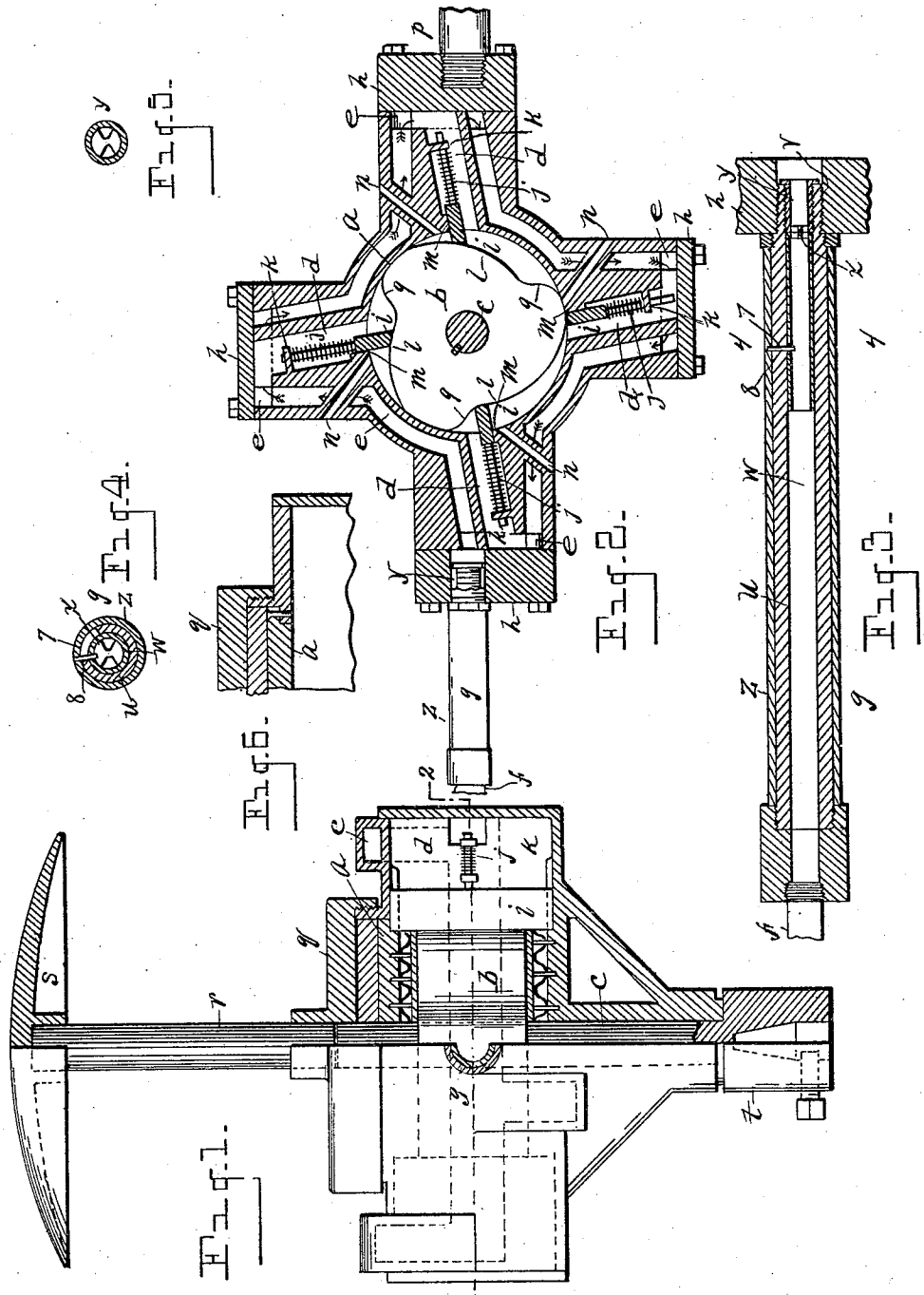
No. 869,971. PATENTED NOV. 5, 1907.

# K. H. KORHONEN.

## ROTARY ENGINE.

APPLICATION FILED MAR. 12, 1907.



WITNESSES

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# UNITED STATES PATENT OFFICE.

KAARLO H. KORHONEN, OF DETROIT, MICHIGAN.

## ROTARY ENGINE.

No. 869,971. Specification of Letters Patent. Patented Nov. 5, 1907.

Application filed March 12, 1907. Serial No. 362,002.

*To all whom it may concern:*

Be it known that I, KAARLO H. KORHONEN, a subject of the Czar of Russia, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Pneumatic Rotary Engines, of which the following is a specification.

My invention has for its object an improved rotary engine, the same being especially designed and adapted as a pneumatic rotary engine, certain features of the invention being similar to those embodied in the application for a rotary engine filed by me the 2nd day of March, 1907, Serial No. 360,195, the device embodied in said application being more especially designed for a steam engine.

My invention consists of the construction, combination and arrangement of devices and appliances hereinafter described and claimed and illustrated in the accompanying drawings, in which,

Figure 1 is a view partly in section and partly in side elevation. Fig. 2 is a view in section on the line 2—2, Fig. 1. Fig. 3 is a longitudinal section of the handle. Fig. 4 is a view in section on the line 4—4, Fig. 3. Fig. 5 is an end view of the valve plug on the inner end of the handle. Fig. 6 is a detail view of portions of the cylinder and the adjacent air chamber.

I carry out my invention as follows: Any suitable cylinder is indicated at *a* within which is a rotatable piston *b* mounted upon a shaft *c*. The cylinder is formed with air chests or chambers indicated at *d* opening into the interior of the cylinder, and also with air channels indicated at *e* leading into the said air chambers. A compressed air inlet pipe is indicated at *f*, the same being preferably connected with a handle *g* engaged with one of the cylinder heads indicated at *h*, the handle communicating with the corresponding air channel *e*, said channel leading into each of the air chambers *d*, the air channel *e* continuing around about the cylinder and communicating with each of the air chambers as indicated in the drawings. Within the respective air chambers *d* is engaged a controlling valve indicated at *i* projecting into the interior of the cylinder, the stem of the valve within the corresponding air chamber being provided with a spring *j* to normally seat the valve. The outer end of the valve stem is made reciprocatory through a guide arm indicated at *k*. The valves normally seat upon the periphery of the piston, and may be retracted in any suitable manner. As shown, the piston is formed with cam surfaces, three being indicated at *l*, so formed that as the piston revolves the respective cams will retract the corresponding valves. The cams are also so arranged, as indicated in the drawings, that three of the air chambers will communicate into the piston cylinder, one air chamber being closed. The air chests or chambers are constructed to form a backing for the valves, as indicated at *m*. Each of the air chests is also formed with an exhaust port indicated at *n* communicating with the interior of the cylinder. On the cylinder head opposite the inlet pipe *f* is an additional handle indicated at *p*. A cylinder cap is indicated at *q*. Engaged with said cap is a push rod indicated at *r* provided with a suitable head *s*. The outer end of the driving shaft *c* may be provided with any suitable means, as a chuck *t* to hold an instrument or tool. The handle is shown formed with a cylinder *u*, which may have a threaded engagement with the head of the corresponding air chest as indicated at *v* within which is an air tube *w* provided at its inner end with a valve *x*, the inner end of the tube *w* is provided also with a valve plug *y*, the ports of the valve plug *y* formed to register with the ports of the valve *x*, the pipe *w* being rotatable within the tube *u* so as to open or close the valves. An outer sleeve is indicated at *z* engaged with the tube *w* to rotate the same in any suitable manner. Thus the tube *u* may be formed with an elongated opening 7, and the outer sleeve *z* with a pin 8 engaged with the inner tube *w*. As so formed it will be apparent that the operator, by grasping the handle *g*, may at the same time readily rotate the sleeve *z* to open or close the valves *x*, *y*.

The pneumatic engine is designed to be movable, if desired, and is shown provided with two handles *g*, *p*, to be grasped by the operator, and with the push rod *r* and head *s* against which pressure may be exerted to force a tool to its work. The piston, it will be observed, is formed with shoulders 9 against which the pneumatic pressure is exerted when the valves are seated to drive the piston, the seating of the valves obviously preventing the pressure being exerted upon the piston in the opposite direction and allowing the cylinder to exhaust.

The operation of the device will now be understood. As shown more particularly in Fig. 2, air entering into the channel *e* passes into the first air chest *d*, the air also passing about said air chest to a continuation of the air channel *e*, thence into the second air chest and into the continuation of the air channel *e*, thence into the third air chest and into the continuation of the air channel *e*, finally passing into the fourth air chest, the air channel *e* being continuous about the cylinder so as to communicate into each of the air chests.

The valves *i*, it will be seen, are always closed, *i. e.*, seated upon the periphery of the piston, said valves simply advancing and retracting against the periphery of the piston, the springs of said valves always keeping the valves closed against the periphery of the piston.

What I claim as my invention is:

1. A rotary engine comprising a cylinder, a driven shaft, a rotatable piston mounted upon the shaft within the cylinder formed with peripheral cam surfaces forming peripheral chambers and adjacent impact shoulders, peripheral air chests upon the cylinder communicating with the

peripheral chambers of the piston, respectively, an exhaust channel leading from each of the peripheral chambers, radially movable valves to prevent the passage of air from the respective air chests to the corresponding exhausts, means to seat said valves, said valves retracted by the cam surfaces of the piston, said cylinder provided with an air inlet channel communicating with said air chests.

2. A rotary engine comprising a cylinder, a driven shaft, a rotatable piston mounted upon the shaft within the cylinder formed with peripheral chambers and adjacent impact shoulders, peripheral air chests upon the cylinder communicating with the peripheral chambers of the piston, respectively, an exhaust channel leading from each of the peripheral chambers, radially movable valves to prevent the passage of air from the respective air chests to the corresponding exhausts, means to seat said valves, said cylinder provided with an air inlet channel communicating with each of said air chests, handles engaged with opposite air chests, and means to control the admission of compressed air to the air channel.

3. A rotary engine comprising a cylinder, a driven shaft, a rotatable piston mounted upon the shaft within the cylinder formed with peripheral chambers and adjacent impact shoulders, peripheral air chests upon the cylinder communicating with the peripheral chambers of the piston, respectively, an exhaust channel leading from each of the peripheral chambers, radially movable valves to control the passage of air from the respective air chests to the corresponding exhausts, means to seat said valves, said cylinder provided with an air inlet channel communicating with each of said air chests, handles engaged with opposite air chests, and means to prevent the admission of compressed air to the air channel and valve mechanism actuated by one of said handles to control admission of air into the air inlet.

4. A rotary engine comprising a cylinder, a driven shaft, a rotatable piston mounted upon the shaft within the cylinder constructed with peripheral cam surfaces forming peripheral chambers and adjacent impact shoulders, peripheral air chests upon the cylinder communicating with the peripheral chambers, respectively, exhaust channels leading from each of the peripheral chambers, radially movable valves to control the exhaust channels, springs to normally seat said valves, respectively, said valves retracted by the cam surfaces of the piston, said cylinder formed with an air inlet channel extended thereabout leading from one air chest to another.

5. A rotary engine comprising a cylinder, a driven shaft, a rotatable piston mounted upon the shaft within the cylinder formed with peripheral chambers and adjacent impact shoulders, peripheral air chests upon the cylinder communicating with the peripheral chambers of the piston, respectively, an exhaust channel leading from each of the peripheral chambers, radially movable valves to prevent the passage of air from the respective air chests to the corresponding exhausts, springs to seat said valves, said cylinder provided with an air inlet channel extending thereabout leading from one air chest to another, and a rotatable push rod engaged with said cylinder.

6. A rotary engine comprising a cylinder, a driven shaft, a rotatable piston mounted upon the shaft within the cylinder formed with peripheral chambers and adjacent impact shoulders, peripheral air chests upon the cylinder communicating with the peripheral chambers of the piston, respectively, an exhaust leading from each of the peripheral chambers, radially movable valves to prevent the passage of air from the respective air chests to the corresponding exhausts, springs to seat said valves, said cylinder provided with an air inlet channel extending thereabout leading from one air chest to another, the wall of the air chest forming a guide and backing for the radially movable valves.

7. A rotary engine comprising a cylinder, a driven shaft, a rotatable piston mounted upon the shaft within the cylinder formed with peripheral chambers and adjacent impact shoulders, peripheral air chests upon the cylinder communicating with the peripheral chambers of the piston, respectively, an exhaust channel leading from each of the peripheral chambers, radially movable valves to prevent the passage of air from the respective air chests to the corresponding exhausts, springs to seat said valves, said cylinder provided with an air inlet channel extending thereabout leading from one air chest to another, said valves always seated upon the periphery of the piston.

In testimony whereof I affix my signature in presence of two witnesses.

KAARLO H. KORHONEN.

Witnesses:
N. S. WRIGHT,
E. M. SPIELBURG.