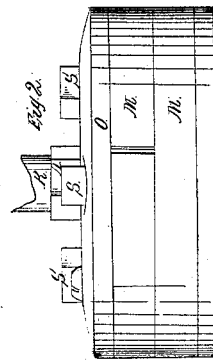
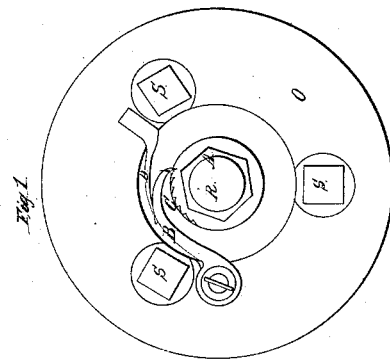
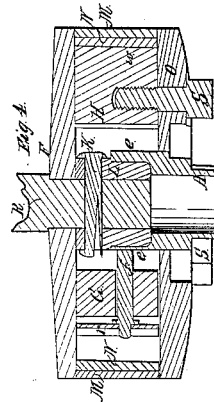
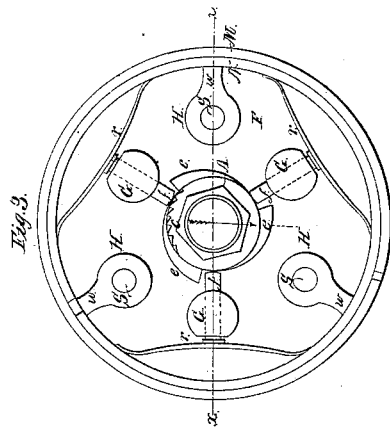
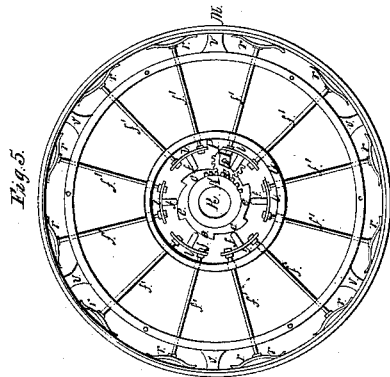


*Touchstone & Clark,  
Steam-Engine Piston.*

*N<sup>o</sup> 6,318.*

*Patented Apr. 17, 1849.*



# UNITED STATES PATENT OFFICE.

JAMES TOUCHSTONE AND JACOB H. CLARK, OF PHILADELPHIA, PENNSYLVANIA.

## METHOD OF EXPANDING METALLIC PISTONS.

Specification of Letters Patent No. 6,318, dated April 17, 1849.

*To all whom it may concern:*

Be it known that we, JAMES TOUCHSTONE and JACOB H. CLARK, of the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Tightening Metallic Pistons, and that we do declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, which make part of this specification.

The nature of our improvement is the tightening of metallic pistons by a single movement of a wrench or other equivalent moving machinery so applied as to obviate the necessity of separating the parts of the piston by removing the follower (as is done in the ordinary pistons hitherto used;) and at the same time securing accuracy and promptitude of adjustment.

The purpose of the invention is to avoid the inconvenience and waste of time which ordinarily occur in tightening the packings of steam and other engines. In the existing practice of setting out or tightening such packings the head of the cylinder is taken off, the screws which hold on the follower, are all drawn out and each separate set-screw which bears upon the metallic rings constituting the packing, is driven forward, and measurements are taken to ascertain whether all parts of the rings of packing are equally advanced, and brought fully in contact with the sides of the cylinder. In our improved pistons, whether for horizontal or for vertical engines, the arrangements are such as to enable us not only to force outward the packing rings without taking off the follower of the piston, but also in many cases to do it without so much as taking off the head of the cylinder.

The manner in which we carry out our design and accomplish the above purpose is represented in Figures 1, 2, 3, and 4.

Figure 1 is a top view or plan of the piston used in a vertical engine, in which R is the piston rod; A, the shank coming through the lid or follower O, from the cams beneath it. B is a pawl or click kept in contact with the ratchet C, by the spring D. S, S, S, are screws which confine the follower to the main part or body of the piston.

Fig. 2, is an elevation of the piston, in which the same letters designate parts corresponding to those in Fig. 1, and in which M, M, represent the divided ring-packing.

Fig. 3 is a horizontal plan of the interior of the piston, affording a view of the manner in which the interior ring N and the exterior ring M are kept out, by the springs *r, r, r*, pressing on their interior sides, which springs are acted on by the rods *f, f, f*, passing through the pillars G, G, G, attached to the bottom F of the piston. The ends of these rods extend centrally beyond the pillars and rest against the curved cams *e, e, e*, each rod having its corresponding cam. When the camhead A' is turned to the right all the rods *f* are simultaneously forced outward and the rings M, N, are thereby pressed against the interior of the cylinder in which the piston plays. H, H, H, Fig. 3 are pillars rising from the bottom of the piston, and having female screws *s, s, s*, to receive the screws S, S, S, Fig. 1. These pillars also have wings *w, w, w*, on the sides toward the rings of packing, which serve to fix approximately the position of the rings and to retain them in place before the cams, rods and springs are brought into action.

In Fig. 4, is seen in section (taken through *x x*, Fig. 3,) the arrangement of our piston when used in a horizontal cylinder so situated that the bottom can be approached, and opened in order to get at the piston. Here the piston rod R passes through the bottom F of the piston, and the shank A, instead of being traversed by the piston-rod, may be solid. In this case the tightening may be effected by having in the center of the cylinder head, a hole of sufficient magnitude to admit the key or wrench to turn the shank A, said hole being ordinarily kept closed by a screw bolt or any of the well known devices for closing similar apertures. L is the socket in which the piston rod R is fastened by means of the key K, and S' S' are screws which hold on the follower O.

By the arrangements last described our pistons when used in locomotive engines can be tightened in a few minutes as no cylinder head is required to be removed, and no packing of a piston rod to be disturbed.

In the large vertical engines which are used in sea steamers and elsewhere we effect the same purpose of tightening the packing without raising the cylinder head by substituting for the square or hexagonal shank A Fig. 3, the toothed arc A' Fig. 5, operated on by the pinion *p* with its shank *i*. In the cylinder head immediately over this shank

is to be made the aperture through which the key or wrench is to be inserted for turning it.

In Fig. 5, is also exhibited the manner in which we multiply the points of application of the tightening force. Twelve springs  $r, r$  &c. are compressed by means of as many small rods  $f' f'$  &c. every pair of which is connected to a cross head  $l$ , which is also united to a bolt  $f$  the direction of which is toward the center of the piston, and its support the face of the cam  $e$ . In large pistons also instead of the pillows  $G, G, G$ , (Fig. 3,) to support the rods which compress the springs, we cast upon the bottom of the piston two circular flanges  $G' G''$ , high enough to support the follower and through these the rods  $f', f'$ , &c pass. These rings serve at the same time to receive the screws which hold on the follower, as at  $s', s'$ . When the pinion  $p$  and the toothed wheel  $A$  are used instead of a shank on the head of the cam the ratchet and click may be applied either directly to the camhead or to the pin-

ion at pleasure though we prefer the latter arrangement, as it gives a ready access to the click in case it may be desirable to relax the pressure on the packing.

What we claim as our invention and desire to secure by Letters Patent is—

The setting out or tightening of metallic packings by means of the series of cams  $e, e, e$ , in combination with the sliding rods  $f, f, f$ , and with the springs  $r, r, r$ , when the whole are operated simultaneously by turning the single camhead or shank  $A$ , substantially in the manner herein set forth.

We do not intend in this claim to limit ourselves to the exact number or arrangement of parts herein described but to vary the same at pleasure while we attain the same ends by means substantially the same.

JAMES TOUCHSTONE.  
J. H. CLARK.

Witnesses:

FRANCIS INGRAHAM,  
EDW. THOMAS.