J. Cochrane,

Steam Cut-Off,

No. 4,002, Patented Apr. 16. 1845.

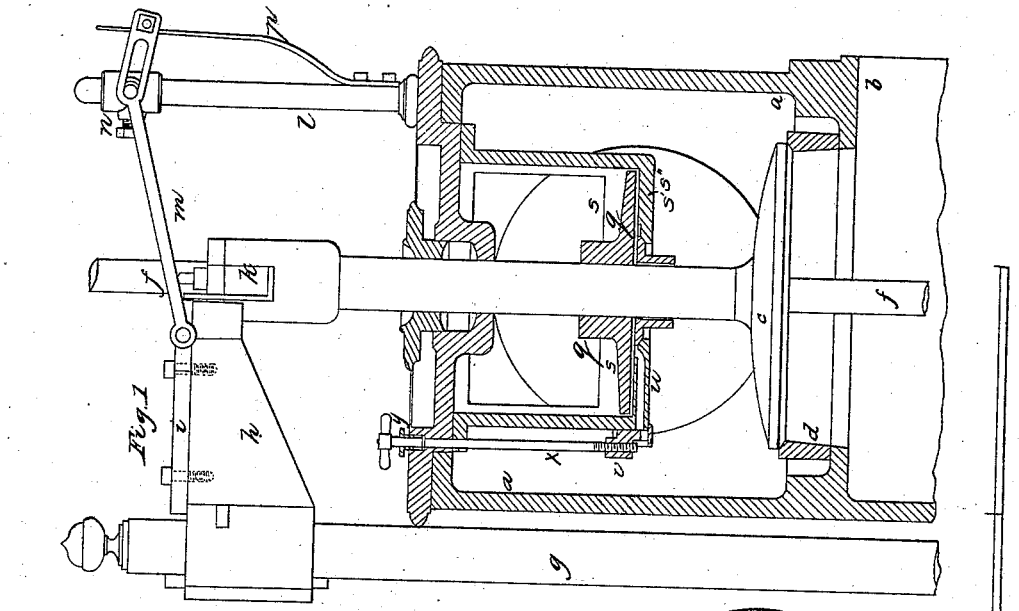

Fig. 1

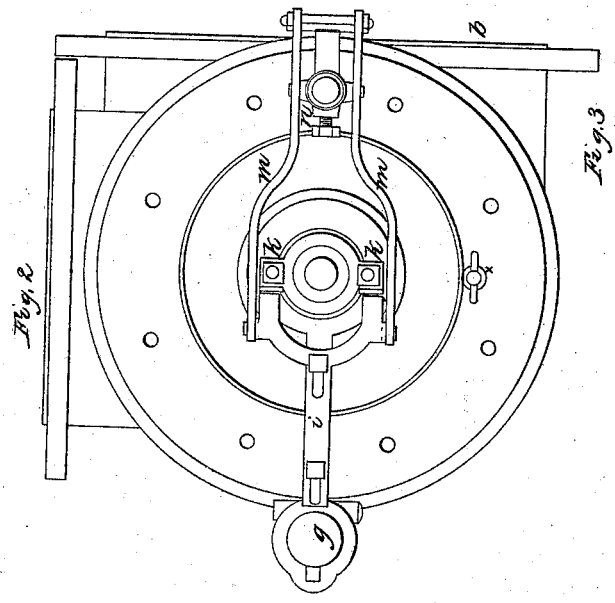

Fig. 2

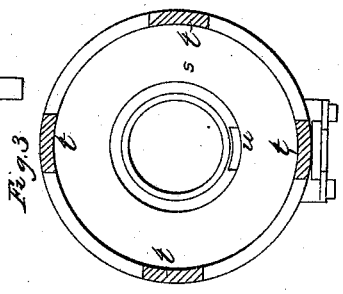

Fig. 3

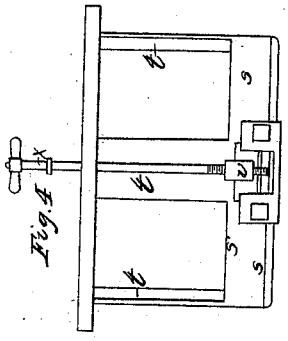

Fig. 4

UNITED STATES PATENT OFFICE.

JOHN COCHRANE, OF BALTIMORE, MARYLAND.

METHOD OF CHECKING THE MOTION OF DROP CUT-OFF VALVES OF STEAM-ENGINES.

Specification of Letters Patent No. 4,002, dated April 16, 1845.

To all whom it may concern:

Be it known that I, JOHN COCHRANE, of the city of Baltimore, in the State of Maryland, civil engineer, have invented certain new and useful Improvements in the manner of arranging the Apparatus Connected with the Drop Cut-Off Valves of Steam-Engines; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a side elevation, shown in part in section, and representing the several parts of the invention, and the mode of applying the same to the valves of a steam engine. Fig. 2 is a plan of the steam chest, the valve lifter, and the tripping apparatus. Fig. 3, a plan of the check chamber, and Fig. 4 an elevation of the same chamber.

The same letters refer to the same parts in all the figures.

a a, Fig. 1, is a vertical section of the upper part of a steam chest; *b*, the port for communicating with the steam cylinder; *c*, the steam valve; *d*, the seat of the steam valve; *f f* the stem of the exhaust valve, represented as broken off at top and bottom.

g is the lifting rod, to which is attached the arm *h*.

i is a sliding piece for coupling the lifting arm *h* with the stem of the steam valve *c*, said lifting arm catching under the projections *k*, *k* on the valve stem, when the lifting rod is let down to its place; this apparatus is operated by the radius rods *m*, *m* moving back and forth by means of the sliding piece *i* and the spring *p*.

n is a sliding piece on the standard *l* carrying the centers of motion for the radius rods *m*, *m*. This piece may be raised or lowered on the standard *l* to suit the quantity to be cut off and it is secured to its place by a set screw.

q is a piston that is attached to the stem of the steam valve *c*, and which may be about the same in area as the steam valve; this piston works in a check chamber *s s*. This chamber extends up from *s'* to *s''* and has a bottom *s''*; it is secured to its place by means of four arms *t*, *t*, the flanges *t'* being bolted to the under side of the bonnet of the steam chest; this piston should be accurately fitted to the check chamber, yet so as to pass up and down freely or without binding, and should come home to within about the one-eighth of an inch of the bottom of chamber.

The use of the piston and chamber is to destroy the descending force of the valve in the latter part of its passage by acting on and compressing the steam within the chamber *s*. To regulate the resistance of this compressed steam so that it may permit the valve to take its seat without striking or noise I use a slide *v* which is so applied to the passage *u* leading into the interior of the chamber that the opening *u* may be closed to any desired extent by means of the screw *w*, the handle of which passes through the stuffing box *y* in the bonnet of the steam chest; the descending velocity of the valve will of course be inversely as the size of this opening.

z is a valve in the bottom of the check chamber to admit steam when the piston is moving upward so as to prevent the formation of a vacuum in the chamber and a consequent loss of power in opening the valve.

By this arrangement of the parts the steam itself is made effectively to regulate the descent of the valve dispensing entirely with water, oil, or other nonelastic fluid.

What I claim as my invention in this machine and desire to secure by Letters Patent, is—

The manner of using the dasher or piston *q* that is attached to the stem *c*, of the steam valve, in combination with, and working within, a short cylindrical vessel, or check chamber *s*, *s*, which is open at top to allow a free passage to the steam in and out, and is furnished with an adjusting slide to regulate the escape of the steam; by which means the valve is made to take its seat without striking or noise.

JOHN COCHRANE.

Witnesses:

HUGH BALDERSTON,

JAMES COCHRANE.