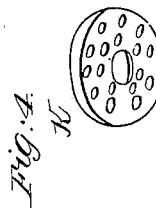
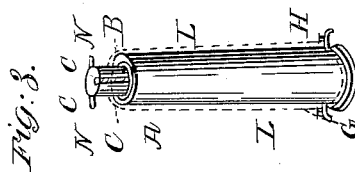
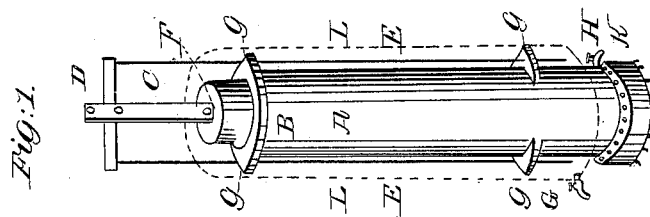
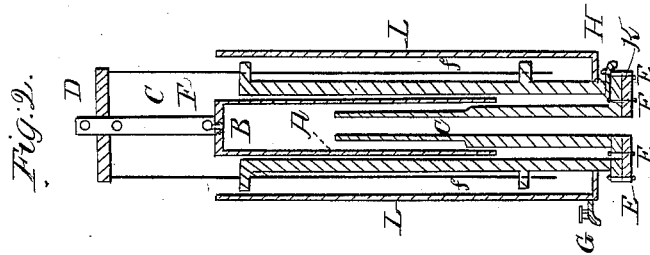


A. Patterson,
Reciprocating Steam Engine,
No. 1,091, *Patented Feb. 26, 1839.*



Witnesses:
 Geo. Park.
 Chester Patterson.

Inventor:
 A. Patterson.

UNITED STATES PATENT OFFICE.

ABRAM PATTERSON, OF RUSH, PENNSYLVANIA.

IMPROVED STEAM APPARATUS TO BE SUBSTITUTED FOR THE PISTONS AND CYLINDERS OF STEAM-ENGINES AND SAFETY-VALVES OF STEAM-BOILERS.

Specification forming part of Letters Patent No. 1,091, dated February 26, 1839.

To all whom it may concern:

Be it known that I, ABRAM PATTERSON, of Rush, in the county of Susquehanna and State of Pennsylvania, have invented a new and Improved Apparatus or Substitute for the Ordinary Steam-Cylinder, Piston, and Safety-Valve in a Steam-Engine; and I do hereby declare that the following is a full and exact description.

The nature of my invention consists of a series of concentric cylinders placed one within the other.

To construct this apparatus, I first make a cylinder with a projecting rim at the bottom, Figure 1, A, with four loops, two in the same line with each other on each side, set opposite each other, as at *g g g g*. Then I make another smaller cylinder, C, Fig. 2, which, like the former, has a projecting rim at the bottom, and surround it with another shorter cylinder, which slides tight onto the inner cylinder, C, forming a shoulder at *f*, and by that means form a wider space above it between the inner and outer cylinders for the purpose of containing sufficient mercurial packing to fill the increased circumference of the space between the piston and outer cylinder. I then make a bottom plate, K, Fig. 4, of a circular form equal in diameter to that of the outer cylinder, with an opening into the center of the inner cylinder, C, requisite to receive the steam and exhaustion pipes, with two sets of bolt-holes corresponding to those of the projecting rim of the outer and inner cylinders. Then I first bolt the smallest cylinder onto the bottom plate, then the largest cylinder may be bolted on. The bolts are shown at *E E E E*, Fig. 2. Close to the bottom a cock, H, Figs. 1, 2, and 3, is set for the purpose of drawing off the mercury used as packing between the cylinders, whenever necessary, from the cell or space between them. I then make another cylinder, B, Figs. 1 and 2, of such diameter as to be worked between the other two without touching either. This is furnished at the top with a head and piston-rod, *c*, Figs. 1 and 2. Near the bottom of the piston-rod a stop-cock, F, Figs. 1 and 2, communicates with the inside of the cylinder B, which I call the "cylindrical piston." Near the top of the piston-rod a strong bar, D, passes through it at right angles. Into the ends of

this bar two guides, *E E*, Fig. 1, are fastened. This apparatus I surround with another, as shown by the dotted lines *L*, Figs. 1 and 3, and double lines in the section, Fig. 2, which I call the "receiver," at the lower extremity of which a cock, G, is placed.

Another mode of making this apparatus is represented by Fig. 3. The larger cylinder A is made without loops. The inner cylinder in this form of the apparatus is like that shown at C, Fig. 2. The cylindrical piston B, Fig. 3, is provided with three or more longitudinal bars permanently attached to the outside of the said cylindrical piston in a line parallel with one through the center and extending the whole length of it. These bars or projections are of use to keep the piston steady in its proper situation, and are of such thickness as to press closely against the inner surface of the outer cylinder and barely to allow the piston a free motion with as little friction as possible. They are shown at *C C C*, Fig. 3. The interstices between these projections will be filled by the column of mercurial packing. The dotted lines round this form of the apparatus show a receiver like the former. The cock G at the bottom is inserted for the recovery of mercury from the receiver in case it should be driven into it. Close to the bottom a cock, H, is inserted which communicates with the cell or space between the cylinders C and A, in which the piston is placed.

This last-described modification is the most appropriate form for a safety-valve, for which purpose it is to be bolted permanently onto the boiler over an opening therein made for that purpose, and mercury sufficient to constitute a column equal to the force of steam intended to be sustained in the boiler (which may be graduated by the ordinary scale) is to be put into the cell between the outer and inner cylinders; then open the cock or screw at D in the top of the head of the cylindrical piston for the purpose of allowing the air to escape and let down the piston, which should not touch the bottom of the cell. Neither should the head of the cylindrical piston be allowed to touch the top of the inner cylinder, but should be supported by the projections of the head of the cylindrical piston, which are shown at *N N*, Fig. 3; then shut the cock or screw in the top and confine this valve. By

applying weight to the piston-rod C or piston-head, in any of the ordinary modes, when force of steam is applied beyond a certain pressure, provided for as above, the mercury will be driven over and thereby open a communication with the atmosphere and the interior of the valve by its escape.

The first-described modification of this apparatus is to be placed at any convenient distance from the boiler, so as to allow the admission of steam and exhaustion pipes at the bottom of plate K, Fig. 4, through its central opening into the inner cylinder, C, of this apparatus, and with its necessary stop-cocks may be permanently secured in its place by the fastenings usually employed to confine the ordinary cylinder and piston, and may then be used as a substitute for the same.

To adjust the cylindrical piston for use, the stop-cock F, Fig. 1, is to be opened for the escape of the air; then mercury sufficient to supply a column on the outside of the piston, indicating the force of steam to be employed, is to be put into the cell, when the cylindrical piston is to be let down into the mercury and

shut the cock, when steam being admitted under the piston it will be elevated, and when the steam is let off or condensed, or both, then the piston returns to its first position, from the top of which, or the piston-rod, motion may be obtained as a propelling power.

Either of the forms may be used as a safety-valve, as a steam-gage, or as a substitute for the ordinary steam-cylinder and piston. This apparatus may be worked either single or in connection with one or more.

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

1. The employment of an apparatus constructed as herein described as a substitute for a steam-cylinder and piston of a steam-engine and the safety-valve of steam-boilers.

2. The employment of mercury in the said apparatus for the double purpose of packing and steam-gage.

ABRAM PATTERSON.

Witnesses:

C. H. ATHBERGER,
CHESTER PATTERSON.