2 Sheets—Sheet 1

A. SIEGRIST.

Rotary Steam Engine.

No. 201,456. **Patented March 19, 1878.**

Fig. 1.

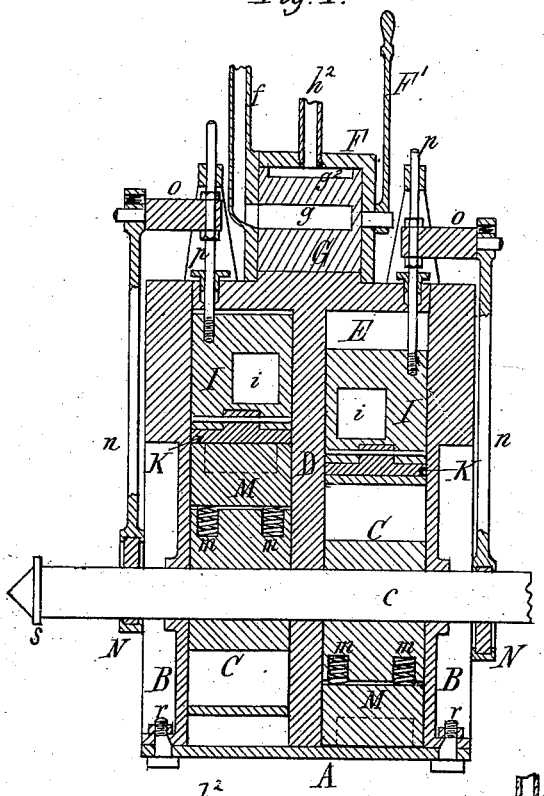


Fig. 2.

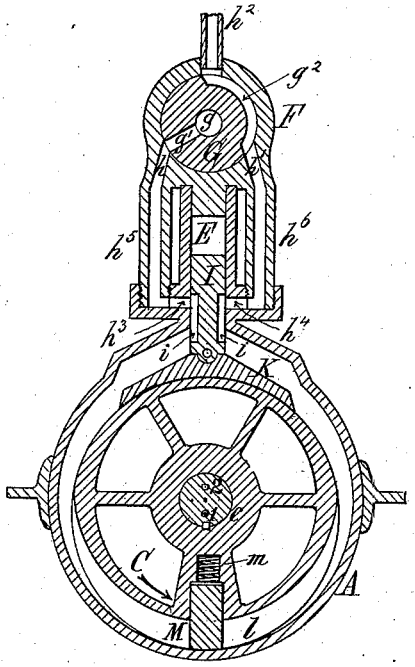


Fig. 4.

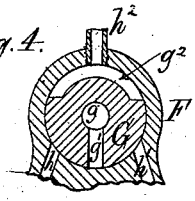


Fig. 3.

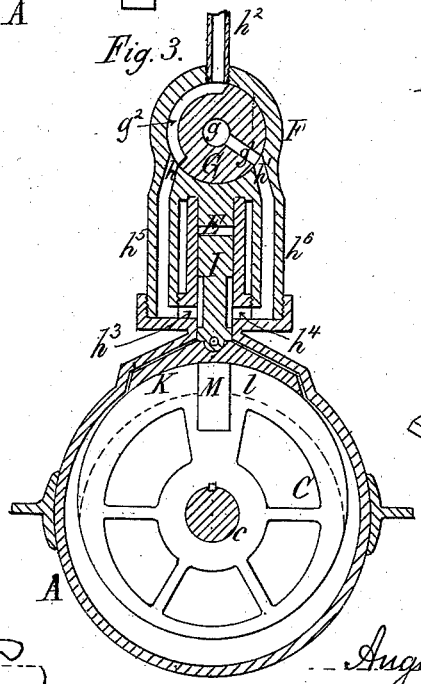


Fig. 7

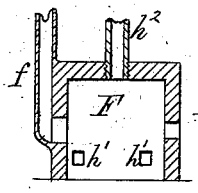


Fig. 5.

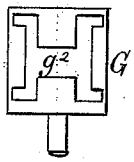


Fig. 8.

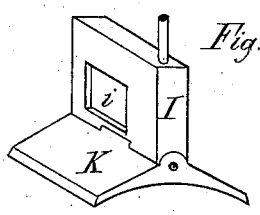
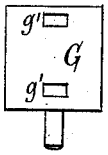


Fig. 6.



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2 Sheets—Sheet 2.

A. SIEGRIST.

Rotary Steam Engine.

No. 201,456. **Patented March 19, 1878.**

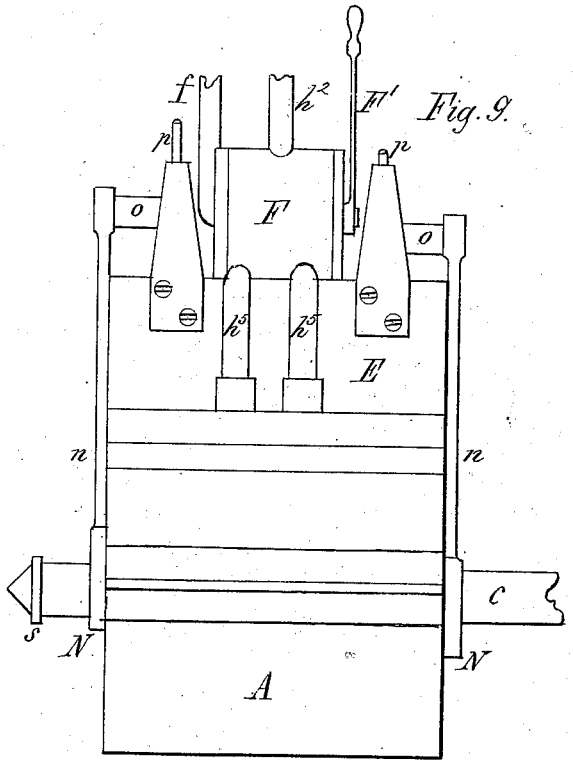

Fig. 9.

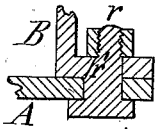

Fig. 10.

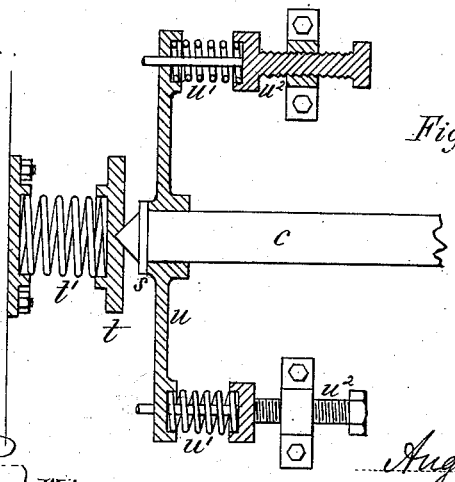

Fig. 11.

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UNITED STATES PATENT OFFICE.

AUGUST SIEGRIST, OF BUFFALO, NEW YORK.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. **201,456,** dated March 19, 1878; application filed September 6, 1877.

To all whom it may concern:

Be it known that I, AUGUST SIEGRIST, of the city of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Rotary Steam-Engines, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

My invention relates to that class of rotary steam-engines which are provided with one or more eccentric motor-wheels arranged in the steam-cylinder, and which have a movable abutment resting upon the motor-wheel, so as to separate the steam-space of the cylinder from the exhaust-space thereof, and moving simultaneously with the motor-wheel, so as to remain in close contact therewith.

The object of my invention is to produce a rotary steam-engine in which the steam is used economically, and which can be readily reversed.

My invention consists of the particular construction of the engine, as will be hereinafter fully set forth.

In the accompanying drawings, consisting of two sheets, Figure 1 is a longitudinal sectional elevation of a rotary steam-engine provided with my improvements. Fig. 2 is a cross-section thereof. Fig. 3 is a similar view with the throttle-valve reversed. Fig. 4 is a detached sectional view of the throttle-valve in a closed position. Figs. 5 and 6 are, respectively, top and bottom plan views of the throttle-valve. Fig. 7 is a sectional view of the throttle-valve chamber. Fig. 8 is a perspective view of the slide-valve and bearing-block. Fig. 9 is a side elevation of my improved engine. Fig. 10 is a sectional view, on an enlarged scale, of one of the bolts by which the cylinder-covers are secured. Fig. 11 is a sectional plan view of the elastic bearings of the driving-shaft.

Like letters of reference refer to like parts in the several figures.

A represents the steam-cylinder; B B, the covers thereof; *c*, the driving-shaft, and C C the eccentric motor-wheels secured thereto. D is a fixed partition arranged in the cylinder A, between the motor-wheels C C. E is the chamber of the slide-valve, and F the chamber of the throttle-valve. *f* is the steam-supply pipe entering the end of the chamber F, and G the cylindrical throttle-valve arranged in the latter, and provided with a central bore or cavity, *g*, communicating with the pipe *f*. g^1 g^1 are two steam-passages extending from the central cavity *g* of the throttle-valve to the surface thereof, so as to register with either of the two pairs of steam-ports *h* h^1, formed in the valve-chamber F. g^2 is a recess or depression formed in the surface of the valve G, and made of such size that when the steam-passages g^1 of the valve G communicate with one pair of the ports *h* h^1 the depression g^2 will connect the opposite pair of ports with the exhaust-pipe h^2, entering the upper side of the valve-chamber F. The valve G is actuated by means of a hand-lever, F′. I is the slide-valve, arranged in the valve-chamber E, so as to fit tightly against both faces thereof, each of which is provided with a steam-port, h^3 h^4, connected, respectively, with the steam-ports *h* h^1 of the valve-chamber F by pipes h^5 h^6.

The valve I is provided on each face with a cavity or recess, *i*, made of such length that it will, in certain positions of the valve, open a communication between the respective steam-ports h^3 h^4 and the steam-cylinder.

K is a concave bearing-piece hinged or pivoted to the lower end of the valve I, and resting upon the eccentric motor-wheel C, with which it forms a steam-tight joint. The bearing-piece K is made of such length that it will completely separate the steam-space of the cylinder from the exhaust-space thereof in all positions of the eccentric-wheel C. The eccentric motor-wheels C are, preferably, so constructed that the greatest distance from the center of the shaft *c* to the circumference of the wheel will be equal to the radius of the steam-cylinder, so that the wheel C, in revolving, will be in contact with the inner surface of the cylinder at one point. This is best accomplished by turning the motor-wheels first of the same size as the cylinder, so as to fit therein, and then turning them on their proper center, (marked 1 in Fig. 2,) whereby the eccentric surface is formed. A steam-space is then formed by turning the wheel on a third center, (marked 2 in Fig. 2,) and arranged in line with the other

centers, but on the opposite side of the shaft *c*, leaving a crescent-shaped flange, *l*, on each side of the wheel.

M is a block or piston receiving the steam-pressure, and arranged centrally in the steam-space of the wheel, in a suitable socket formed in the latter. The block M is held against the cylinder by suitable springs *m*. The two eccentric motor-wheels are secured to the shaft *c* directly opposite each other, or so that the center of one wheel is half a turn ahead of the center of the other, as shown in Fig. 1.

N N are two eccentrics secured to the shaft *c*, one on each side of the cylinder, and corresponding in position and throw with the adjacent wheel C. *n n* are the eccentric-rods, connecting, by means of cross-heads *o*, with the valve-rods *p*, so as to actuate the slide-valves.

As the wheels C are arranged directly opposite each other, the second valve may be operated from the same eccentric-rod by interposing a two-armed lever between the second valve-rod and the cross-head of the first valve, so as to reverse the motion.

If preferred, the valves I may be operated simply by the eccentric-wheel C, by interposing suitable springs between the valves and the end of the valve-chamber, so as to keep the valves I and bearing-pieces K in contact with the wheel C.

The parts being in the positions shown in Figs. 1 and 2, the steam entering through the pipe *f* enters the steam-ports *h*, passes through the pipes h^5 and ports h^3 into the cavity *i* of the valve I, and thence into the cylinder A, where it presses against the block M, and revolves the wheel C and shaft *c* in the direction of the arrow. The exhaust-steam from before the block M escapes, through the port h^4, pipe h^6, and port h^1, into the recess g^2 of the valve G, and thence through the pipe h^2. As the revolution of the shaft *c* continues, the valve I is raised until the lower edge of the cavity *i* of the valve passes by the lower edge of the valve-chamber E, when the supply of steam is cut off and the expansion begins. This continues until the downward movement of the valve again opens the supply of steam, when the exhaust begins on the other side; hence, by properly proportioning the length of the cavity *i* of the valve, the steam-supply can be made to conform to the desired work.

By turning the throttle-valve G so as to assume the position shown in Fig. 3, the course of the steam and direction in which the engine rotates are reversed. By placing the throttle-valve in the position shown in Fig. 4, the steam is entirely cut off.

In order to secure a large bearing-surface, the recess g^2 of the valve G may be made in the form shown in Fig. 5, the branches of the recess connecting with the steam-ports and the central part with the exhaust-pipe.

The cylinder A may be cast with the valve-chambers and steam-passages complete; or the cylinder may be made of boiler-iron or steel plate, and the valve-chamber of cast-iron, and bolted thereto.

The covers B B are secured to the cylinder A by bolts *r*, provided with an incline, *r'*, bearing against a correspondingly-inclined opening of the flange of the cover, so that by tightening the bolt *r* the cover is drawn against the motor-wheel C, and a tight fit produced.

When my improved engine is used for actuating the screw-propeller of a vessel, the shaft *c* is provided with an adjustable elastic end support, (represented in Fig. 11,) to receive the thrust of the propeller. The conical end of the shaft, provided with a collar, *s*, revolves in a bearing, *t*, resting against a spring, *t'*, while the collar *s* runs in contact with a cross-head, *u*, the ends of which rest against springs u^1, rendered adjustable by screws u^2. In this manner the thrust of the propeller in either direction is received by an elastic cushion, and the great friction of the wheels C against the cylinder-covers, and great strains resulting therefrom to the wheels and shaft on a sudden start, reversal, or immersion of the propeller, are thereby entirely avoided.

I claim as my invention—

1. The combination, with the cylinder A, provided with valve-chamber E, having ports h^3 h^4, of the eccentric motor-wheel C, provided with piston M, double-faced slide-valve I, having cavities *i i*, concave bearing-piece K, pivoted to the lower end of the slide-valve, and reversible throttle-valve G, all arranged as shown and described, for the purpose set forth.

2. The eccentric motor-wheel C, constructed with crescent-shaped flanges *l*, the surfaces of which lie in the same circle with the remaining surface of the motor-wheel, and are described from the center 1, and having the surface between the flanges *l* curved from the center 2, in combination with the piston-block M, slide-valve I, and pivoted bearing-piece K, substantially as and for the purpose set forth.

3. The combination, with the cylinder A and cover B, having its flange provided with bolt-holes made inclined on the inside, of the fastening-bolts *r*, provided with inclines *r'*, substantially as and for the purpose hereinbefore set forth.

4. The combination, with the driving-shaft *c*, provided with conical end and collar *s*, of the spring-bearing *t t'*, cross-head *u*, springs u^1, and adjusting-screws u^2, substantially as and for the purpose hereinbefore set forth.

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