H. S. ROSS.

Stuffing-Boxes for Steam-Engines.

No. 206,139. Patented July 16, 1878.

*Fig. 1.*

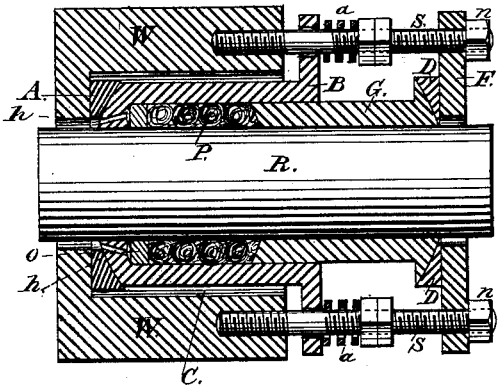



*Fig. 2.*

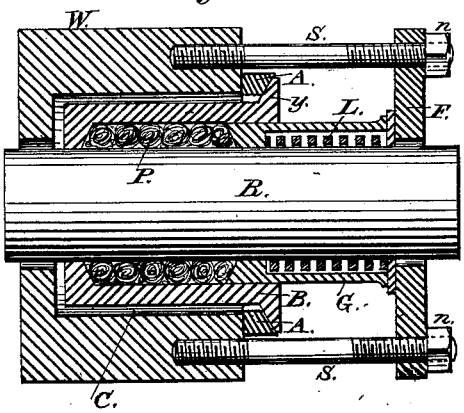



*Fig. 3.*

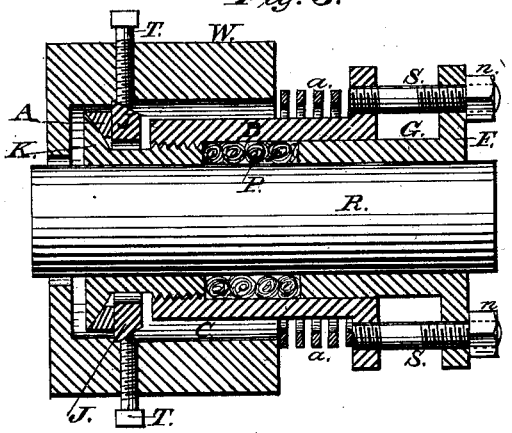



*Fig. 4.*

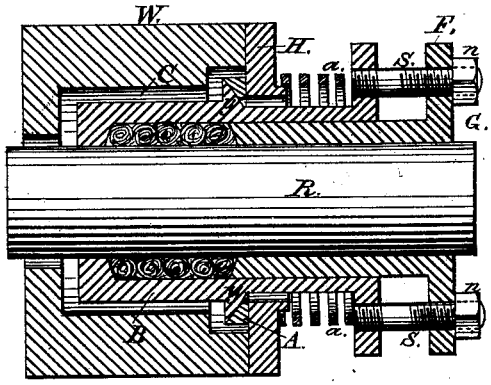



*Fig. 5.*

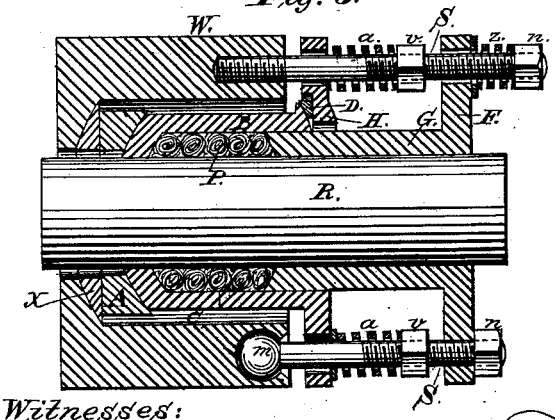
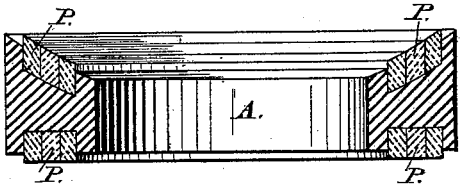



*Fig. 6.*

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H. SCHUYLER ROSS, OF CHICAGO, ILLINOIS.

## IMPROVEMENT IN STUFFING-BOXES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **206,139**, dated July 16, 1878; application filed November 16, 1877.

*To all whom it may concern:*

Be it known that I, H. SCHUYLER ROSS, of the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Stuffing-Boxes of Steam-Engines; and to enable others skilled in the art to construct the same, I do hereby declare the following to be a full, clear, and exact description of the same.

In stuffing-boxes as at present constructed the packing is compelled to maintain not only elasticity enough to keep steam from passing out through or around it, but also to take up and give way to all the angular or out-of-line motions of the rod or stem to be packed.

The object of my invention is to so construct a stuffing-box that all inequalities or irregularities in the motion of the rod may be taken up or permitted by the box itself, and thus prevent injury to and lessen the wear of the material used for packing, permitting the latter to perform one duty only—that is, to prevent the passage of steam around the rod—and in consequence requiring less pressure from the gland than is commonly required, and permitting the use of a cheaper quality and a less quantity or smaller size than is commonly needed, and at the same time securing greater tightness and preservation of the rod, these advantages to be accomplished by a stuffing-box similar in form to the ones commonly used, the modifications being inexpensive and the parts very easy of access.

In the accompanying drawings, Figure 1 is a central longitudinal section of my invention; and Figs. 2, 3, 4, 5, and 6 are modifications.

Like letters refer to like parts.

I will now describe the construction which I consider best to carry out my invention, as it is applicable to both condensing and non-condensing engines.

R is a rod or stem to be packed. P is the packing. W is the partition or a part of the cylinder-head, and C the cavity of the old stuffing-box in the cylinder-head. B is a stuffing-box; G, the gland, and F a flange or cap, with bolts S S, as commonly constructed. If the cavity in the old stuffing-box C has its bottom in good condition, I grind in a ring, A, making a steam-tight joint. One side of the ring is flat, the other curved. It is not material which side is flat, though I prefer the flat side to be next the cylinder-head. Against the outer side of this ring I grind an annular stuffing-box, B, the external diameter of which is smaller than the cavity C, leaving a small annular space around the same, in which it is free to move when subjected to any side pressure from the rod. The box B has entering it a gland, G, to bear upon the packing P with one end, and provided at the opposite or outer end with a ring, D, similar to ring A, the faces being nicely fitted. The flange F is placed outside of the ring, and bearing against it, being provided with bolts or studs S S running through it near the outer edges, and secured to the old stuffing-box or cylinder-head by nuts *n n* bearing against the flange, by which the gland may be adjusted as in common stuffing-boxes. In case a screw-cap is used, such screw-cap bears directly on the ring D, and is in nowise different from those in common use. I find that a short strong spiral spring, L L, Fig. 2, when coiled around the rod and let into the gland G, bearing against the flange F, is very useful in some cases, as it maintains an even pressure against the packing, and permits the gland to move freely while the flange is stationary, thus dispensing with the ring D. This spring may be placed outside of the gland G, and bear against the stuffing-box B and flange F.

It is evident that when the nuts *n n* are screwed up or tightened against the flange F the packing will be compressed, and as the inner end of the box B bears upon the ring A the same pressure maintained against the packing will be maintained against the ring A, and through it against the bottom of the cavity C, maintaining the ground joints on each side of ring A constantly tight.

At *h h* are shown passages through the bottom of the box B, to admit steam on the under side of the packing, beneath which a ring, *o*, is interposed to protect the packing. Thus the pressure of steam, instead of forcing the box B outward, acts back against the bottom of the inside of the box, and increases the pressure against the ring A. The coiled spring or springs *a a* serve to press the box B against

the ring A, even should the gland G become loose. The pressure on the box B, Fig. 5, can be regulated by the nuts *r r*.

Should the bottom of the cavity C be irregular or in a poor condition, I place at the bottom a second ring, *x*, Fig. 5, between which and the cylinder-head I make a solid red-lead or rust joint, and use the ring *x* as the bottom of the cavity C.

It is evident that the sides of the old stuffing-box can be entirely dispensed with, the studs S S running from the flange F directly into the cylinder-head, and the ring A applied or ground directly upon the surface of the said cylinder-head.

I do not confine myself to the exact construction of the box, rings, flange, and bolts described, as they can be easily modified without departing from the spirit of my invention, which is an elastically-retained stuffing box with an adjustable exterior gland.

I show in Fig. 6 a form of ring that forms an essential part of my invention. The ring A is made thicker longitudinally, and a recess is sunk on each side of the ring of sufficient depth to contain packing, such as is commonly used, or it can be Babbitt metal, if desired, such packing P P projecting beyond the face of the ring, one side bearing against the bottom of the cavity C and the inner end of the box B bearing against the other side, making tight joints, that will permit the box to move freely, as may be required. This form is applicable to large boxes where large metallic faces are difficult to grind to a good joint.

The ring A can be transferred to the outside of cavity C, Fig. 2, and a flange, *y*, be formed on the outer end of stuffing-box B; or the ring can be reversed and placed on the outside of this flange *y*, Fig. 4, an annular plate, H, being fastened at the end or mouth of the cavity C, the box B extending out beyond H, and flanged at its extremity, and connected by bolts with flange F. The flange F and gland G are made in one piece. A coiled spring, *a a*, bears against the outer flange of box B and annular ring H, and serves to keep the parts in place when there is no steam-pressure.

The disadvantage of forms 2 and 4 is that the annular space about box B must be filled and emptied at each stroke of the engine, much vapor being thus used with little effect.

In Fig. 3 a flange, K, is made at the inner end of a neck screwed into the bottom of box B. A ring, J, is secured near the bottom of the cavity C by means of set-screws T T; or it can be held in place by means of a thin sleeve fitting closely in the cavity C, and this sleeve held in by the annular plate H. The ring A is interposed between ring J and flange K. Box B is provided with flange and spring *a a*, gland, and bolts similar to Fig. 4, the spring *a a* to keep flange K closely against ring A when there is no steam-pressure.

This modification is expensive, its parts are not easy of access, and it, as well as form shown in Fig. 4, is not applicable to a condensing-engine.

In Fig. 5 two methods are shown of dispensing with the ring D—first, with the bolt S socketed in the cylinder-head at *m*; second, by placing a coiled spring, L, between the nut *n* and flange F, the bolt-holes in said flange being large enough to permit it to move laterally.

I am aware that detached packing-receptacles with tapered or conical cavities have been used; but such receptacles do not permit the entrance of a gland or follower having straight or parallel sides, nor the use of elastic or fibrous packing.

I am also aware that a ball-and-socket joint-ring is not new; also, that hinged bolts have been used with a packing-piston; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. A movable stuffing-box held elastically against a ring with flat and curved faces, in combination with an adjustable external gland.

2. A movable stuffing-box bearing against a ring with flat and curved faces, combined with an external adjustable gland, having also a flat and curved joint-ring, for the purpose set forth.

3. In a movable stuffing-box, an external adjustable gland, G, and flange F, having between them a flat and curved joint-ring, D, for the purpose set forth.

4. In a movable stuffing-box, B, having an external adjustable gland, G, the spring or springs *a a* bearing against the flange of said box.

5. A steam-packing apparatus consisting of a movable box, B, gland G, flange F, and rings A and D, in which the pressure maintained by the gland against the packing is exerted through the packing and upon the joint between the box B and the cylinder-head.

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Witnesses:

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