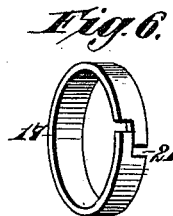
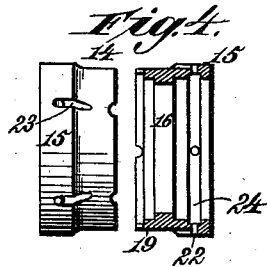
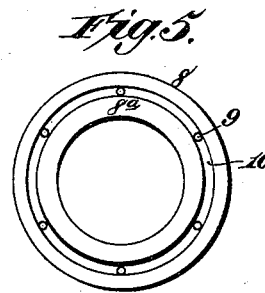
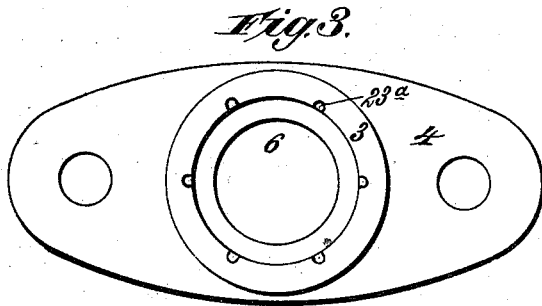
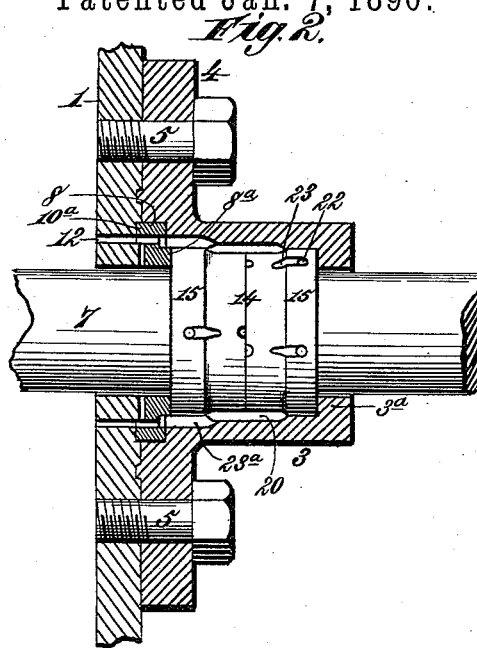
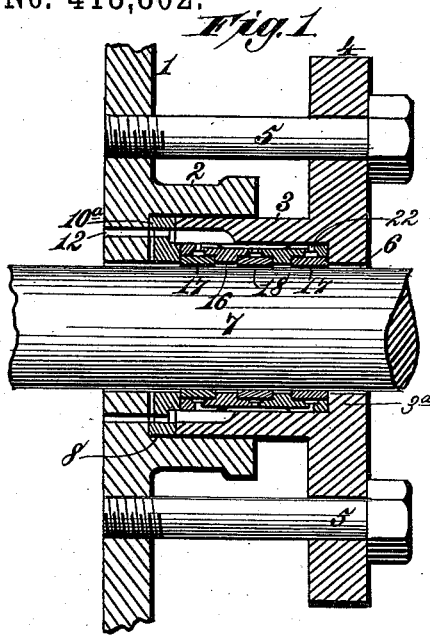


(No Model.)

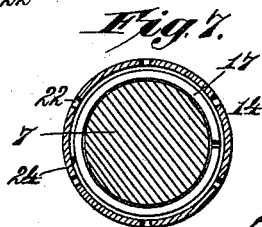
F. P. MARTIN.
ROD PACKING.

No. 418,802.

Patented Jan. 7, 1890.



Witnesses:
Phet G. G. G.
J. Grant Meyers Jr.



Inventor:
Francis P. Martin.
By *James L. Norris*
Atty.

UNITED STATES PATENT OFFICE.

FRANCIS P. MARTIN, OF EASTON, ASSIGNOR TO JOHN T. MARTIN, OF SCRANTON, PENNSYLVANIA.

ROD PACKING.

SPECIFICATION forming part of Letters Patent No. 418,802, dated January 7, 1890.

Application filed April 4, 1889. Serial No. 305,933. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS P. MARTIN, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented new and useful Improvements in Steam-Packing, of which the following is a specification.

It is the purpose of my invention to provide a simple and comparatively inexpensive packing for the pistons of steam-engines of every known class, wherein the construction is such that the packing will be compressed upon the surface to which it is applied by the force of the live steam within the cylinder and with a power proportioned to the pressure of steam, whereby the piston shall be practically released by the packing when the live steam is introduced upon the remote side of the piston and the frictional resistance thereof upon the outward stroke removed and a considerable part of the wear and tear of the packing-surfaces avoided.

It is a further purpose of my invention to provide a packing for steam-surfaces of the class named, in which the use of the ordinary stuffing-box and gland is wholly avoided, and which shall be capable of application, without structural alteration and without material expense, to the cylinder-heads of engines provided with the form of stuffing-box heretofore in use, whereby a perfectly steam-tight joint is produced under all pressures without unnecessary friction and with a marked economy in wear and in the consumption of lubricating-oil.

The invention consists, to these ends, in the several novel features of construction and new combinations of parts hereinafter described, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a central section, taken in substantially an axial plane, showing a portion of a steam-cylinder of ordinary form, and piston, to which my invention is applied. Fig. 2 is a similar section showing the application of the invention to a cylinder-head which is not provided with the old form of stuffing-box. Fig. 3 is an end elevation of the casing or shell with the packing removed. Fig. 4 is a detail elevation of the sectional supporting-

annulus removed from the casing. Fig. 5 is a detail plan view of the annular cushion. Fig. 6 is a detail perspective of one of the packing-rings. Fig. 7 is a transverse section of the ring-support, taken in the plane of the steam-entrances.

In the said drawings the reference-numeral 1 designates the head of a steam-cylinder of any known or desired construction, it being noted that when the invention is applied to cylinders provided with the usual form of stuffing-boxes heretofore in use the cylinder-head will ordinarily be constructed with an annular flange 2, surrounding the piston-opening to receive the stuffing and gland. I have shown the invention applied to a cylinder of this construction to illustrate the ease and simplicity with which it is adapted to old as well as new types of steam mechanism.

The numeral 3 denotes a cylindrical casing or shell slightly resembling the gland heretofore employed and of such diameter that its end may readily enter the flange 2. Upon the other end of this cylindrical shell is formed a cross-head or projecting flange 4, of any suitable form and dimensions, lying parallel with the cylinder-head and provided with apertures which receive bolts 5. An opening 6 is formed in the cross-head concentric with the cylindrical shell 3 and of such size as to permit the entrance of the piston-rod 7.

The inserted open end of the shell or casing 3 rests upon an annular seat 8, of brass or other suitable metal, having steam-tight faces which seat upon the cylinder-head and the end or edge of the shell, and that portion lying inside of the inner face of the cylindrical shell is of increased thickness, forming upon one face an annular rib 8^a, lying within the open end of the casing 3. Just outside this rib I form a series of small apertures 9, drilled entirely through the annular seat, the extremities of each aperture lying in a shallow circular channel 10, formed in that side of the seat upon which the casing 3 rests. Upon the other face of said seat is formed a raised face 10^a, surrounding the steam-apertures 9, and ground to form a steam-tight seat upon the cylinder-head. In the latter are formed a se-

ries of steam-openings 12, which register with the apertures 9 of the annular seat or open within the inner circumference of the raised surface 10^a. It will be seen that live steam will pass from the cylinder not only through the piston-opening in the cylinder-head but through the steam-apertures 12 also, and in both cases this steam will have free access to the openings 9 in the annular seat.

Surrounding the piston-rod, and lying loosely within the casing 3, is a sectional ring-support 14, composed of two equal and similar halves. Each section of this ring-support consists of a circular portion 15, having such diameter as to lie easily within the casing, and provided with an interior rib 16, surrounding the piston. This rib, in conjunction with the circular part 15, forms a seat for a packing-ring 17, the specific construction of which will presently be described, and a similar seat for a third or intermediate packing-ring 18 is formed by the union of the two circular portions 19, which project beyond the ribs 16 a distance equal to or a little less than half the width of the packing-rings. I prefer to mill-cut away the exterior faces of the circular portions 19 to a point beyond or nearly in a plane with the middle of the ribs 16, forming thereby an annular steam-chamber 20 between the sectional ring-support and the casing. It is evident, however, that this steam-chamber might be formed in the interior face of the cylindrical casing or shell.

The packing-rings 17 and 18 are formed of any suitable metal or alloy; or they may be constructed of hard vulcanized rubber or other suitable material. Each ring is cleft at one point, and its ends are formed, preferably, to lap by a notched joint 21, although I may employ a straight cut at an angle to the axis, or any other suitable form. These rings, when introduced within their seats in the ring-support, will be so far compressed upon the piston as to maintain only a slight frictional or surface contact therewith.

Entering each seat containing a packing-ring is a series of steam-entrances 22, cut through the circular portions 15 and 19 of the sectional ring-support in such manner as to open directly behind the packing-rings in substantially a central plane. The steam-entrances 22, cut through the circular parts 15, may be connected with the annular steam-chamber 20 by means of narrow slots 23, and the said annular chamber is supplied by means of a series of apertures or grooves 23^a, cut in the inner face of the cylindrical casing far enough to carry their extremities into said chamber.

It will be readily understood that when my invention is applied to the cylinder-heads already in use the arrangement will be substantially that shown in Fig. 1; but when the same is adapted to steam-cylinders constructed in accordance with my said invention and having no stuffing-box or circular flange 2 then the cross-head 4 or its substi-

tute flange is placed directly upon the cylinder-head 1 and bolted thereto. The only structural alteration required in this case is that shown in Fig. 2, wherein a channel is formed in the flange to receive the annular seat 8, while an inwardly-turned flange 3^a is formed upon the outer end of the external casing or shell 3, to form a stop and seat for the ring-support and packing-rings, as is clearly shown in Fig. 2. I may also cut a shallow interior channel 24 upon the inner face of each ring-seat, connecting all the steam-entrances 22 and throwing a continuous stratum of steam behind each packing-ring.

When the parts are assembled properly, the bolts 5, which are tapped into the cylinder-head, are turned up to draw the shell or casing 3 down upon the annular seat 8, thereby forcing the sectional ring-support also against the steam-tight seats upon the annular seat and the head or flange of the cylindrical casing and upon the raised rib 16 of the annular seat 8, the edges of the packing-rings 17 being also seated steam-tight upon the same parts and upon the ribs 16 of the ring-support, while the intermediate ring 18 seats upon the ribs 16, all of said parts being ground tight to prevent escape of steam.

It will readily be seen that I may dispense with the steam-apertures 12 in the cylinder-head, though I prefer to employ the latter as a safeguard.

The operation is as follows: When steam is admitted to the cylinder upon that side of the piston next to the packing live steam flows through the piston-opening in the annular seat or through the apertures 12, or both said apertures and the piston-opening, and thence passes by way of the annular steam-chamber through the steam-entrances 22 behind the packing-rings 17 and 18, compressing the latter upon the piston with a power exactly proportioned to the head of steam carried. As the steam exhausts, this pressure is removed and the compressing-force exerted upon the rings is suspended, thereby avoiding all needless wear of the parts as well as the additional power required to overcome the resistance offered by the stuffing, which in some cases is by no means inconsiderable. As the steam again enters the cylinder upon the side of the piston adjacent to the packing, it flashes into the steam-chambers behind the packing-rings and again produces the required compressing-force. The cushioning-steam also, which is generally thrown in just as the stroke is completed to cushion the piston, will accomplish the same result.

I may, evidently, dispense with the central or intermediate ring 18 and construct the ring-support in a single piece, dispensing with the central seat, or I may use a single ring only; but it will be seen that these changes involve no material or substantial alteration in my invention.

What I claim is—

1. In a piston-rod packing for steam-engines, the combination, with the cylinder-head having steam-openings therein, of an annular seat provided with similar apertures having one end lying in a circular channel adjacent to the cylinder-head, a ring-support surrounding the piston-rod and seating at one end on a steam-tight seat on the annular seat inside the steam-openings, said ring-support having separate interior circumferential seats provided with circumferential steam-passages communicating with apertures drilled through the wall of said support, compressible cleft rings lying in said seats, a cylindrical casing inclosing the support and provided with interior steam-channels, and means for attaching said casing to the cylinder-head, substantially as described.

2. In a piston-rod packing for steam-engines, the combination, with a cylinder-head having live-steam apertures pierced therein, of an annular seat of metal having a raised steam-tight seat outside of a series of steam-apertures formed in said seat and communicating with the live-steam apertures in the cylinder-head, a cylindrical casing and a sectional ring-support within said casing, a series of cleft packing-rings arranged in separate seats, having interior circumferential steamways formed within said ring-support, and means for connecting the cylindrical casing to the cylinder-head, whereby a steam-joint is formed between the meeting edges of the same and of the rings, the live-steam open-

ings having communication with steam-entrances introducing live steam behind the packing-rings, substantially as described.

3. In a piston-rod packing for steam-engines, the combination, with a cylinder-head having a series of steam-openings surrounding the piston-rod opening, of a metallic annular seat having on one face a raised steam-tight seat making a steam-fit with the cylinder-head, a series of steam-apertures piercing said seat within the raised face or steam-tight seat, a ring-support consisting of two similar parts, each containing a seat for a packing-ring, and a fractional seat for a packing-ring intermediate of the other seats, said ring-support resting upon the annular seat within the steam-entrances, cleft packing-rings lying in the seats and embracing the piston-rod, and an outer cylindrical casing resting upon the annular seat and surrounding the ring-support, an annular steam-chamber being formed between the two and communicating with the interior of the cylinder by means of steamways formed in the inner face of the casing and with the ring-seat by means of steam-openings entering said ring-seats behind the rings, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

FRANCIS P. MARTIN.

Witnesses:

JAMES L. NORRIS,
J. A. RUTHERFORD.