No. 688,571. Patented Dec. 10, 1901.

J. AIREY.

PACKING FOR PISTONS.

(Application filed Mar. 18, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

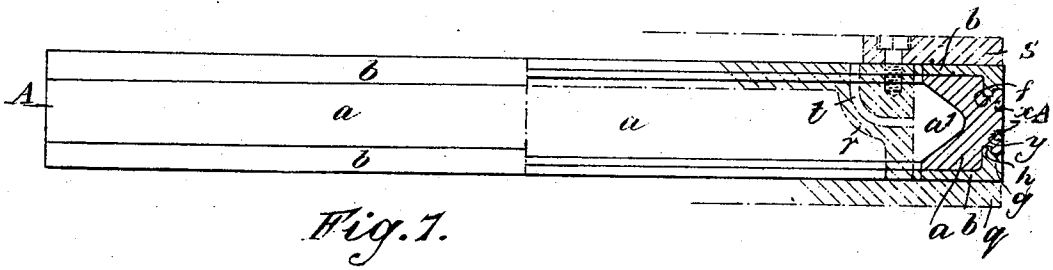


Fig. 7.

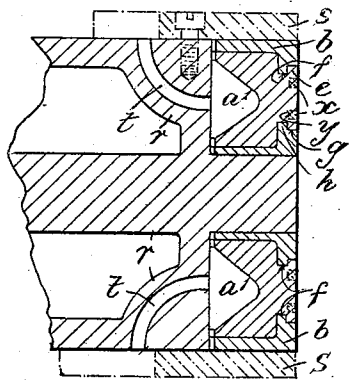
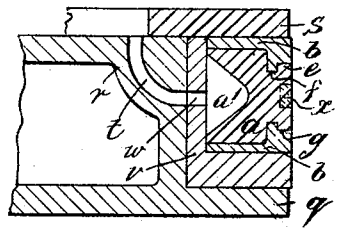


Fig. 8.



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Fig. 2.

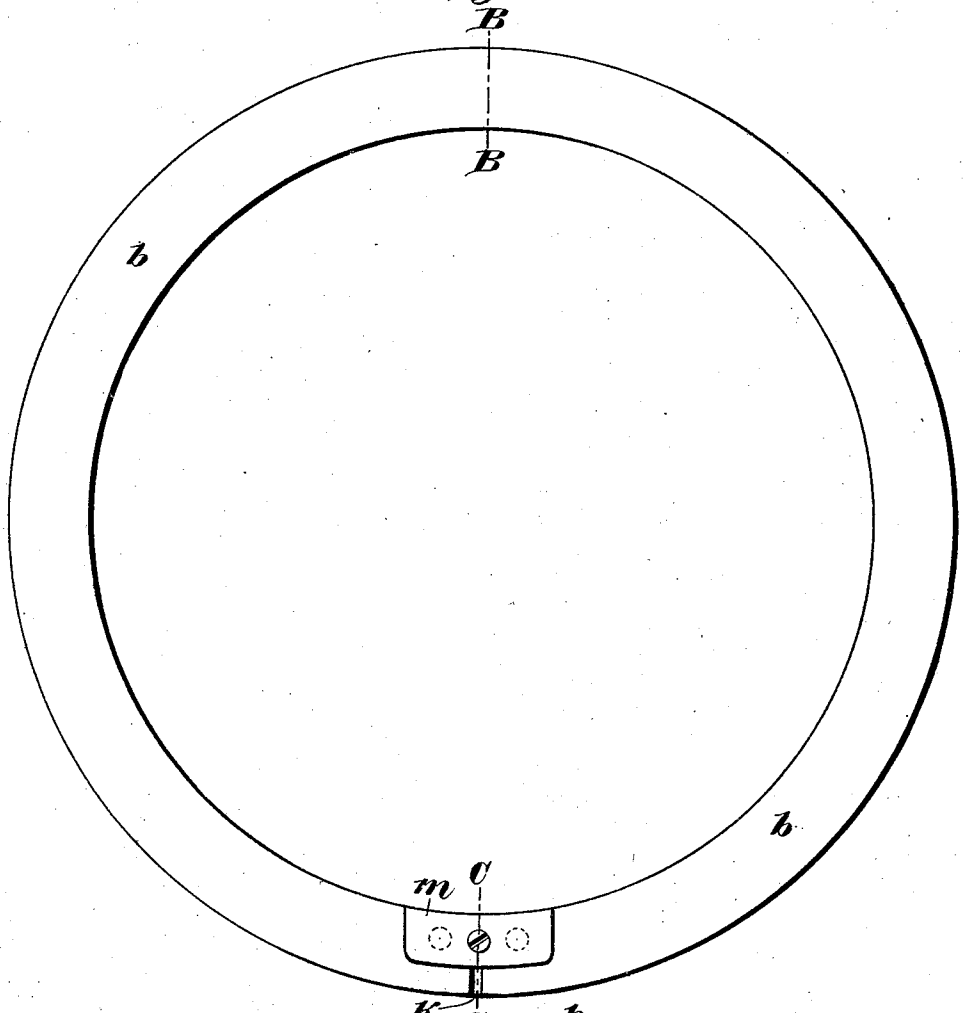
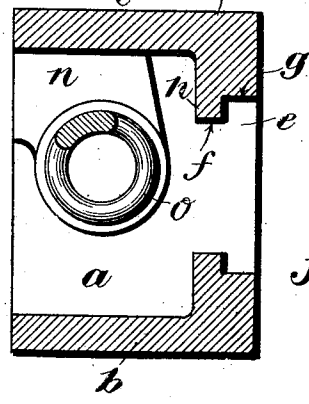


Fig. 4.



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Fig. 3.

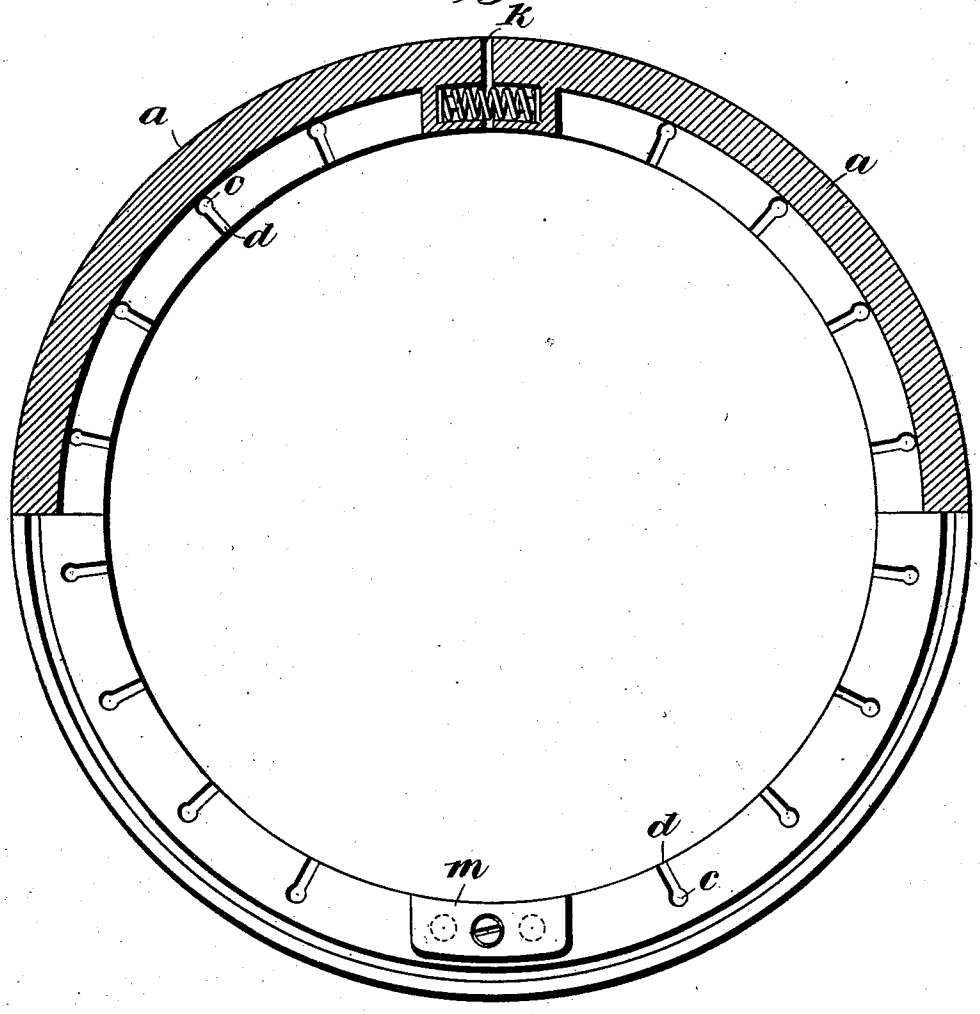
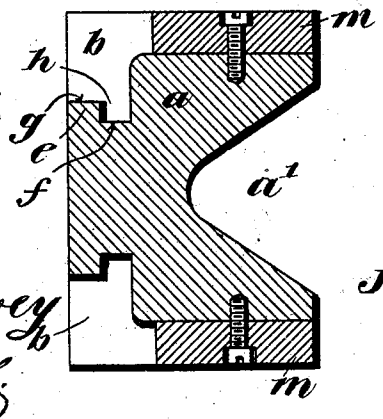


Fig. 5.



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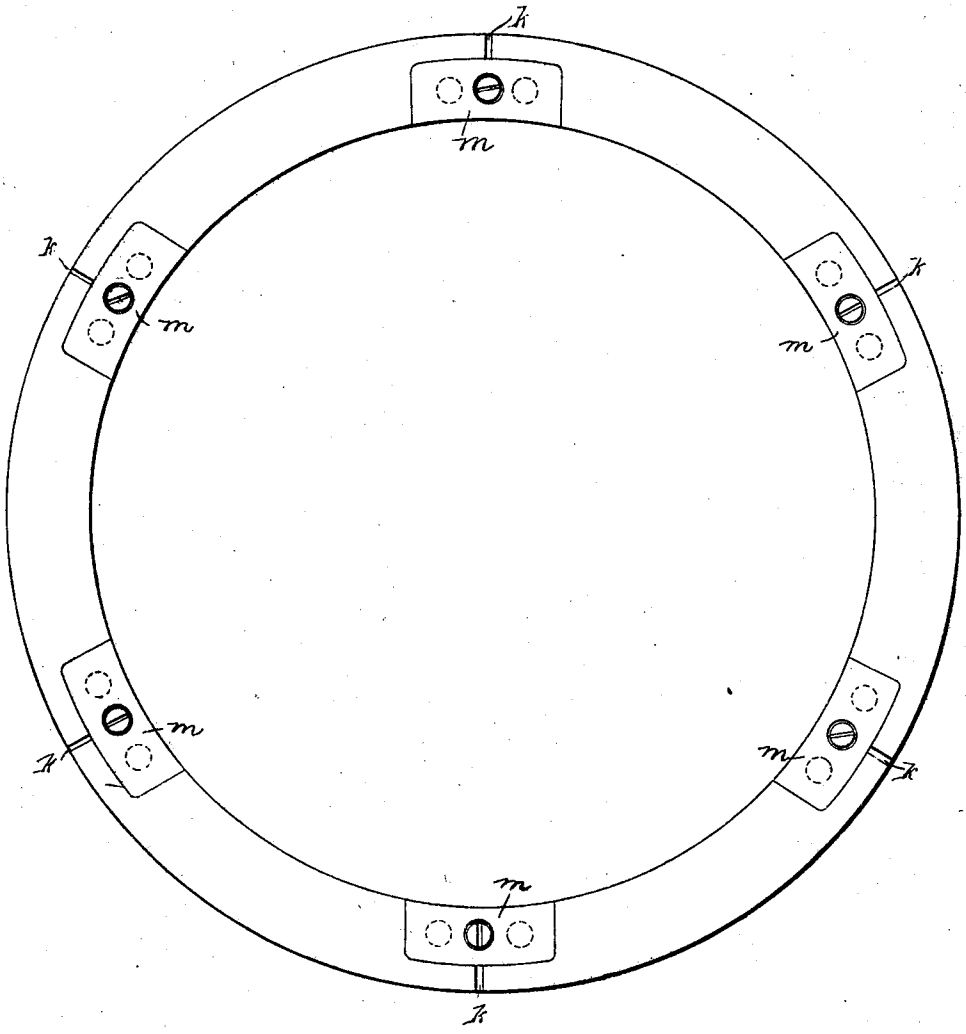
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PACKING FOR PISTONS.

(Application filed Mar. 18, 1901.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES AIREY, OF WEST HARTLEPOOL, ENGLAND.

PACKING FOR PISTONS.

SPECIFICATION forming part of Letters Patent No. 688,571, dated December 10, 1901.

Application filed March 18, 1901. Serial No. 51,766. (No model.)

To all whom it may concern:

Be it known that I, JAMES AIREY, a subject of the King of Great Britain and Ireland, residing at West Hartlepool, county of Durham, England, have invented Improved Packing for Pistons, of which the following is a specification.

Pistons and the like—as, for example, piston-valves—are sometimes provided with one or more main packing-rings fitted with auxiliary rings of a metal having a higher coefficient of expansion than that composing the main ring or rings, and packing of this kind forms the subject of a former United States Patent granted to me, No. 612,223, dated October 11, 1898.

According to my present invention, which relates to piston-packing of the kind referred to, the main packing-ring or each such ring is made of a suitable channel-section, the mouth of the channel or hollow being turned toward the axis of the ring, and the sides of the ring are formed with a series of holes with inwardly-directed radial slits, these holes and slits extending from the channel to the upper and lower or outer faces of the main ring, which are overlapped or covered by the auxiliary rings. The said holes and slits, besides increasing the flexibility and elasticity of the main packing-ring, permit steam admitted to the interior of the main packing-ring to act upon those surfaces of the auxiliary rings which are next the upper and lower or outer faces of the main ring, and thus to press the auxiliary rings in directions away from the main ring and into contact with the juxtaposed surfaces, such as those of the piston-flange and junk-ring, or of other parts between which the rings are placed, according to the construction adopted. The main ring and each auxiliary ring are so constructed that a part or parts of the one entering a part or parts of the other the auxiliary rings will be kept in place, while left perfectly free to expand with rise of temperature and to fulfil their office without undue friction.

Figure 1 of the accompanying illustrative drawings shows my improved packing, partly in side elevation and partly in cross-section, applied to a single-acting piston, which is represented in dotted lines. Fig. 2 is a view of one end of the packing detached from the piston. Fig. 3 shows the main packing-ring partly in end elevation and partly in section on the line A A of Fig. 1. Figs. 4 and 5 are sections of the packing on the lines B B and C C, respectively, of Fig. 2, but drawn to a larger scale than that figure. Fig. 6 is a similar view to Fig. 2, showing a modified construction of the packing. Fig. 7 shows in cross-section part of a piston provided with the improved packing at each end thereof. Fig. 8 shows in cross-section part of a piston provided with a separate carrier-ring upon and around which the improved packing is placed.

The improved packing shown comprises a main packing-ring *a*, made of metal, such as steel or cast-iron, and provided at opposite sides with auxiliary packing-rings *b*, of metal, such as bronze, having a higher coefficient of expansion than that of the ring *a*, each of these auxiliary rings being made of the same radial width as the main ring, so as to provide a wide annular outer bearing-surface. The main ring *a* is of channel-section, the open end of the channel *a'* being toward the axis of the ring, and in its sides are a number of combined holes *c* and slots *d*, that are open at their inner ends and extend from the channel to the outer annular faces of the said ring and render such ring more flexible than it otherwise would be. Each of these outer faces of the ring in the example shown is formed with annular shoulder *e* and groove *f*, which engage with a corresponding annular recess *g* and fillet or projection *h* on the inner face of the adjacent auxiliary ring *b*, so that the latter ring will be kept in place, while left perfectly free to expand with rise of temperature and to fulfil its office of packing a piston efficiently without undue friction against the wall of the cylinder in which it works.

The main ring *a* and the auxiliary rings *b* may each be formed in one piece with a single radial slit *k*, as shown in Fig. 2, or they may each be built up in segments, as shown in Fig. 6, with respect to one of the auxiliary rings *b*. In some cases segmental auxiliary rings, Fig. 6, may be applied to a main-ring slit at one point only. Whatever may be the construction adopted the slit or slits *k* in the main ring *a* is or are arranged to break joint

with those in the auxiliary rings *b*, and thus prevent escape of steam past the packing, while for the same purpose opposite each slit *k* in an auxiliary ring *b* there is suitably fixed upon the main ring *a* a tongue-piece *m*. At the place where the main ring *a* is divided there is provided a recess *n*, containing a coiled spring *o*, arranged across the slit *k* and tending to enlarge or expand the ring circumferentially. Fig. 1 shows how such combined main and auxiliary packing-rings can be applied to a piston, such as a single-acting steam-piston, the rings being held in place between the flange *q* on the piston-body *r* and the junk-ring *s*. In this case the piston-body *r* is formed on the steam side with one or more passages *t*, through which steam can pass to the hollow interior *a'* of the main packing-ring *a* and force this ring into close contact with the inner surface of the cylinder in which the piston works, the forming of the flanges or sides of the ring with the radial slits *c d* facilitating such expansion of the said ring under the action of the internal steam-pressure. The said slits *c d* also serve to allow of steam from the hollow main ring *a* passing through the sides thereof and pressing the two auxiliary rings *b* against the adjacent surfaces of the piston-flange *q* and junk-ring *s*, with the result that steam cannot escape between these parts, and the auxiliary rings, by reason of the heating to which they are subject and of their higher coefficient of expansion than the main ring *a*, expanding outward under the action of the heat to a greater extent than such main ring and forming an efficient closure between the piston body and cylinder.

A piston may in some cases be fitted with more than one main ring *a* with auxiliary rings *b*. Fig. 7 shows a set of rings *a* and *b* fitted to each end of a piston, which in this case may be a double-acting steam-piston, live steam being admitted to the interior of each main ring *a* through one or more passages *t* from the corresponding side of the piston-body.

In Figs. 1 and 7 each main ring *a*, with its auxiliary rings *b*, is mounted in a rabbet or groove formed in the piston-body *r*. Fig. 8 shows a modification wherein the said rings are mounted in a rabbet or groove formed in a solid—*i. e.*, continuous—carrier-ring *v*, which is itself placed in a rabbet or groove in the piston-body *r* and secured therein by the junk-ring *s*. In this case the carrier-ring *v* is formed with one or more holes *w*, coinciding with the passage or passages *t* in the piston-body, to admit of steam passing to the interior of the main ring *a*.

Additional packing-rings of known types—such as Ramsbottom rings *x*, Figs. 1, 7, and 8—may in some instances be fitted in annular recesses *y*, cut in the peripheries of the main packing-rings *a*, as a further security against leakage and excessive friction.

What I claim is—

1. Packing for a piston or the like, comprising a split or divided main packing-ring made of channel-section and having its flanges or sides slit for a part of their radial width, and auxiliary packing-rings fitted to the opposite sides of said main ring and made of metal having a greater coefficient of expansion than that of the metal comprising said main ring, substantially as described.

2. Packing for a piston or the like, comprising a split or divided main packing-ring made of channel-section with radial slits extending through its opposite sides or flanges, and split or divided auxiliary packing-rings made of a metal having a greater coefficient of expansion than the metal comprising said main rings and having parts fitted into recesses in the latter ring so that they cannot move bodily in a radial direction relatively to said main ring but will, when heated, expand outward to a greater extent than said main ring, substantially as described.

3. Packing for pistons and the like, comprising a split or divided main packing-ring made of suitable metal such as steel or cast-iron and of channel-section with radial slits extending through the sides of said ring from its hollow interior to its outer opposite sides or faces, and split or auxiliary packing-rings made of metal such as bronze having a greater coefficient of expansion than the metal comprising the main ring, said rings being made of the same radial width as the main ring and having their inner faces so fitted to the opposite sides of said main ring as to prevent them being displaced outward relatively to the main ring while permitting them to expand outward to a greater extent than said main ring when heated, substantially as described.

4. Packing for pistons and the like, comprising a split or divided main packing-ring made of channel-section with radial slits extending through its opposite sides or flanges, and auxiliary packing-rings applied to the opposite sides of said main ring and made of metal such as bronze having a greater coefficient of expansion than the metal comprising said main ring, the adjacent faces of said main and auxiliary rings having interlocking grooves and projections, substantially as described.

5. Packing for pistons and the like, comprising a split or divided main packing-ring made of metal such as steel or cast-iron of channel-section and with radially-slit flanges or sides, split or divided auxiliary packing-rings fitted to the opposite sides of said main ring so that they cannot move bodily in an outward direction relatively to said main ring, said auxiliary rings being made of metal such as bronze having a greater coefficient of expansion than the metal comprising said main ring and normally of the same radial width as said main ring, and tongue-pieces fixed to

the opposite sides of said main ring and fitting recesses in said auxiliary rings opposite the slits therein, substantially as described.

6. Packing for pistons and the like, comprising a split or divided main packing-ring made of channel-section on its inner side with radially-slit flanges or sides, split or divided auxiliary packing-rings fitted to the opposite sides of said main ring so that they cannot move bodily in a radial direction relatively to said main ring and made of a metal having a greater coefficient of expansion than the metal composing said main ring, tongue-pieces fixed to said main ring and fitting recesses in said auxiliary rings opposite the slits therein, and a spring adapted to expand said main ring, substantially as described.

Signed at West Hartlepool this 4th day of March, 1901.

JAMES AIREY.

Witnesses:
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JOHN WM. WALTON.