W. H. OGDEN.

PACKING FOR ENGINES.

APPLICATION FILED NOV. 24, 1911.

1,020,842. Patented Mar. 19, 1912.

Fig. 1.

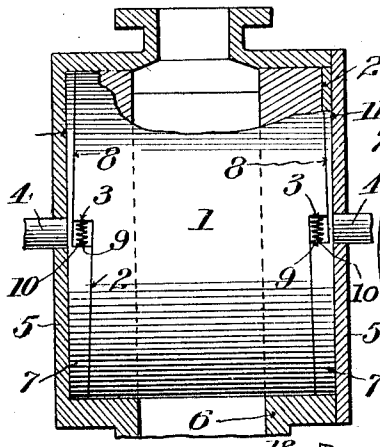
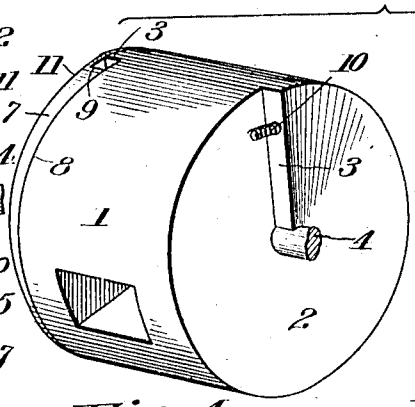


Fig. 2.



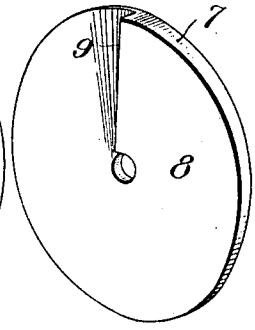


Fig. 4.

Fig. 5.

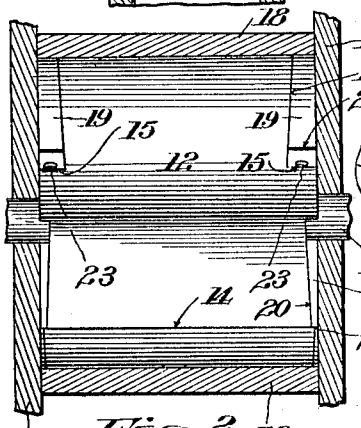
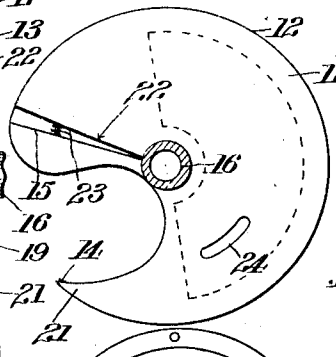


Fig. 3.



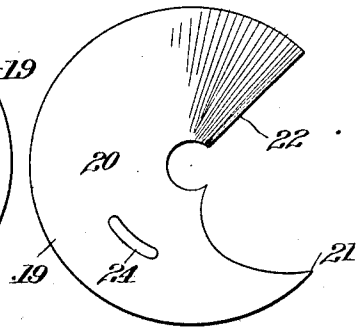
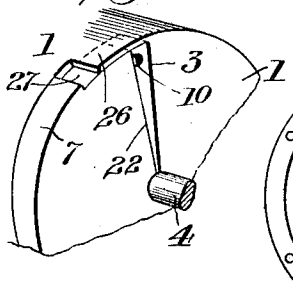


Fig. 7.



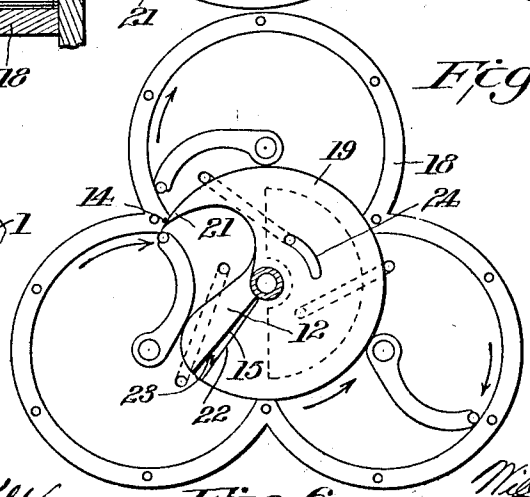
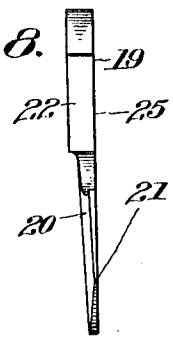


Fig. 6.

Fig. 8.



WITNESSES

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PACKING FOR ENGINES.

1,020,842. Specification of Letters Patent. Patented Mar. 19, 1912.

Application filed November 24, 1911. Serial No. 662,232.

To all whom it may concern:

Be it known that I, WILLIAM H. OGDEN, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented a certain new and useful Improvement in Packings for Engines, Valves, and the Like, of which the following is a full, clear, and exact description.

The object of this invention is to provide means for rendering substantially fluid-tight the rotary elements, such as pistons, abutments, steam-chests or other fluid chests, valves, or other parts of steam engines, internal combustion engines, and other engines or machines, which parts are arranged within cylinders or casings and have their ends fitted against the heads or end walls of said cylinders or casings and require a substantially fluid-tight engagement between themselves and their cylinders or casings; said means being of such character as to be effective in operation and automatically maintain a balance between the friction and operative parts, and also insure a fluid-tight contact of parts, without any undue amount of friction or leakage, and compensate for expansion and wear between the parts.

The invention consists in a packing for devices of the character mentioned, comprising in one preferred form, a substantially cylindrical rotary member having its end or ends formed with a spiral surface, and a substantially circular packing plate having a reverse spiral surface arranged adjacent to and engaging the spiral surface of said rotary member, and a plane outer surface adapted to engage the adjacent wall of the casing for said rotary member, so that in the operation of the rotary member the coaction of the spiral surfaces will insure a fluid-tight contact of the packing plate with the adjacent wall of the inclosing member, all as I will proceed now more particularly to set forth and finally claim.

Without thereby restricting the scope and utility of the invention, I have herein shown the same as embodied in a rotary valve and one form of rotary engine.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 shows a valve with the rotary member and packing in elevation, and its casing in section. Fig. 2 is a perspective view of the rotary member of the valve of Fig. 1, and one of the packing plates detached. Fig. 3 is an elevation of an abutment for rotary engines with the invention applied thereto and showing a portion of the cylinder in section. Fig. 4 is an end elevation of the rotary abutment of Fig. 3. Fig. 5 is an elevation of the packing plate for the abutment of Figs. 3 and 4, showing the spiral surface thereof. Fig. 6 is an interior elevation of a trefoil or three cylinder rotary engine having a rotary abutment and steam or gas chest provided with my invention. Fig. 7 is a detail perspective view showing a modification. Fig. 8 is an edge view of the packing plate of Figs. 3, 4, 5 and 6.

Referring to Figs. 1 and 2, the rotary cylindrical body or member 1 of the valve has its ends formed or provided with a spiral surface 2, terminating in a shoulder or stop 3. This cylindrical body or member 1, may be fixedly mounted upon or made integral with a shaft 4 projecting a suitable distance beyond the end walls thereof to be mounted in bearings therefor in the heads or side walls 5 of a casing 6, said shaft being adapted to be connected with any suitable mechanism for continuously rotating said cylindrical body or member.

Loosely mounted upon the projecting ends of the shaft 4 within the casing are circular packing plates 7 having their inner faces formed or provided with spiral surfaces 8, complemental to the spiral surfaces of the body or member 1, and terminating in a shoulder or stop 9, said packing plate with its spiral surface fitting closely up against and engaging the spiral-surfaced ends of the body or member 1, with the shoulders or stops 3 and 9 thereof adjacent. A coiled or other spring 10 is fixed between the adjacent shoulders or stops 3 and 9, to keep said shoulders or stops slightly separated to permit of the operation of the packing plates as hereinafter described. The outer faces 11 of the packing plates are constructed as a plane surface to fit closely against the adjacent

surfaces of the walls of the casing heads 5, to form a fluid-tight contact therewith.

In Figs. 3, 4, 5, 6 and 8, I have shown the invention as applied to a combined rotary abutment and steam or gas-compression chest such as is employed in the rotary steam engine forming the subject of my application for patent filed May 16, 1911, Serial No. 627,579, or in my internal combustion engine forming the subject of my application for patent filed June 20, 1911, Serial No. 634,385. In this form of the device, the rotary abutment and steam or gas chest 12 is of volute form; and in accordance with this invention the ends of the rotary abutment are formed or constructed with a spiral surface 13 beginning at the leading end 14 of the abutment and gradually increasing in depth toward the longitudinal center of the abutment and terminating in a shoulder or stop 15, at the exhaust side of the abutment. The abutment is fixedly mounted upon a shaft or has trunnions made integral therewith, as indicated at 16, adapted to engage suitable bearings therefor in the ends or heads 17 of the cylinder or casing 18.

Loosely mounted upon the shaft or trunnions 16, upon opposite sides of the abutment, are the packing plates 19 formed to substantially correspond in outline to the volute ends of the abutment, and provided with the spiral surfaces 20, beginning at the leading end 21 of the plate very thin and gradually increasing in thickness on the inside adjacent to the ends of the abutment, to form said spiral surface, its radii being always at right angles to the vertical axis or hub of the abutment, and its greatest thickness being at the exhaust side of the abutment, and terminating in a straight edge 22, extending substantially radially from the axis of the plate, and constituting a stop terminating at and arranged adjacent to the shoulder or stop 15 on the spiral-surfaced end of the abutment. A coiled or other spring 23 is interposed between the stop or shoulder 15 and the stop 22, to keep the parts slightly separated to permit of the operation of the packing plates.

In Fig. 6 I have shown somewhat diagrammatically in vertical section, a rotary engine such as that illustrated in my applications for patents above mentioned, and in connection therewith have shown in elevation the combined abutment and fluid compression element constructed in accordance with this invention. In this form of the device the spiral packing plates are provided with an elongated port or opening 24 to coöperate with the port in the fluid compression element in maintaining an open port during the movements of the packing plates, although such movements are very slight. The outer faces 25 of the spiral packing plates 19 are plane surfaces, and are adapted to engage and maintain a fluid-tight surface contact with the heads of the cylinders during the movements of the moving parts.

The rotary members with this invention applied thereto are arranged in their cylinders or casings so that the springs between the abutting stops or shoulders of the spiral surfaces on the ends of the body and the packing plates will tend to force the packing plates forward in the direction of rotation of the rotary part; and during the operation of the device any friction between the packing plates and the heads of the cylinder or casing will force the packing plates back against the pressure of the spring and thus automatically maintain a perfect balance of force between the friction and the spring and consequently a substantially perfect steam or gas-tight contact between the rotary member and heads of the cylinder or casing is obtained, without undue friction or leak, and furthermore, the packing plates automatically accommodate themselves to and compensate for expansion or contraction and wear. As only a very small fraction of an inch of variation is required for these conditions in any sized engine or machine, the movement of the spiral packing plate either forward or reversely would be slight, thus not affecting materially the change in position of any ports that it may be necessary to provide in the packing plates. This, however, may be overcome by elongating the ports, as above described. Should the fluid pressure find its way between the spiral surfaces or between the rotary member and cylinder heads, the spring would immediately force the spiral packing plate forward and close the space and force out such steam or other pressure; and should the engine become heated and the parts expand, the friction between the spiral packing plates and cylinder heads would force the packing plates back and thus compensate for such expansion and prevent undue friction between the parts.

In the application of the invention to the rotary engines of my applications hereinbefore referred to, the spaces or openings between the stops and shoulders of the spiral surfaces being arranged on the exhaust side of the abutment and fluid compressing chest would in no wise affect the operation of the engine by any leakage that might occur at this point. However, in other applications of the invention, it may be necessary to provide against leakage at the opening between the adjacent edges or stops of the spiral packing plate and rotary member, and as one illustration of such provision, I have shown in Fig. 7 a rotary valve member 1, such as that shown in Figs.

1 and 2, provided with a lip or plate 26 overhanging the stop or shoulder 3 and fitting and adapted to slide upon a countersunk portion 27 of the spiral packing plate 7. Thus it will be seen that the opening between the adjacent edges of the rotary member and its spiral packing plate at the surface of the rotary member is always kept closed irrespective of the movements of the packing plate relative to the rotary member.

I have herein shown the invention as applied to cylindrical rotary or revolving devices, but I wish it to be understood that the invention is not limited to such use, as it is equally applicable to any revolving or rotary member requiring end-packing against a casing or cylinder head, whether said rotary or revolving member be cylindrical or tapering.

Furthermore, I do not wish to be understood as limiting the invention to the exact details of construction herein shown and described, as the same may be changed in various particulars without altering the scope of the invention.

What I claim is:—

1. The combination of a rotary member provided with a spiral-surfaced end, a casing therefor, and a packing plate loosely mounted upon said rotary member and having a complemental spiral surface in contact with the spiral-surfaced end of said rotary member and a plane surface in contact with the adjacent wall of said casing.

2. A packing, comprising a rotary member and a casing therefor, said rotary member provided with a spiral-surfaced end terminating in a shoulder, a packing plate loosely mounted upon said rotary member and having a complemental spiral surface contacting with the spiral-surfaced end of the rotary member and terminating in a shoulder adjacent to the shoulder on the rotary member and a plane surface contacting with the wall of said casing, and a spring interposed between said shoulders for forcing said packing plate in the direction of rotation of said rotary member and maintaining a yielding contact between said packing plate and the wall of the casing.

3. A packing, comprising a cylindrical rotary member, a shaft therefor, and a casing in which said member is mounted, said cylindrical rotary member having its opposite ends provided with spiral surfaces terminating in shoulders, packing plates loosely mounted upon said shaft at the ends of said rotary member and having complemental spiral surfaces adjacent to the spiral surfaces of said ends and terminating in shoulders adjacent to the shoulders on said rotary member, and plane outer surfaces to contact with the walls of said casing, and springs interposed between said shoulders to force said spiral-surfaced packing plates in the direction of rotation of the rotary member and maintain a yielding contact between said packing plates and the walls of the casing.

4. In a rotary engine, the combination with the cylinder and pistons thereof, of a rotary abutment for said pistons, having spiral surfaces, a supporting shaft, and packing plates loosely and yieldingly mounted upon said shaft adjacent to said spiral surfaces and having complemental spiral surfaces in movable contact with the spiral surfaces first named, and plane outer surfaces yieldingly contacting with the inner walls of the cylinder.

5. In a rotary engine, the combination with the cylinder and pistons thereof, of a combined abutment and compression chest, comprising a rotary member of volute form having spiral-surfaced ends, a shaft upon which said rotary member is mounted in said cylinder, and volute packing plates loosely and yieldingly mounted upon said shaft and having complemental spiral surfaces adapted to contact with the spiral-surfaced ends of said rotary member, and plane outer surfaces adapted to yieldingly contact with the inner walls of the cylinder heads.

6. In a rotary engine, the combination with the cylinder and pistons thereof, of a combined abutment and compression chest, comprising a volute rotary member having spiral-surfaced ends terminating in shoulders, a shaft upon which said rotary member is mounted in said cylinder, volute packing plates loosely mounted upon said shaft and having complemental spiral surfaces adapted to contact with the spiral-surfaced ends of said rotary member and terminating in stops adjacent to the shoulders on said rotary member and plane surfaces to contact with the inner walls of said cylinder, and springs interposed between said shoulders and stops to force said packing plates in the direction of rotation of said rotary member and thereby maintain said packing plates in yielding contact with the walls of the cylinder.

7. A packing, comprising a cylindrical rotary member, a shaft therefor, and a casing in which said rotary member is mounted, said cylindrical rotary member having its opposite ends provided with spiral surfaces terminating in shoulders, packing plates loosely mounted upon said shaft at the ends of said rotary member and having complemental spiral surfaces adjacent to the spiral surfaces of said ends and terminating in shoulders adjacent to the shoulders on said rotary member and plane outer surfaces to contact with the walls of said casing, springs

interposed between said shoulders to force said packing plates in the direction of rotation of said rotary member and maintain a yielding contact between said packing plates and the walls of the casing, and a plate carried by one of said members and overhanging the opening between said shoulders and slidably engaging the other member.

In testimony whereof I have hereunto set my hand this 23 day of November A. D. 1911.

WILLIAM H. OGDEN.

Witnesses:
LEON C. RHODES,
OUIDA JENISON.