G. STRANCE, R. S. BULL & W. P. NORRIS.

STUFFING BOX.

APPLICATION FILED OCT. 26, 1908.

946,408. Patented Jan. 11, 1910.

Fig. 2

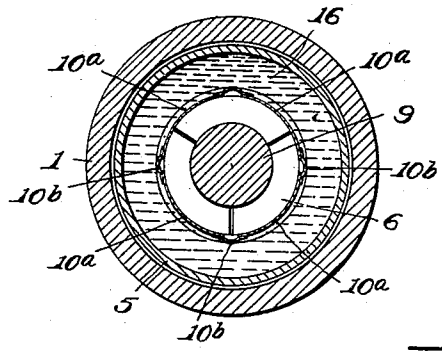


Fig. 1

Fig. 3

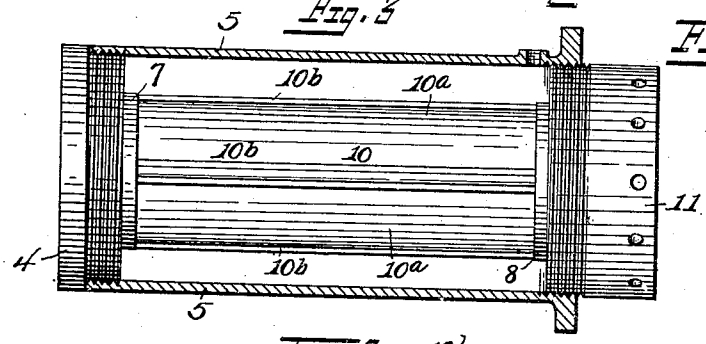


Fig. 5

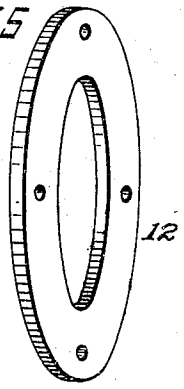
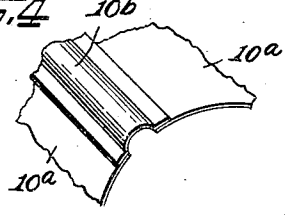


Fig. 4



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STUFFING-BOX.

946,408. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed October 26, 1908. Serial No. 459,479.

To all whom it may concern:

Be it known that we, GEORGE STRANCE, REECE S. BULL, and WILLIAM P. NORRIS, citizens of the United States of America, and residents of Sistersville, county of Tyler, and State of West Virginia, have invented certain new and useful Improvements in Stuffing-Boxes, of which the following is a specification.

This invention relates to improvements in packings for stuffing-boxes, and more particularly to that class of stuffing-boxes employed in connection with the plungers of pumps and the like; and it has for its principal objects to provide a metallic packing actuated by fluid pressure which may be readily adjusted or regulated to exert any desired pressure upon a plunger or piston; to provide a metallic packing which may be readily applied and removed; and to provide means whereby wear of the plunger and of the packing is automatically taken up or compensated for and which, at the same time, admits of limited lateral movement or play of the plunger.

In describing the invention in detail, reference is herein had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a longitudinal sectional view of the invention; Fig. 2 is a cross section on the line 2—2, Fig. 1; Fig. 3 is a longitudinal sectional view of the casing, showing, in elevation, the diaphragm in position therein; Fig. 4 is an enlarged perspective view of a fragmentary portion of the diaphragm; and Fig. 5 is a similar view of the ring or gland.

Referring to said drawing, in which like designating characters distinguish like parts throughout the several views, 1 indicates the body of the stuffing-box which is terminated at its inner end by an internal annular shoulder or abutment 2. A gasket 3, of leather, rubber, or other suitable material, is interposed between said abutment and an exteriorly-threaded plunger-embracing plug or collar 4 which is screwed up within the inner end of a hollow casing 5, said casing being fitted within, and having its outer end projected outward beyond the outer end of, said stuffing-box.

A plurality of close-fitting, segmental, metallic packing-rings 6, interposed between two plunger-embracing ground-joint rings 7 and 8, is held in embracing engagement with the plunger 9 by an incasing diaphragm 10 whose opposite ends are fixed, as by soldering, to said rings or collars 7 and 8. Said diaphragm, whose diameter is materially less than that of the casing 5 by which it is inclosed, consists of a very thin flexible metallic shell which is readily impressionable or yieldable to pressure applied thereto or exerted thereon, and is, consequently, adapted for communicating pressure applied thereto to the packing-rings incased thereby.

Screwed up within the outer end of the casing 5 against the outer ring 8, so as to firmly hold the diaphragm and incased packing-rings against longitudinal movement, is an exteriorly-threaded plunger-embracing plug 11, the outer end of which projects outward a substantial distance from the end of said casing, as shown. Fitted about said plug 11 against the flanged outer end of the casing 5 is a ring 12 which serves the purpose of the usual gland, said ring being connected to the flange 13 of the stuffing-box by means of stud-bolts 14. By maniuplation of the nuts 15 carried by said bolts, the pressure of the collar 4 against the gasket may be adjusted.

For effecting the compression of the packing-rings against the plunger, the chamber 16 formed between the diaphragm 10 and the walls of the casing 5 is filled with fluid, and a compression-device is employed for compressing said fluid. A pipe 17 is tapped into the casing 5 at a point intermediate the outer end of the stuffing-box body and the inner end of the plug 11, said pipe leading to the compression-device mentioned, which consists of a reservoir 18 having therein an adjustable spring-pressed hydraulic piston 19 mounted for effecting displacement of the fluid and whereby the degree of pressure exerted upon the fluid may be regulated. The mechanism constituting the compression-device and the relief-valve 20 is substantially the same as that shown and described in our pending application for United States Letters Patent, Serial No. 423,340, and therefore need not be here specifically described. Or, instead of employing the compressor, the pressure of a water-line or of a steam-line may be utilized, as is also shown and described in said application for Letters Patent.

The diaphragm is made of thin flexible sheet-metal, preferably copper, and is readily susceptible to external pressure, yielding to the pressure of the fluid in the chamber 16 and forcing the metallic ring-segments inward against the plunger. Experience has, however, demonstrated the fact that a plain one-piece copper diaphragm will buckle under pressure, and that repeated bucklings or flexures of the copper, due to fluctuations in the pressure, will cause said copper to break. To avoid this condition or result, the diaphragm is composed of a plurality of lengths or sections 10^a of sheet-copper, with interposed ribs 10^b of thin sheet-steel, said ribs having their lateral edges connected, as by soldering, to the lateral edges of the sections of copper. Said ribs are bowed slightly, as shown, and, the steel being more readily flexed or buckled than the copper, any tendency of the diaphragm to buckle will produce a bending or buckling of the ribs rather than of the copper sections; and, since the steel will more readily withstand breakage from bending, breakage of the diaphragm is not likely to occur.

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

1. In a device of the character described, the combination with a plunger, stuffing-box, and a casing seated within said stuffing-box, of segmental packing-rings in embracing engagement with said plunger, and means for compressing said rings against said plunger, said means consisting of a sheet-metal diaphragm and fluid means for compressing said diaphragm against said rings.

2. In a device of the character described, the combination with a plunger, stuffing-box, and a casing seated within said stuffing-box, of segmental packing-rings in embracing engagement with said plunger, and a diaphragm incasing said rings, said diaphragm consisting of a plurality of longitudinal sections of flexible sheet-metal and a plurality of interposed sections of a different metal, the edges of said sections being connected.

3. In a device of the character described, the combination with a plunger, stuffing-box, and a casing seated within said stuffing-box, of segmental packing-rings in embracing engagement with said plunger, and a diaphragm incasing said rings, said diaphragm consisting of a plurality of longitudinal sections of flexible sheet-copper and a plurality of interposed sections of sheet-steel.

4. In a device of the character described, the combination with a plunger, stuffing-box, and a casing seated within said stuffing-box, of segmental packing-rings in embracing engagement with said plunger, and a diaphragm incasing said rings, said diaphragm consisting of a plurality of longitudinal sections of flexible sheet-copper and a plurality of interposed sections of sheet-steel, and fluid-pressure means for actuating said diaphragm to exert inwardly-directed pressure against the packing-rings.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE STRANCE.
REECE S. BULL.
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