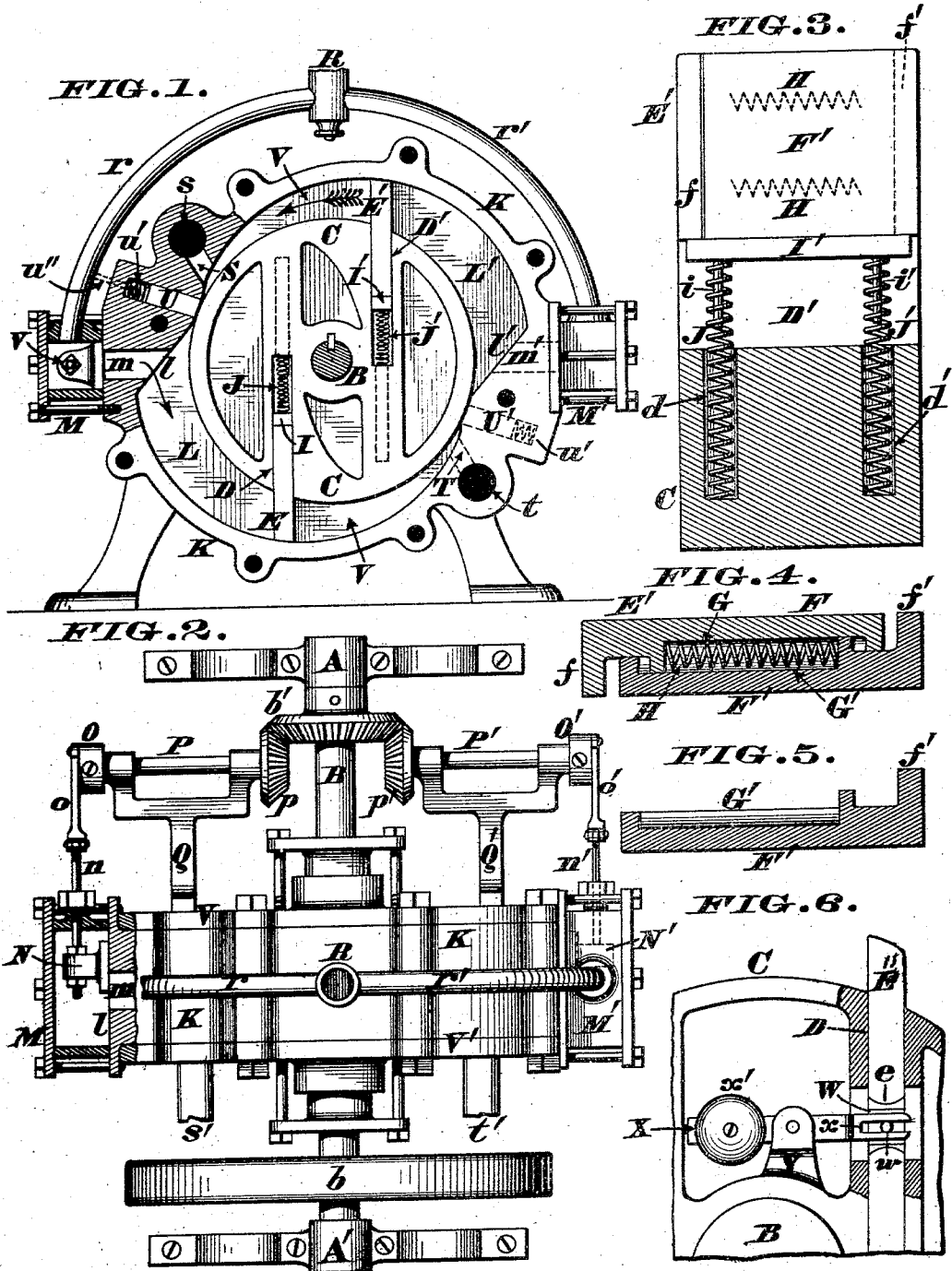


(No Model.)

F. STEINKOENIG.
ROTARY STEAM ENGINE.

No. 563,814.

Patented July 14, 1896.



Attest.
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UNITED STATES PATENT OFFICE.

FREDERICK STEINKOENIG, OF CINCINNATI, OHIO.

ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 563,814, dated July 14, 1896.

Application filed March 11, 1896. Serial No. 582,770. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK STEINKOENIG, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Rotary Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the annexed drawings, which form a part of this specification.

This invention relates to those motors commonly known as "rotary steam-engines," and the first part of my improvements includes a novel combination of outer casing; a hub fitted steam-tight therein and fastened to the main shaft; one or more pistons adapted to reciprocate within said hub; a corresponding number of fixed abutments for the steam to react against; an induction and eduction port for each piston, and a valve or valves driven by geared connections with said shaft for the purpose of admitting steam to the engine, as hereinafter more fully described.

The second part of my improvements comprises a novel combination of devices where-with two sections of a rotary engine-piston are simultaneously forced outward, so as to cause their faces to wear uniformly as they sweep around within the concave surface of the casing, as hereinafter more fully described.

In the annexed drawings, Figure 1 is a side elevation of my improved rotary steam-engine, one of the heads being detached from the casing, and the main shaft and a portion of said casing being sectioned. Fig. 2 is a plan of said engine, one of the steam-chests and its accessories being sectioned. Fig. 3 is an enlarged vertical section of the hub, taken in the plane of its piston E', the latter and the devices that force it outwardly being shown in elevation. Fig. 4 is a still greater enlarged horizontal section through said piston. Fig. 5 is a similar section of one of the counterpart members of said piston. Fig. 6 shows one form of device for counterbalancing the pistons.

Referring to Fig. 2, A A' represent a pair of journal-bearings for a main shaft B, which latter may have a band-wheel b for transmitting the power of the engine for any purpose.

Keyed or otherwise securely fastened to this shaft is a hub C, made in the shape of a cylinder, but having longitudinal openings to diminish its weight. Furthermore, this cylindrical hub has a pair of parallel slots D D' running through it from end to end and situated on opposite side of the shaft B, reciprocating pistons E E' being fitted within said slots. These pistons are constructed in a very peculiar way; but as they are exactly alike, a description of one will be sufficient for both of them.

Now by referring to Figs. 3 and 4, it will be noticed that the piston E is composed of two similar sections or counterpart members F F', whose flat inner faces are in contact with each other, and provided with one or more transverse grooves G G' to admit coiled springs H, that shift said members laterally. Again, the semembers have ledges or flanges f f', that conceal the parting between them and cause the entire outer edges of said flanges to bear against the opposite heads of the casing.

I I' are followers fitting snugly within the slots D D' and bearing constantly against the inner ends of the two-part pistons E E', so as to force them outwardly with a yielding pressure, each follower being carried by a pair of springs J J', as more clearly seen in Fig. 3. d d' are sockets in the hub to admit the inner ends of the springs, and i i' are pins projecting from the followers and traversing the outer ends of said springs.

The casing, within which the hub revolves, is a casting K, so formed as to afford a pair of diametrically-opposite semicrescent-shaped chambers L L', each of which has an inclined abutment l l' at its larger or receiving end, and then gradually runs down to nothing at its discharging end. m m' are induction-ports traversing these abutments and communicating with steam-chests M M', each chest being provided with a simple sliding valve or cut-off plate, one of which is seen at N, while the other one is indicated by the dotted lines N'.

n is the stem of the valve N, and o is a rod connecting said stem with the wrist of a disk or crank O, capable of being so adjusted around a counter-shaft P as to regulate the stroke of valve N and cause it to "cut off" at any desired place.

Shaft P is journaled in a bracket Q, projecting from a head of the casing K, and having a bevel-pinion *p* engaged with a master-wheel *b'* of the main shaft B. *p'* is a similar pinion engaged with said wheel and serving to turn another counter-shaft P', journaled in a bracket Q', and carrying a wrist-plate O', whose connecting-rod *o'* operates the stem *n'* of a valve N', fitted within the chest M', the two chests M M' being supplied with steam by branches *r r'* proceeding from a common inlet-pipe R.

S is an eduction-port leading into a passage *s*, to which an escape-pipe *s'* is connected. T is another eduction-port; *t*, a passage, and *t'*, an escape-pipe.

U U' are packing-plates held against the periphery of the hub C by springs *u u'*. V V' are heads bolted to the casing K in the manner shown.

The operation of my rotary engine will be readily understood by referring to Fig. 1, which illustration shows that steam enters the casing through the ports *m m'*, as indicated by the featherless arrow, and acts against the pistons E E' and abutments *l l'*, and as the latter are immovable it is evident said pistons must sweep around within said casing, and thereby turn the hub C and its attached shaft B.

It is also evident that the pistons are the most fully protruded from the hub when they are near the abutments *l l'*, but as they recede therefrom said pistons are gradually retracted within the slots D D' on account of the eccentric shape of the chambers L L'. Consequently, by the time the pistons have about reached the eduction-ports S T, said pistons will be fully retracted, this automatic action of said devices E E' being permitted by the proper expansion and contraction of the springs J J'. It will thus be seen that said springs preserve the faces of the pistons in close contact with the inner surfaces of the casing, while the other springs H hold the edges of said pistons snugly against the heads V V'. Therefore the pistons play "steam-tight" within the casing, and without being fitted so closely therein as to cause excessive friction, and thereby detract from the power of the engine.

As the pistons are acted on by the live steam the waste steam on their opposite sides is being driven out through the eduction-ports, as indicated by the feathered arrow in Fig. 1, and by properly setting the valves N N' the inlets *m m'* will be closed in time to prevent steam blowing through the engine and escaping at the pipes *s' t'*. Again, by adjusting the wrist-plates O O' the valves can be closed at any point to produce the desired "cut-off."

When the engine is driven at a very high speed, the centrifugal velocity tends to throw the pistons outwardly and produce such an extra amount of friction between them and the casing as to diminish the power very materially, but by adopting the construction seen in Fig. 6 this difficulty will be overcome. Here the piston E'' is cut away at *e* to admit a block W, having a pin *w* traversing a slot *x* in one end of a lever X, whose other end is loaded at *x'*. This lever is pivoted to a lug Y of the hub, and by properly adjusting or loading the weight *x'*, any desired retarding influence can be exerted against the piston. It is evident the weight *x'* will partake of the centrifugal velocity of the engine, and just in proportion as said weight tends to fly outwardly, it will pull back on the piston and thus overcome a great amount of unnecessary friction.

The dotted lines *u''* in Fig. 1 indicate a connection that can be made between the pipe *r* and the cavity containing the packing-plate U, in order that the latter may be forced out with live steam, thereby dispensing with the spring *u'*. Finally, it will be noticed that the bevel-pinions *p p'* are one-half the diameter of the master-wheel *b'*, which arrangement is necessary to properly work the valves for a pair of pistons; but if the engine should have three pistons, said pinions would then be one-third the diameter of said wheel.

I claim as my invention—

1. In a rotary steam-engine, the revolving hub C, having a pair of pockets *d d'*, a slot D', the two-part piston F *f*, F' *f'*, reciprocating within said slot; the follower F' bearing against the inner end of said piston; the springs J, J', being seated within said sockets, and supporting said follower, and pins *i, i'*, that project from the latter and enter said springs, for the purpose described.

2. The combination, in a rotary steam-engine, of the casing having a pair of inlets *m, m'*, and outlets S, T, and a pair of chambers L L', that gradually diminish, in the manner described; a hub C fitted within said casing, and secured to the main shaft B, a pair of pistons E, E', reciprocating within said hub; valves N, N', that control said inlets *m, m'*, counter-shafts P, P', that operate said valves, by suitable connections; and bevel-gears *b, p, p'*, that communicate motion from said main shaft B, to said counter-shafts P, P', all as herein described.

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

FREDERICK STEINKOENIG.

Witnesses:

JAMES H. LAYMAN,
JOHN C. ROGERS.

It is hereby certified that in Letters Patent No. 563,814, granted July 14, 1896, upon the application of Frederick Steinkoenig, of Cincinnati, Ohio, for an improvement in "Rotary Steam-Engines," an error appears in the printed specification requiring correction as follows: In line 72, page 1, the words "the semembers" should read *these members*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 28th day of July, A. D., 1896.

[SEAL.]

WM. H. SIMS,

First Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,

Commissioner of Patents.