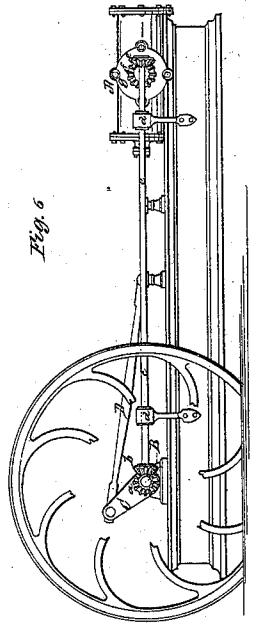
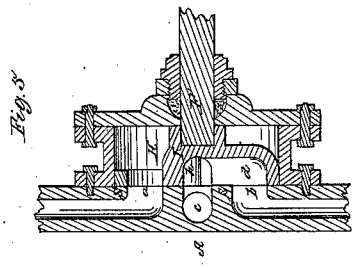
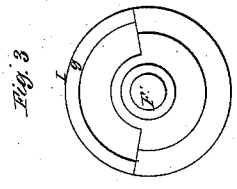
H. T. Carter,

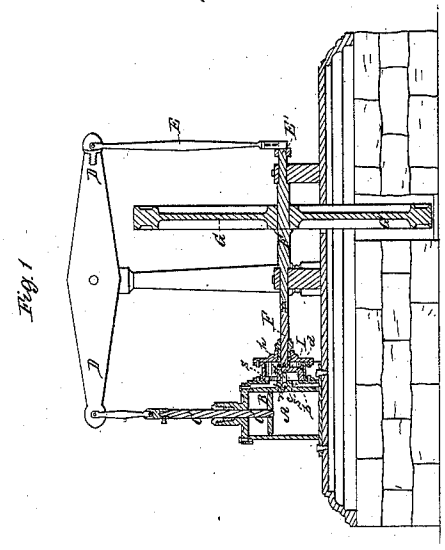
Rotary Steam Valve.

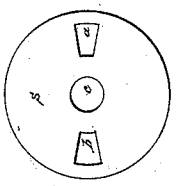
No. 42,272. Patented Apr. 12, 1864:

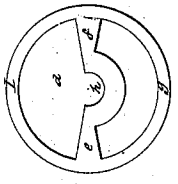












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UNITED STATES PATENT OFFICE.

HENRY T. CARTER, OF PORTLAND, MAINE.

IMPROVEMENT IN THE VALVE-GEAR OF STEAM-ENGINES.

Specification forming part of Letters Patent No. **42,272**, dated April 12, 1864.

To all whom it may concern:

Be it known that I, HENRY T. CARTER, a resident of Portland, in the county of Cumberland and State of Maine, have invented a new and useful Improvement in the Steam-Engine; and I do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 denotes a vertical section of a steam-engine as constructed with my invention. Fig. 2 is a face view of the valve seat. Fig. 3 is an external view of the rotary valve. Fig. 4 is an inner side view of it. Fig. 5 is a transverse section of the valve, its case, the valve-seat, and the induction and eduction ports of the steam chest and cylinder.

My invention consists in the combination of a rotary valve apparatus, made substantially as described, with the fly-wheel shaft in manner so that the rotary valve or its spindle or stem shall be applied to, and so that the valve shall be rotated with and by the said shaft while the latter may be in revolution.

In the drawings, A denotes the steam cylinder, of which B is the piston. The said piston, by a connecting-rod, C, is joined to a working beam or lever, D, which has another connecting-rod, E, leading from it to the crank E′ of the fly-wheel shaft F.

In my improved engine, the working-beam travels in a plane which is at a right angle to that of the fly-wheel G, and cutting the axis of the fly-wheel longitudinally.

The steam-chest of the cylinder is shown at H, is placed against the side of the cylinder and with its axis in range of that of the fly-wheel shaft. This chest is a cylindrical box having in its bottom a valve-seat, *s*, formed circular and made with two induction ports, *a b*, and one eduction port, *c*, leading from or through it, and arranged as shown in Figs. 2 and 3.

The rotary valve I, which is placed within the steam-chest H and rests against its bottom or valve-seat, is made as shown in Figs. 3, 4, and 5, it being provided with a sectoral chamber, *d*, and two port-covering surfaces, *e f*, arranged together or in a circle, as shown in Fig. 4. The valve is a sector of a circle somewhat greater than a semicircle, and may be provided with an extension, *g*, which, however, is not essential to it, although advantageous. The two flat valve-surfaces, *e f*, cover the ports *a b* when directly over or on them. The chamber *d*, by a recess or extension, *h*, of it, communicates freely with the eduction-port *c*. The ports or passages *a*, *b* respectively lead to the two ends of the interior of the cylinder. The spindle or stem F′ of the valve I is fixed directly to the end of the shaft F, and so as to be revolved with and by it. During a revolution of the valve the steam, when in the chest H, will be caused to flow into and be discharged from the cylinder in such manner as to move the piston in opposite directions therein, the steam discharged from the cylinder being caused to rush into the chamber *d* of the valve I, and from thence into and through the eduction-port *c*.

Instead of applying the valve I or its stem directly to the fly-wheel shaft, in manner as above described, I have contemplated an arrangement, such as is shown in Fig. 6, wherein the cylinder is represented at A and the fly-wheel shaft at B. The said fly-wheel shaft has a crank, C, which is operated by a connecting-rod, D, leading directly from the piston rod. A bevel-gear, *a*, on the fly-wheel shaft, engages with another bevel-gear, *b*, fixed on one end of another shaft, *c*, which is duly supported in bearings *d d* and carries on its other end another bevel-gear, *e*, which engages with a bevel-gear, *f*, fixed on the spindle or stem of the rotary valve whose steam-chest is shown at *g*. By this arrangement the rotary valve or its stem is not affixed to the fly-wheel shaft, but is operated by the gears *a b e f* and the shaft *c*.

Instead of the gears *a b e f* and the shaft *c*, an eccentric or a crank may be affixed to the fly-wheel shaft and be made to operate the rotary valve by means of a crank and a suitable connecting-rod or mechanism. Furthermore, when the spindle of the rotary valve is directly applied to the fly-wheel shaft, or arranged with respect to it, as shown in Fig. 1, the connection of the two should be such as to allow of the rotary valve being moved up to or kept in close contact with its seat from time to time, as the two may become more or less worn on their surfaces in contact.

The advantages of the rotary valve over the common slide valve are, that it not only can

be separated by the fly-wheel shaft connected directly to it or its spindle, but, by its peculiar mode of operation, it maintains a better steam-joint with its seat.

I claim—

The arrangement of the cylinder, the fly-wheel shaft, and the rotary valve in manner so that the valve or its spindle shall be affixed to and so as to be rotated with and by the said shaft while such shaft may be in revolution.

HENRY T. CARTER.

Witnesses:
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