No. 775,314. PATENTED NOV. 22, 1904.

P. SCHMIT.

EXPLOSIVE ENGINE.

APPLICATION FILED APR. 20, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

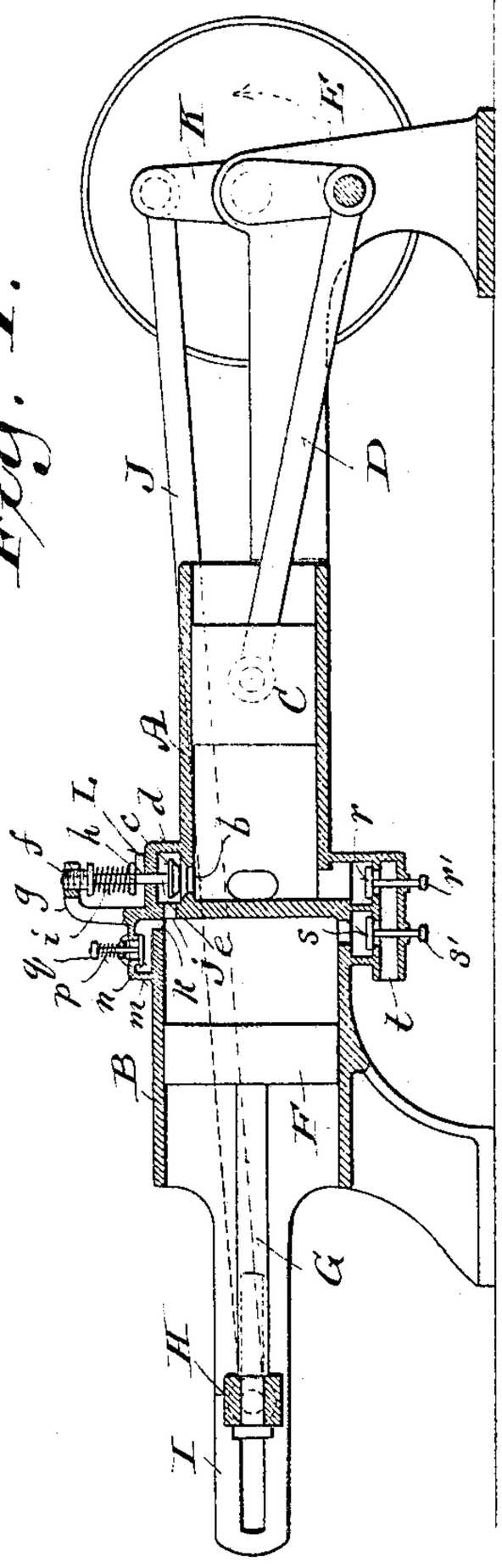
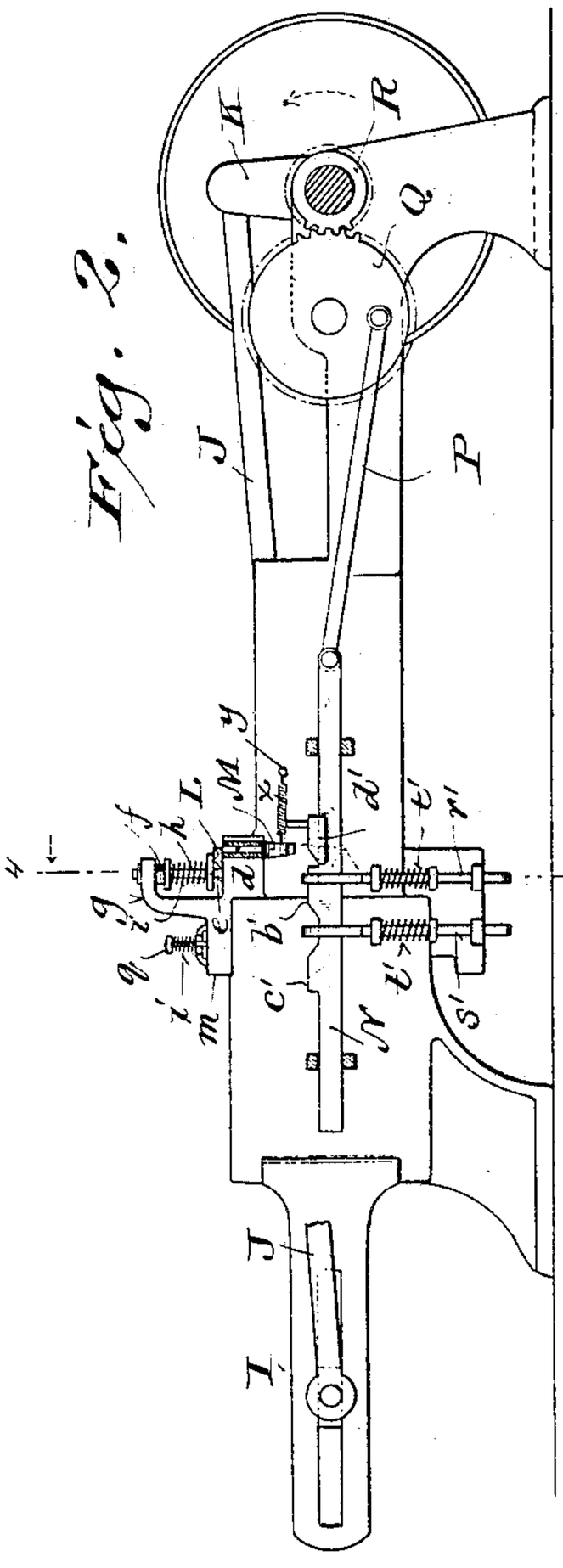


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

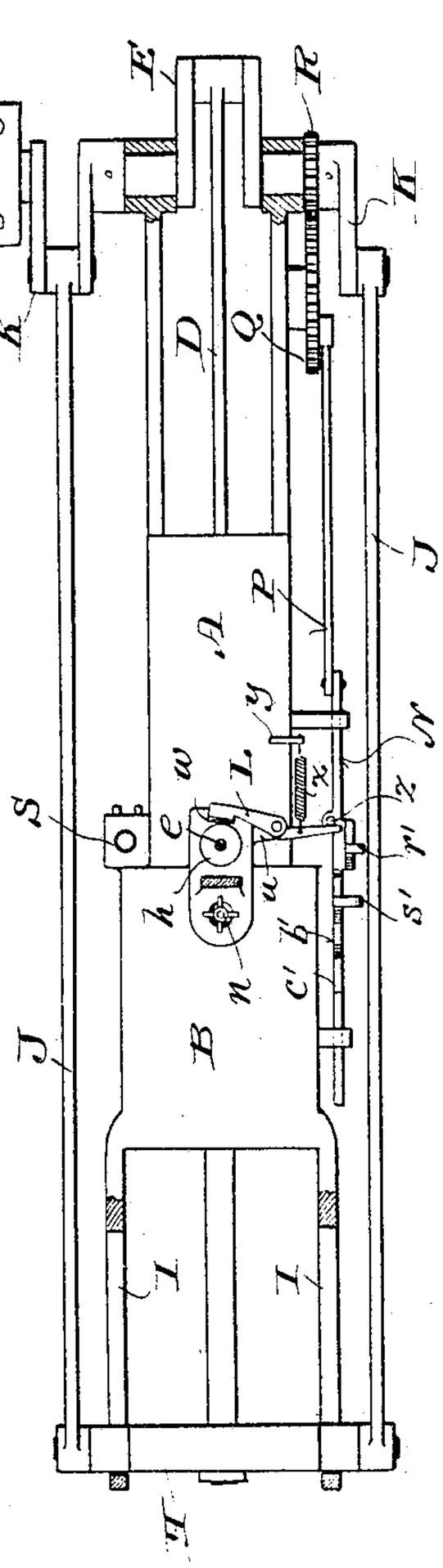
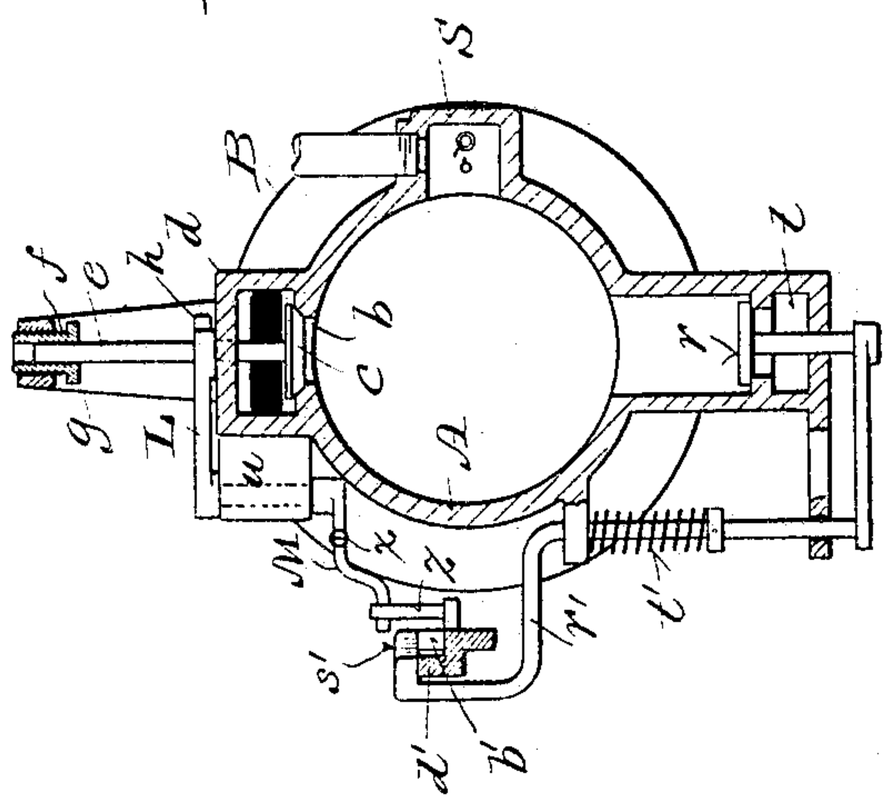


Fig. 4.



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No. 775,314. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

PETER SCHMIT, OF PORT WASHINGTON, WISCONSIN.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 775,314, dated November 22, 1904.

Application filed April 20, 1904. Serial No. 203,990. (No model.)

To all whom it may concern:

Be it known that I, PETER SCHMIT, a citizen of the United States, and a resident of Port Washington, in the county of Ozaukee and State of Wisconsin, have invented certain new and useful Improvements in Explosive-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention has for its object to increase the effectiveness of explosive-engines and to render the same less noisy in action, said invention consisting in certain peculiarities of construction and combination of parts hereinafter particularly set forth with reference to the accompanying drawings and subsequently claimed.

Figure 1 of the drawings represents a vertical longitudinal section view of an explosive-engine in accordance with my invention; Fig. 2, a side elevation of the same; Fig. 3, a plan view of the engine, partly in horizontal section; and Fig. 4 a transverse sectional view of said engine indicated by lines 4 4 in the second figure of said drawings.

Referring by letter to the drawings, A indicates the main cylinder of my improved explosive-engine, the same being provided with a port *b* adjacent to its head. This port is controlled by a pop-valve *c*, that has play in a chamber *d*, with which the cylinder A is provided. The stem *e* of the valve extends up through the chamber *d* and into a flanged sleeve *f*, that has screw-thread connection with an arm *g* of said cylinder. A collar *h* is made fast on the valve-stem, and the tension of a spiral spring *i*, supported on the collar, is regulated by adjustment of the sleeve aforesaid.

An opening *j* is provided between the valve-chamber *d* and an auxiliary cylinder B, that has a vent-port *k* back of said opening. The vent-port communicates with a chamber *m* on the auxiliary cylinder, and a relief-valve *n* controls an outlet of the chamber. The stem of the relief-valve is guided in a spider on the chamber *m*, and a spiral spring *p*, supported by the spider, is regulated as to tension by the adjustment of a nut *q* on said valve-stem.

Both of the cylinders have exhaust-ports each in communication with a separate chamber, and outlets of these chambers are governed by valves *r s*, said outlets being in communication with an exhaust-passage *t*, open to atmosphere. The stems of the valves *r s* are connected to angularly-offset outer arms *r' s'*, that play in suitably-arranged guides, and a spiral spring *t'* surrounds each arm between a collar thereon and one of the guides, the corresponding valve being lifted against resistance of the spring.

The piston C in the main cylinder A has a rod D in pivotal connection therewith, and this rod is coupled to a crank E of the engine-shaft. The piston F in the auxiliary cylinder B has a rod G in connection with a cross-head H, and this cross-head is guided in longitudinally-slotted arms I, that extend rearward from said cylinder. Links J connect the cross-head H with cranks K of the engine-shaft.

A bracket *u* of the valve-chamber *d* constitutes a bearing for a bell-crank lever, one arm, L, of which has a beveled lip *w*, that at times comes under the collar *h* of the stem of valve *c* to hold said valve off its seat. The other arm, M, of the bell-crank lever is coupled by a spiral spring *x* to an ear *y* of the cylinder A and extends in the path of a striker *z*, with which a slide N is provided. The slide has its play in brackets projecting laterally from both cylinders, and said slide is connected by a pitman P with a spur-wheel Q, that turns on a stud with which the engine-frame is provided, this spur-wheel being in mesh with a pinion R, fast on the engine-shaft, the proportions of said spur-wheel and pinion being such that the former has one revolution to two of the latter. Beveled elevations *b' c'* of the slide N play under the upper horizontal terminal of the arm *s'* to automatically unseat the exhaust-valve *s* at predetermined intervals, and an offset elevation *d'* of said slide forward of those aforesaid has play under the upper horizontal terminal of the arm *r'* to automatically unseat the valve *r* at predetermined intervals.

The main cylinder is provided with the usual mixing-chamber S for air and gas or vaporized gasolene, the explosive mixture being fired at predetermined intervals by any suit-

able means common in the art to which my invention relates.

The piston in the main cylinder is shown on forward movement subsequent to an explosion in said cylinder that operated to blow the valve *c* off its seat and open communication between both cylinders, said valve being now held in raised position by the lip *w* of the arm L of the bell-crank lever, due to automatic rock of said lever occasioned by contraction of the spring *x* when the aforesaid valve lifted against spring resistance. From the foregoing it will be understood that the force of the explosion is exerted on the pistons in both cylinders and there is utilization of what is ordinarily waste gases. The movement of the slide N is so timed that the valves *r s* are automatically unseated on the finish of the working stroke of the pistons in the cylinders and these valves remain unseated during the exhaust-stroke of said pistons, the striker *z* of said slide operating in the meantime to rock the bell-crank lever in the direction necessary to move the lip *w* of its arm L to original position, thus permitting reseating of the valve *c*, governing the outlet from the main cylinder to the auxiliary cylinder. By the time the main piston starts on suction-stroke the movement of the slide N has been such that the exhaust-valves *r s* are permitted to reseat themselves, and the suction in the auxiliary cylinder unseats the relief-valve *n* to supply air to the auxiliary cylinder. The relief-valve is automatically reseated when the main piston starts on compression-stroke and the slide N has had movement that causes unseating of the exhaust-valve *s* to permit the escape of air accumulated in the auxiliary cylinder, this valve being reseated previous to another explosion.

By utilizing in the auxiliary cylinder what is ordinarily waste gases the customary noisy exhaust is avoided, because all the gases are burned out by the time the exhaust-valves open.

The details of the engine and the arrangement of the cylinders may be varied from what is herein shown and described without departure from the scope of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An explosive-engine comprising a main cylinder and an auxiliary cylinder, a pop-valve controlling a passage from one to the other of the cylinders, pistons in said cylinders suitably connected to cranks of the engine-shaft, spring-controlled valves governing exhaust-ports of both cylinders, a relief-valve governing an air-inlet of the auxiliary cylinder, and mechanism timed in connection with said engine-shaft by which to automatically defer reseating of the pop-valve for a predetermined time subsequent to an explosion in the main cylinder and to likewise unseat the exhaust-valves at predetermined intervals.

2. An explosive-engine comprising a main and auxiliary cylinder containing pistons suitably connected to cranks of the engine-shaft a pop-valve controlling a passage from one to another of the cylinders, valves governing exhaust-ports of the cylinders and having their stems in connection with outer spring-controlled unseating devices, a relief-valve governing an air-inlet of the auxiliary cylinder, a spring-controlled movable device arranged to operate in conjunction with the pop-valve to hold the same off seat subsequent to explosion in the main cylinder, a slide coöperative with said movable device as well as the exhaust-valves, and time gearing connecting the slide with the engine-shaft.

3. An explosive-engine comprising a main and auxiliary cylinder containing pistons suitably connected to cranks of the engine-shaft, a pop-valve controlling a passage from one to the other of the cylinders, valves governing exhaust-ports of said cylinders and having the stems thereof in connection with outer angularly-offset arms for which guides are provided, a relief-valve governing an air-inlet of the auxiliary cylinder, a spring-controlled pivotal device arranged to engage under an enlargement of the pop-valve stem when said valve is unseated, a slide provided with a striker for said pivotal device as well as with beveled elevations operative in conjunction with the arms aforesaid to unseat the exhaust-valves, and time gearing connecting the slide with the engine-shaft.

In testimony that I claim the foregoing I have hereunto set my hand, at Port Washington, in the county of Ozaukee and State of Wisconsin, in the presence of two witnesses.

PETER SCHMIT.

Witnesses:
WM. AHLHAUSER,
W. B. KRAUSE.