2 Sheets—Sheet 1.

J. J. CORDES & E. LOCKE.

ROTARY ENGINE.

No. 2,019. **Patented Mar. 29, 1841.**

Fig: 1.

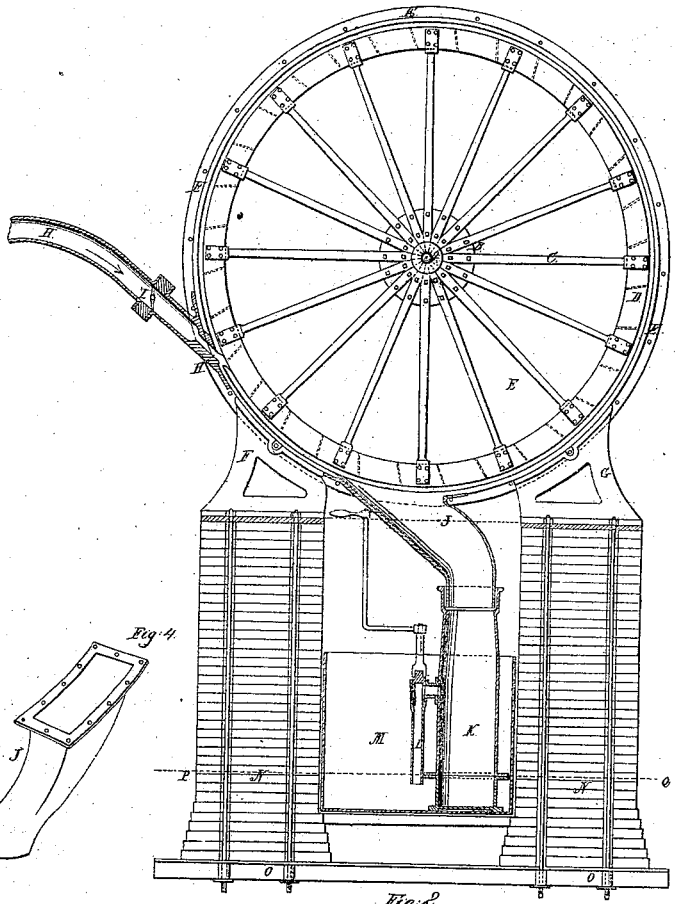


Fig: 3

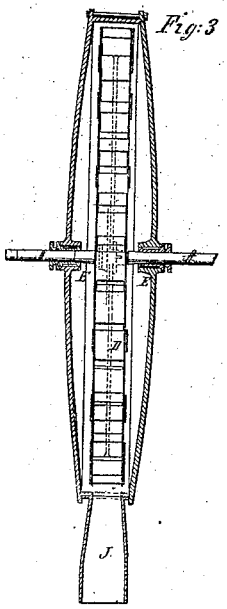
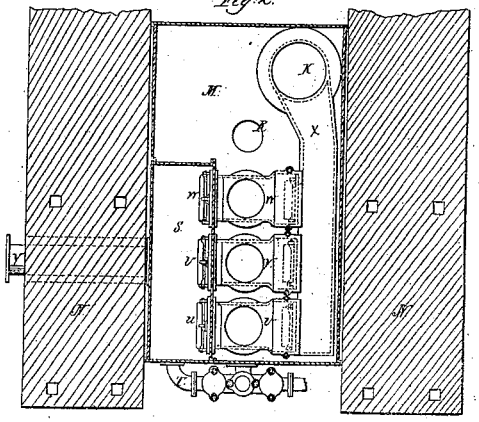


Fig: 4

Fig: 2.



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Edwd Locke

2 Sheets—Sheet 2.

J. J. CORDES & E. LOCKE.

ROTARY ENGINE.

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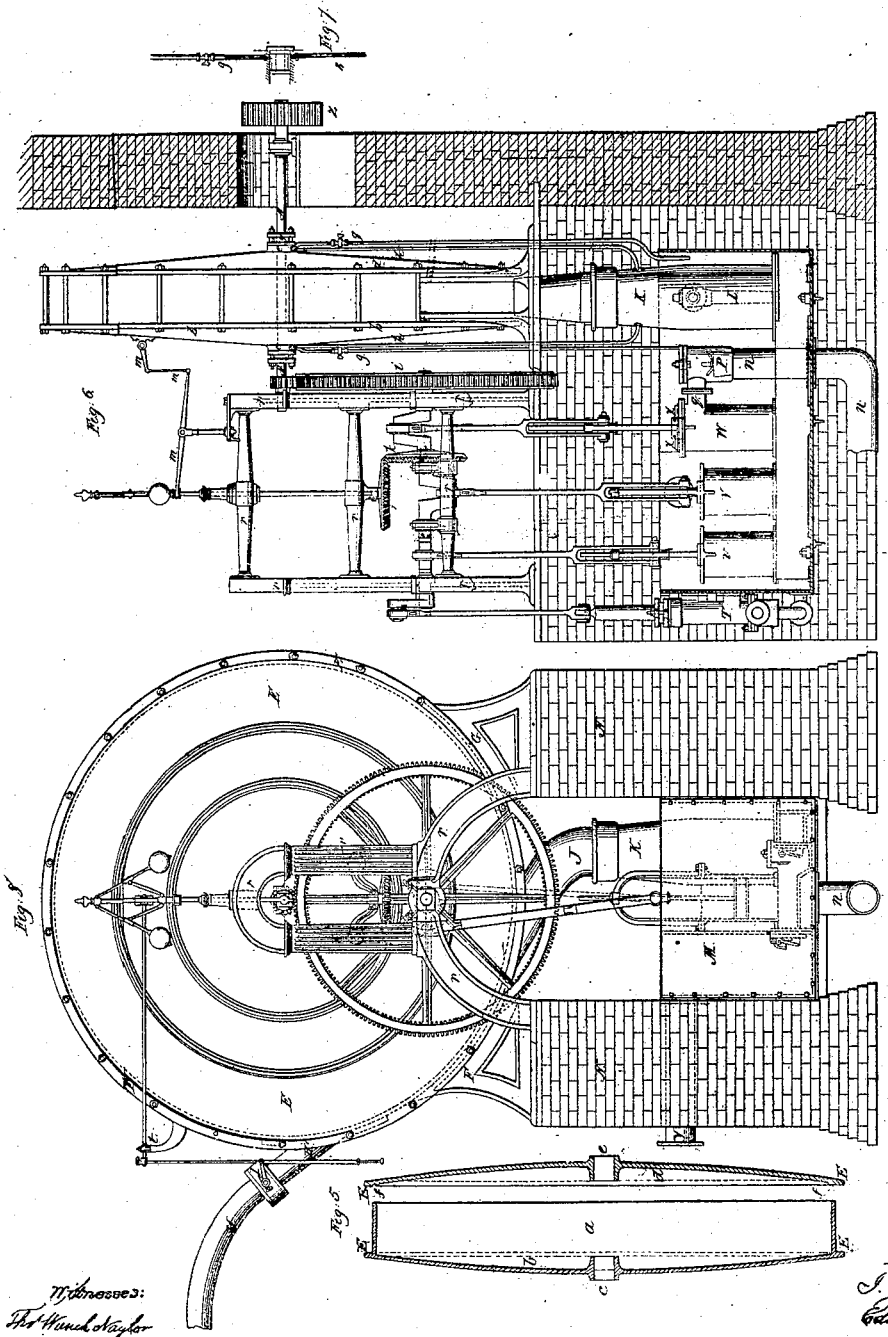

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Inventors:
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UNITED STATES PATENT OFFICE.

JAMES JAMIESON CORDES AND EDWARD LOCKE, OF NEWPORT, ENGLAND.

ROTARY STEAM-ENGINE.

Specification of Letters Patent No. 2,019, dated March 29, 1841.

To all whom it may concern:

Be it known that we, JAMES JAMIESON CORDES, a citizen of the United States of America, and now residing at Newport, in the county of Monmouth, England, gentleman, and EDWARD LOCKE, a subject of the Queen of Great Britain, also residing at Newport, in the county aforesaid, have invented or discovered a new Rotary Engine; and we, the said JAMES JAMIESON CORDES and EDWARD LOCKE, do hereby declare that the nature of our said invention and the manner in which the same is to be performed is described and ascertained in manner following, and by the aid of the two sheets of drawings hereunto annexed, that is to say,—

Our new rotary engine consists principally of a revolving wheel and of an exhausted cylindrical box or chamber which incloses that wheel within it, and conforms to the circumference thereof as nearly as it can do, without touching that circumference and the said revolving wheel of our new rotary engine is put in motion or impelled with a continuous circular motion by a direct action of a current of steam entering into the said chamber in the direction of a tangent to the circumference of the wheel and impinging against suitable vanes affixed to that circumference, the said steam afterward passing out from the said box or chamber through a suitable eduction passage into a condensing apparatus wherein the steam is condensed so as that the interior of the said box or chamber will be kept exhausted in order that the wheel may revolve in an exhausted space and also in order that the current of steam may enter into the chamber and impinge on the said vanes, with all the force and velocity due to steam rushing into an exhausted space. The power exerted by our new rotary engine being communicated from the axle of the said revolving wheel to give motion (by intervention of wheelwork and such other means of communicating motion as may be suitable and requisite) to any mill work or machinery which is intended to be impelled by the engine.

Description of the Drawings.

Note: The same or similar letters of reference are used to denote the same parts wherever they appear in all the different figures.

Figure 1 Sheet I, is a vertical section, Fig. 2 a horizontal plan and Fig. 3 an elevation of the revolving wheel of our new rotary engine.

The parts marked A B, C and D constitute the revolving wheel which is somewhat similar to an over shot water wheel or bucket-wheel.

A is the main axle of the said wheel.

B is the center piece to which the inner ends of all the spokes C are fastened and they radiate outward and are fastened at their outer ends to the rim D which is composed of a cylindrical hoop and two flat circular rims projecting outward therefrom and forming sides to the rim D and across which rim the several vanes are fixed in the space between the said two sides thereof. The direction of the planes of the several vanes may be radial or may be somewhat inclined to a radial line as is shown by the dotted lines in Fig. 1 which dotted lines represent the said vanes.

The axle A, center piece B, and spokes C, may be made of wrought iron and the rim D with its vanes of copper.

E E is the cast iron box or chamber wherein the wheel is inclosed. The box E is supported on two standards F. G, so as to be immovable; and the wheel revolves within the box E without touching at any part; except at the axle A each end of which comes out from the box E through suitable stuffing boxes.

H is an induction steam pipe furnished with a throttle valve I and conveying steam from any suitable boiler or apparatus which steam is directed through an aperture H′ to impinge upon the vanes of the wheel in the direction of a tangent to the rim D thereof and J is an exhausting passage joining to the circumference of the box E and leading the steam out therefrom in a line (or nearly in a line) with the direction of the induction pipe H and the exhausting pipe J joins by a suitable curve to the top of the condenser K which is immersed in the cold water of the cistern M. That cistern is supported on the brick work N N, and on which brick work the standards F, G are also erected and are fastened down by bolts to the foundation plate O, O, upon which the whole engine rests.

In Fig. 2 (which is a plan of the lower part of the engine taken in the horizontal line P Q in Fig. 1) K is the condenser, M the cold water cistern, R an aperture for

the cold water pipe *n* to come upward through the bottom of the cistern M.

S is the hot water cistern or hot well which may be partitioned off within the cold water cistern M. The boiler is fed by means of the hot water pump T with hot water which is drawn from the hot well S.

U, V, W are three pump-barrels combined together (in the manner of a three barreled force pump with solid pistons) in order to act by turns in succession, as a continual air pump for exhausting and keeping the condenser K exhausted. The upper part of one of those pump barrels W is joined (as will be hereafter explained) with the cold water suction pipe *n* which comes upward through the aperture R, Fig. 2, before mentioned in order that the said upper part of the barrel W may serve for a cold water pump while the lower part of that barrel is performing its part as one of the three barrels of the continual air pump.

X is a common communication from the lower part of the condenser to the entrance valves or foot valves of the three pump barrels U V W. The three discharge valves belonging to those three barrels are marked *u*, *v*, *w*, in Figs. 2 and 8 they lead out from the lower part of each barrel into the hot well S and open into the same.

Y is the waste or overflow pipe for conveying the surplus hot water away from the hot well S.

In Fig. 3 which is an edge view of the revolving wheel the vanes thereof are shown and also a section of the box E wherein the wheel is inclosed.

Fig. 4 is a perspective view of the exhausting passage J more distinctly showing its shape at the part where it joins to the circumference of the box E, E.

Fig. 5, Sheet II, is a section of the box E with its cover opened or rather removed a little way from the box, *a* is the circumference of the box, *b*, the circular concave disk or side of the box which is cast in the same piece with the circumference *a*, and a neck or boss *c*, projects out at the center of the disk *b*, to form a central neck through the aperture of which the axle A of the wheel is to pass with suitable packing to make a tight stuffing box. The whole box viz. its circumference *a*, concave side *b*, center boss *c*, and flange E being one entire casting, *d* is the removable convex disk or cover forming one side of the box, it is cast separately with a similar neck or central boss and aperture *e*, to those already mentioned and a corresponding flange E, and with a circular groove *f*, all around its outer edge, just within the flange to receive and shut over the edge of the circumference *a* of the box. The cover *d*, being accurately fitted to the box it is fastened in its place by nuts and screw bolts passing through both the flanges as shown at *b*, *d*, in Fig. 6, which is a lateral elevation of the engine, wherein the box E is seen edgewise with its cover *d*. A A, Fig. 6, is the axle of the revolving wheel passing out through the said central apertures or bosses of the box and of its cover.

The mode whereby the bearings in which the axle A works, are kept cool is as follows. The brass bearings (one of which is shown separately at Fig. 7 and which bearings fit into the necks or bosses *c*, *e*, are turned smaller at the middle part of their outer surfaces so as to leave a narrow space all around them at that part when they are lodged in their places within the bosses *c*, *e*, and to each of those spaces two small water pipes *g* and *h* are connected one of them (*g*) being provided to bring up cold water from the cistern M and the other (*h*) to convey it away down again into the condenser K. The pipe *g*, is furnished with a stop cock to shut off the water when the engine stops or else that cock (or another such cock in addition) may be in the pipe *h*. The lower ends of the two pipes *g* dip into the cold water in the cistern M and the lower ends of the two pipes *h* join to the condenser K. The effect of this arrangement is, that owing to the exhaustion within the condenser K, a current of cold water is urged up each of the pipes *g*, and through the aforesaid spaces around the brasses of the bearings, and thence down the pipes *h* into the condenser, those currents of cold water keeping the bearings and the axle A always cool at those parts.

y y are stuffing boxes within the bosses *c* and *e*, to retain suitable packings around the axle A, and prevent entrance of any external air into the box E.

Z is a wheel of any suitable kind, fastened on one end of the axle A, for the purpose of communicating motion to the machinery that the engine is required to drive. On the other end of the axle A, a small pinion is fixed to turn the spur wheel *i*, which is fastened on one end of the triple crank which works the solid pistons of the three pump barrels, U, V, W, by suitable crank rods and guides, in the usual manner of working a three barreled forcing pump of that kind which has its barrels open at top, and solid pistons. On the end of the axis of the triple crank, a crank is fixed to work the hot water pump T. The triple crank may also have fastened upon it, the miter wheel *k*, to turn the governor, as shown in Figs. 6 and 8, where *m*, *m*, *m*, show the lever regulating rods, and cranked lever for connecting that governor with the throttle valve I, in the usual manner of steam engines.

u, *u*, is the cold water pipe passing upward through the aperture R, in the bot-

tom of the cold water cistern M, and having a suction valve p, in the pipe u which joins by a branch q above that valve, to the upper part of the pump barrel W, which barrel has a cover on its top, with a stuffing box in the center, for the pump rod to work through, and also discharge valves x x in that cover, opening upward, in order that the down stroke of the solid piston in that pump barrel W, may cause the cold water to rise up through the suction valve p, and fill the upper part of that barrel W, and then, that the succeeding upstroke of the same solid piston may cause the suction valve p, to close, and may then lift the water contained in the upper part of the barrel W, above its piston into the cold water cistern M, through the said valves x, x. The pump barrel, W, thus being made to serve the purpose of a cold water pump and at the same time to act as one of the three barrels of the continual air pump. Note the other two barrels U and V thereof, are open at top, and all three are immersed beneath the cold water in the cistern M.

In Fig. 8 only one of the three pump rods which are worked by the triple crank is shown. Fig. 8, also shows the frame work marked r with its horizontal connecting bars, wherein the triple crank and governor are supported.

L, Figs. 1 and 6, is the injection pipe, and regulating cock for admitting a continual jet of cold water into the condenser K, in order to cool and condense the steam therein, whenever the engine is at work, as is usual in condensing steam engines; but note instead of so admitting an injection, the condenser K may be constructed so as to cool and condense the steam within the condenser, by application of external cold according to the mode well known for that purpose, and practised in some steam engines.

The mode of working this engine is as follows: The steam to work it is conveyed through the pipe H, to the throttle valve I from an ordinary steam boiler, or in some cases H may be part of the eduction pipe of an ordinary condensing steam engine which eduction pipe conveys the waste steam away from the cylinder of that engine to its condenser. Or in other cases H may be part of the eduction pipe of a common high pressure engine which usually blows away its waste steam through that eduction pipe, into the open air; but in either of the two latter cases the pipe H, will conduct such waste steam into our new engine in order to work the same. By the throttle valve I, the steam is admitted through the induction aperture H′, and it issues therefrom with force and rapidity into the space within the box E so as to impinge directly upon the vanes, at the circumference of the revolving wheel in order to turn that wheel around, but at first it will only be turned slowly, because of the air wherewith the box E is at first filled, but the entrance of the steam therein, drives out part of that air through the condenser K, and through the discharge valves u v and w of the air pumps or else through what is termed a blow valve if the condenser K is provided with such a valve as is often the case in ordinary condensing steam engines, and by degrees as the motion of the wheel sets the air pumps to work they soon draw out all the remaining air, and the injection cock being opened to admit a constant stream of cold water, into the condenser K (or otherwise by the external application of cold water) the steam which goes down into the condenser is condensed, and the box E becomes exhausted, and is kept so, by the continual cooling of the cold water, and by the action of the air pumps, and then the steam issuing with great force, and velocity from the aperture H′ into the exhausted space within the box E impinges violently against those vanes of the revolving wheel, which are opposite to that aperture the steam acting in the direct line from that orifice H′ to the line of the eduction pipe J, that line being nearly a tangent to the rim of the wheel so as to turn the same around, with great rapidity and force. The sides and circumference of the rim of the wheel being very closely adapted to that portion of the interior of the box E which is between the entrance passage H′ and eduction pipe J, (although the wheel does not actually touch the box) little or no steam will spread into the interior of the box E, and any little steam which may so spread, will be exhausted by the condenser, so that the wheel is caused to work as nearly *in vacuo* as is required for the purpose of rendering its motion very free and unresisted except by the work that the engine is appointed to perform. The degree of exhaustion which is kept up within the box E being nearly the same as is usual in the condensers of ordinary condensing steam engines.

Having now described our new rotary engine, we the said James Jamieson Cordes, and Edward Locke, do hereby declare that the new invention whereof the exclusive use to be granted to us by the said Letters Patent consists in—

The new rotary engine hereinbefore described the distinguishing character of which is that a revolving wheel is inclosed within an exhausted box or case and impelled and turned rapidly around by a continual current of steam entering with force and velocity into the exhausted space wherein the wheel is situated, and impinging against suitable vanes, at the circumference of such wheel, in the direction of a tangent to that circumference. The said box being

connected by an eduction pipe with a condenser which is kept cool by means of cold water, so as to exhaust the steam from the box, at that part of the circumference of the said box, where the steam ceases to act against the vanes; and that condenser having an air pump capable of continual action in order to keep up the exhaustion within the condenser.

J. J. CORDES.
EDWD. LOCKE.

Witnesses:
JAMES HOLLAND,
THOMAS MACKAY.