C. M. DYER.

AUXILIARY AIR VALVE FOR INTERNAL COMBUSTION ENGINES.

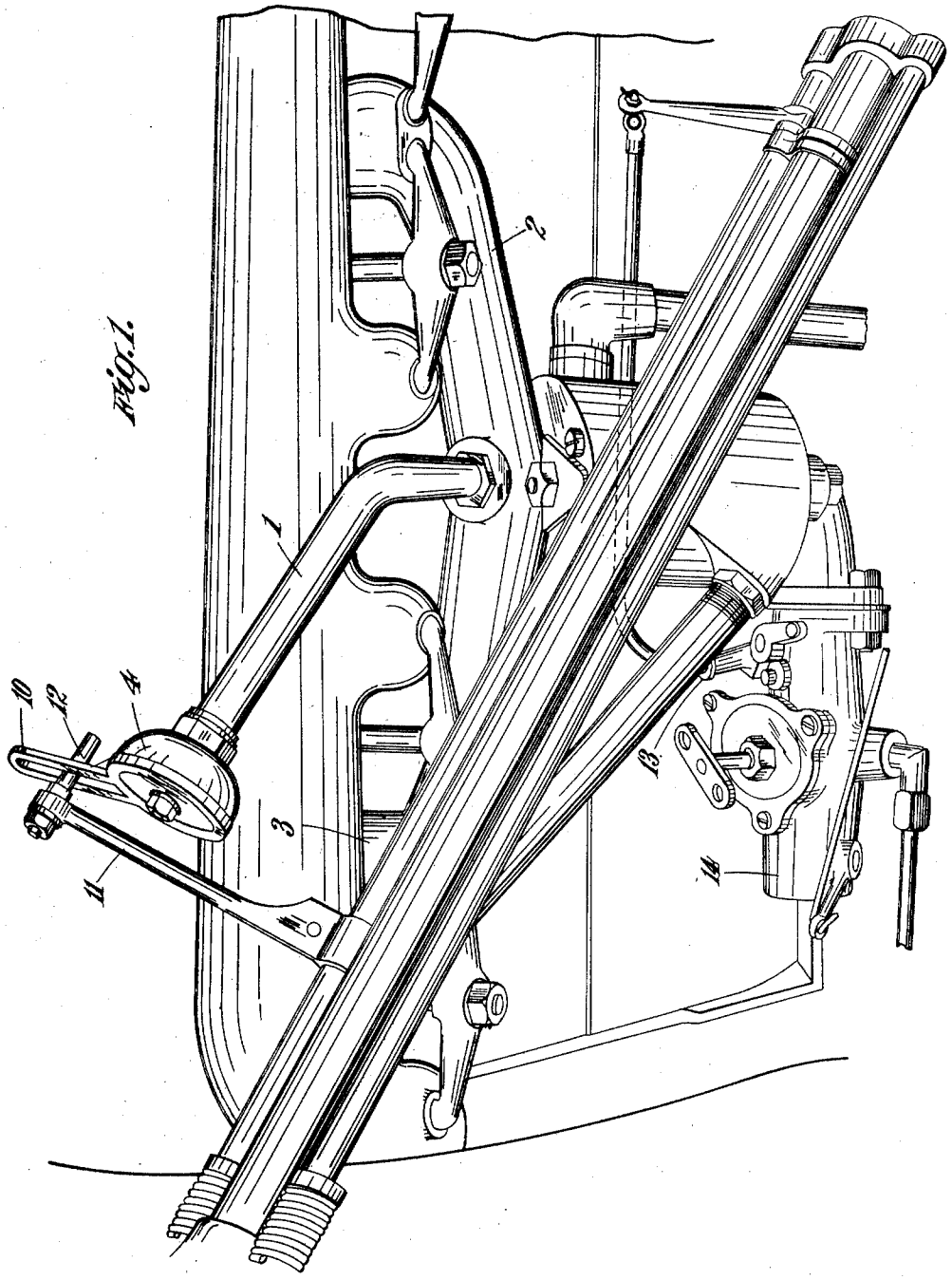
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Patented Mar. 29, 1921.

2 SHEETS—SHEET 1.

Fig. 1.



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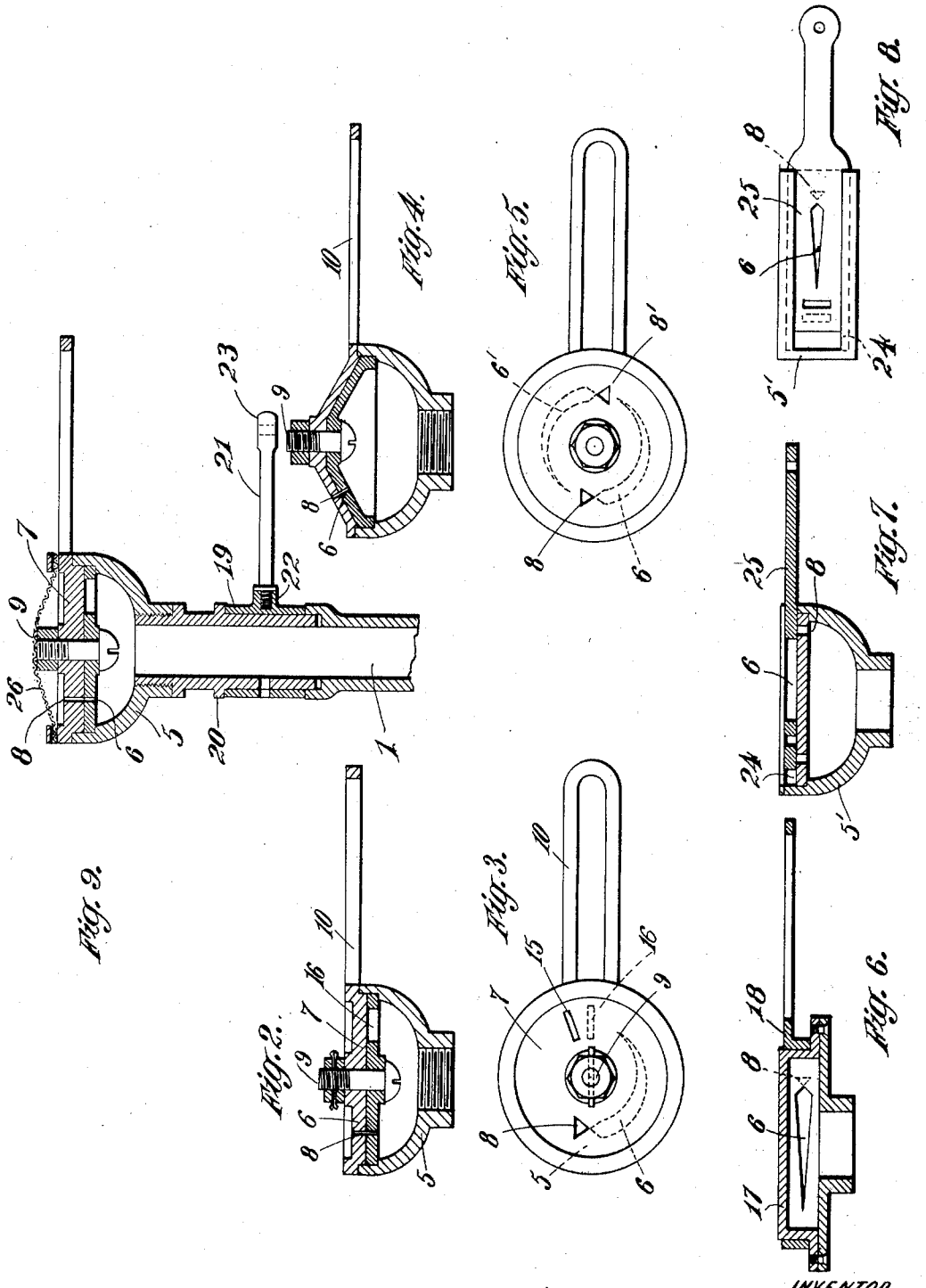
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AUXILIARY AIR-VALVE FOR INTERNAL-COMBUSTION ENGINES.

1,373,119. Specification of Letters Patent. Patented Mar. 29, 1921.

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To all whom it may concern:

Be it known that I, CECIL MUNRO DYER, a subject of the King of Great Britain, and residing at Narbethong, 30 Barrington avenue, Kew, Melbourne, in the State of Victoria, Australia, have invented certain new and useful Improvements in Auxiliary Air-Valves for Internal-Combustion Engines, of which the following is a specification.

This invention relates to a positive mechanically operated auxiliary air valve device for internal combustion engines. It is the object of the invention to provide a device of the character which shall be operated by the movements of the throttle lever and will control the opening for auxiliary air correctly according to the adjustment of the throttle valve. When this is effected, the device will provide exactly the correct quantity of air required at all engine speeds dependent upon the adjustment of the throttle for running at such speeds.

The accompanying drawings show some forms of construction of the device according to the present invention. In the said drawings:—

Figure 1 is a perspective view showing the device applied to an internal combustion engine.

Fig. 2 is an elevation in section of the extra air valve device.

Fig. 3 is a plan view of Fig. 2.

Fig. 4 is an elevation in section of the device wherein conical disks are used.

Fig. 5 is a plan view of Fig. 4, and shows two sets of openings formed on the disks.

Fig. 6 is a sectional elevation of the device wherein the openings are formed in annular members.

Fig. 7 is a view in elevation of the device wherein the openings are formed on flat plates one of which is slidable longitudinally.

Fig. 8 is a plan view of Fig. 7.

Fig. 9 is a view in elevation showing the device fitted with an additional hand controlled extra air valve.

Referring more particularly to the drawings, a pipe 1 connected at a suitable point to the induction pipe 2 has its end terminating adjacent to the throttle lever rod 3 which operates the throttle lever 13 on the carbureter body 14, and carrying the extra-air valve 4. This is made as a disk 5 (Figs. 2 and 3) with a slot 6 in it with its center line following the arc of a circle around 180° or rather less. At the end corresponding with closed throttle the slot commences in a triangular shape, expanding quickly to a full width, and from that point onward the width contracts until the slot terminates at a position at or shortly before the full throttle opening position. A revoluble disk 7 is mounted to turn over the fixed disk and has a slot 8 of triangular shape therein with its point oppositely directed to that of the triangular end of the slot 6 in the fixed disk 5. The revoluble disk is carried on a center screw-ended pin 9 with a washer and a locked nut holding the disks in close contact. The revoluble disk 7 has a slotted arm 10 projecting laterally therefrom, and a lever 11 is clamped to the throttle lever rod 3, with a pin 12 on its end engaging in the slotted arm aforesaid, the positions of the parts being such that as the throttle lever rod turns through about 90° in moving the throttle from the fully closed to the fully open position, the lever 11 attached to said rod swings across the end of the extra-air valve turning its slotted arm through nearly 180°. With this construction, as the throttle lever rod is turned, the extra-air valve opens so as to give its maximum opening between one-quarter throttle and three-eighths throttle opening or thereabout, while after about half-throttle opening the extra-air valve closes rapidly diminishing the extra air admission down to nothing at or before full-throttle opening.

The device shown in Figs. 2 and 3 is formed with a slot at 15 on the movable disk 7 which comes into register with a slot 16 in the stationary disk 5 of the valve after the valve has been moved past the position for cutting off auxiliary air when the throttle is closed. With this arrangement, if the driver of the vehicle keeps the clutch in engagement after closing the throttle when running down hill for example, and moves the lever 10 far enough to bring the additional slots in the auxiliary air valve into regis-

ter, the engine will draw in air through these slots which will both cool and clear out the cylinders and passages of the engine, and will produce the effect of an air brake. The braking action can be controlled by varying the amount of opening of the additional slot by movement of the auxiliary air valve lever while the throttle is in the closed position. On opening the throttle again when the engine is to pick up for driving purposes, the additional slot is closed and the auxiliary air valve slot begins to open and to function exactly as above described.

The disk faces are ground to work truly one over the other, and are held firmly pressed together so as to prevent leakage of air. Either the slot 6 or the aperture 8 may be in the movable member while the other is in the fixed member. Instead of disks, of course, cones as shown in Figs. 4 and 5, working one over the other may be used, with slots 6 and apertures 8 similarly formed therein. There may also be more than one slot; for example, Fig. 5 shows a pair of similar apertures 8 and 8′, in the one member and a pair of slots 6 and 6′ of the shape already described in the other member. Fig. 6 shows an alternative wherein slot 6 is in the circumference of a cap-shaped member 17 over which works a ring 18 provided with the aperture 8. Figs. 7 and 8 show a fitting 5′ corresponding to the cup-shaped member 5 in Figs. 2 and 3, but of long form with a channel-shaped top 24 on which a slide 25 works. The slot 6 is shown in this case as being in the moving member 25, while the aperture 8 is in the stationary member 24.

The range of movement is not necessarily 180° or thereabout, but it may be no more than 90° for example, if that is most convenient and if the slot and aperture are shaped accordingly to give the correct opening for each position.

Fig. 9 shows an arrangement of the device according to the present invention wherein an additional extra air valve is provided. This consists of a revoluble sleeve 19 which is made a working fit around the tubular member 20 which is adapted to be connected to the pipe 1. Holes are formed in the sleeve 19 and member 20 and are adapted to come into register with one another on turning the sleeve 19; the sleeve is turned by an arm 21 screwing into the boss 22, and positively operated from any desired point through a rod 23 for instance. The use of such an additional valve is optional and does not form an essential feature of the invention. However, with this device fitted a more accurate adjustment of the extra air admitted to the induction pipe is obtainable.

A fine-mesh wire cage as shown at 26, Fig. 9, or the like may be fitted over the valve to prevent entry of dust and foreign matter.

The details of construction may obviously be varied.

I claim:—

1. A positive mechanically operated auxiliary air valve for use with internal combustion engines, said valve comprising a hollow member adapted to be attached to the induction pipe of an internal combustion engine, a movable member slidably mounted on a face of said hollow member, one of said members having a relatively long slot therein tapering toward one end, while the other of said members has an aperture therein which is relatively short, and is adapted to pass longitudinally over the said slot as the movable member is moved over the hollow member, means for holding the faces of the said members in effective contact, and link mechanism adapted for connection to the operating mechanism of a throttle valve, said mechanism being so proportioned that in the range of movement imparted to the said movable member it will pass from the position in which the aperture is out of register with the slot, through positions in which the area of co-registration between the aperture and slot rapidly increases to the maximum, and then through positions in which the area of co-registration is gradually reduced.

2. A positive mechanically operated auxiliary air valve for use with internal combustion engines, said valve comprising a hollow member adapted to be attached to the induction pipe of an internal combustion engine, a circular disk mounted on said hollow member, a second disk revolubly mounted on said disk, one of said disks having a concentric circular groove formed therein rapidly increasing in width from a point to the maximum width and then relatively slowly decreasing in width to a point, while the other of said members has an aperture therein of substantially triangular shape and disposed in such a way that on being revolved the apex thereof first uncovers the apex of the rapidly opening end of the groove on the first disk member, means for holding the faces of the said members in effective contact, and link mechanism adapted for connection to the operating mechanism of a throttle valve, said mechanism being so proportioned that in the range of movement imparted to the said movable member it will pass from the position in which the aperture is out of register with the slot, through positions in which the area of co-registration between the aperture and slot rapidly increases to the maximum, and then through positions in which the area of co-registration is gradually reduced.

3. A positive mechanically operated aux-

iliary air valve for use with internal combustion engines, said valve comprising a hollow cup-shaped member, a boss on said member adapted to be connected to the induction pipe of an internal combustion engine, a circular disk mounted on said cup-shaped member, a second disk revolubly mounted on said disk, one of said disks having a concentric circular groove formed therein rapidly increasing in width from a point to the maximum width and then relatively slowly decreasing in width to a point, while the other of said members has an aperture therein of substantially triangular shape and disposed in such a way that on being revolved the apex thereof first uncovers the apex of the rapidly opening end of the groove on the first disk member, means for holding the faces of the said members in effective contact, an annular recess formed in the mouth of said cup-shaped member and adapted to fit tightly around one of said disk members, and link mechanism adapted for connection to the operating mechanism of a throttle valve, said mechanism being so proportioned that in the range of movement imparted to the said movable member it will pass from the position in which the aperture is out of register with the slot, through positions in which the area of co-registration between the aperture and slot rapidly increases to the maximum, and then through positions in which the area of co-registration is gradually reduced.

4. The combination with a throttle valve for use with internal combustion engines and operating mechanism therefor including a throttle lever rod, of a positive mechanically operated auxiliary air valve, said valve comprising a hollow member adapted to be attached to the induction pipe of an internal combustion engine, a movable member slidably mounted on a face of said hollow member, one of said members having a relatively long slot therein tapering toward one end, while the other of said members has an aperture therein which is relatively short, and is adapted to pass longitudinally over the said slot as the movable member is moved over the hollow member, means for holding the faces of the said members in effective contact, and a link mechanism comprising an arm extending from said movable member and provided with a longitudinal slot, an arm mounted on the throttle lever rod, and a pin projecting laterally from said arm and adapted to slidably engage in said longitudinal slot, said mechanism being so proportioned that in the range of movement imparted to the said movable member it will pass from the position in which the aperture is out of register with the slot, through positions in which the area of co-registration between the aperture and slot rapidly increases to the maximum, and then through positions in which the area of co-registration is gradually reduced.

5. A positive mechanically operated auxiliary air valve for use with internal combustion engines, said valve comprising a hollow member adapted to be attached to the induction pipe of an internal combustion engine, a movable member slidably mounted on a face of said hollow member, one of said members having a relatively long slot therein tapering toward one end, while the other of said members has an aperture therein which is relatively short, and is adapted to pass longitudinally over the said slot as the movable member is moved over the hollow member, further apertures formed in said members and adapted to register with one another when the throttle is in the closed position.

6. A positive mechanically operated auxiliary air valve for use with internal combustion engines, said valve comprising a hollow member, a boss on said member, a tubular member connected to said boss and communicating with the induction pipe of the internal combustion engine, and hand operated means for admitting air into said tubular member, a movable member slidably mounted on a face of said hollow member, one of said members having a relatively long slot therein tapering toward one end, while the other of said members has an aperture therein which is relatively short, and is adapted to pass longitudinally over the said slot as the movable member is moved over the hollow member, means for holding the faces of the said members in effective contact, and link mechanism adapted for connection to the operating mechanism of a throttle valve, said mechanism being so proportioned that in the range of movement imparted to the said movable members it will pass from the position in which the aperture is out of register with the slot, through positions in which the area of co-registration between the aperture and slot rapidly increases to the maximum, and then through positions in which the area of co-registration is gradually reduced.

7. A positive mechanically operated auxiliary air valve for use with internal combustion engines, said valve comprising a hollow member, a boss on said member, a tubular member connected to said boss and communicating with the induction pipe of the internal combustion engine, a revoluble sleeve on said tubular member, openings in said sleeve and tubular member adapted to register with one another on revolving said sleeve, an arm projecting from said sleeve, and means connected to said arm adapted to operate the same from any desired position, a movable member slidably mounted

on a face of said hollow member, one of said members having a relatively long slot therein tapering toward one end, while the other of said members has an aperture therein which is relatively short, and is adapted to pass longitudinally over the said slot as the movable member is moved over the hollow member, means for holding the faces of the said members in effective contact, and link mechanism adapted for connection to the operating mechanism of a throttle valve, said mechanism being so proportioned that in the range of movement imparted to the said movable member it will pass from the position in which the aperture is out of register with the slot, through positions in which the area of co-registration between the aperture and slot rapidly increases to the maximum, and then through positions in which the area of co-registration is gradually reduced.

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