C. GILSBACH.

ROTARY ENGINE.

APPLICATION FILED JUNE 26, 1911.

1,029,677.

Patented June 18, 1912.

2 SHEETS—SHEET 1.

Fig. 1

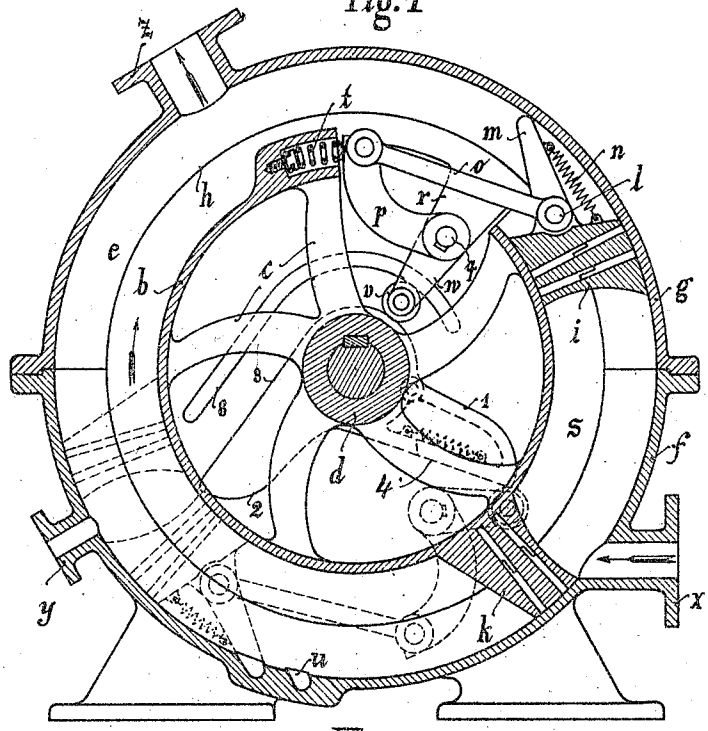
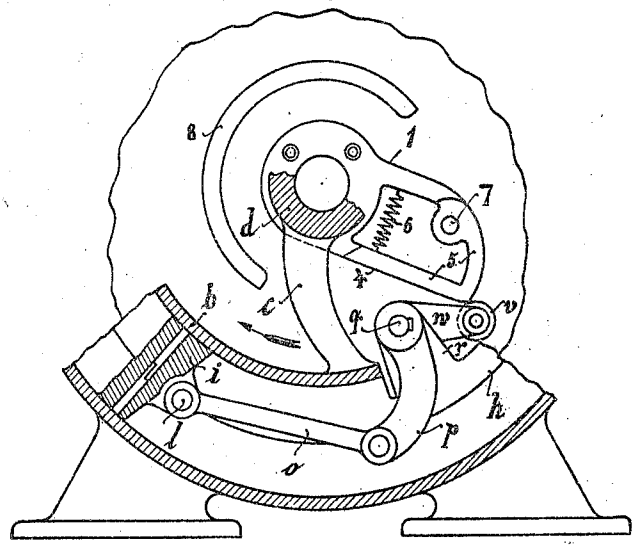


Fig. 2



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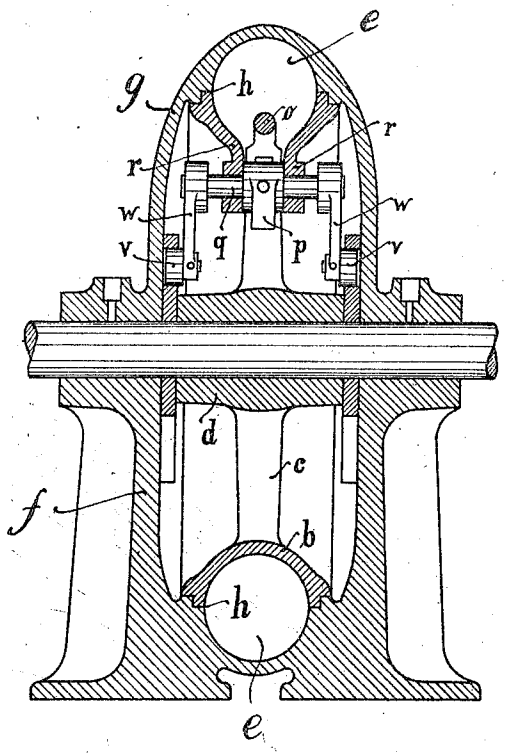
2 SHEETS—SHEET 2.

Fig. 3



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UNITED STATES PATENT OFFICE.

CLEMENS GILSBACH, OF BONZELER-HAMMER, NEAR GREVENBRÜCK, GERMANY.

ROTARY ENGINE.

1,029,677. Specification of Letters Patent. Patented June 18, 1912.

Application filed June 26, 1911. Serial No. 635,465.

To all whom it may concern:

Be it known that I, CLEMENS GILSBACH, a subject of the Emperor of Germany, residing at Bonzeler-Hammer, near Grevenbrück, Westphalia, Germany, have invented certain Improvements in Rotary Engines, of which the following is a specification.

The present invention relates to improvements in rotary engines of the kind fitted with two pistons of which one is rigidly connected to the rotating body of the engine and the other adjustable on the periphery thereof, the latter piston being adjusted relative to the former, during the movement of both, so as to form an abutment for transmitting the power of the expanding motive fluid to the rotating body, so as to expel the spent fluid, so as to admit fresh fluid, and, in the case of gas engines, so as to effect a compression of the gas mixture before the ignition thereof.

The invention consists in the various details of construction and combination of parts as hereinafter described and claimed, increased efficiency of the engine and complete utilization of the motive power being aimed at.

In the accompanying drawings the invention is illustrated, Figure 1 representing a central section of the improved rotary engine, and Fig. 2, a central sectional elevation and partial view of the same, with modifications. Fig. 3 is a section along the shaft of the machine.

The rotary engine consists of a ring-shaped body part *b* rotating in the direction of the arrow and rigidly connected to the machine shaft by means of arms *c* and a hub *d*. Said body *b* reaches into the center of the working chamber *e* and is snugly fitted to the machine frame which consists of the rigid parts *f* and *g*.

The letter *h* indicates the border line between the rotating and the rigid parts of the engine. The parts are tightened to one another by packing in any usual known manner. By thus connecting the rigid and the rotating parts the working chamber *e* is formed, the cross-sectional shape of the chamber being dependent upon constructional considerations.

It may be pointed out here that a gas engine is shown in the drawings and that the invention will be described only in connection with such engine.

With the rotating body *b* a piston *k* is rigidly connected which is packed within the chamber *e* in the usual manner. In said chamber a second piston *i*, of similar appearance is provided which is loosely arranged therein and provided with a journal bearing *l* to which an arm *m* is turnably connected, a spring *n* tending to force the latter against the periphery of the rigid frame part *g*. Said arm *m* may be provided with a roller at its extreme end so as to reduce the friction on the periphery wall. To the journal bearing *l* is furthermore connected a rod *o* which with its other end is jointed to a lever *p*. The latter is mounted on a shaft *q* which has its bearings in brackets *r* provided on the rotating body *b*. The body *b* is provided with a recess through which the lever *p* can enter the chamber *e*. This recess has no detrimental effect, since only the space *s* between the pistons *k* and *i* is needed for the actual working. The lever *p* and the elements connected thereto are checked in one direction by an elastic abutment *t* which is also provided on the body *b*. At both sides of the machine frame rigid cam faces 1, 2, 3, 4 and 8 are provided for the rollers *v* mounted on the free ends of levers *w*, the latter being rigidly connected to opposite ends of the shaft *q*. *x* is the inlet-port, and *z* the exhaust-port. The ignition of the gas mixture takes place at *y*. Somewhat to the rear of the igniting position recesses *u* are provided in the part *f* of the machine frame to form abutments for the free end of the arm *m*.

The *modus operandi* is as follows: In the position shown in full in Fig. 1, the gas mixture is just being admitted into the space *s* between the pistons *k* and *i*. The body *b* rotates, as already noticed, in the direction of the arrow and carries with it the piston *i* and the shaft *q* as well as the levers connected to these elements. As the elements move away from the position indicated, the roller *v* will soon run up against the cam-face 1 and be deflected by the latter so as to turn the lever *w* and with it the shaft *q* and the lever *p*. The movement of the lever *p* is transmitted by the rod *o* to the piston *i* which is thereby caused to approach the piston *k* so as to diminish the space *s* and compress the gas-mixture inclosed in the latter. In the position shown dotted in Fig. 1, the roller *v* has reached the summit of the cam-face 1 and the gas mixture the maximum of

compression. At this moment the igniting position *y* has also been reached by the space *s* so that an ignition of the gas-mixture takes place. The sudden increase in the gas volume following upon such ignition causes the pistons to be forced apart. Return-movement of the piston *i* is prevented by the arm *m* which is retained in one of the recesses *u*, and the whole impelling power of the expanding gases will therefore be applied to the piston *k* so as to urge it forward together with the body *b*, the piston *i* remaining stationary while the roller *v* travels down along the cam-face 4. When the roller *v* reaches the cam-face 2 another approach of the pistons is effected this causing the spent gases to be expelled from the space *s* through the exhaust port *z*. Having passed the summit of the cam-face 2, the roller *v* is guided between the cam-faces 3 and 8 so as to effect a forcible separation of the piston and create a vacuum between them which, upon their arrival at the inlet-port *w*, causes a fresh supply of gas mixture to enter the space *s*.

It is obvious that the arrangement may be doubled in which case the body *b* will be properly balanced and one-sided action of the centrifugal force prevented.

It is also obvious that the arm *m* and the recesses *u* may be dispensed with since the piston *i* could be supported by means of the rod *o* and the levers *p* and *w* against the cam-face 4. In this case it may be advisable, in order to relieve the shock of the explosion, to adapt the cam-face 4 to yield. Such an arrangement is indicated by dotted lines in Fig. 1 and shown more clearly in Fig. 2 where the outer part 5 of the cam element is adapted to turn in one direction about a pivot 7. A strong spring 6 tends to hold the part 5 in its normal position and produces the desired resiliency of the cam-face 4.

If the arrangement is to be applied to steam engines, the cam-faces are adapted to bring the pistons in close proximity at the inlet-port and to retain the piston *i* in this position to utilize the expansion of the steam.

In the construction shown in Fig. 1 the part *a* may be extended to form a complete cam-groove together with the cam-faces 1, 2, 3 and 4.

I claim:—

1. In a rotary engine of the character described, the combination with a rotatable body carrying one rigid and one adjustable piston, of a stationary frame forming, together with the body, a ring-shaped working space for said pistons, a shaft rotatably held by said body, a lever connected to said shaft so as to project, through a slot in the body, into the working space, a rod pivoted to the free end of the lever and to the adjustable piston, levers connected to the ends of said shaft, rollers on the free ends of the latter levers, and cam elements for guiding said rollers so as to control the position of the adjustable piston relative to the rigid one during the movement of the rotatable body, the cam elements being so constructed that the adjustable piston is retracted from the rigid one for the admission of the motive fluid, then approached thereto for the compression of such fluid, then held stationary for transmitting the energy of the expanding fluid to the rotating body and finally reapproached thereto for the expulsion of the spent fluid, substantially as set forth.

2. In a rotary engine of the character described, the combination with a rotatable body carrying one rigid and one adjustable piston, of a stationary frame forming, together with the body, a ring-shaped working space for said pistons, a shaft rotatably held by said body, a lever connected to said shaft so as to project, through a slot in the body, into the working space, a rod pivoted to the free end of the lever and to the adjustable piston, levers connected to the ends of said shaft, rollers on the ends of the latter levers, and cam elements for guiding said rollers so as to control the position of the adjustable piston relative to the rigid one during the movement of the rotatable body, the cam elements being so constructed that the adjustable piston is retracted from the rigid one for admitting the motive fluid between them, then approached thereto for the compression of such fluid, then held stationary for transmitting the energy of the expanding fluid to the rotating body, and finally reapproached thereto for the expulsion of the spent fluid, the cam element which controls the adjustable piston at the commencement of the expansion being hinged and spring-actuated so as to relieve the shock of such expansion, substantially as set forth.

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Witnesses:

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