

T. F. REILLEY.
 Reciprocating Steam-Engines.

No. 147,519.

Patented Feb. 17, 1874.

Fig. 2.

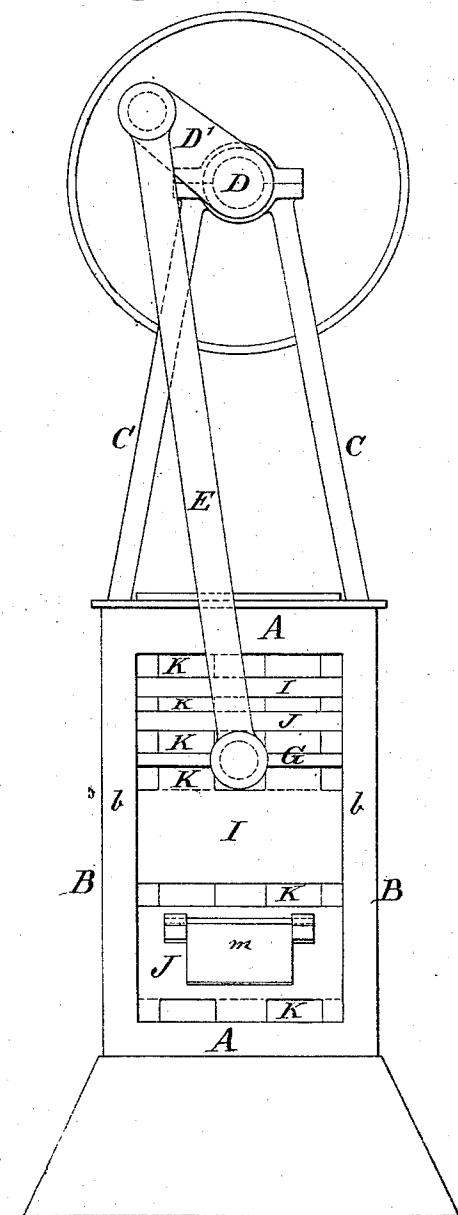
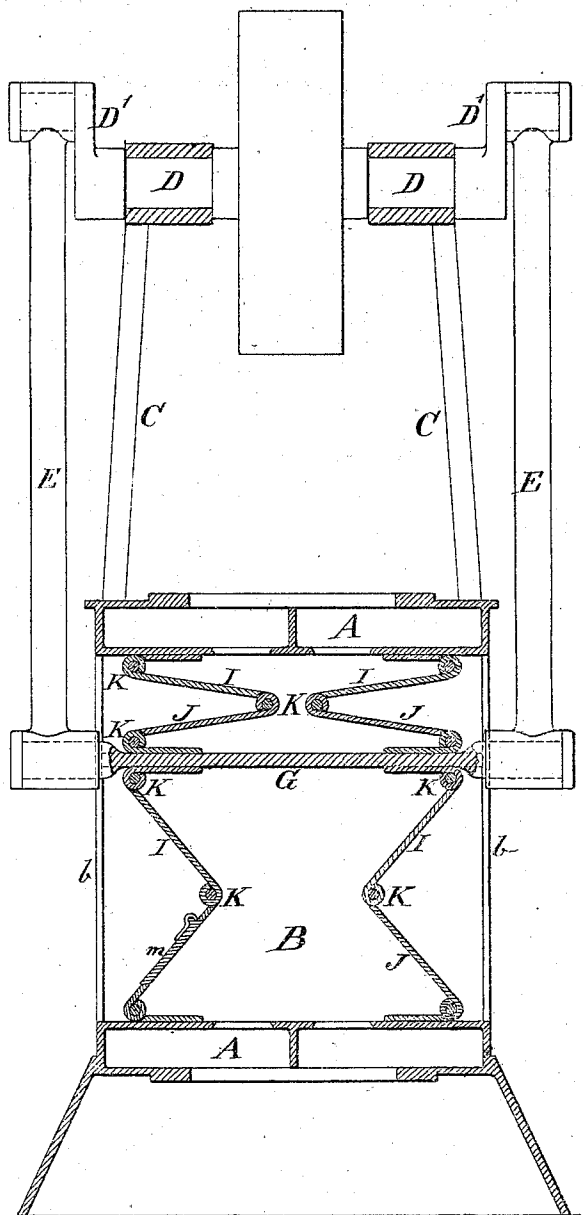


Fig. 1.



Witnesses:

Arnold Hermann
W. C. Dey

Inventor:

T. F. Reilly
 by his atty *J. L. Stilson*

UNITED STATES PATENT OFFICE.

TERENCE F. REILLEY, OF NEW YORK, N. Y.

IMPROVEMENT IN RECIPROCATING STEAM-ENGINES.

Specification forming part of Letters Patent No. **147,519**, dated February 17, 1874; application filed December 20, 1873.

To all whom it may concern:

Be it known that I, **TERENCE F. REILLEY**, of New York city, in the State of New York, have invented certain Improvements relating to Reciprocating Steam-Engines, applicable also to engines operated by gas or water, of which the following is a specification:

My improved engine is of the reciprocating class, which usually requires a cylinder and piston. I dispense with any parts having functions corresponding fully with those parts. My approximation to a cylinder or analogous inclosing-vessel is simply two stiff plates having their inner surfaces perfectly plain and parallel to each other. My approximation to a piston lies in a movable piece of rectangular form, extending across the space between the parallel plates, and fitting tightly to each by the aid of suitable packing, and connected to the valve-chest by means of tightly-hinged side pieces, which also extend across and fit tightly against the aforesaid parallel plates. The hinged side pieces fold and unfold in a manner analogous to the leather of a bellows, or more exactly to the stiff folding parts frequently employed in the construction of the musical instrument known as the accordion.

On the admission of the steam to the limited space below the piston and within the folding sides, the piston is pressed upward, and the sides are caused to expand. The admission of but little steam causes a large amount of motion in the piston at this stage of the movement. Later, in the upward movement of the piston, the steam is received much faster in proportion to the movement of the piston and near the termination of the strokes. The pressure of the steam against the folding sides causes the sides to act as toggle levers to powerfully urge up the piston. In the latter portion of the stroke the steam is highly effective in three directions—upward against the piston and in both directions laterally against the folding sides. Earlier in the stroke the action against the folding sides contributes to move the piston, but in a less degree. The efficiency of the pressure against the side in urging up the piston increases as the movement of the piston progresses.

In the working of steam very expansively, the pressure of the elastic fluid varies in the

reverse direction. It is very great at the commencement, and is reduced, according to certain well-known laws, as the piston moves. My invention tends to equalize the action of the engine in working steam with a high degree of expansion. The steam received at eighty pounds pressure at the beginning of the stroke works with little advantage. When it has been expanded until its force is nearly lost toward the close of the stroke, it still exerts a very effective action on the piston by reason of its toggle action on the folding sides.

I believe that my invention may be used with success in nearly or quite every situation where engines are required, as in the propulsion of vessels and locomotives, and in the driving of machinery for manufactories, &c., but it is more especially adapted for pumps. I can so proportion it, and so condition the pressure of the steam supplied, that its action shall be nearly equal throughout the entire stroke, as is required in pumping water, or that its force shall be much the greatest toward the close of each stroke, as is required for pumping air or other elastic fluids.

The following is a description of what I consider the best means of carrying out the invention in the form of a double-acting upright engine.

The accompanying drawings form a part of this specification.

Figure 1 is a vertical section in the plane parallel to the main shaft. Fig. 2 is an end elevation.

Similar letters of reference indicate like parts in both the figures.

A A are steam-chests, carrying suitable valves, with connections for operating them, which may be of any ordinary character, and need not be represented. In water-engines I employ additional valves to aid in the exhaust, which will be described further on. B B are parallel sides, which may be of cast-iron, smoothly finished on the inner faces, and stiffly braced with cross-webs on the outer surfaces. C C are upright frames, which support the crank-shaft D, from the cranks D' D' of which extend connecting-rods E E, which take hold of suitable bearings on the end of the stout flat piece G, which I denominate the piston. Its action is somewhat analogous to the piston

of an ordinary steam-engine, but working under very different conditions, inasmuch as it fits tightly only at the sides, and its ends are free. The several folding end parts I J are of a width exactly equal to the width of the piston G. Each pair, I J, are hinged together, and also to one of the steam-chests and to the piston. There are four sets of these hinged ends, I J, arranged as represented. Two sets form the ends of the steam-space below the piston, and two similar sets form the ends of the steam-space above the piston. Packing should be employed at the edges of the piston, and also at the edges of the parts I J. The joints or hinges K should also be tightly packed or formed, so as to not only be tight when new, but to allow of being set up or tightened to compensate for wear. The piston may be guided by inclosing its corners within the corners *b* of the side pieces B, as shown, or by any other suitable means.

When my engine is used as a water-engine, operating, for example, by the force of water in a pipe at the foot of a mountain, it is desirable to provide an unusually liberal passage for the escape of the fluid immediately on the completion of the stroke. The rapidity with which the folding sides are pressed inward during the early portion of the return movement of the piston renders this more necessary in my engine than with any ordinary style. I get over this difficulty by providing extra exhaust-valves, *m*, mounted in the lower portions J of the hinged ends. These valves are worked by suitable connections, (not represented,) so that they widely and promptly open at the commencement of the return stroke, and remain open during the whole of the return movement. They then close tightly, and the mechanism lies flat, so as to offer no im-

pediment to the folding of the parts I and J together. The ordinary valves at the top and bottom may be slide or puppet valves, worked in the ordinary manner, and providing only the ordinary openings.

I have represented the parts as in the simplest form. It is obvious that they may be cast so as to match to each other very closely, and allow but little steam-space for what is denominated clearance or valve passages.

I have described the piston G as connected by the rods E to a cranked shaft, carrying a heavy pulley, which may serve as a fly-wheel, and also as a means of giving motion by a belt to any suitable machinery. It will be obvious that, instead of the crank-shaft D, the piston G may, if desired, be connected directly to the plunger of the pump, or to a beam which is connected to a pump or other resistance.

There may be additional discharge-valves, similar to the valve *m*, on the upper portion I of the folding sides.

I claim as my invention—

1. An engine for working by steam or other fluid, having the hinged ends I J, in combination with the piston G, side pieces B B, and valve-chests A, all substantially as herein set forth.

2. In combination with the folding ends I J, piston G, side pieces B B, and steam-chests A, the exhaust-valves *m*, adapted to allow a free discharge during the return movement, as herein specified.

In testimony whereof I have hereunto set my hand this 17th day of December, 1873, in the presence of two subscribing witnesses.

TERENCE F. REILLEY.

Witnesses:

WM. C. DEY,

LUCIUS W. HOW.