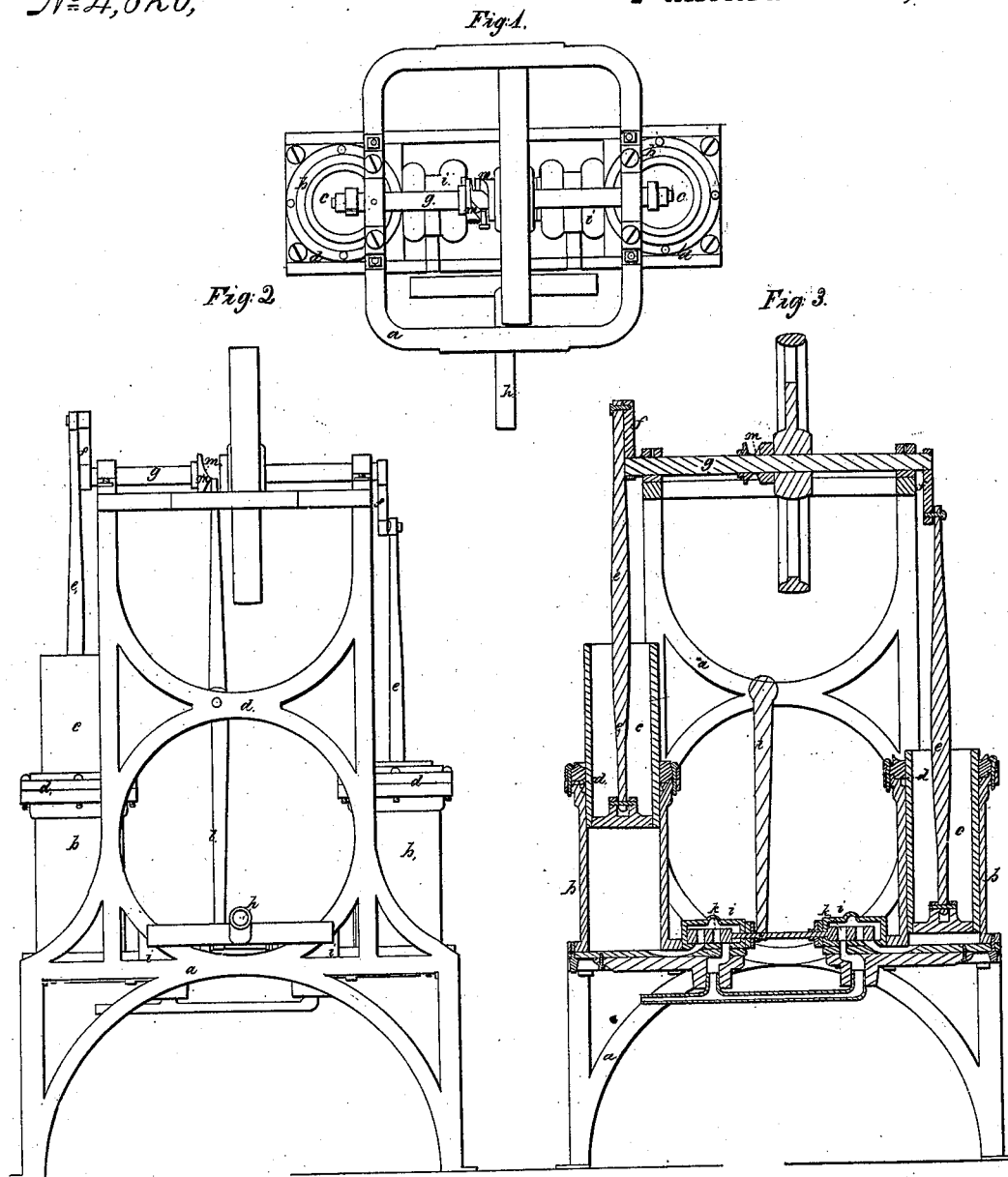


*N. N. Barlow,*  
*Reciprocating Steam Engine,*  
*No. 4,820, Patented Oct. 21, 1846.*



# UNITED STATES PATENT OFFICE.

NATHAN N. BARLOW, OF HOMER, NEW YORK.

## IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 4,820, dated October 21, 1846.

### *To all whom it may concern:*

Be it known that I, NATHAN N. BARLOW, of Homer, in the county of Cortland and State of New York, have invented new and useful Improvements in Steam-Engines; and I do declare that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the engine; Fig. 2, a front elevation, and Fig. 3 a vertical section, of the same.

The same letters indicate like parts in all the figures.

In the steam-engine as now constructed the piston must be accurately fitted to the cylinder and packed. The cylinder is then provided with a head or cover accurately fitted and bolted and provided with a stuffing-box around the piston-rod, and then the end of the piston-rod where it receives the connecting-rod is either provided with a sliding head working on ways or with a parallel motion, which are not only very expensive, but either of these methods occupy much room, for there must be between the upper end of the cylinder and the beam or other connection sufficient room for the length of piston and connecting-rods, which in many instances is a source of great inconvenience—as, for instance, in steamboats. Many of these objections I avoid, and render the engine cheaper and less liable to derangement by making the piston a long hollow cylinder, the outer diameter of which fits either accurately or loosely the inside of the steam-cylinder, the upper end of which is provided with a stuffing-box, which surrounds the hollow cylindrical piston that is therefore made of greater length than the steam-cylinder within which it works, thus avoiding the necessity of a packed piston. The inner end of this piston-cylinder is closed to form the piston-head, and to the inner surface of it is attached the connecting-rod which extends to the crank. By this arrangement the unequal wear of the piston and cylinder by the vibrations of the connecting-rod is avoided. The steam of course in this arrangement can act only in one direction, and therefore will be only single-act-

ing; but when it is desired to make a double-acting engine then two such single-acting engines are so arranged as to be connected together by a crank-shaft having two cranks on opposite sides of the axis, so that the moment one ceases to act the other commences, the valves alternately opening and closing the induction and eduction valves.

In the accompanying drawings, *a* represents the frame of the engine, and *b b* the two cylinders closed at bottom and open at top, and to the inside of these are fitted two other cylinders, *c c*, also closed at bottom and open at top, which take the place of the piston in the common engine. The outside of these cylinder-pistons *c c* is accurately turned, and the inside of the steam-cylinders *b b* may or may not be bored out to fit the pistons accurately, and their upper end is provided with stuffing-boxes and packing *d d*, in any desired manner, to fit the cylinder-pistons accurately and prevent the escape of steam. To the inside of the closed end of these cylinder-pistons are attached, by means of proper joints, the connecting-rods *e e*, that take hold of the two cranks *f f* on the crank-shaft *g*, the cranks being placed each on opposite sides of the shaft, so that when one of the pistons is down the other shall be up to act alternately. The steam-pipe *h* from a boiler or generator branches off to communicate with the two steam-chests *i i*, provided with steam and exhaust slide-valves *k k*, connected with a lever, *l*, the upper end of which is alternately moved in opposite directions by two cams, *m m*, on the crank-shaft.

Instead of slide other kinds of valves may be employed, as this makes no part of my invention, and they may be cut-off or full valves.

It will be obvious that this engine may be single-acting by having but one cylinder, and its appendages double-acting, as above described; and threefold-acting by having three cylinders with the cranks making an angle of one hundred and twenty degrees with each other, so as to divide the circle into three equal parts, the threefold-acting being the best for working the steam expansively by means of cut-off valves, as the steam will at all times be acting with its full force on one and expansively in another.

By constructing an engine on this plan but one packing will be required for each cylin-

der, and that a stuffing-box, which admits of adjustment much more readily than a piston, which can only be repacked by taking the engine apart. It dispenses with the necessity of a sliding head or parallel motion, the cylindrical piston performing that office by having the connecting-rod jointed to it within and at the bottom, at the same time saving the room occupied by the piston-rod in the common engine; and, what is of great importance, the piston can always be kept oiled by simply oiling the stuffing-box, which is not the case in engines as heretofore made.

For the purpose of preventing the cylinder-piston from being cooled by the surrounding atmosphere when out of the steam-cylinder, the open end may be covered with a cap having a slot cut in it of sufficient capacity to admit of the free working of the connecting-rod, or the cavity of the piston may be filled with warm water for the same purpose.

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

Making the piston of steam-engines cylindrical and of sufficient length to work through a stuffing-box around it at the open end of the steam-cylinder, substantially in the manner and for the purpose specified, in combination with the jointing of the connecting-rod to the bottom thereof for the purpose of saving the room occupied by the piston-rod, the piston being guided by the stuffing-box at the end of the cylinder and preventing the upper edge of the piston from cutting the cylinder, as would be the case with a shorter piston, as described.

NATHAN N. BARLOW.

Witnesses:

ALEX. PORTER BROWNE,  
RICH. H. HOBBS.