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EXPLOSIVE ENGINE.

APPLICATION FILED JUNE 7, 1919.

1,406,072. Patented Feb. 7, 1922.

Fig. 1.

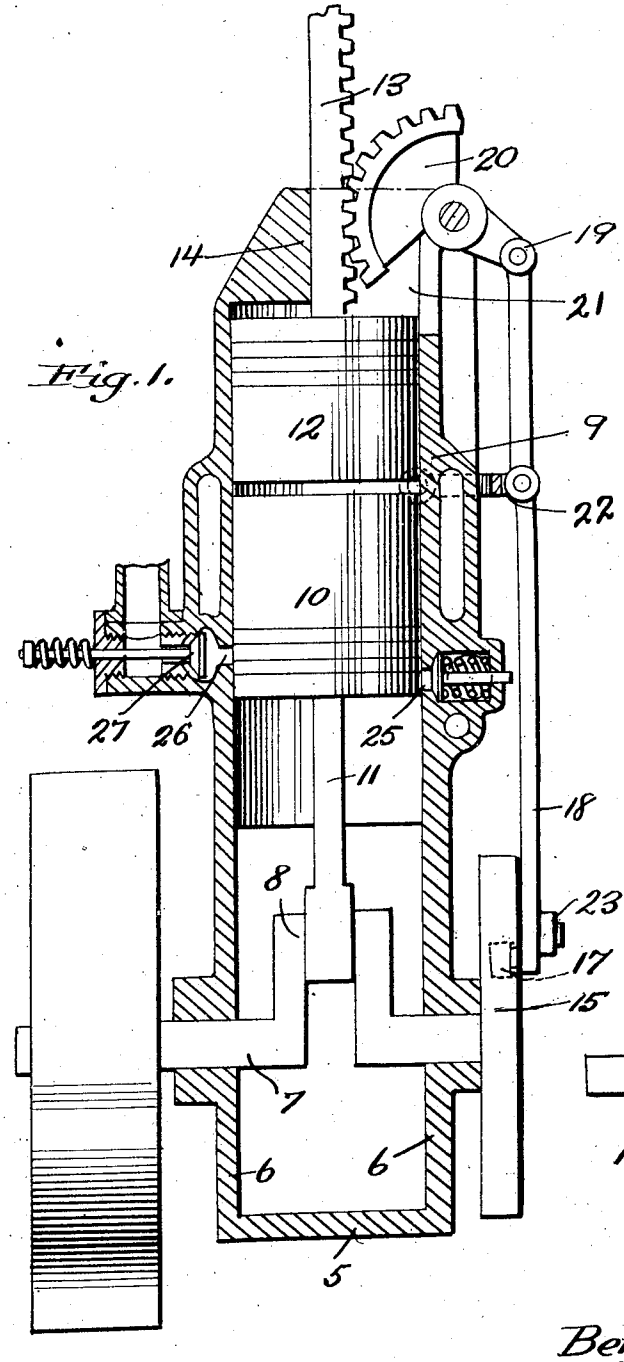
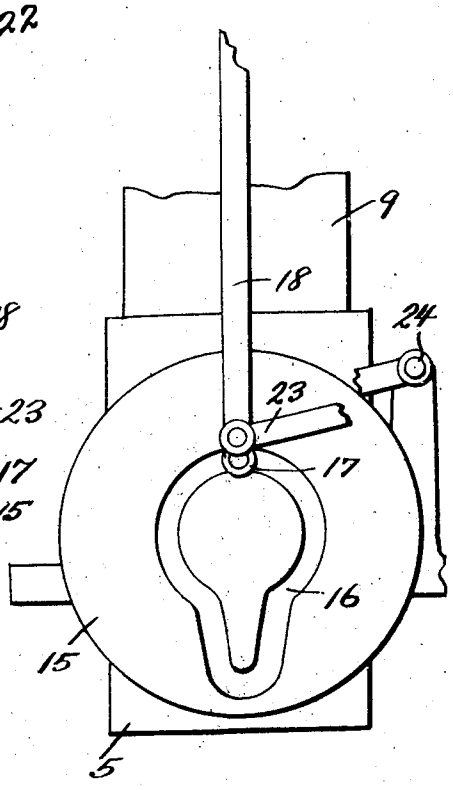


Fig. 2.



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EXPLOSIVE ENGINE.

1,406,072. Specification of Letters Patent. Patented Feb. 7, 1922.

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To all whom it may concern:

Be it known that I, BENJAMIN F. PEARSALL, JR., a citizen of the United States, residing at Wallace, in the county of Duplin and State of North Carolina, have invented certain new and useful Improvements in an Explosive Engine, of which the following is a specification.

This invention relates to improvements in explosive engines of the two cycle type and has for its object to dispense with crank case compression by the provision of a supplementary piston operating in conjuction with the main or power piston to draw in a charge of fuel, assist in compressing the charge and finally thoroughly scavenging the explosive chamber of the products of combustion.

Another object of the invention is the provision of an engine of this character in which the supplementary piston is positively actuated directly from the crank shaft.

With these and other objects in view as will appear as the description proceeds the invention comprises the novel features of construction, accompanied by elements and arrangement of parts which will be more fully described in the following specification and set forth with particularity in the claim appended hereto.

Figure 1 represents a vertical longitudinal sectional view through an engine constructed in accordance with the invention, and,

Figure 2 represents a fragmental side elevation of the engine illustrating the cam wheel for actuating the supplementary piston in detail.

Referring to the drawings in detail wherein similar reference characters designate corresponding parts throughout the several views, the numeral 5 indicates an adequate supporting base provided with parallel uprights 6 equipped with preferred types of bearings supporting the crank shaft 7 carrying the usual type of crank pin 8. The cylinder 9 is formed integral with or supported upon the base structure 5 and receives the vertically reciprocable piston 10 having connection with a depending connecting rod 11 suitably attached at its lower terminal with the crank pin 8 in such a manner that rotary movement of the crank shaft is produced during vertical reciprocation of the piston 10.

The wall of the cylinder 9 is extended a distance beyond the plane representing the limit of the upstroke of the piston 10 and constitutes a guide for the supplementary piston 12 carrying a vertically extending rack bar 13 mounted for reciprocatory movement in a guide 14. The pistons 10 and 12 are in no way connected and are capable of distinctly independent movement, the lower piston 10 being controlled directly by the movement of the shaft 7 and the upper piston being actuated by an oscillating mechanism controlled by the crank shaft in a manner to be hereinafter more fully described.

A cam wheel 15 is keyed for rotary movement with the crank shaft 7 and is provided with a cam shaped groove 16 receiving the laterally projecting pins 17 of the vertically disposed push rod 18 the upper terminal of which is pivotally connected at 19 with the arm of a gear segment 20. A supporting bracket 21 for the gear segment 20 is suitably supported upon the cylinder 9 and the teeth of the segment are in permanent mesh with the teeth of the rack bar 13 whereby during oscillatory movement of the gear segment the piston 12 is oscillated vertically. The medial portion of the push rod is received in a horizontally extended guide 22 carried by the cylinder 9 and the lower terminal thereof at a point adjacent the cam wheel 15 is pivotally connected with one terminal of an arm 23 the opposite terminal of which is pivotally connected at 24 with the cylinder 9 whereby the lower terminal of the rod is prevented from taking the movement of the cam wheel during rotation of the latter.

The lower portion of the cylinder is provided with an exhaust port 25 which is controlled by an outwardly opening check valve and is so located as to be covered by the piston 10 throughout the major portion of the stroke of the latter, the port being open for only a comparatively brief period as the direction of movement of the piston is reversed at the limit of its downstroke. At a point slightly elevated above the port 25 the cylinder 9 is formed with an inlet port 26 provided with an inwardly opening check valve 27 adapted to be automatically opened during the suction stroke of the supplementary piston 12 to admit a charge of fuel to the combustion chamber.

Assuming that the pistons 10 and 12 are in the position shown in full lines in Figure 1 and a compressed charge of fuel is con-

tained in the combustion chamber, the charge is ignited by a suitable ignition device (not shown) and during the down stroke of the piston incident to the expansion of the gases during combustion, the crank shaft 7 is rotated producing a rotary movement of the cam wheel 15. As the crank pin 8 approaches lower dead center the radial portion of the cam 16 is elevated above the shaft 7 producing a swift vertical movement of the rod 18, oscillating the gear segment 20 and rapidly depressing the supplementary piston 12. As the main piston 10 approaches the limit of its downward movement the exhaust port 25 is uncovered and during the subsequent downstroke of the supplementary piston 12 the products of combustion are effectively exhausted from the explosive chamber and during the rapid ascension of the piston 12 as the pin 17 of the push rod is removed from the prominent portion of the cam 16 a partial vacuum is created and an explosive charge is drawn past the inwardly opening inlet valve 27 and is subsequently compressed to the proper degree during ascension of the piston 10. The compressed charge is subsequently ignited and the cycles of the engine successively repeated in this order.

What I claim is:

In an explosive engine, a cylinder provided with inlet and exhaust ports, opposed pistons reciprocably mounted in the cylinder, a crank shaft, means connecting the pistons with the crank shaft whereby one of the pistons is caused to reciprocate with greater rapidity than the other piston, a rack bar carried by said other piston, the head portion of said cylinder being extended to provide a guide for the rack bar and the contiguous portion of the cylinder head being extended longitudinally to provide a supporting bracket, a gear segment meshing with said rack bar pivotally supported in said bracket, a cam wheel, and a push rod having positive pivotal connection with the segment and connected with the cam wheel whereby reciprocatory movement of the last mentioned piston is produced during rotation of the shaft.

In testimony whereof, I affix my signature hereto.

BENJAMIN F. PEARSALL, JR.