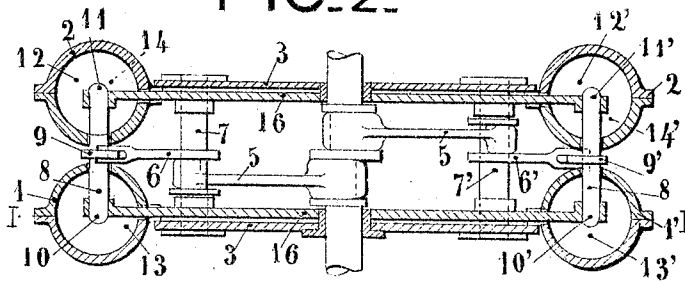


1,025,361.

FIG. 2.



**FIG. 3.**

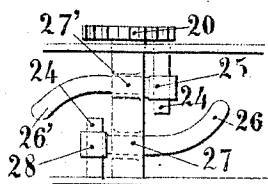
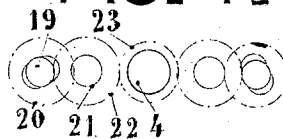


FIG. 4.



Stanley Wood.  
H. W. Blake.

Frédéric Beck

W. E. Evans:

*Attorney.*

# UNITED STATES PATENT OFFICE.

FRÉDÉRIC BECK, OF NEUILLY-SUR-SEINE, FRANCE.

ROTARY EXPLOSION-MOTOR.

1,025,361.

Specification of Letters Patent.

Patented May 7, 1912.

Application filed October 10, 1911. Serial No. 653,791.

*To all whom it may concern:*

Be it known that I, FRÉDÉRIC BECK, a subject of the Emperor of Germany, residing at 46 Rue Ybry, Neuilly-sur-Seine, Seine, France, have invented a certain new and useful Rotary Explosion-Motor, of which the following is a specification.

The present invention has for its object a rotary motor in which the pistons are displaced in ring-like elements which receive a continued circular motion around a fixed crank-shaft passing through the center of the ring to which the elements considered are attached.

The object which it is desired to obtain is to produce a motor which shall be easily cooled and which shall have a high power. The arrangements shown hereinafter allow of effecting this double result.

On the accompanying drawing is diagrammatically represented a method of construction of the motor which is the object of the invention.

Figure 1 is a section on the line 1—1 of Fig. 2. Fig. 2 is a section along the line 11—11 of Fig. 1. Fig. 3 is a plan view in detail of the device for controlling the valves. Fig. 4 is a diagrammatic view of the cam mechanism which operates the 30 valves.

As is seen from the figures the arrangement of the motor is as follows:—The twin ring elements 1, 2; 1<sup>1</sup> 2<sup>1</sup> which constitute the working cylinders of the motor are fixedly connected by a suitable arrangement, to the two plates 3, 3; through the center of these plates passes a crank-shaft 4 provided with two crank-pins to which shaft they serve as supports and on which they can rotate, this shaft 4 always remaining fixed and invariable in position. On each crank-pin is mounted a crank 5, (5<sup>1</sup>) the end of which is connected to a right-angled bell-crank lever 6, (6<sup>1</sup>), which is common to the pistons of a group of ring-elements 1, 1<sup>1</sup>, (or 2, 2<sup>1</sup>); this bell-crank lever which can oscillate around an axis 7, (7<sup>1</sup>) serving as a tie between the plates 3, 3, is pivoted at its other end to a swing bar 8, (8<sup>1</sup>) by means of a small crank 9, (9<sup>1</sup>). This swing bar operates the rod 10, 11 (10<sup>1</sup> 11<sup>1</sup>) of each of the double pistons 12, 14; 13, 15; (12<sup>1</sup>, 14<sup>1</sup>; 13<sup>1</sup>, 15<sup>1</sup>) provided in the ring-elements.

Two longitudinal members 16, 16, freely mounted on the shaft 4 and pivoted to the ends of the swing-bars relieve the pistons

from the centrifugal force which tends to push them against the internal face of the exterior wall of the ring element, which rapidly causes the ring-element to become oval in section.

At the end of each working cylinder is provided a chamber so situated that it lies along a radius of the section of the ring-element; at each end of this chamber is provided a valve; the valve 17, serves for admission and the valve 18 for exhaust. This chamber is common to the twin ring-elements.

As shown in the drawings, the admission valve is placed on the radius nearer the center than the exhaust valve, which is placed at the extremity of the radius. This arrangement has for its object to equalize the centrifugal force, either at the admission of the fresh gas or at the exhaust of the burned gases. These valves are operated in the following manner: In the plates 3 is mounted a cam shaft 19 for each group of four neighboring valve chambers. This shaft carries a toothed pinion 20 which gears with a pinion 21 fixedly connected with a wheel 22 loosely mounted on an axis provided in the plates 3. This toothed wheel gears with a pinion 23 fixedly mounted on the shaft 4. If the wheels, 23 22 and 20, are given the same diameter and the pinion 21 half this diameter, it will be seen that on the rotation of the whole mechanism together with the plates 3, the cam shaft will turn with half the speed of the rest of the mechanism. Under these conditions, if on an underhung shaft 24 mounted in the plates 3, and parallel to the shaft 19, a right-angled bell-crank lever 25, 26 is provided it will be possible with the same cam to control the admission and exhaust valves of one of the chambers. By providing on an axis 24<sup>1</sup>, symmetrical with the first axis 24 as regards a radius passing through the axis of the shaft 19, a right-angled bell-crank lever 25<sup>1</sup>, 26<sup>1</sup>, arranged similarly to the right-angled bell-crank lever 25, 26 it will be possible with another cam provided on the same shaft 19 to control the exhaust and admission valves of the other chamber. This particular method of control is partially represented in plan in Fig. 3. The bell-crank lever 25, 26 pivots under the action of the cam 27 around the axis 24; when the cam operates the roller 28 of the arm 25 the arm 26 is lifted and

operates the rod 29 attached to the member 30; the exhaust valve then opens; when the cam operates the roller 31 of the arm 26, this arm moves toward the chamber and opens the admission valve by acting on the member 32. The cam 27<sup>1</sup> arranged at 180° with regard to the cam 27 acts in the same manner on the bell crank lever 25<sup>1</sup>, 26<sup>1</sup>.

The working of this motor is as follows:—If, in the case of Fig. 1 the cylinders A are supposed to be in the explosion period, the cylinders B will be in the compression position and the ring elements and the motor together with the pistons 12, 14; 13, 15 will turn around the fixed crank-shaft in the direction of the arrow F. At the same time the cylinders A<sup>1</sup> are in the exhaust position, and the cylinders B<sup>1</sup> are in the suction position. The cycle is then developed in each working cylinder, at the rate of four explosions or two double explosions per revolution.

It will be remarked that in this motor the absolute movement of the pistons is not alternative, the phases of the cycle being effected by the greater or less speed of the ring elements with regard to the pistons, which remain stationary during the exhaust periods. On the other hand, the general arrangement allows of providing large ports in those parts of the ring elements in which the pistons do not engage, or even of suppressing them together. This is a simple method of lightening the motor, and at the same time assures cooling.

It is evidently possible by mounting them on the same shaft to group together a series of motors thus constituted of ring elements, either twin or not, with the members which have been described; the separate motors may be fixedly provided with regard to

each other, so as to assure in the most convenient manner, the balancing of the rotating parts, and the regular repetition of the explosions in each revolution; in this manner the power of the motive group may be increased at will with the least amount of encumbrance.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a rotary explosion motor the combination of twin ring-elements constituting the working cylinders, pistons provided in the ring elements, means for transmitting a varied circular motion to the pistons, valve chambers common to the twin-ring-elements, admission and exhaust valves contained in the said valve chambers, and means for simultaneously operating the admission and exhaust valves, of a pair of twin ring-elements.

2. In a rotary explosion motor the combination of twin ring-elements constituting the working cylinders, pistons provided in the ring elements, means for transmitting a varied circular motion to the pistons, valve chambers common to the twin ring-elements, admission and exhaust valves contained in the said valve chambers, and means for simultaneously operating the admission and exhaust valves, of a pair of twin ring-elements, and means for preventing the effect of centrifugal force on the section of the respective ring-elements.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

FRÉDÉRIC BECK.

Witnesses:

LEON FRANET, S.,  
DEAN B. MASON.