

C. DONOVAN.  
ROTARY ENGINE.

No. 29,473.

Patented Aug. 7, 1860.

Fig. 2.

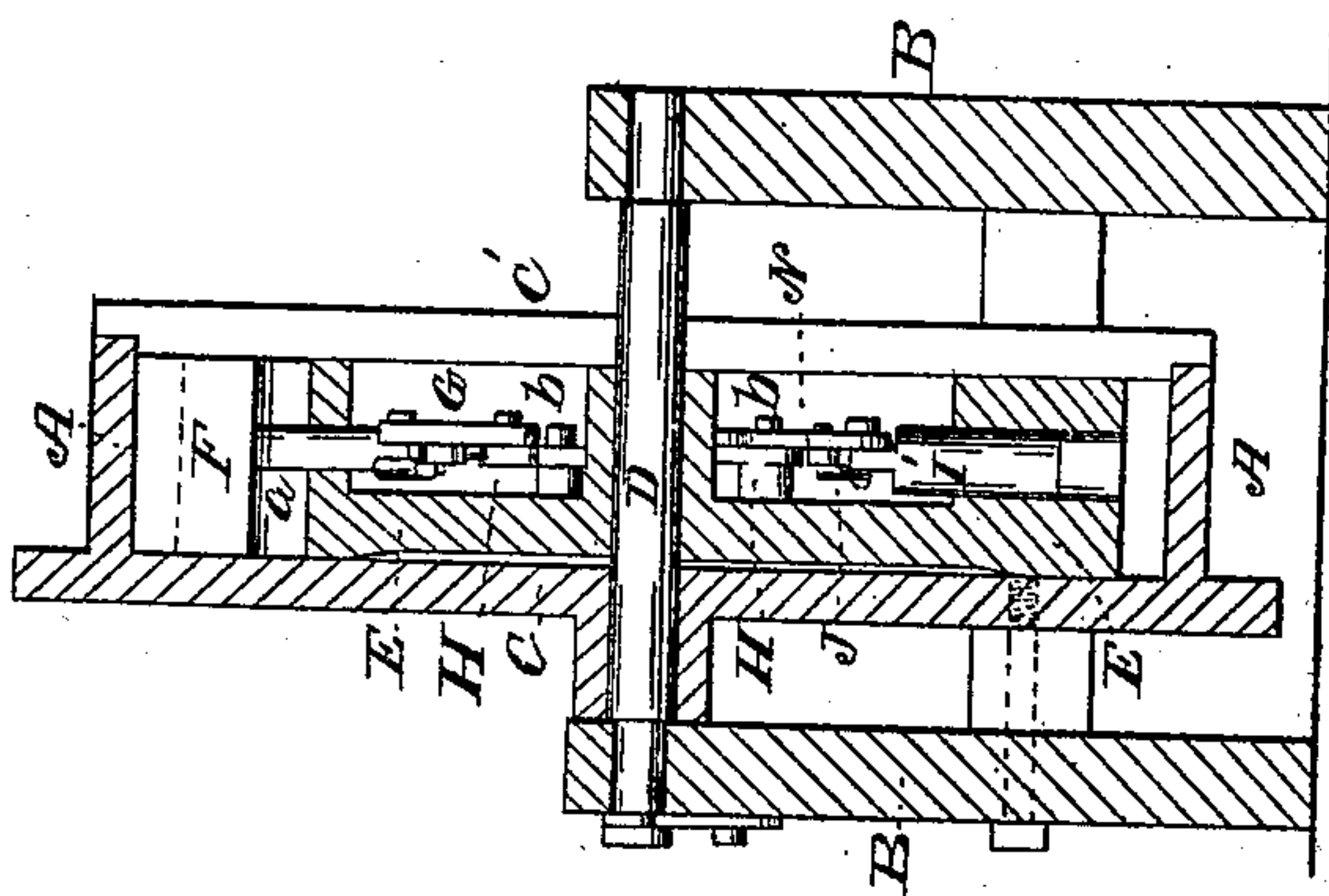
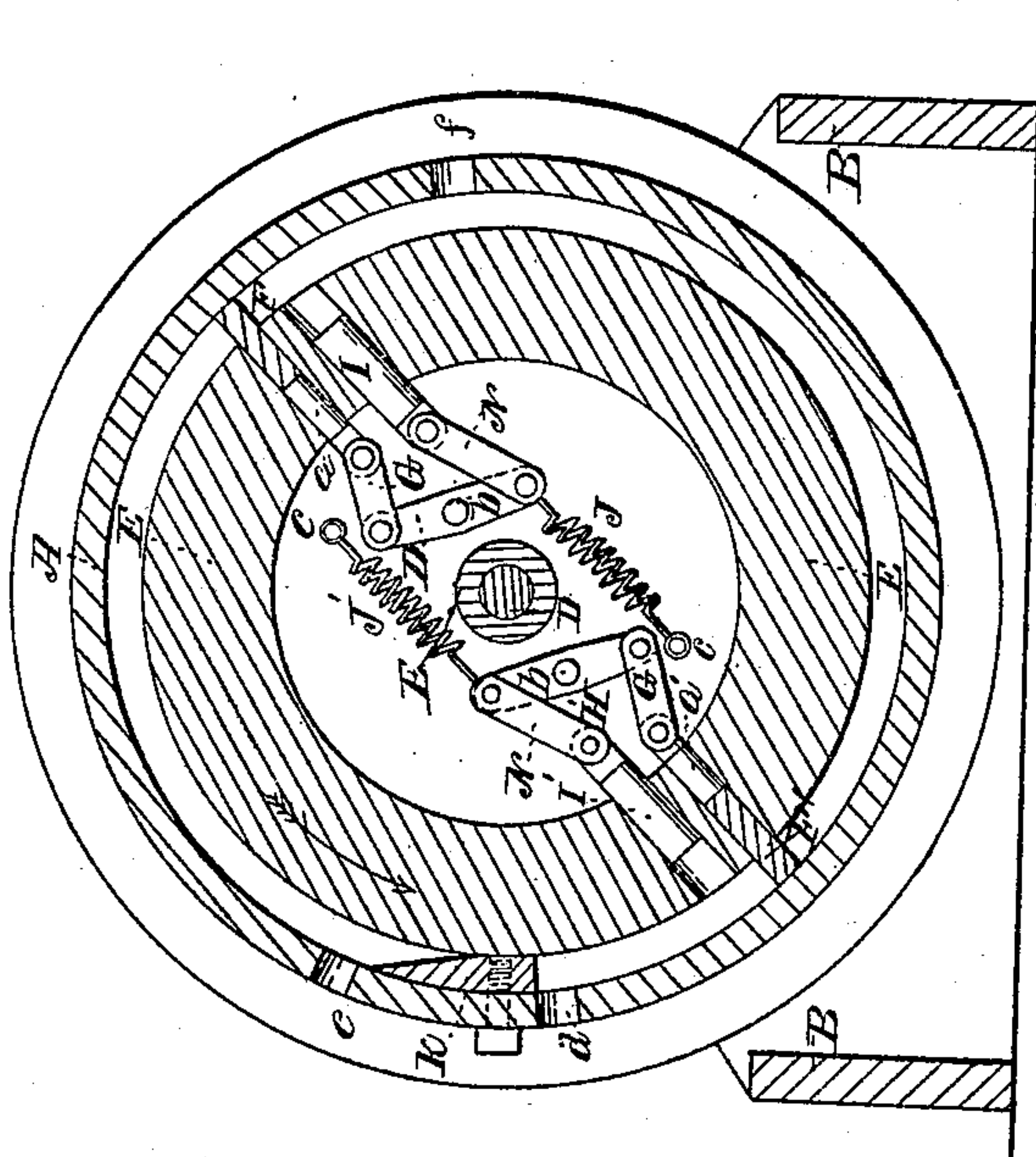


Fig. 1.



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# UNITED STATES PATENT OFFICE.

CORNELIUS DONOVAN, OF EAST ABINGTON, MASSACHUSETTS.

## ROTARY ENGINE.

Specification of Letters Patent No. 29,473, dated August 7, 1860.

*To all whom it may concern:*

Be it known that I, CORNELIUS DONOVAN, of East Abington, in the county of Plymouth and State of Massachusetts, have invented a new and useful Improvement in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a section of the engine in a plane perpendicular to the shaft. Fig. 2, is a central section of the same parallel with the shaft.

Similar letters of reference indicate corresponding parts in both figures.

My invention consists in a certain mode of applying in combination with the sliding pistons which I will term the main pistons upon which the steam acts to produce rotary motion, pistons upon which the steam acts to force out the main pistons from the wheel to which they are attached, into contact with the stationary cylinder of the engine, and hold them out in contact therewith; also in the employment in combination with such pistons, of springs applied as hereinafter described.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A, is the stationary cylinder of the engine having one or both of its heads C, C', movable and having its inner peripheral surface turned or bored perfectly cylindrical, and the inner faces of its heads made perfectly flat and true. This cylinder is supported on a suitable framing B, which contains the bearings for the main shaft D, which passes through the cylinder heads.

E, is the piston wheel secured firmly to the shaft D, and having its rim fitted between the cylinder heads, with which it may be kept steam tight by suitable packing.

F, F', are the main pistons two in number, consisting of flat plates fitted to slide in opposite radial grooves in the wheel E, and furnished with stems *a*, *a'*, which project through the said rim into the interior of the wheel where they are connected each by a link G, with the end of a separate one of two levers H, H', working on fulcra *b*, *b'*, secured to the wheel. The opposite ends of said levers have each attached by a link N, one of two cylindrical pistons I, I', which fit

to corresponding cylindrical openings in the rim of the wheel, the said pistons being each parallel with its respective main piston F, and presenting a greater area of transverse section than the main pistons.

J, J', are springs connecting those ends of the levers H, H', to which the pistons I, I', are attached, with pins *c*, *c'*, secured to the wheel, and exerting a tendency to draw in the pistons I, I', toward the axis of the wheel and shaft and so to force out the main pistons F, F', toward the inner periphery of the cylinder.

K, is a fixed abutment secured to the interior of the cylinder A, and closing at one point the channel between the said cylinders and the piston wheel. One side of this abutment is beveled off in a wedge form to meet the cylindrical inner periphery of the cylinder A, and the other side being radial to the cylinder. Close to the radial side of the abutment is the induction opening *d*, to which is connected the steam pipe, and close to the beveled side is the exhaust opening *e*. Opposite to the opening *d*, there is another opening *f*, in the cylinder for the connection of a steam pipe for conveying away the principal portion of the exhaust steam to work another engine by its expansion.

The operation is as follows: The steam admitted at the opening *d*, operates between the abutment and the nearest main piston F, or F', on the same side of it as *d*, to produce the rotary motion of the piston wheel and shaft in the direction of the arrow shown on the wheel in Fig. 1. As one piston F, or F', passes the opening *d*, the other one passes the opening *f*, and the steam which has acted on the latter piston escapes from between the pistons, at the latter opening, to work another engine by its expansion, and what steam remains behind each piston as it passes the opening *e*, escapes at that opening to the atmosphere or to a condenser. The pistons F, F', as they pass the inclined side of the abutment are thereby forced into the wheel E, but as soon as they have passed the abutment are forced out against the inner periphery of the cylinder by their springs J, J', before their respective pistons I, I', pass the abutments, but, as soon as the latter pass the abutments, the steam acts upon them to force them inward, they being of greater area than the pistons F, F', thereby forcing the latter into closer contact with

the peripheral surface of the cylinder and so holding them till they arrive again at the abutment.

I do not claim broadly by the use of pistons upon which the steam acts to force out the main pistons of a rotary engine, but

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

1. Combining the pistons I, I', with the main pistons F, F', by means of levers H,

H', applied within the piston wheel substantially as herein described.

2. In combination with the pistons F, F', I, I', and levers H, H', the springs J, J', applied and operating as herein specified.

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