the ring 10 is now in the position shown in full lines in Fig. 1 and the maximum possible opening of the carburetor is the one illustrated; this opening is limited according to the maximum stroke of the lever which is within reach of the pilot.

But if the engine works at a higher altitude, the atmospheric pressure will diminish, and in these conditions the diaphragm 20 pushes the rod 19, and this causes the piece 16 to slide on the shaft 7 and brings it into the position shown in full and dotted lines in Fig. 1. It will be readily noticed that in this movement the centre of the ring 10 comes to 27, and as the pilot or the driver has left his lever in the position of maximum opening, the disc 13 remains fixed but the bent lever 6 comes into the position shown in full and dotted lines, thus further opening the carburetor throttle 3. α being the angle of rotation of the piece 8 i. e. of the disc 13, from the position shown in Fig. 2, to the position shown in Fig. 1 when the center of the ring 10 registers with the center of the disc 13, and β being the angle of rotation of the piece 8 corresponding to a rotation of same magnitude α of the disc 13 when the center of the ring 10 is at 27, β is obviously greater than α. It is thus observed that for a given movement of the conductor's hand lever, corresponding to an angle of rotation α of the disc 13, the angle of rotation of the lever 6 is α, in case the engine is working on the ground, and is β in the case in which the engine is working at a higher altitude i. e. when the center of the ring 10 is at the point 27.

To bring back the engine to slow speed, it suffices to act upon the rod 15 in the contrary direction to the arrow 15^a; the disc 13 will turn in the contrary direction to 13^a; the arm 11 coming into the horizontal position (Figs. 2 and 3) the position of the bent lever 6 is such that the throttle 3 will only give passage to exactly the amount of gas necessary to keep up the slow speed working. Since at this time the arm 9 is also horizontal, whatever may be the outer air pressure, that is to say whatever may be the position of the piece 16, the carburetor throttle will have the same position and will remain closed. The action of the manometric receptacle 21 will be manifested according as the pilot acts upon the control device to open the carburetor throttle.

Various constructional modifications may obviously be brought to the above described device without departing from the spirit of the invention.

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

A control gear for the carburetor of an internal combustion engine comprising a control member operated by the operator, a rod and link gear embodying two swinging arms respectively connected to said control member and to the carburetor throttle, an intermediate member upon which said arms are jointed, a shaft on which said two swinging arms and said intermediate member are mounted and whereon said intermediate member is adapted to slide transversely with respect to said shaft, an elastic membrane subjected on one face to a predetermined constant pressure and on the other face to the surrounding atmospheric pressure and means operatively connecting said elastic membrane to said intermediate member and adapted to transversely displace said intermediate member and whereby the angular position of said arm connected to the carburetor throttle is varied in accordance with the altitude at which the engine is working.

In testimony whereof I have signed my name to this specification.

MARIUS JEAN-BAPTISTE BARBAROU.