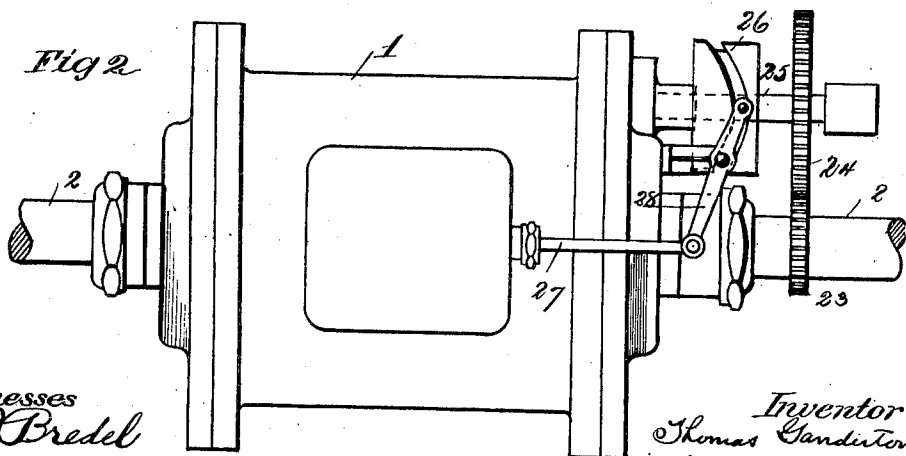
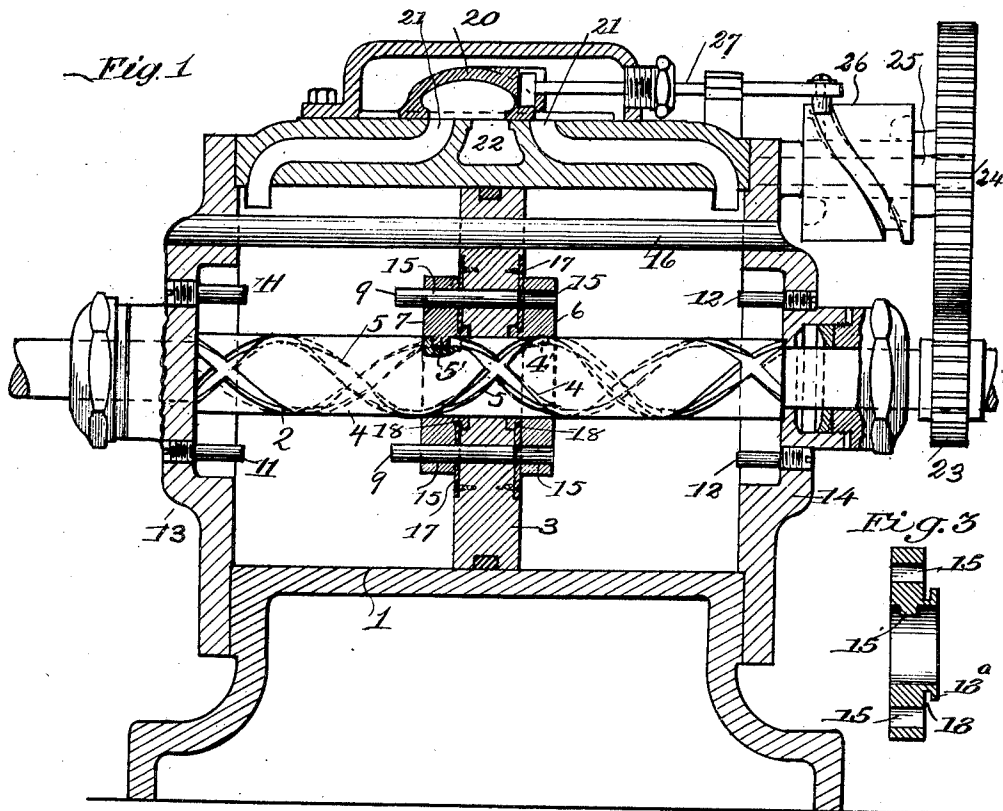


T. GANDERTON.
STEAM ENGINE.
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1,089,408.

Patented Mar. 10, 1914.



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UNITED STATES PATENT OFFICE.

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STEAM-ENGINE.

1,089,408.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THOMAS GANDERTON, a citizen of the United States, and resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Steam-Engines, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The objects of the invention are to provide an improved form of steam actuated engine, in which a reciprocating piston operates to rotate a screw threaded shaft, having reversely formed spiral grooves therein.

In this invention movement is communicated from the piston to the shaft by means of nuts which are alternately rotatable and rotatably fixed in the piston and engage the oppositely directed spiral grooves in the shaft, and the device is provided with positive means for alternately engaging said nuts with the piston and alternately releasing the same whereby each nut in turn provides means for rotating the shaft as the piston reciprocates and the shaft is continuously rotated in one direction.

To accomplish these objects the invention comprises the combination and arrangement of parts and construction of details as hereinafter described, shown in the accompanying drawings and specifically pointed out in the claims.

In the accompanying drawings Figure 1 is a central vertical section of the device; Fig. 2 is a plan view of the engine, showing a different cam movement from that shown in Fig. 1; Fig. 3 is a longitudinal section of one of the nuts.

In these views 1 is a steam cylinder having a steam inlet port 21 at each end and a central exhaust port 22. 2 is a screw threaded shaft which is rotatable in the cylinder heads 13 and 14. 3 is a piston sleeved over and slidably movable on the shaft; 4 and 5 are the right and left spiral grooves in the shaft between the cylinder heads.

At each side of the piston is shown nuts such as 6 and 7. Each nut is attached to the piston to rotate freely by means of an annular shoulder 18^a providing a groove 18 in which a plate 17 is secured.

The nuts rotate freely on the shaft until operatively secured to the piston. To alter-

nately secure them from movement so they will rotate the shaft as the piston advances a sliding rod or sliding rods 9, 9 are inserted in the piston and are preferably long enough to pass through the piston and through the openings 15, 15 in one of the nuts and leave a portion projecting.

Each rod 9 is designed to connect only one nut at a time with the piston, the other nut at that time being free to rotate. 11, 11 are pins adjustably secured in the cylinder heads in alinement with the rods 9, 9, so that the rods will strike against the pins at each end of the piston stroke and will be pushed backward and forward thereby. Each nut may have a number of openings 15 therein annularly arranged so that the pins 9, 9 will always enter them.

To prevent the piston from rotating a guide rod 16 may pass through it into the cylinder heads.

In Fig. 1 the steam is shown admitted through an ordinary slide valve 20 through steam ports 21, 21 and exhausted at the port 22. The valve is operatively connected with the shaft so that the movements of the shaft and valve will be suitably timed relative to each other. Mechanism for accomplishing this coöperation of parts is shown in both of the figures. In Fig. 1 a spur gear 23 on the piston shaft drives a similar gear 24 upon a counter shaft 25 and a cam 26 on this shaft operates the valve stem 27. The relative throw of valve and the period of its operation are readily controlled by the cam and the number of revolutions of the shaft to the piston and valve strokes can be controlled by the number of turns of the spiral grooves and relative sizes of the gears.

In Fig. 2 the cam movement is modified and the valve stem is operated by means of a rock arm 28. Any convenient mechanism for the purpose of operating the engine valve or valves may be employed without departing from the scope of the claims.

In Fig. 3 the construction of one of the nuts is shown.

The operation of the device may be described as follows: The steam entering one end of the cylinder as at the right will move the piston toward the opposite or left end from which the steam is being exhausted. The rods 9, 9 are pushed forward and will then operatively connect the piston with the disk nut 7 but do not enter the disk nut 6

and since neither piston or nut 7 can revolve the lug on the nut 7, will traverse the channel 4 and rotate the shaft to the left. The disk nut 6 will then revolve freely with the shaft. When the piston arrives at the limit of its stroke in that direction the rods 9, 9 will strike the pins or studs 11, 11 which project from the head 13, and will be driven into the piston and into the openings 15, 15 in the opposite disk nut 6. The rods 9, 9 are driven sufficiently far into the piston by the action of the pins 11, 11 to release the rods 9, 9, entirely from the disk nut 7. At this time the valve 20 is shifted and the steam then enters behind the piston and drives it to the right. The disk nut 6 is then operatively connected with the piston and will rotate the shaft until the rods 9 are pushed back by encountering the pins 12 and the disk nut 7 is pulled along meanwhile by the piston and is then free to rotate freely on the shaft. This action is constantly repeated. In this manner the nuts are always in engagement with the shaft but are alternately connected in an operative manner with the piston by means of the rods 9, 9. They are always attached to the piston to revolve therein by means of the shoulders 18^a and plates 17, 17. The shaft in rotating operates the valve by means of the cam and gearing hereinbefore mentioned to reverse the movements of the piston at the right moment.

Having described the invention what I claim as new and desire to secure by Letters Patent is:

1. In a steam engine, a cylinder and piston shaft therefor, said piston shaft being provided with right and left spiral grooves, a piston slidably movable on said shaft, a disk nut on each side of said piston, each nut rotatably secured thereto, one nut engaging a right spiral groove and the other nut engaging a left spiral groove in said shaft, a rod slidably mounted in said piston and adapted to engage said piston with one of the said disk nuts and simultaneously to release the other nut when going in one direction, and to reverse said movement when going in the opposite direction, means for operating said rod as said piston nears the respective limits of its stroke, to release the nut it is engaging and to engage the other one, and means for alternately admitting steam to opposite ends of said cylinder, said means operatively connected with said piston shaft.

2. In a steam engine, a cylinder, a piston shaft therein, a reciprocating piston slidably mounted on said shaft, said piston

shaft being provided with right and left spiral grooves, rods slidably mounted in said piston, a nut on each side of said piston rotatably connected therewith, said nuts provided with openings registering with said rods, said rods of a length adapted to connect with said piston operatively with one disk nut at a time and pins projecting inwardly from the cylinder head, adapted to engage in turn with said rods, to push them out of one nut and into engagement with the other nut and alternately reverse said movement as said piston reciprocates.

3. In a steam engine, in combination, a cylinder, having steam ports and a valve, a piston reciprocable therein, a shaft on which said piston moves, said shaft being provided with right and left spiral grooves, a nut on each side of said piston means for rotatably connecting said piston with said disk nuts, rods inserted in said piston and adapted to alternately connect said piston with said nuts, adjustable pins in the cylinder heads in alinement with said rods and adapted to alternately engage said rods in said piston as said piston reciprocates, means for preventing the piston from rotating, a shaft adjacent to the engine shaft gearing operatively connecting said shafts and a cam on the adjacent shaft, said cam operatively connected with said valve.

4. The combination with the reciprocating piston and cylinder of a steam engine, of a shaft passing through said piston and cylinder, said shaft being provided with right and left spiral grooves, a disk sleeved on said shaft on each side of said piston, an annular extension on each disk extending into said piston, said extension having an annular groove, a plate on each side of the piston, said plate engaging one of said grooves, a lug on each disk engaging one of said spiral grooves, a rod slidably movable in said piston, adapted to alternately connect said piston in an operative manner with said disks and when so connected to prevent them from turning, and a pin longitudinally projecting from each cylinder head and adapted to engage alternate ends of said rod at the ends of said piston stroke, to release one disk from the piston and to operatively connect the other disk therewith.

In testimony whereof, I hereunto set my hand this 29th day of November, 1910.

THOMAS GANDERTON.

In presence of —

WM. M. MONROE,
GEO. S. COLE.