(No Model.)

2 Sheets—Sheet 1.

E. SCOTT.

STEAM ENGINE.

No. 422,980. Patented Mar. 11, 1890.

Fig. 1.

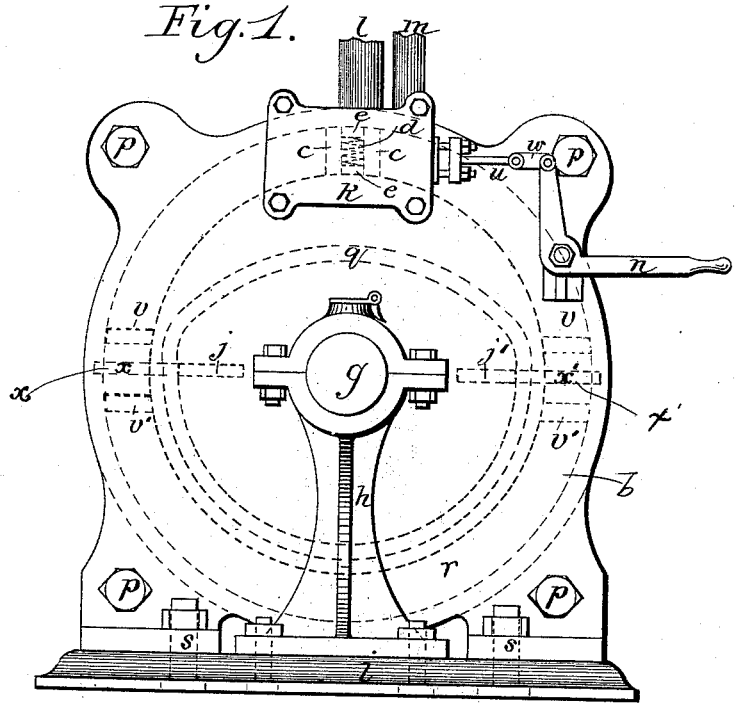
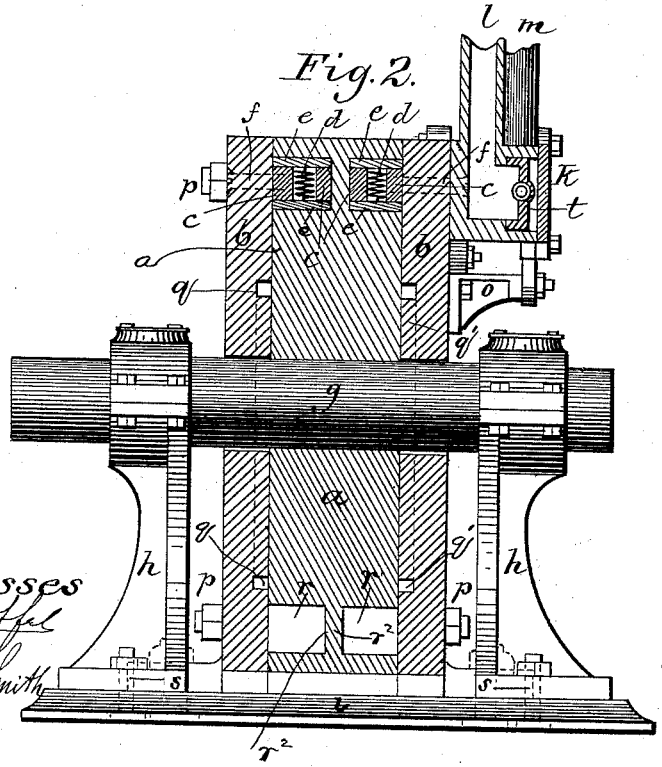


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

E. SCOTT.

STEAM ENGINE.

No. 422,980. Patented Mar. 11, 1890.

Fig. 3.

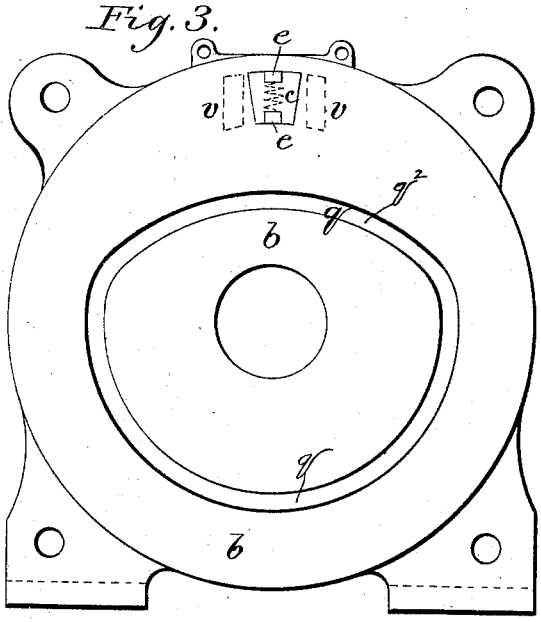


Fig. 5.

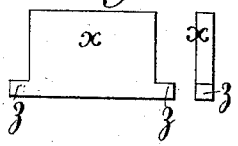
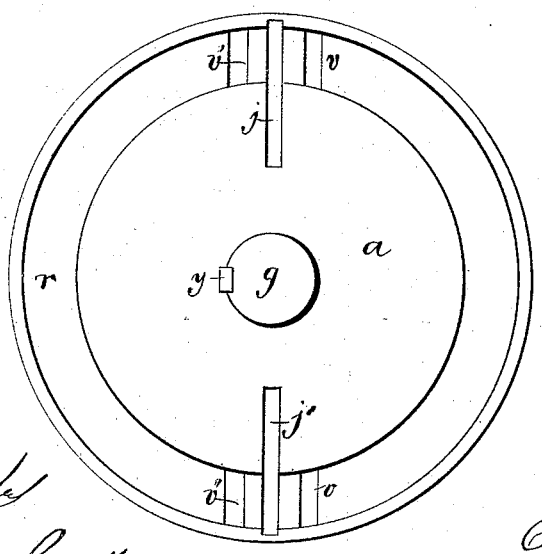


Fig 5-a

Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWARD SCOTT, OF PITTSBURG, PENNSYLVANIA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 422,980, dated March 11, 1890.

Application filed May 2, 1889. Serial No. 309,399. (No model.)

To all whom it may concern:

Be it known that I, EDWARD SCOTT, a subject of the Queen of Great Britain, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Steam-Engines; and I do hereby declare the following to be a full, clear, and exact specification of the same, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a side elevation of my improved rotary steam-engine. Fig. 2 is a vertical transverse sectional view of the same. Fig. 3 is a face view of one of the face-plates. Fig. 4 is a similar view of the rotary cylinder. Figs. 5 and 5ª are views in side and end elevation, respectively, of one of the reciprocating pistons.

My invention relates more especially to improvements in that class of rotary engines in which a rotary cylinder is arranged concentric with the shell of the engine and reciprocating pistons are carried with said rotary cylinder, against which the steam exerts its pressure when said pistons are extended or projected into the steamway, as will appear more fully hereinafter; and the object of my invention is to provide an improved engine of the class stated which is equally steam-balanced, so that it has equal power the full revolution, will start with equal power at all points, and reduces the friction and wear on the journals, which shall be simple, cheap, and durable in construction, efficient and reliable in operation, and economical in the use of steam, and can be adapted to different work—as, for instance, as a circulating pump when another prime motor or engine is employed to drive the same.

With these objects in view, and such others as pertain to my invention, it consists of a rotary cylinder or solid disk which is fitted between lateral face-plates that are firmly bolted to a bed-plate and drawn laterally upon the faces of the rotary disk or cylinder, a shaft being secured centrally to the disk or cylinder and journaled in stationary pillow-blocks located exteriorly of the face-plates, through which said shaft passes. In the exposed lateral faces of the rotary cylinder or disk, near the periphery thereof, are formed two concentric steam-grooves, one groove being formed in one face of the cylinder and the other groove being formed in the opposite face of said cylinder, the grooves being separated by an annular rib that extends continuously around the cylinder, and at diametrically-opposite points in the periphery of this cylinder radial slots are formed, in which are fitted reciprocating pistons that are projected into the steam-grooves to form a head against which the steam exerts its pressure to rotate the cylinder or disk.

In order to balance the cylinder or disk equally, the steam-grooves on opposite faces of the cylinder are connected by transverse steamways, four of which are provided, two being located on each side of the pistons in order to allow one-half of both steam-grooves to communicate with each other, and thereby secure an equal pressure on both face-plates. In each of the steam-grooves is fitted a fixed abutment, each of which bears laterally against one face of the annular rim that separates the steam-grooves and one of the face-plates, and each abutment has a metallic spring-pressed packing that normally presses against the upper and lower sides or faces of the steam-groove; and in order to enable the pistons to clear the abutments in the steam grooves or passages, said pistons are automatically withdrawn into the radial slots of the cylinder, out of the steam grooves or passages, when the pistons approach the abutments, a cam-groove being formed in the face-plates, in which grooves ride pins on the ends of the pistons. Steam is supplied to and exhausted from the annular steam-passages of the rotary cylinder by an ordinary steam-chest, in which a throttle-valve reciprocates that can be controlled by a lever which is connected thereto.

To enable others to understand and practice my invention, I will now proceed to a detailed description thereof in connection with the accompanying drawings, in which like letters of reference denote corresponding parts in all the figures of the drawings.

The letter *a* designates the rotary cylinder, which is made in the form of a flat solid disk, and this cylinder or disk is arranged concen-

tric between two face-plates *b b*, between which said cylinder is free to rotate on its axis. Through the center of the cylinder and face-plates passes a horizontal shaft *g*, to which the cylinder is rigidly fixed by a key or spline, and this shaft is journaled in pillow-blocks or bearings *h h*, which are arranged outside of the face-plates and rigidly secured, as by bolts, to a horizontal bed-plate *i*. These face-plates *b b* are drawn upon the lateral faces of the rotary cylinder by transverse bolts *p p*, which pass from one face-plate to the other outside of the periphery of the rotary cylinder, and said face-plates are rigidly secured to the bed-plate *i*, as by bolts *s*.

In each lateral face of the rotary cylinder or disk is formed a steam groove or passage *r r'*, which grooves extend quite deep, nearly half-way into the cylinder or disk, (see Fig. 2,) but are separated from one another by means of an annular ring or flange r^2, which is made integral with the cylinder or disk, said steam grooves or passages being located near the periphery of the cylinder and being made concentric with its axis and periphery. (See Fig. 4.) At diametrically-opposite points in the cylinder or disk, and near the periphery of the same, I have provided radial piston-slots *j j'*, which are arranged across the annular concentric steam grooves or ways and extend into the body of the cylinder or disk for a distance equal or slightly greater than the width of said steam grooves or passages, and in these radial slots are fitted reciprocating pistons *x x'*, which are carried with the rotary cylinder in its revolutions, but are free to move edgewise in the radial slots, for a purpose which will hereinafter appear. In each of the annular concentric steam grooves or ways is fitted a fixed abutment *c c*, which is located in the upper part of the cylinder or disk, and each abutment is arranged to bear against one face of the annular dividing flange or ring r^2 and the inner face of one of the face-plates, said abutments having metallic packings *e*, which are normally forced away from each other and into contact with the upper and lower faces of the steam grooves or passages *r r'* by means of an interposed coiled spring *d*, whereby a steam-tight joint is secured between the abutments, the rotary cylinder, and its fixed face-plates. The abutments are held in rigid stationary positions by means of bolts *f*, the bolts for one abutment or box being placed in position before the steam-chest is applied, while the bolts for the other abutment can be secured in place at any time before the engine is ready for use.

In order to prevent the reciprocating pistons which are carried by the rotary cylinder from striking the fixed abutments as they are carried around with the cylinder, which abutments are arranged in the annular steam passages or grooves in the path of said pistons, I have provided mechanism for automatically and positively withdrawing the pistons in the radial slots *j j'* as said pistons approach the abutments or pressure-boxes. In the opposing faces of the face-plates I have formed two grooves *q q'*, one half of which are arranged concentric with the rotary cylinder on the lower side of the face-plates; but the upper half of these grooves are deflected, as at q^2, to form a cam track or surface, by which the pistons are withdrawn from the steam grooves or passages and depressed into the radial slots as they approach the fixed abutments *c c*, the ends of said pistons being provided with projections or studs *z z*, which are fitted to ride easily in the grooves *q q'* as the cylinder rotates.

In order to secure an equilibrium of pressure on both sides of the rotary cylinder and against the two face-plates, so as to provide a rotary cylinder which is equally balanced at all points, I have provided four steamways *v v'*, which are formed in the annular rim or flange r^2, and connect the two steam grooves or passages *r r'*. Two of these steamways *v v* are located on one side of the radial slots *j j'* and the pistons, and two ways are likewise arranged on the other side of said pistons, the cylinder being thus practically divided into two equal parts, each part of which consists of two semicircular passages which are in communication at their ends, one half of the cylinder during a part of each revolution being in communication with the exhaust of the engine, while in the other half the steam is exerting its expansive force against the pistons to rotate said cylinder, while during the remaining part or half of each revolution that part of the cylinder which previously was in communication with the exhaust is filled with live steam, which acts to rotate the cylinder, and the part of the cylinder which was previously filled with live steam is now in communication with the exhaust of the engine.

By the described arrangement of steam passages or grooves, the steamways, the pistons, and abutments I am enabled to provide a rotary engine in which the rotary cylinder or disk is equally balanced, so that it will exert uniform power during each revolution and will start with equal force at all points of its circumference, the balanced cylinder also operating with less jar and wear on the journals. The parts are simple, strong, and durable in construction, and the engine as a whole is exceedingly efficient and reliable in operation and economical in the use of steam.

Steam is supplied in the ordinary way to the steam passages or grooves through the usual steam-chest *k*, which is applied laterally to one of the face-plates, and this chest has the supply-pipe *m*, the exhaust-pipe *l*, and a slide-valve *t*, all of which are of the ordinary pattern; and as no novelty is herein claimed thereon I have not deemed it necessary to more fully describe the construction and operation of said parts. The slide-valve can be started or reversed by means of a

lever *n*, which is fulcrumed on a fixed bracket *o* and connected to the valve-rod by a link *w*. (See Fig. 1.)

The operation and advantages of my invention will be readily understood and appreciated by those skilled in the art to which it relates from the foregoing description, taken in connection with the drawings, and I do not therefore deem it necessary to repeat the same here.

I am aware that changes in the form and proportion of parts and details of construction can be made without departing from the spirit or sacrificing the advantages of my invention, and I would therefore have it understood that I do not confine myself strictly to the exact details of construction herein shown and described as an embodiment of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rotary engine, the combination of a rotary cylinder or disk having the annular concentric steam grooves or passages, which are formed in the lateral faces of said cylinder and communicate with each other at diametrically-opposite points by the transverse steamways, substantially as described, the pistons carried by the cylinder at its periphery and each located between two adjoining transverse steamways, the fixed abutments arranged in the annular steam grooves or passages, and the fixed face-plates, substantially as and for the purpose described.

2. In a rotary engine, the combination of a rotary cylinder having the annular concentric steam grooves or passages, which communicate with each other at diametrically-opposite points at the periphery of the cylinder, and the radial piston-slots located between two adjoining steamways, as described, the face-plates having the grooves *q q'*, the pistons fitted in the radial slots of the cylinder and having the pins which ride in the grooves of the face-plates, and the fixed abutments located in the annular concentric grooves or passages and having the spring-pressed packings, which are normally forced against the upper and lower faces or sides of said steam-grooves, substantially as described.

In testimony whereof I hereuuto set my hand in the presence of two witnesses.

EDWARD SCOTT.

Witnesses:

JACOB SOFFEL,

WILLIAM BELL SMITH.