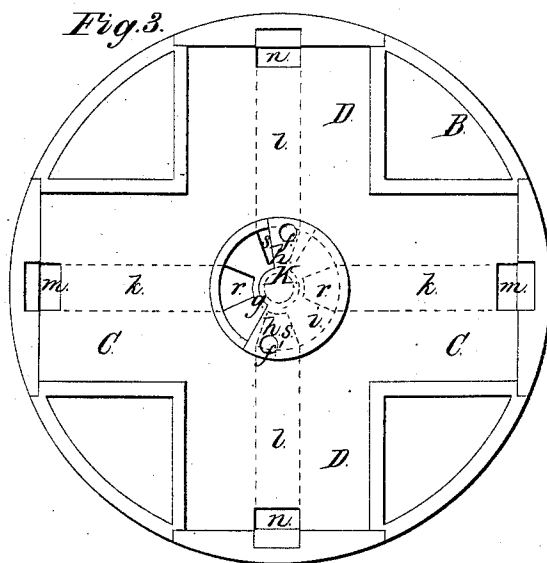
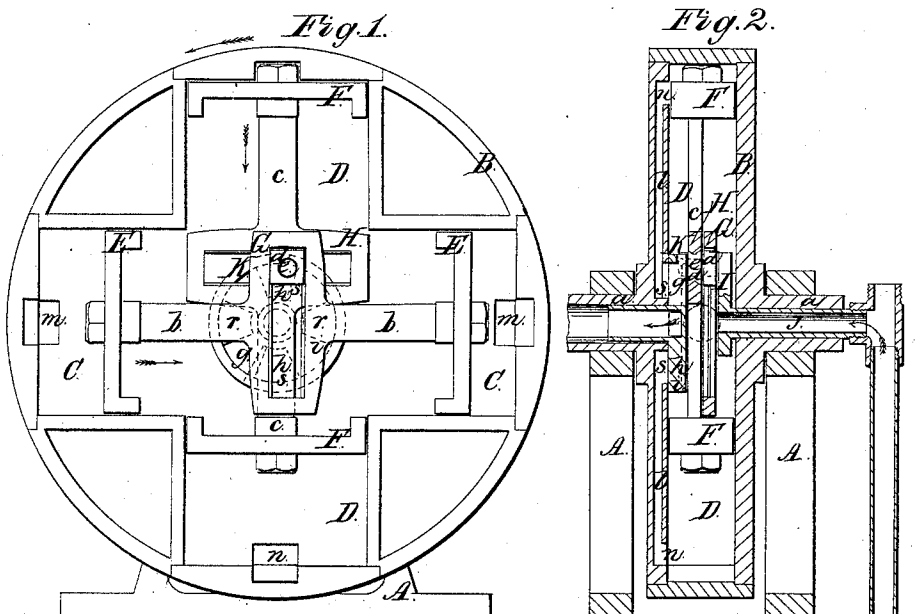


A. Kipp, Jr.,
Rotary Steam Engine,
N^o 82,007. Patented Sep. 8, 1868.



Witnesses.

A. Sellers
A. Kemmer

Inventor.

A. Kipp Jr.

UNITED STATES PATENT OFFICE.

ABRAHAM KIPP, JR., OF SING SING, NEW YORK.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. 82,007, dated September 8, 1868.

To all whom it may concern:

Be it known that I, ABRAHAM KIPP, JR., of Sing Sing, in the county of Westchester and State of New York, have invented a new and useful Improvement in Steam-Engines, applicable also to pumps and meters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a face view of an engine constructed in accordance with my improvement, the lid or cover to the case containing the working parts being removed; Fig. 2, a transverse section of the same; Fig. 3, a similar view to Fig. 1, but with the pistons and their connections removed for the purpose of more clearly illustrating the action of the valve; and Fig. 4, a transverse section of the valve detached.

Similar letters of reference indicate corresponding parts.

This, my improvement, consists in a certain combination of double pistons working in cylinders, which are arranged radial to a central shaft, and operating in a direct manner through yokes, on or in connection with a crank secured to the shaft; also, valve having a fixed character relatively to the crank, whereby a most simple and efficient engine is produced, and which may be used either as a motor for driving purposes, a pump, or a meter.

The invention, however, will here be described as a motor employing steam.

In the accompanying drawing, the crank and valve are represented as occupying a stationary position, while the pistons, with their cylinders, revolve around them; but this action, if desired, may be reversed—that is, the cylinders and pistons remain stationary, and the valve and crank with its shaft be caused to revolve.

Any number of double cylinders, with pistons to correspond, may be used in connection with a single valve and crank; but it will suffice here to illustrate the invention as employing two double cylinders, arranged at right angles, with pistons to match.

In said drawing, A represents the frame of the engine, carrying a drum or case, B, hung by hollow necks or trunnions *a a*, to rotate

therein. This drum carries within it two double radial cylinders, C C and D D, arranged at right angles to each other, and open at their inner ends. Reciprocating within these cylinders are pistons E E and F F, the one set of pistons, E E, being connected together by rods *b b* and yoke G, while the other pistons, F F, are similarly linked together by rods *c c* and yoke H.

Though the pistons and cylinders are here shown as of rectangular form in their transverse sections, it will be obvious that they may be made circular; also that any suitable packing may be used to secure the close working of the pistons within the cylinders.

The yokes G and H are made to gear, by or through blocks *d d*, with a wrist-pin, *e*, of a stationary crank, I, fast to a steam-pipe, J, passing axially through the one hollow trunnion of the drum B, and in open communication with the interior of the space of the latter. This pipe J is connected externally with any suitable supply-pipe or branch, fitted—say, with a starting valve or cock. The opposite hollow trunnion of the drum serves to form an outlet for the spent or exhaust steam.

Geared also by one or other, say, of two cavities, *f f'*, with the wrist-pin *e* of the stationary crank, is a stationary disk-valve, K, occupying a concentric position to the drum, and freely bearing against its one inner face, with which it is kept in close contact by the pressure of the steam within the drum acting on the back of said valve. This valve has a steam passage or opening, *g*, of segmental form, made through it, the same being arranged on one side of two segmental blocks or face formations, *h h*, while an exhaust covered cavity, *i*, of, say, similar configuration to the open passage *g*, is formed in the valve, on the opposite side of said blocks.

Arranged along or across the one side or face of the drum are radial passages *k k* and *l l*, terminating at their outer ends in ports *m m* and *n n*, in open communication with the cylinders C C and D D, at the backs of the pistons, and at their inner ends in ports *r r* and *s s* under cover of the valve K.

Steam being let on, it fills, in a constant manner, the interior of the drum, between the inner faces of the pistons E E and F F, acting in a negative manner, or with counteracting

force, on said faces, and on the two sides of the drum; but, by the construction of the valve K, and arrangement of the passages *k k* and *l l*, with their ports *m m*, *n n*, and *r r*, *s s*, steam is also being admitted through the opening *g*, to act upon the backs of two of the pistons, E and F, while the other two of such pistons are open, by the passages and ports of their respective cylinders, to the exhaust-cavity *i* of the valve. By this disposition of the parts, passages, and ports, and connection of the pistons with the wrist-pin *e* of the stationary crank I, as described, is a rotary motion communicated to the drum, with its cylinders and pistons, causing the live steam to be admitted to and spent steam to be exhausted from the backs alternately, first of the one pair of pistons, E F, and then the other pair of such pistons, and so on in succession.

In this operation of the parts the following points should be observed: First, there is no dead-point to the engine, but always an action or force, as exerted by two of the pistons working at right angles to each other, equal to a full pressure at the most available or advantageous angle of one piston, on or in relation to the crank. Furthermore, by the open character or construction to the inner ends of the cylinders, all stuffing-boxes to the piston-rods are dispensed with, and, by the connection of either two opposite pistons with each other, as described, the one piston is made to act as a guide to the other, while, as no pitman or connecting-rods are used, great compactness is insured, and the full stroke of the pistons made available, within a comparatively small diameter of drum, to the production of a rotary motion.

By throwing over the valve K half a revolution, so as to establish its gear by the cavity *f'* instead of *f*, with the wrist-pin *e* of the crank, the motion of the engine is reversed. This reversal, however, may be effected by causing the valve to be otherwise held than by the crank, and so that it may be reversed by, say, a shaft running through the exhaust-pipe, and provided with a suitable locking device to hold it and the valve in position, when set to run the engine in the required direction. So far as the general operation of the valve, however, is concerned, when once set, all special or separate gear for working it is, in this, my improved engine, dispensed with.

It will be obvious that by making the drum

or case B with its cylinders stationary, then the crank, with its shaft, being left free to turn, will be rotated by the action of the pistons instead of the drum, the valve, in such case, moving along with the crank. Worked as a pump, it is only necessary to change the steam inlet and exhaust pipes into suction and delivery ones, and to drive the engine instead of using it as a motor. Applied as a meter, the pressure of the fluid to be measured serves to drive it.

Of course, any other fluid or gas than steam may be used to work the engine as a motor; thus, water, under a head or pressure, may be used to advantage, and the engine be worked with its axle or shaft in a vertical instead of a horizontal position; or the engine may be arranged to operate at any other angle, as circumstances may suggest or require.

One set or pair of double cylinders might, by the aid of a fly-wheel, or its equivalent, be used in the place of two pairs or sets, but at least two pairs of double cylinders, arranged at right angles to each other, as described, are preferred. Of course the valve will require to have its passages arranged to suit the number of cylinders and pistons used.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination of double cylinders C C and D D, open at their inner ends to a steam chamber or space, pistons E E and F F, with their rods and yoke G and H, crank I, and valve controlling the flow of steam to and from the backs of the pistons, essentially as herein set forth.

2. The combination of the double cylinders C C and D D, arranged, either pair at right angles, or thereabout, to each other, and with their inner ends open, as described, and in communication with a central or intermediate steam chamber or space, pistons E E and F F, with their rods *b b*, *c c*, and yokes G H, crank I, and valve controlling the admission and escape of steam to and from the backs of the pistons, substantially as specified.

3. The valve K, when constructed and arranged for operation, in combination with the double cylinders, their pistons and crank, substantially as shown and described.

A. KIPP, JR.

Witnesses:

A. LE CLERC,
A. KINNIE.