W. Huston,

Rotary Steam Engine.

No. 46,672. Patented Mar. 7, 1865.

Fig. 3.

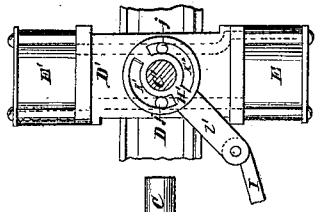


Fig. 6.

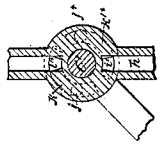


Fig. 8.

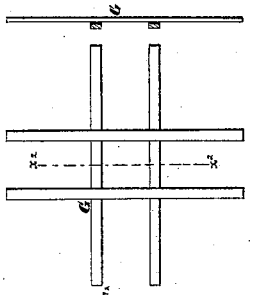


Fig. 7.

Fig. 2.

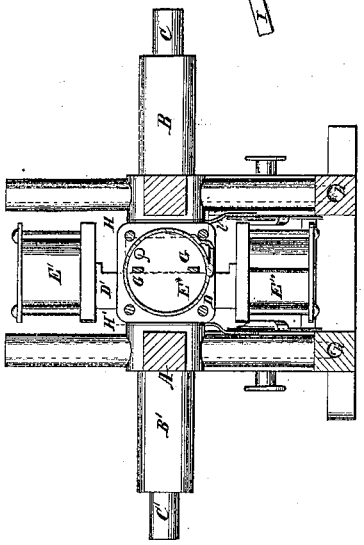


Fig. 5.

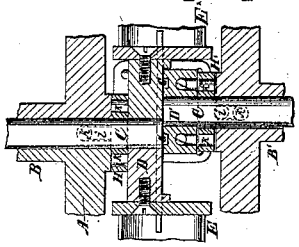


Fig. 1.

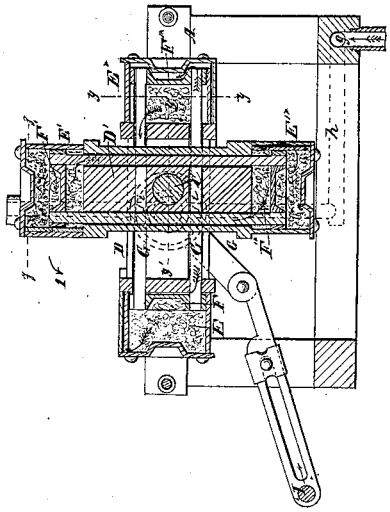
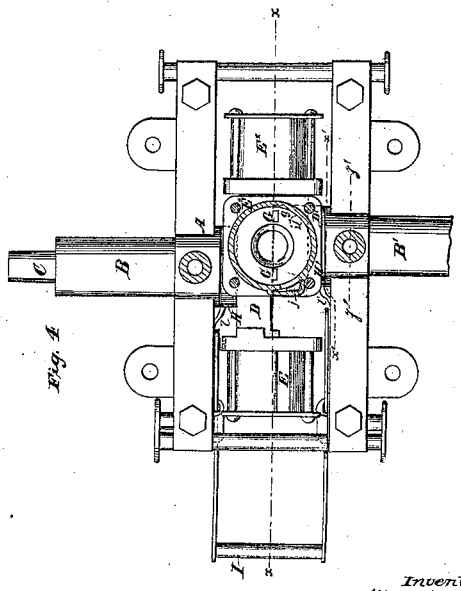


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM HUSTON, OF WILMINGTON, DELAWARE.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **46,672**, dated March 7, 1865.

To all whom it may concern:

Be it known that I, WILLIAM HUSTON, of Wilmington, in the county of New Castle and State of Delaware, have invented a new and Improved Revolving-Cylinder Engine; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal vertical section of this invention, the plane of section being indicated by the line *x x*, Fig. 4. Fig. 2 is a transverse vertical section of the same taken in the plane indicated by the line *y y*, Fig. 1. Fig. 3 is a transverse section of the valve, the line *x' x'*, Fig. 4, indicating the plane of section. Fig. 4 is a sectional plan, the line *z z*, Fig. 1, indicating the plane of section. Fig. 5 is a horizontal section in the plane indicated by the line *y' y'*, Fig. 1. Fig. 6 is a transverse section of the steam and exhaust channels, the line *z' z'*, Fig. 4, indicating the plane of section. Fig. 7 is a detached elevation of the compound piston-rod. Fig. 8 is a transverse section of the same taken in the plane indicated by the line x^2 x^2, Fig. 7.

Similar letters of reference indicate like parts.

This invention consists in an engine composed of four cylinders, which are secured one to each end of two heads mounted on the ends of two shafts which are parallel, but not situated in line, with each other, and coupled together by a compound piston-rod moving in suitable guide-grooves in said heads in such a manner that each pair of cylinders revolve in a true circle round the shaft to which they are connected, but the pistons of one set of cylinders act concentrically on the shaft of the other set, and vice versa, and if steam or other fluid under pressure is admitted by this eccentric action of each set of pistons on the shaft of the other set a revolving motion of the whole system results, and on account of the concentric position which the several cylinders preserve in relation to their respective shafts a very quick velocity can be effected without producing that trembling or shaking motion which inevitably results if heavy bodies revolve eccentrically.

The compound piston-rod, which is common to all four pistons, is composed of four bars united in the form of a double cross, so that by its action the pistons are steadied and the power from the same is transmitted to the shafts without binding. Two adjustable disk-valves are combined with the revolving heads and with the supply and exhaust ports in such a manner that by changing the position of said disk-valves the motion of the engine can be reversed or stopped at any moment.

A represents a frame, made of cast iron or any other suitable material, and provided with two tubular boxes, B B', which form the bearings for the shafts C C'. These two shafts are parallel to each other, but they are not in line, or, in other words, they are eccentric one in relation to the other. On the inner end of the shaft C a head, D, is mounted, which is rigidly attached to said shaft, and provided with a flat, smooth surface which bears against a similar surface of the head D', that is mounted on the inner end of the shaft C'.

E E* E' E'* are four steam-cylinders, two of which are mounted on the ends of the head D, and two on the ends of the head D', as shown in Fig. 1. Each of these cylinders is provided with an ordinary piston, F F* F' F'*, and all these pistons are connected to a common piston-rod, G, detached views of which are shown in Figs. 7 and 8. Said piston-rod is made in the shape of a double or single cross, and it is guided in grooves in the heads D D', as shown in Figs. 1 and 5 of the drawings. It is firmly keyed to all its pistons, and by its application the two shafts C C' are coupled together, and the action of the steam on one set of pistons is transmitted to the shaft of the other set, and vice versa. For instance, in the position which the pistons occupy in Fig. 1 the steam acts on the outer surface of the piston F'* and on the inner surface of the piston F*, and a pressure is exerted on the piston-rod in the direction of the arrow marked thereon in Fig. 1 of the drawings. Said piston-rod, however, is prevented from sliding in this direction by the grooves in the head D, and a pressure is thus exerted on each head in a vertical direction, passing through the center of the shaft C'. This pressure has a tendency to turn the head D on the shaft C in the direction of arrow 1, being, as it were, applied to an imaginary crank, the stroke of which is equal to the distance of the centers

of the two shafts C and C′. As the heads D D′ begin to rotate in the direction above stated, the pistons F F* are brought into action, and then again the pistons F′ F′*, or in the intermediate positions—that is to say, when both heads stand in oblique or angular position both sets of pistons exert a certain power tending to run the heads in the desired direction. In the position shown in Fig. 1 the pistons F F* are on their dead points. They have no power to produce a rotary motion of the heads, but at that moment the pistons F′ F′* are in their most favorable positions, acting at right angles on their imaginary crank.

Steam is admitted to the several cylinders by means of a pipe, *g*, which communicates through channels *h h* and ports *i i′* or *i* i′** with the channels *j j* j′ j′** in the heads D D′.

The channel *j* communicates with the outer end of the cylinder E and with the inner end of the cylinder E*, and the channel *j** with the inner end of the cylinder E and with the outer end of the cylinder E*, and in the same manner the channel *j′* communicates with the outer end of the cylinder E′ and with the inner end of the cylinder E′*, as indicated in dotted lines in Fig. 3.

In the drawings, the ports *i i′* are represented as the induction, and the ports *i* i′** as the exhaust ports; but it is obvious that steam might be admitted through the ports *i* i′** and exhausted through the ports *i i′*.

The communication between the ports *i i′ i* i′** and the channels *j j* j′ j′** is governed by the ring or disk valves H H′ which are situated between the frame A and the heads D D′, and which rotate freely on the shafts C C′. Said valves are provided with long segmental slots *k k* k′ k′**, and their position is adjusted by a bar, I, which connects with arms *l l′*, extending from said valves, as clearly shown in Figs. 1, 3, and 6. In the position in which the valves are shown in said figures the induction-ports *i i′* communicate through the segmental slots K* K′* with the channels *j′ j′**, and the exhaust-ports *i* i′** through the segmental slots *k k′* with the channels *j j′*, and the engine revolves in the direction of the arrow 1, marked near it in Fig. 1. By pushing the bar I in the direction of the arrow marked on it in Fig. 1 the valves are turned so that the induction-ports *i i′* communicate with the channels *j j′*, and the exhaust-ports *i* i′** with the channels *j* j′**, and the motion of the engine is reversed. In order to stop the motion of the engine, the valves are brought in such a position that the solid portions between the segmental slots cover the ports *i i′ i* i′**, and thereby the supply of steam is cut off. By referring to Fig. 4 it will be seen that both valves H H′ connect with one and the same bar, I, which may be properly termed the "starting-bar." By the action of this bar on the valves the engine can be started or stopped, or the motion of the engine reversed, at any moment. This engine can be run with great velocity, the cylinders revolving in true circles around the centers of their respective shafts, and the eccentric motion of the pistons is counteracted by the greater weight and consequent larger momentum, of the cylinders, so that even at a very high speed the engine runs comparatively steady and without trembling.

I claim as new and desire to secure by Letters Patent—

1. The cylinders E E* E′ E′*, secured to the ends of heads D D′, mounted on eccentric shafts C C′, and operating in combination with a common piston-rod and pistons F F* F′ F′* in the manner and for the purpose substantially as set forth.

2. The use of the compound piston-rod G, constructed as shown in Figs. 7 and 8.

3. The disk-valves H H′, applied in combination with the revolving heads D D′, and with the common starting and reversing bar I, in the manner and for the purpose substantially as described.

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