F. FELBINGER & J. G. KOCH.

Pistons for Steam-Engines, Pumps, &c.

No. 161,400. Patented March 30, 1875.

Fig. 1.

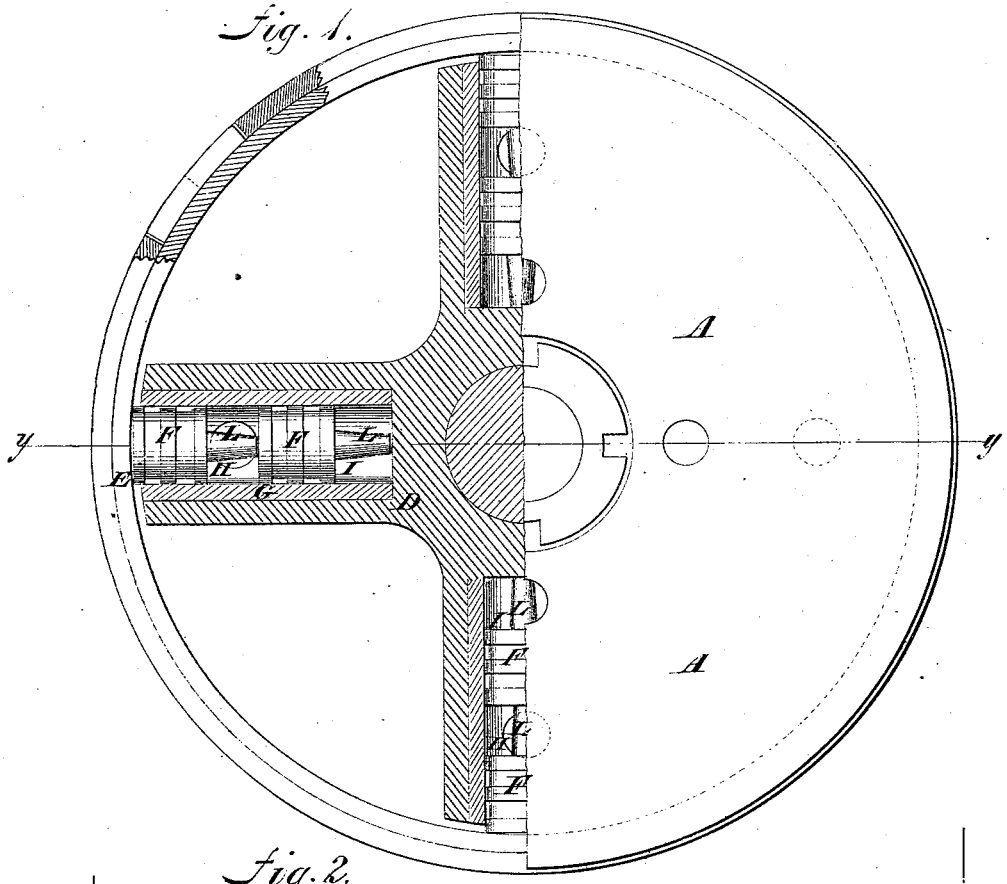


Fig. 2.

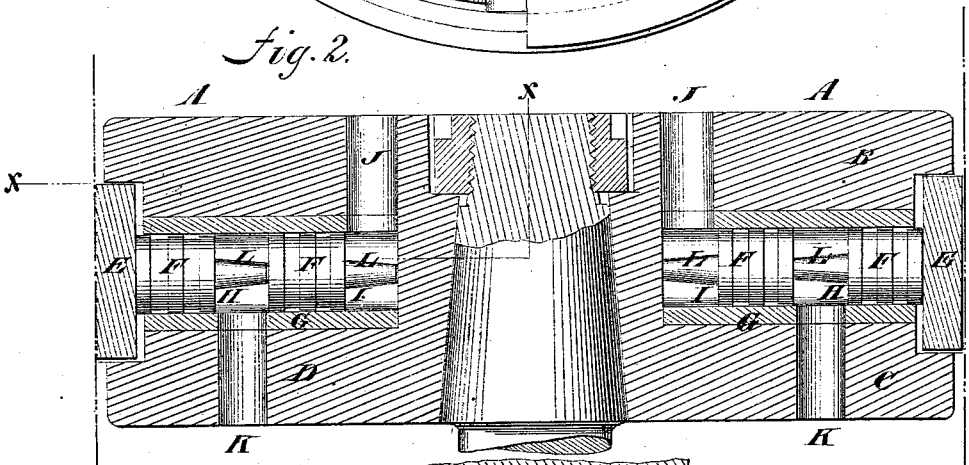
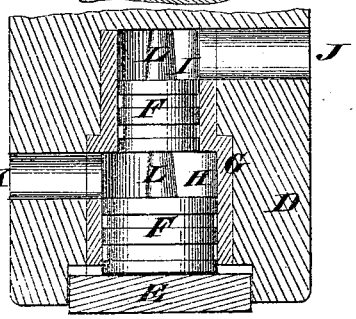


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANZ FELBINGER AND JOHANN G. KOCH, OF VIENNA, AUSTRIA.

IMPROVEMENT IN PISTONS FOR STEAM-ENGINES, PUMPS, &c.

Specification forming part of Letters Patent No. **161,400**, dated March 30, 1875; application filed September 21, 1874.

To all whom it may concern:

Be it known that we, FRANZ FELBINGER and JOHANN GEORGE KOCH, of Vienna, Austria, have invented a new and useful Improvement in Pistons for Steam-Engines, Pumps, &c., of which the following is a specification:

This invention relates to pistons for steam-engines, pumps, &c., having a series of small pistons, which operate to expand the packing-ring by the pressure of the steam. The improvement consists in the construction and arrangement of parts, as hereinafter described and claimed.

In the accompanying drawing, Figure 1 is a plan view in partial section of our improvement. Fig. 2 is a cross-sectional elevation of our improvement, taken on the line *y y* of Fig. 1. Fig. 3 represents a cross-sectional elevation of a portion of a piston, showing the combination of two small pistons, each of different size.

Similar letters of reference indicate corresponding parts.

A is the main piston, which is cast in a single piece in the form of a spider, with cross-arms D and a central hub to receive the piston-rod. The spaces between the arms D are left open, thus forming plates B and C, between the edges of which, and extending around said cross or spider, or solid portion, is a recess, which receives a packing-ring, E, which expands and contracts concentrically between the two plates B and C like the ordinary spring packing-rings. In our improvement the expansion of the packing-rings is assisted by means of small pistons F, which work in small cylinders G, which are formed in and radiate from the center of main piston A, substantially as shown. Each of the small pistons F is provided with the steam-surfaces H and I—one to receive steam when the piston is passing in one direction, and the other surface for the other direction. J and K represent the steam-openings from each side of the main piston. The outer ends of these small pistons F bear against the inside of the packing-ring E, as seen in Fig. 2. These small pistons F may be made in one piece, or of two separate pieces, and their areas are proportioned to the pressure of steam or the duty required of the engine.

In engines which do not have to labor hard the pressure of the steam on these pistons may be less, which consequently lessens the friction of the main piston in the cylinder; and where more labor is required the steam-area of these pistons may be enlarged.

L are stems on the small pistons, the inner one of which bears against the ends of the cylinder to receive the reaction of the steam.

The packing-ring E may be made in one or more pieces, so that it will readily conform to the surface of the engine-cylinder. The small cylinders G may be turned and bored out, and slipped into corresponding cavities bored in the arms D of the cross or spider of the piston, and may be made of brass or other metal, as may also be the piston F.

A piston constructed in this manner is always the same, whether working under high or low pressure.

The leading idea in constructing a piston should be to make a contact or pressure between the packing-ring and the cylinder just sufficient to prevent the leakage of steam or liquid from one side of the piston to the other. Any pressure of the above parts more than is sufficient to prevent leakage produces undue friction, and results in loss of power in the engine. In the case of a steam-engine it is easy to calculate the amount of pressure to the square-inch surface of the packing for any given pressure of steam to make the piston fit tightly.

The packing-ring has a second ring, or the segment of a ring, behind the joints or planes of separation. Before the ring is cut it is turned to the exact size of the cylinder, so that it will work without any apparent friction until it is expanded by the small piston. The diameter and number of the small pistons may be varied according to the pressure and object for which the engine is intended.

Instead of casting the piston A with the spider or cross arms, and open spaces between the arms, the piston may be cast in one solid piece, and the recesses for the cylinders G may be bored therein. Instead of placing the pistons F within cylinders G, the latter may be omitted, and the pistons F placed and fitted in any suitable manner within the recesses bored in the piston A. Instead of casting the

piston in one piece, it may be made in any other suitable manner.

We do not limit or confine ourselves to the precise form or arrangement of any of the parts here shown, as these may be varied in many ways without departing from our invention.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A piston having a series of radial cavities, with openings at different points, communicating with its opposite sides or faces, a series of small pistons having stems, and a circumferential packing-ring, said parts being combined as shown and described.

2. The combination of a small piston, F, having a projection or stem, L, with a piston having a radial cavity for reception thereof, and a passage leading out from said cavity to the sides of the piston, substantially as shown and described, whereby steam is admitted around the stem and in rear of such small piston.

3. The combination, with the piston A, having arms D, as described, of the cylinders G, for reception of the small pistons F, as specified.

The above specification of our invention signed by us this 12th day of August, 1874.

FRANZ FELBINGER.
JOH. G. KOCH.

Witnesses:
JULIUS PATERNY,
LUDWIG ZEISCH.