(No Model.)

G. W. CUSHING.

REVERSE GEAR FOR STEAM ENGINES.

No. 357,308. Patented Feb. 8, 1887.

Fig. 2.

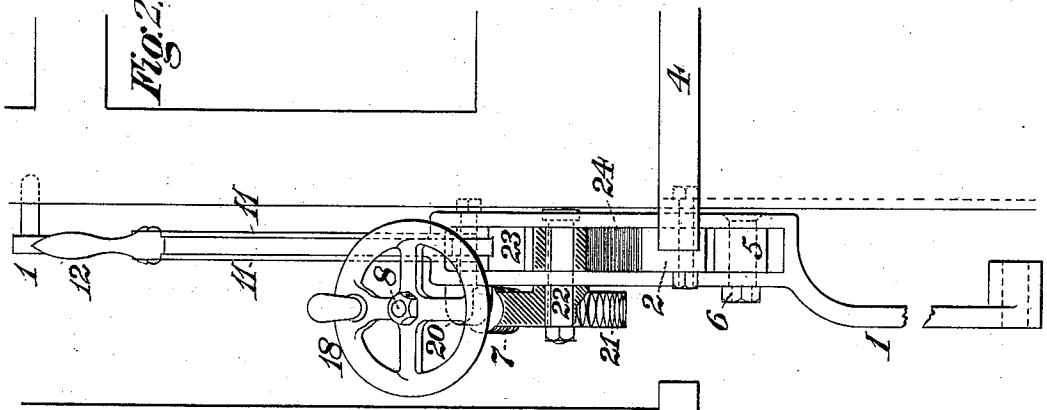
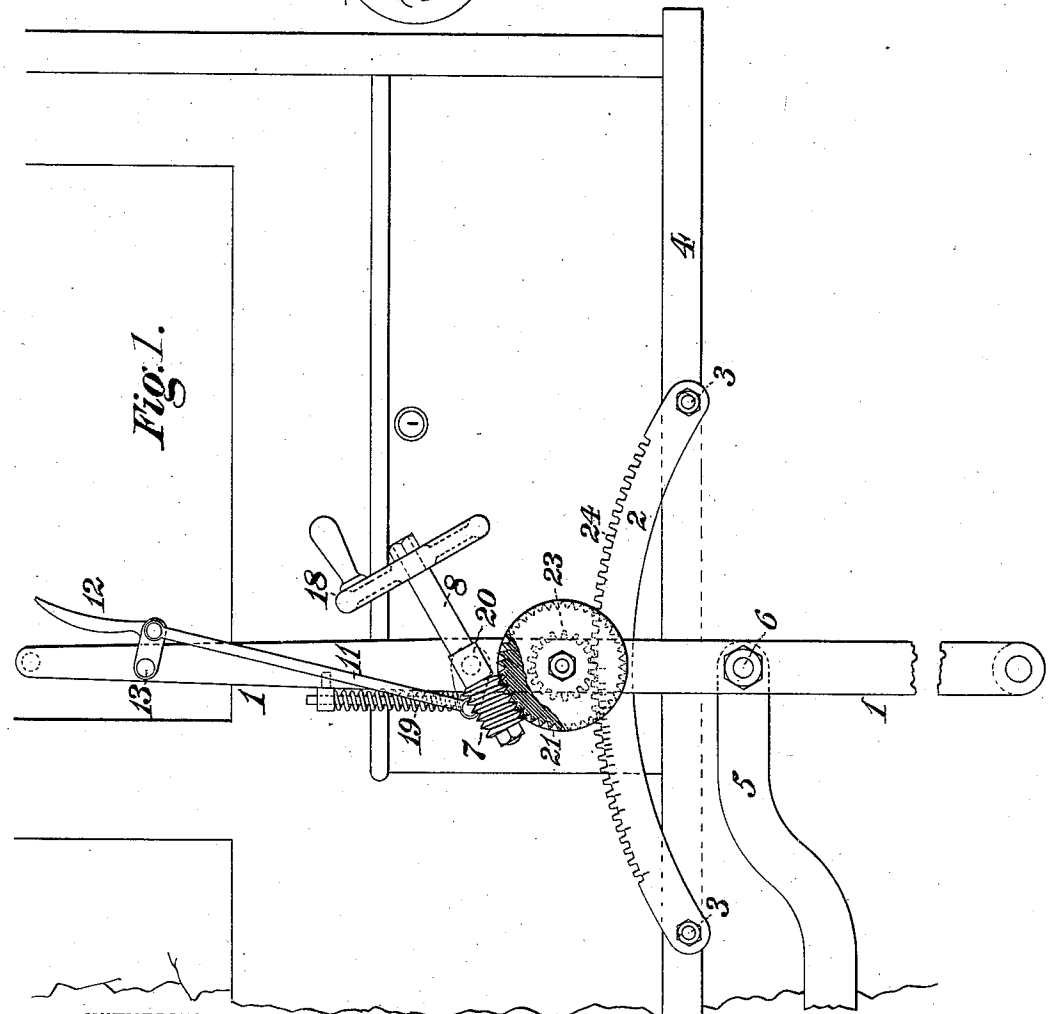


Fig. 1.



WITNESSES:

R. H. Whittlesey

C. M. Clarke

INVENTOR,

G. W. Cushing,

by J. Bowden Sons

Att'y.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

GEORGE W. CUSHING, OF ST. PAUL, MINNESOTA.

REVERSE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 357,308, dated February 8, 1887.

Application filed September 23, 1886. Serial No. 214,310. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. CUSHING, of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Reverse-Gears for Steam-Engines, of which improvements the following is a specification.

My invention, which is particularly designed for application in locomotive-engines, relates to mechanism for governing the reversal of the movement of the engine and the variation of the point of cut-off in either direction by changing as required the direction and degree of traverse of a steam-distribution valve or valves; and its object is to enable a close and accurate adjustment to be effected for any desired direction of movement and degree of expansion, as well as to firmly lock the parts in adjusted position with the capacity of ready and immediate variation therefrom in either direction as from time to time required.

To this end my invention, generally stated, consists in the combination of a reverse-lever adapted to effect the adjustment of a variable cut-off valve-gear, a fixed quadrant or abutment for the support of said lever in adjusted position, and helical gearing interposed between the lever and quadrant and adapted to effect the traverse of the lever over the quadrant and lock the lever at any desired point in its traverse.

The improvements claimed are hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a side view in elevation of a reverse-gear for locomotive-engines embodying my invention, and Fig. 2 an end view, partly in section, of the same.

My invention is herein shown as applied to a hand reverse and cut-off adjusting-gear of the standard type employed in locomotive-engines, the valves of which are ordinarily actuated by link-motions having either shifting or stationary links, but which is likewise adaptable to use with radial valve-gears, different constructions of which have to some extent been put in practice. The reverse-lever 1 is pivoted at its lower end to a suitable bearing on the side of the cab or on the foot-plate, and is forked to pass freely laterally along each side of a quadrant or segment, 2, which is secured at its ends by bolts 3 to the running-board 4 of the engine. A reverse-bar, 5, which is coupled by a pin, 6, to the reverse-lever below the quadrant 2, extends to a connection with an arm on a lifting or reverse shaft in the usual manner.

A worm, 7, is fixed upon a shaft, 8, which is inclined relatively to the reverse-lever 1, and is mounted in a bearing, 20, journaled transversely to the reverse-lever and coupled by links 11 to a thumb-latch, 12, pivoted by a pin, 13, to the reverse-lever near its upper end. The worm 7 engages a worm-wheel, 21, fixed upon a shaft, 22, journaled transversely on the reverse-lever and carrying a spur-pinion, 23, which engages a series of teeth, 24, forming a segment of a spur-gear upon the periphery of the quadrant 2. A spring, 19, bearing against an abutment on the front of the reverse-lever and against the worm-shaft bearing 20, maintains the worm in gear with the worm-wheel except when, for the purpose of moving the reverse-lever for a comparatively long traverse by the application of the hand to its upper end, the bearing 20 is swung upon its pivot by the thumb-latch 12 and links 11 sufficiently far to wholly disengage the worm from the teeth of the worm-wheel.

It will be seen that while the worm 7 remains in gear with the worm-wheel 21 and is not rotated, the reverse-lever 1 is securely locked in any desired position for head or back motion on the quadrant 2. When it is required to move the reverse-lever for a comparatively short distance, as to effect variations of the point of cut-off, rotation is imparted to the worm 7 by the hand-wheel 18, fixed on its shaft, the position of which is such that it can be readily and conveniently operated by the engineman, and the movement of the reverse-lever may thus be graduated to the minutest degree desired. For comparatively long traverse of the reverse-lever, as in reversal of the engine or movement from nearly full-throw in either direction to center of the quadrant, the worm is raised out of gear with the worm-wheel by the thumb-latch, and the reverse-lever manipulated by hand in the ordinary manner.

I am aware that screw reverse-gears in which the reverse-bar actuating the lifting-shaft arm is moved by a screw engaging a nut or nuts and rotated by a hand-wheel or by gearing rotating a worm-wheel which engages helical teeth

on a quadrant have been heretofore known and used, and I therefore disclaim, broadly, the application of helical gearing to a reverse-gear.

I claim as my invention and desire to secure by Letters Patent—

The combination of a reverse-lever, a toothed quadrant, a bearing journaled on the reverse-lever, a thumb-latch or shifting-lever pivoted to the reverse-lever and coupled to the bearing, a worm fixed upon a shaft mounted in the bearing, a worm-wheel fixed upon a shaft journaled on the reverse-lever, a spur-pinion fixed upon the worm-wheel shaft and engaging the teeth of the quadrant, and a spring which exerts tension upon the worm-shaft bearing to normally maintain the worm in gear with the worm-wheel, substantially as set forth.

GEORGE W. CUSHING.

Witnesses:
CHAS. E. CRAIG,
O. N. PARMELEE,