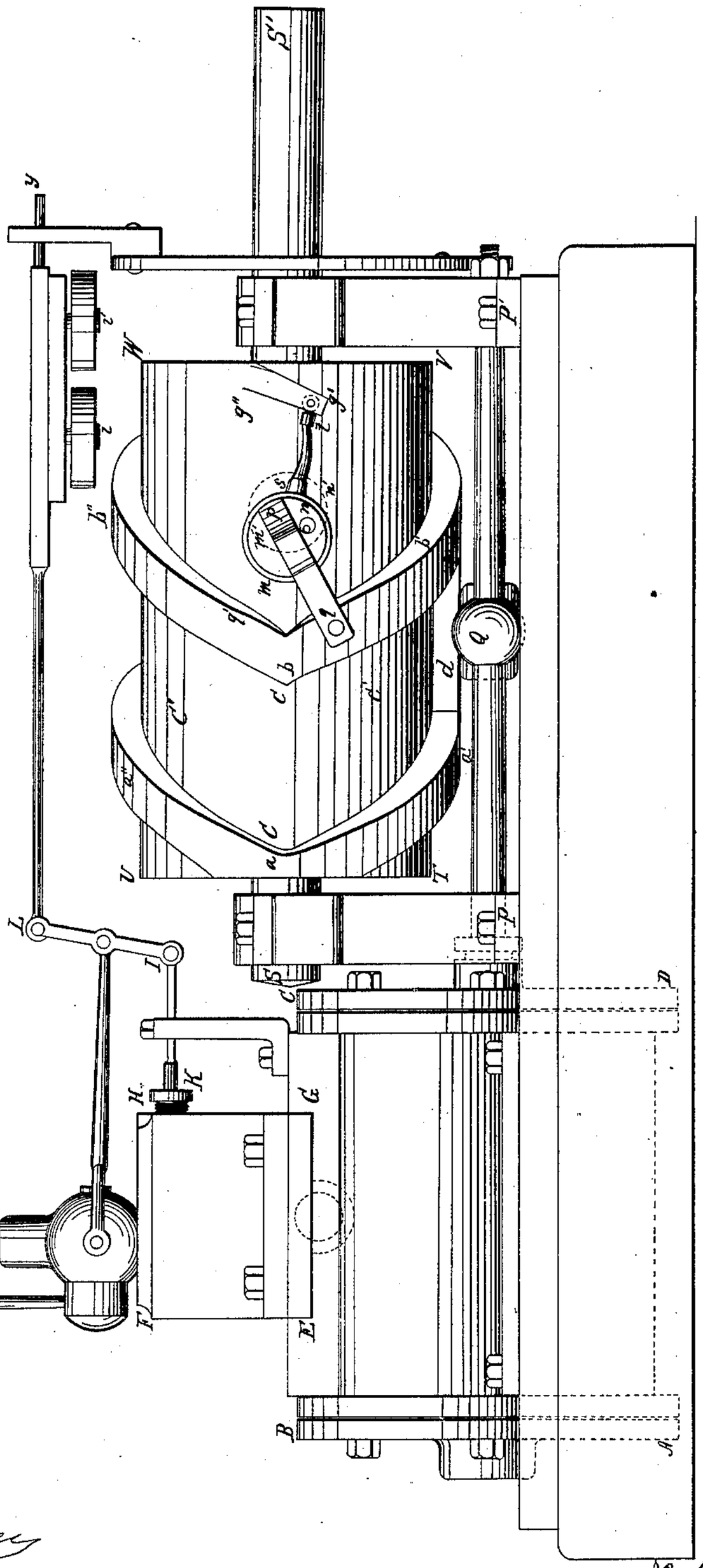
Sheet 1-2 Sheets.

N. Atherton,

Reciprocating Steam Engine,

No. 11,851, Patented Oct. 31, 1854.



Witnesses;
Alf. C. Gowey
Geo. Harding

Inventor;
Nathan Atherton

Sheet 2 - 2 Sheets.

N. Atherton,

Reciprocating Steam Engine,

No. 11,851. Patented Oct. 31, 1854.

Fig. 3.

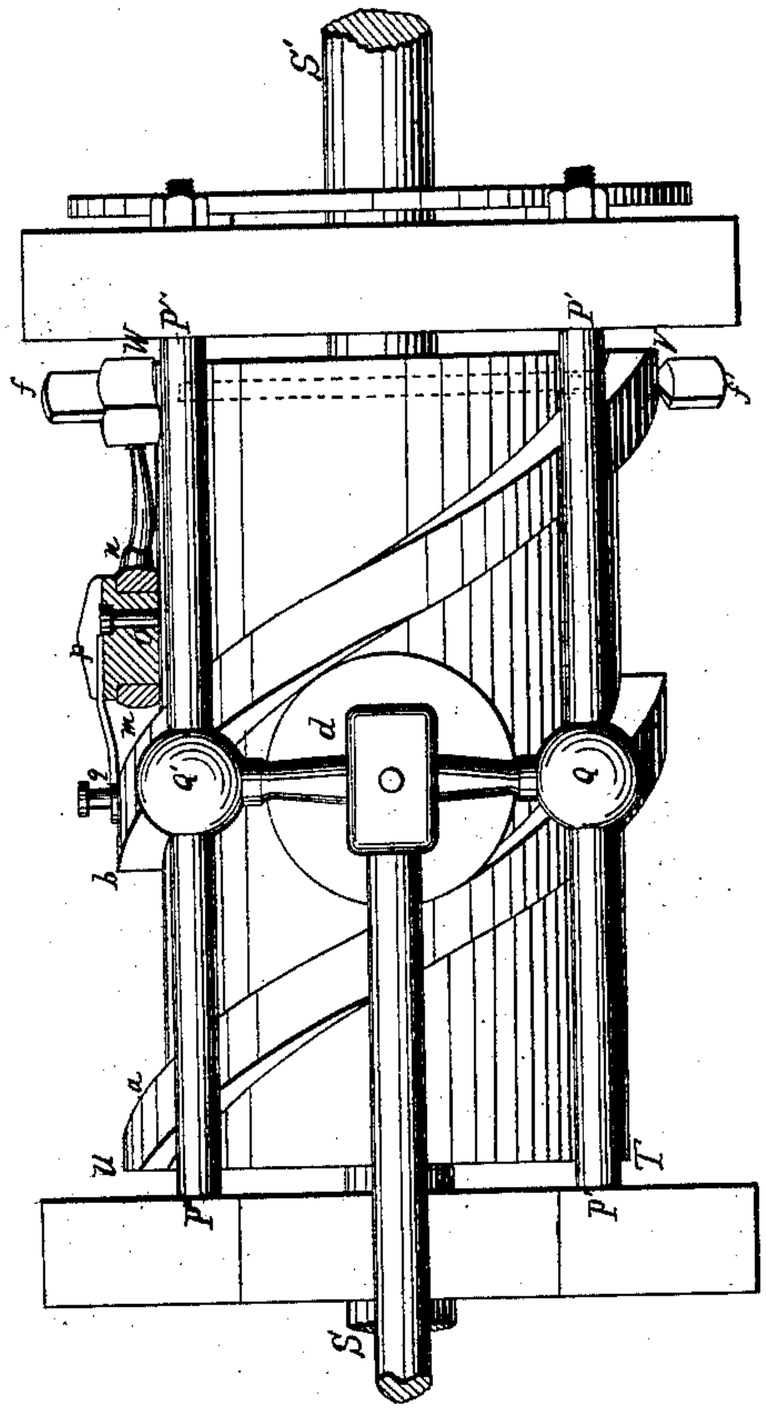


Fig. 5.

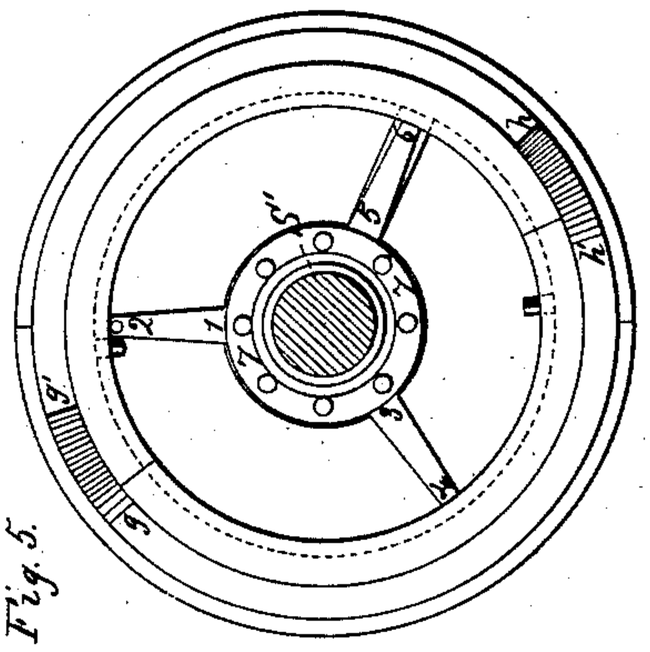


Fig. 2.

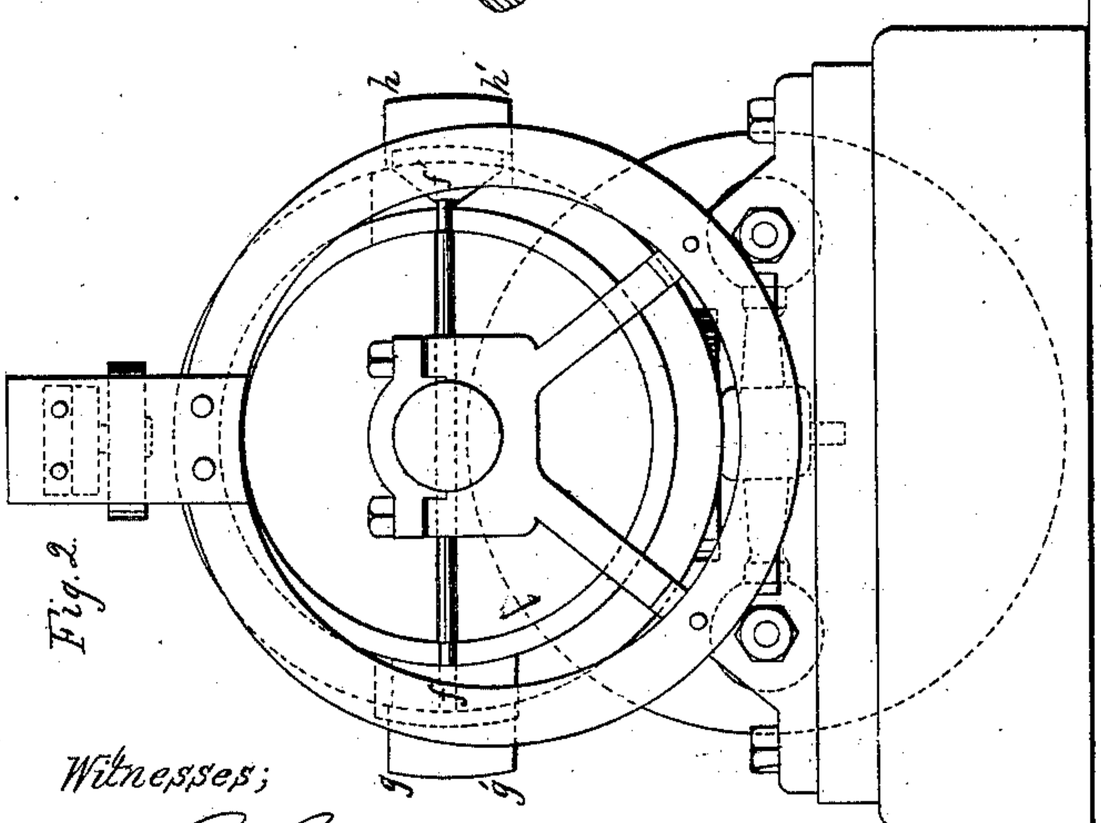
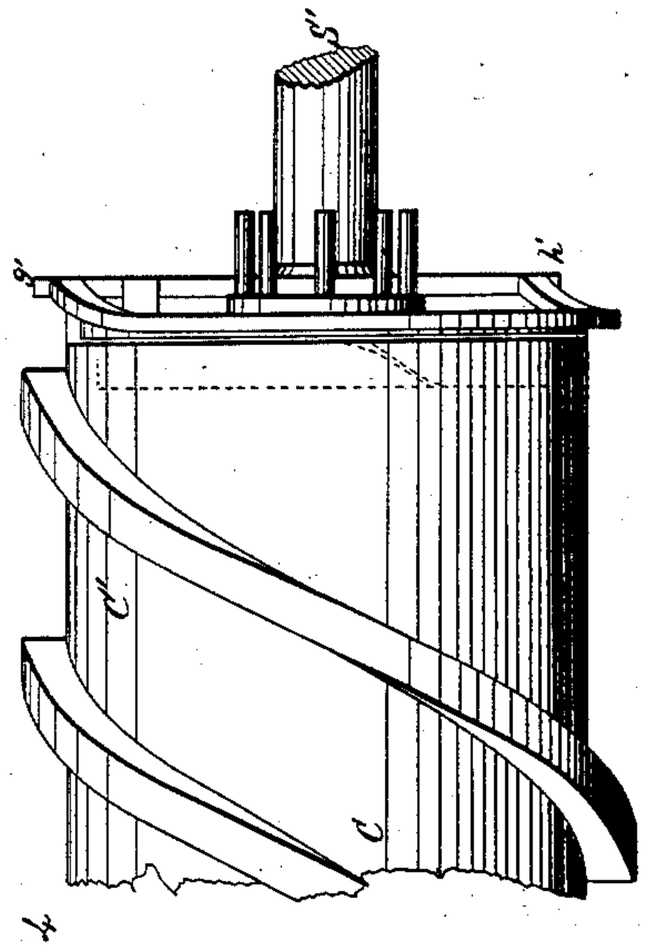


Fig. 4.



Witnesses;

Alf. C. Gowey

Inventor;

Nathan Atherton

UNITED STATES PATENT OFFICE.

NATHAN ATHERTON, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **11,851**, dated October 31, 1854.

To all whom it may concern:

Be it known that I, NATHAN ATHERTON, of the city of Philadelphia, and State of Pennsylvania, have invented a new and useful improvement in the construction of steam-engines, for converting the reciprocating motion into a rotary motion and for operating the slide-valves of the engine; and I do hereby declare that the following is a full description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a side view of a steam-engine and valves with my improved arrangement attached. Fig. 2 is an end view of the same. Fig. 3 is a view of the guides and driving-cylinder as seen from below. Fig. 4 is a side view of the detached part of Fig. 1, with a modified arrangement for working the slide-valves. Fig. 5 is an end view corresponding to Fig. 4.

To enable others skilled in the art to make and use my improvement, I will proceed to describe its construction and mode of operation.

A B C D, Fig. 1, represent the cylinder of the steam-engine.

E F G H represent the steam-chest containing the ordinary slide-valves.

I K is the valve-rod. I L is the rock-shaft.

P P′ and P″ P‴ are the guides on which the cross-head Q Q′ slides, Fig. 3.

d is a friction-roller placed upon the head of the piston-rod, which roller rolls in the grooves *c c′* and *c c″* as the piston moves backward and forward.

T U W V is the driving-cylinder mounted on the main shaft S S′. It is a hollow metallic drum of cast-iron or brass, and has two helical grooves, *c c′* and *c c″*, formed on its surface by the screw-like projections *a a′ a a″* and *b b′ b b″*. These grooves start at the line *c c* and extend around right and left in the directions *c c′* and *c c″* to a line of the drum diametrically opposite the point C of the line C C, forming a double inclined plane or screw, the pitch and diameter of which are in proportion to the length of the stroke of the piston.

g g′, Fig. 1, is a small inclined projection extending radially outward from the drum and supported at its center on a small rod or shaft which passes diametrically across the driving-drum. To the other extremity of the rod or shaft *f f′* an inclined projection, *h h′*, similar to *g g′*, is in like manner attached. The inclined projections *g g′* and *h h′* extend radially outward a short distance beyond the projection *b b′* and *b b″*. Two small friction-rollers, *i* and *i′*, are placed upon the sliding rod L Y in such a position that as the driving-cylinder revolves the inclined projections *g g′* and *h h′* will alternately press against the roller *i* and the roller *i′*, and thus at each half-revolution of the driving-cylinder the connecting-rod L Y is alternately forced backward and forward. Through the medium of the rock-shaft I L and the valve-rod K J the slide-valves are so acted upon that the steam shall be admitted behind the piston when the piston-head is at that end of the driving-cylinder nearest the engine, and vice versa.

If it be desired to reverse the direction of rotation of the driving-cylinder, then the projection *g g′* is made to revolve upon the small shaft *f f′*, so as to occupy the position *g″ g‴*, and instead of pressing upon the roller *i* it will press upon the roller *i′*. As the projection *h h′* is upon the same shaft, *f f′*, a corresponding change in its direction of inclination will take place, and thus the slide-valves will be so acted on that the direction of rotation of the driving-cylinder will be reversed. In order conveniently to revolve the shaft *f f′* and alter the relative position of *g g′* and *h h′*, these projections *g g′* and *h h′* are geared in the following manner: A circular metallic disk, *m n*, turns upon a fixed center at *o*. A lever, *p q*, projects from this disk. An arm, *s t*, connects the disk *m n* with the inclined projection *g g′*. When the lever *p q* is in the position indicated in Fig. 1, the projection *g g′* is in the position shown in that figure. By moving the lever *p q* into the position *p q′* the disk *m n* revolves on O as a center and occupies the position *m′ n′*, and the arm *t s* forces *g g′* into the position *g″ g‴*. As *h h′* is attached to the other extremity of the shaft *f f′*, the inclined projection *h h′* at the same time time undergoes a corresponding change in the direction of its inclination.

Figs. 4 and 5 exhibit a modified arrangement of the inclined projections *g g′* and *h h′*. In this modification the inclined projections *g g′* and *h h′* form part of a thick metallic rim. (Shown in Figs. 4 and 5.) This metallic rim is supported by spokes 1 2, 3 4, and 5 6, radiating

from a central hub, 7, which fits upon the main shaft S S′ and revolves with it. When it is desired to reverse the motion of the engine, the rim is to be turned half a turn in advance of the revolving drum, so as to bring the plane *h h′* into the position occupied by *g g′* and the plane *g g′* into the position occupied by *h h′*, and thus change the motion of the slide-valves and reverse the action of the engine.

Having thus described my improvement, I do not claim a driving-cylinder having screw-like grooves, in combination with a piston-rod, for the purpose of converting reciprocating into continuous rotary motion; but

What I do claim is—

The connection of such a cylinder with inclined projections, constructed and arranged substantially as herein described, for operating the valve-gear by motion taken directly from the cylinder, whereby the proper lead may be given to the steam, whether the cylinder be turning to the right or left, and the engine is rendered more convenient, compact, and durable than any heretofore known, in which the axis of the driving-shaft is parallel to that of the piston.

NATHAN ATHERTON.

Witnesses:

ALFRED C. GOWEN,

CHARLES D. FREEMAN.