June 26, 1945. N. B. BIRGE 2,379,212

INTERNAL COMBUSTION PRESSURE GENERATOR

Filed Aug. 21, 1943

Fig. 1.

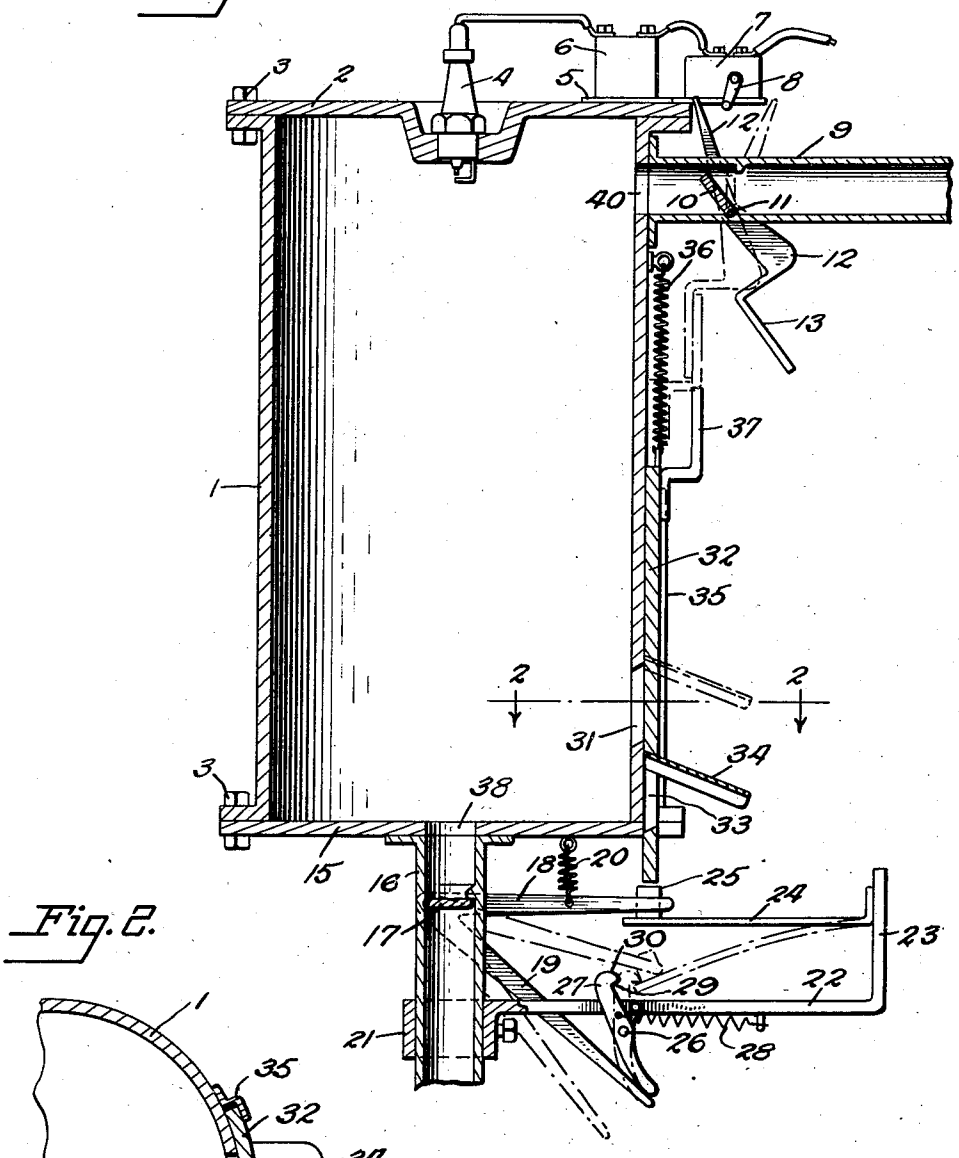
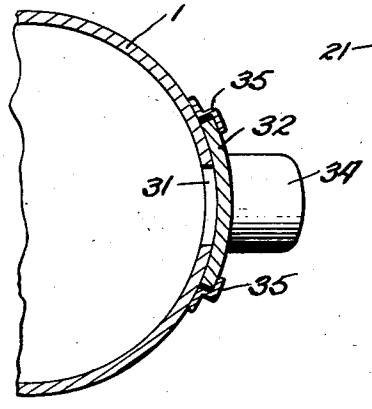


Fig. 2.



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INTERNAL-COMBUSTION PRESSURE GENERATOR

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6 Claims. (Cl. 60—44)

This invention relates to combustion pressure generators and more particularly to the type of combustion pressure generators in which a succession of explosions of a combustible gas or mixture are utilized either to operate tools of the pneumatic type or to build up a pressure reservoir from which such tools or other machinery may be operated, as desired.

The object of the invention is to provide an improved and simplified device substantially automatic in operation and in which the variations in pressure in the combustion chamber are utilized to operate the valves and the ignition system.

The invention consists in the novel construction, arrangement, and combinations of parts hereinafter more particularly described and claimed.

One sheet of drawings, largely diagrammatic, accompanies this specification as part thereof, in which like reference characters indicate like parts throughout.

In the drawing:

Figure 1 is a vertical, cross-section of a device illustrating the principles of the present invention;

Figure 2 is a fragmentary, horizontal, cross-section taken on line 2—2 of Figure 1.

In the simplified, diagrammatic illustration accompanying this specification, in which, for purposes of clearness, no attempt has been made to show more or less essential, practical features such as cooling system and the like, the combustion chamber is illustrated as a cylindrical member 1 provided with outturned peripheral flanges at each end to which are secured a top plate 2 and bottom plate 15. The top plate 2 is formed with a central depression having a threaded orifice adapted to receive a spark plug 4 and on the head 2 is mounted a bracket 5 on which may be mounted a spark coil 6 and switch 7. The switch 7 is provided with an operative crank handle 8 so arranged as to rotate the switch shaft when the handle is rotated in a counter-clockwise direction and to ride freely on the switch shaft in a clockwise direction. Such switches are well known and details are not shown herein. The top and bottom plates 15 may be conveniently secured to the cylinder 1 as by bolts 3.

Below the bracket 5 the cylinder 1 is provided with a fuel inlet port 40 and below that and in substantial vertical alignment therewith is an auxiliary exhaust port 31, while centrally of the bottom plate 15 is the principal or power exhaust port 38.

A fuel supply pipe 9 is secured to the cylinder 1 in alignment with the inlet port 40, and positioned in the fuel pipe 9 substantially below the crank handle 8 of switch 7 is a pivoted valve 10 mounted on a shaft 11 to which is secured a double armed lever 12, the lower arm of which is provided with an offset portion 13, while the upper arm is adapted to rock so as to rock the crank 8 of the switch.

Secured to the cylinder 1 below the fuel inlet pipe 9 are two vertically aligned and spaced track members 35—35 between which is slidably positioned a valve 32 of arcuate cross-section adapted to seat closely against the wall of cylinder 1. The slide valve 32 is provided with a port 33, above which is secured a downwardly directed and outwardly extending baffle 34, and the slide valve 32 is suspended from cylinder 1 by an expansion spring 36 of just sufficient strength to retain the slide valve 32 normally suspended with its port 33 below the auxiliary exhaust port 31 of cylinder 1 and in the full line position illustrated in Figure 1.

Secured to the upper end of the slide valve 32 is an offset arm 37 adapted to engage the offset portion 13 of lever 12 to lock inlet valve 10 in closed position when valve slide 32 is in its elevated position and with its port in alignment with port 31 of cylinder 1.

A power exhaust pipe 16 is secured to the bottom head 15 of cylinder 1 in alignment with the power exhaust port 38 and in this pipe 16 is pivotally mounted an outlet valve 17, to the shaft of which is secured a double-armed lever having the operative arms 18 and 19. The upper lever arm 18 is attached to the bottom plate 15 by means of an expansion spring 20. Mounted on the pipe 16 is a collar 21 carrying an arm 22 extending horizontally therefrom, the outer end of arm 22 being upturned as at 23 to carry a leaf spring 24 having near its free end and on its upper face a hammer member 25 which in the normal position of spring 24 and in the lowermost position of slide valve 32 is slightly spaced below the lower edge of the slide valve, as illustrated. The free end of lever arm 18 overlies the free end of leaf spring 24 adjacent hammer 25.

Pivoted as at 26 to lugs carried by arm 22 is a double-armed catch lever 27 having a detent 29 adapted to engage the free end of leaf spring 24 when the latter is depressed, and as illustrated in dotted lines. The catch lever 27 is arranged to be operated by the lower lever arm 19 connected with outlet valve 17.

In the full line position of the mechanism, illustrated in Figure 1, it will be noted that both

of the exhaust ports 38 and 31 are closed by their respective valve devices, while the inlet valve 10 is open, admitting the fuel mixture through inlet pipe 9. With the inlet valve 10 in this position, it will be noted that the upper arm of lever 12 is to the left of the switch crank 8 and when the pressure of the fuel mixture within the cylinder 1 becomes the same as the pressure of the fuel mixture supply, the weight of the extended portion 13 of lever 12 will swing valve 10 to a closed position, indicated in dotted lines, and in so doing will rock crank 8, thus closing the circuit through spark coil 6 and producing an ignition spark through spark plug 4, thus exploding the mixture within the cylinder 1. Immediately upon the explosion occurring, power exhaust valve 17 will be forced open, with the result that lever arm 18 will depress leaf spring 24 from the full line position illustrated to the dotted line position, the free end of the spring rocking catch lever 27 so that the catch 27 controlled by spring 28 will engage and hold in depressed position the spring 24. At this time, the lower lever arm 19 will have assumed dotted line position and the gas from the initial stages of the explosion will pass through power exhaust pipe 16 either to the tools or the pressure reservoir, not shown. As the pressure of these expanding gases fall below the strength of expansion spring 20, lever arms 18 and 19 will be drawn upwardly, closing valve 17, and by this movement the lower lever arm 19 will rock catch lever 27, releasing leaf spring 24, so that hammer 25 is thrown upwardly, giving an impact blow to slide 32 which, as previously pointed out, is in its barely balanced position controlled by spring 36 and raising the slide valve 32 to a point where its port 33 will begin to clear the lower edge of auxiliary port 31 in cylinder 1. The remaining lower pressure gases from the final stages of combustion will pass outwardly through ports 31 and 33 and in so passing will engage the downwardly inclined baffle 34 to further elevate slide valve 32, so that the ports 31 and 33 will be brought into substantially complete alignment. During this motion of slide valve 32, the offset arm 37 will assume a locking position with respect to offset portion 13 of valve control lever 12, as illustrated in dotted lines, thus preventing the opening of fuel inlet valve 10 until the gases in chamber 1 have been exhausted to such a point that slide valve 32 will gravitate against the tension of spring 36 to close port 31, at which point arm 37 is cleared from arm 13, releasing lever 12 and permitting the higher pressure of the fuel supply to rock valve 10, readmitting a new charge of fuel into cylinder 1. The above outlined cycle will then be repeated automatically.

Various modifications in the precise structure and arrangement of parts will readily suggest themselves to those skilled in the art, but within the scope of the present invention, as claimed.

Having thus fully described my invention, I claim:

1. A combustion pressure generator comprising, a combustion chamber, an ignition device, a fuel intake with valve control, a work pressure outlet with valve control and an exhaust port with valve means for the exhaust port, means associated with the valve for the exhaust port arranged to control the inlet port valve and means associated with the valve for the work pressure outlet for opening the exhaust valve.

2. The combination of claim 1, in which the valve for the exhaust port is suspended in a spring supported balanced position of repose.

3. The combination of claim 1, in which the valve for the exhaust port has a port associated with a deflector adapted to be impacted by exhaust gases.

4. In a combustion pressure generator having a combustion chamber formed with a fuel inlet port, a work pressure port and an exhaust port and an igniter device, valves for said ports, the valve controlling the inlet port arranged to operate the ignited device, the exhaust port valve having means to lock the intake port valve, means adapted to coact with the exhaust gases to maintain the said exhaust port valve in the open position, and means associated with the work pressure port valve to initiate the opening operation of the exhaust port valve.

5. A combustion pressure generator comprising, a combustion chamber formed with fuel inlet port, work pressure outlet port and exhaust port, valves for said ports and an igniter device a baffle associated with the exhaust valve, operative means associating said valves and igniter device, the exhaust port valve balanced to be influenced by escaping gases impinging the baffle in the last stages of exhaust to open position to reduce the chamber pressure below that of the fuel supply.

6. A combustion pressure generator comprising a combustion chamber having fuel inlet port, work pressure outlet port and exhaust port, and an igniter device with control switch, a pressure operated control valve for the fuel inlet port, said valve carrying means arranged to operate the control switch and means to be lockingly engaged to control said valve's operation, a spring suspended slidable valve member to control the exhaust port having a port, said slidable valve member arranged to lockingly engage the fuel valve locking member and having a deflector adjacent the port arranged to be impinged by exhaust gases, a spring controlled valve for the work pressure outlet port and means associated with said last mentioned valve and controlled thereby to impact the slidable exhaust valve member to contribute the initial movement for its opening stroke.

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