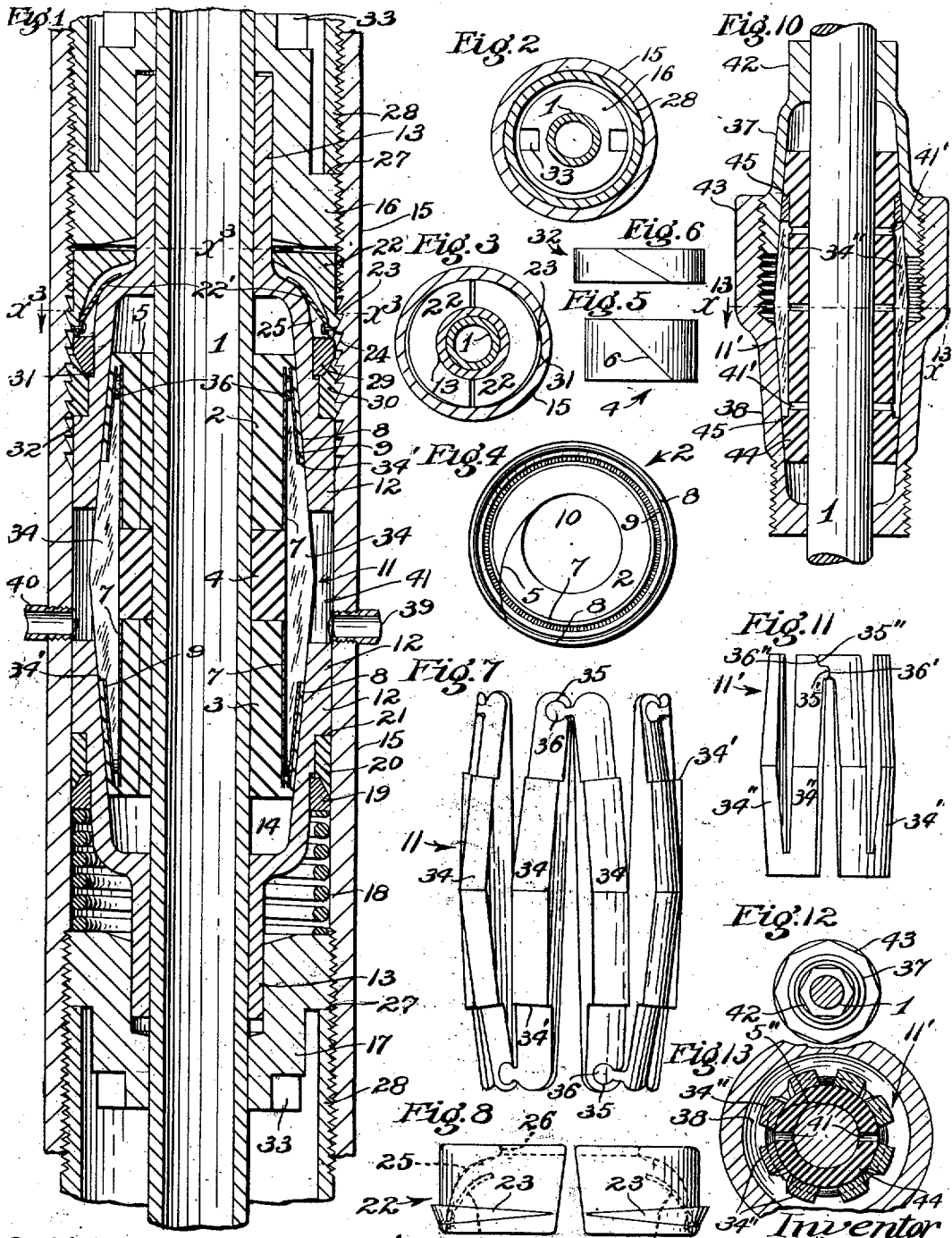


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Patented Mar. 21, 1911.



UNITED STATES PATENT OFFICE.

JOHN HAHN, OF LOS ANGELES, CALIFORNIA.

STUFFING-BOX.

987,296.

Specification of Letters Patent.

Patented Mar. 21, 1911.

Continuation of application Serial No. 568,033, filed June 20, 1910. This application filed November 7, 1910.
Serial No. 591,190.

To all whom it may concern:

Be it known that I, JOHN HAHN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Stuffing-Box, of which the following is a specification.

This invention includes features shown in my application for pump fittings, Serial No. 568,033, filed June 20, 1910, and is a continuation of, and covers features of invention shown and not claimed in said application.

The invention is adapted for application in various forms to prevent leakage between relatively moving parts, of many kinds.

An object of this invention is to provide a stuffing box by means of which the packing to close the joint can be adjusted to any degree of tightness; and also to make provision whereby a chamber for oil or other cooling medium is formed around the packing as is desirable for shafts, engine pistons and cylinders.

Cheapness, simplicity, ease of adjustment and freedom from becoming loose are other objects in view.

Further objects and advantages may appear from the subjoined detail description. The invention is applicable in various shapes and in different proportions and sizes to meet the various requirements of different structures to which it may be applied.

In this invention provision is made for compressing or squeezing a long packing equally from both ends and from all sides throughout its length, so that the packing will aline the body that is packed and hold it in true alinement with the ends of the stuffing box.

The accompanying drawings illustrate the invention in some of the forms in which it may be applied for packing cylindrical bodies.

Figure 1 is an axial section of a stuffing box embodying this invention and applied in cylindrical form as it might be arranged for the cylinder of an engine or a pump; and for the purpose of illustration, the inclosing case shown may be regarded either as a fragment of pump casing or of the cylinder of a steam or gas engine; and the inclosed body may be regarded as occupying the place of the piston of an engine or pump, or as the piston rod of an engine or as a pro-

PELLER shaft, or as the polishing rod of a pump. The parts are adjusted as applied for packing the vertical piston rod of a pump, and fragments of pump tubing are shown above and below the packing. Fig. 2 is a reduced plan section from the top of Fig. 1. Fig. 3 is a reduced plan section on the irregular plane indicated at x^3 , Fig. 1, showing the upper ends of the dog members intact. Fig. 4 is a view of the lower end of the upper section of the packing sleeve shown in Fig. 1. Fig. 5 is a side elevation of the middle packing section shown in Fig. 1 viewed from the slit side. Fig. 6 is a view analogous to Fig. 5 showing the outer packing ring that is next to the case in Fig. 1. Fig. 7 is a side elevation of the compressible packing cage shown in Fig. 1 assembled as in use and detached. Fig. 8 is a side elevation in the scale of Fig. 1 showing the dogs for one of the wedging members. Fig. 9 is an elevation in reduced scale of the inside face of one of the dogs shown in Fig. 8. Fig. 10 is a longitudinal section of a stuffing box embodying the invention in a simpler form than that shown in Fig. 1, and applied to the polishing rod of an oil pump. Fig. 11 is a side elevation of the simple compressible packing cage shown in Fig. 10. Fig. 12 is a reduced plan from the top of Fig. 10. Fig. 13 is a fragmental section on line x^{13} , Fig. 10.

Referring to the form shown in Fig. 1, the body 1 to be packed is surrounded by a packing sleeve which is shown in three sections, the upper end section having a main body 2 and the lower end section having a main body 3 and said end sections being practically duplicates. Between the main bodies of the end sections is held a middle section 4. All of said sections are spirally split on one side in such a manner as to allow the sections to be separately spread open and applied to the body 1 from any side thereof, so that each section when compressed as hereinafter described, forms a practically impermeable barrier to the fluid to be packed against. In the end packing sections 2 and 3, which are of considerable length, the split 5 is tangential and the spiral joint faces at the split 5 extend in longitudinal traces parallel with the axis of the packing, while in the middle packing section 4, the spiral joint faces at the split 6 are in a plane that is aslant relative to the

axis of the packing. Said packing may be of any yielding flexible stuff as rubber, asbestos, hemp or other material adapted for the particular use to which the cylinder may be applied. The packing sections 2 and 3 as shown are of rubber, vulcanized to the inside of a spiral split band 7 of brass. The main bodies 2, 3, of the end packing sections are cylindrical and each is provided at one end with a flaring flexible rubber apron 8 which is vulcanized to a frusto-conical brass lining 9. Said lining and apron are tapered down toward the outer end of the packing; and all are spirally split as indicated at 5 in Fig. 4; the spiral split in said figures extending through the main body 2, the band 7, the lining 9 and the apron 8. The central orifice 10 of the packing is preferably of the same diameter as the body 1 and the purpose of the longitudinal spiral joints at 5 and 6 is to allow the packing sections to be compressed without wrinkling and to prevent leakage. Outside of the packing sections shown at 2, 3 and 4 and inside the aprons 8 a reversely tapered contractible packing-compressing cage 11 is applied. Said cage is preferably formed of metal and constructed of corresponding sections which are inter-locked in zigzag relation with each other to prevent relative longitudinal displacement and to allow movement toward and from the axis of the packing. Applied to the opposite ends of the packing and to the opposite tapers of the compressing cage are two wedging members in the form of conical boxes 12, each having bearing sleeves 13, in slidable relation to the body 1, the packing and the compressing cage. Preferably the wedging members 12 are provided with frusto-conical chambers or cups 14 fitting the outside of the packing and compressing cage, so that when said wedging members are moved toward each other they press endwise on the packing, and inward on the members of the cage, thus compressing the packing in all directions against the body 1. The packing sections are placed in the box with their joints at 5 and 6 in staggered relation to each other and at variant angles so as to increase the security against leakage. The middle packing section is compressible independently of the end packing sections and its joint is closable by pressure both transversely and longitudinally of the packing and the joints of the end packing sections are closable by inwardly directed pressure at right angles to the axis of the packing sleeve. By this construction maximum security against leakage along and through the packing is obtained with minimum compression of the packing, and consequently minimum friction on the packed body, and the packing sections may be applied to and removed from such body without sliding them over the end thereof. Suitable

means which may be automatic or otherwise are provided for relatively moving the elements that effect the compression. A case 15 is applied outside of the wedging members 12 as shown in Fig. 1, and forms a chamber around the packing sleeve between the wedging members. Said case may be of any form to carry out the purpose of the constructor and may be the cylinder of a steam or gas engine or a section of pump tubing, or may be any other inclosing member to encircle a piston or a piston rod or other body to be packed and may form a chamber of any character to hold lubricant or other cooling medium. In Fig. 1 said case is internally threaded at its ends, and heads or followers 16, 17, are screwed into its bore for the purpose of adjusting the wedging members 12 toward each other. The force exerted by the followers may be supported or transmitted in various ways as by a tension spring 18 which is mounted on the follower 17 and bears against a metal washer 19 which in turn bears against an outer packing ring 20 of hemp or other suitable material which engages a shoulder 21 of the wedging member 12 to move such member. There is also shown in Fig. 1 a dog 22 provided with detents 23 to engage notches 24 inside the case 15, and also provided with springs 22' that contact the wedging members 12 and hold the dog in position. Said dog is formed in two segmental pieces shown in Fig. 8, said pieces being somewhat less than semi-circular and each provided with a cavity 25 and with a recess 26 to accommodate the cup and the bearing sleeve of the wedging member. Each of the followers 16, 17, is provided with a locking shoulder 27 which may be engaged by the ends of pump tubing sections 28 when the same are screwed home in the case, thus to lock the followers in place and fix them as stationary heads. The dog 22 engages a beveled ring 29 the beveled face of which slopes from the wedging member 12 which is there provided with the notches 24 into which the detents 23 of the dog engage thus to retain the wedging member. The beveled ring 29 wedges against an outer compressible packing ring 30 to pack the notches 24 and prevent leakage from or to the annular space between the wedging members. The wedging members 12 are externally stepped at 31 and 32 to receive the pressure of the dog 22, the bevel metal ring 30 and the packing ring 32, and thereby applies force to move the wedging member toward the thicker middle portion of the compressing jacket, thereby to contract said jacket. When it is desired to do so the beveled ring 29 and the packing ring 32 may be dispensed with and the dog 22 applied directly to move the wedging member; or the dog also may be dispensed with and the follower 16 screwed

directly onto the wedging member. When a dog is to be employed in the packing for a pump it will be made of such gravity as may be required in each case to effect the desired compression of the packing without excessive friction upon the pump rod. The followers may be provided with wrench seats 33 to receive a spanner wrench or other device by which the followers may be screwed home.

In the form of cage shown in Figs. 1 and 7, a number of bars or slats 34 are joined together in zigzag relation to form a hollow slitted body that is internally cylindrical; each of said slats being externally tapered from the middle to the ends and provided at reverse sides and ends with a seat 35 and a tongue 36; said seat and tongue being complementary and correspondingly circular so that the tongue of one slat and the seat of the adjacent slat pivotally interlock to form hinges alternately at the ends of the cage, so that either end of the cage may be contracted or expanded independently of the other end. As the cage expands it shortens and as it contracts it lengthens. The ends of the cage are inserted in the spaces between the bands and linings; the slats being externally shouldered at 34' thus to form a cavity between the taper tips of the slats and the wedging members to accommodate the aprons 8 and their linings 9. When the cage lengthens and contracts it presses endwise on the packing at the tips and also inward on the packing along the main bodies and also outward on the aprons and the thrust is withstood by the wedging members and the body 1.

In the form shown in Figs. 10, 11, 12 and 13 the hollow wedging members 37 and 38 screw together to inclose the packing, and have conical cavities inside to engage the reversely tapered packing compressing cage which in this form, as illustrated in Fig. 11, consists of two corresponding semi-circular metal segments 11' each provided with staggered slats 34'' and with seats and tongues 35', 35'', 36', 36'' to hold the segments against longitudinal displacement, thus to render the cage compressible toward the axis after the manner of the cage shown in Fig. 7. The wedging members 37, 38, when screwed together form a substitute for the case 15 shown in Fig. 1.

Wherever it is desired to circulate a cooling medium around the packing this may be accomplished by providing the case with a passage as at 39 and 40 to allow the medium to enter and escape from the cooling chamber 41 inside the case. In Fig. 1 the pipes 39 and 40 form the inlet and outlet from such cooling chamber.

The packing may or may not be perforated thus forming passages to allow a medium to flow from or toward the body that

is packed. In Fig. 10 a number of such passages 41' is shown.

The wedging members 37, 38, may be provided with wrench seats 42 and 43, so that they may be readily turned.

In practice the stuffing box parts may be assembled originally by sliding onto the body to be packed the various elements which are to surround the same; said elements being put in the relative positions shown in Fig. 1. All the parts to surround the body 1 may be assembled independently of said body 1 and the body 1 may then be slipped into the stuffing box. Then assuming that the tube sections 28 have not been applied the followers or either of them may be adjusted, thus bringing the wedging members sufficiently close together to effect the desired compression, then the tube sections 28 may be screwed into place, thereby locking the followers in fixed relation to each other and the other parts.

If at any time, the packing becomes worn a tube section 28 may be unscrewed and the follower thus made available may be screwed in to tighten the packing. As the dog is moved along for this purpose it will spring back as the detents pass the notches and the springs 22' return the detents into the notches. In the case of a vertical stuffing box the weight of the dog 22 may be sufficient to force the wedging members down to take up the wear.

To remove the packing the tubing and one of the followers may be unscrewed, thus allowing the case to be slipped off of the active parts of the stuffing box. Whereupon the wedging members may be slid apart, thus giving access to the cage and then the sections of the cage may be separated and the sections of the packing sleeve may be withdrawn laterally and replaced with new. In the form shown in Figs. 10 and 13 it is sufficient to simply unscrew the wedging members from each other, thus giving access to the internal parts. The packing sleeve 44 shown in Figs. 10 and 13 is unitary and is provided with a slit 5'' corresponding to the slit 5 of Fig. 1. The shoulders 45 at the ends are devoid of the aprons shown in Fig. 1 and contact with the conical cups of the wedging members 42, 43, thus to be squeezed endwise radially as the wedging members are screwed home upon the contractible cage 11'.

The spaces between the slats or bars of the cage in either of the forms shown constitute channels in which the cooling medium or lubricant may circulate to cool and lubricate the packing.

I claim:—

1. The combination with a body to be packed, of a compressible packing sleeve around said body; said packing sleeve being tapered toward its ends and provided be-

tween the tapered portions with a recess, wedging members adapted to be screwed together to inclose the packing and to engage the tapered ends thereof, and means in the recess to hold the packing toward the body to be packed.

2. The combination with a body to be packed, of a split packing sleeve around said body; said sleeve being provided with shoulders at its ends, wedging members around the sleeve contacting with the shoulders of the sleeve, and means between the shoulders to compress the sleeve.

3. The combination with a body to be packed of a split packing sleeve around said body, said sleeve being provided with shoulders at its ends, bars arranged in zig-zag relation between the shoulders and around the sleeve, wedging members contacting with the sleeve and with the bars and means to move the bars and compress the sleeve.

4. The combination with a body to be packed of a spirally split packing sleeve provided with shoulders and aprons at its ends, bars arranged in staggered relation to each other around the sleeve and between the shoulders and between the aprons and the body of the sleeve, and means for wedging the sleeve, apron and bars to compress the sleeve.

5. The combination with a body to be packed of a compressible packing sleeve around said body, said sleeve being provided at its ends with shoulders and with aprons, bars arranged in staggered relation to each other around the sleeve between the shoulders and between the aprons and the main body of the sleeve and means for wedging the sleeve, apron and bars to compress the sleeve endwise and laterally.

6. The combination with a body to be packed of a compressible sleeve provided at its ends with shoulders and aprons, bands around the ends of the sleeve inside the aprons, linings inside the aprons, bars arranged in staggered relation between the aprons, and hollow wedging members to wedge the aprons and the bars to compress the sleeve.

7. In a stuffing box the combination with a packing sleeve of hollow wedging members around the ends of the sleeve, a case around the wedging members and means inside the case for relatively moving the wedging members to compress the sleeve.

8. In a stuffing box the combination with a packing sleeve, of bars arranged in staggered relation around the packing sleeve, hollow wedging members around the ends of the sleeve and bars, a case around the wedging members, sleeve and bars, and means inside the case to relatively move the wedging members to compress the bars and sleeve.

9. The combination with a body to be packed of a compressible packing sleeve around said body, a cage composed of bars in staggered relation to each other around the sleeve, hollow wedging members around the ends of the sleeve and cage, said wedging members having external shoulders, a case around the wedging members, said case being externally screw-threaded at its ends and provided with notches, packing rings around the wedging members and against the shoulders thereof, rings around the wedging members and against the packing rings, a spring against one of said rings, a dog having detents to engage the notches and arranged against the other of said rings, said dog being formed in parts, and followers screwed into the case against the spring and the dog.

10. The combination with a body to be packed of a compressible packing sleeve around said body, a cage composed of bars in staggered relation to each other around the sleeve, hollow wedging members around the ends of the sleeve and cage, said wedging members having external shoulders, a case around the wedging members, said case being externally screw-threaded at its ends and provided with notches, packing rings around the wedging members and against the shoulders thereof, rings around the wedging members and against the packing rings, a spring against one of said rings, a dog having detents to engage the notches and arranged against the other of said rings, said dog being formed in parts, followers screwed into the case against the spring and the dog, and means screwed into the case to lock the followers.

11. The packing sleeve provided at its ends with shoulders extending around the sleeve, a contractible cage between the shoulders, and means inclosing the packing sleeve and cage and contacting with the shoulders to compress the same and with the cage to contract the cage and thereby to compress the packing intermediate the shoulders.

12. The combination with a case and a body inside the case, of a packing sleeve arranged outside the body having shoulders at its ends and recessed to form a chamber between its ends and provided on said shoulders with frusto-conical aprons, metallic lining inside the aprons, metallic bands around the ends of the packing sleeve, a cage in the chamber; said cage being contractible and provided with channels for a lubricating or cooling medium, followers between the ends of the packing and the case to contact with the packing and the cage, and to compress the packing, and means to supply a lubricating or cooling medium to the chamber.

13. A stuffing box comprising spirally

split packing and means to compress the sleeve packing from all sides toward the center to aline the packed body with the ends of the stuffing box.

- 5 14. A stuffing box comprising a packing sleeve and means to compress the packing from all sides toward the center to aline the packed body with the ends of the stuffing box; and means to form a chamber
10 around the packing practically throughout the length of the packing to contain a cooling or lubricating medium.

- 15 15. In a stuffing box a packing compressing cage composed of bars longitudinally spaced apart and pivotally connected at their ends so as to be relatively movable toward and from each other.

- 20 16. The combination of bars arranged in zigzag relation and provided at their reverse sides and ends with seats and tongues pivotally interlocked substantially and for the purpose set forth.

- 25 17. In a stuffing box the combination with packing, of bars arranged in zigzag relation and provided at their reverse sides and ends with seats and tongues pivotally interlocked and means to move the bars to compress the packing.

- 30 18. A packing cage composed of slats hinged together alternately at the ends of the cage.

- 35 19. A packing cage composed of slats provided on their reverse sides and ends with seats and tongues and thereby alternately hinged at opposite ends of the cage so that the ends of the cage are independently contractible.

- 40 20. A packing externally recessed between its ends, a contractible cage in the recess and means to contract the cage.

21. In a stuffing box movable means to compress the packing and a dog to hold said means to tighten the packing.

- 45 22. In a stuffing box a case around the packing and provided inside with notches, means inside the case to compress the packing, and a dog formed in parts and provided with detents to engage the notches to tighten the packing.

- 50 23. The packing sleeve provided with an apron at its end and means outside and within the apron to compress the sleeve.

24. A stuffing box comprising a case; compressible packing arranged inside the case and provided with aprons at its ends; 55 contractible means around the packing and inside the aprons to compress the packing; boxes to compress the aprons and the contractible means; means to adjust one of the boxes in the case and resilient means to 60 support the thrust of the other box.

25. The combination with a case of a spring, means to support the spring, a washer on the spring, a packing sleeve on the washer, a wedging member inside the 65 washer and packing sleeve, a shoulder to receive the thrust of said washer and packing sleeve, packing inside the wedging member, contractible means arranged with one end inside the wedging means inside the wedging member, packing inside the contractible 70 means, wedging means around the other end of the contractible means to contract the same, and means to adjust the last-named wedging means. 75

26. The combination with packing of contractible means arranged around and adapted to compress the packing, wedging means to contract the contractible means, a case 80 around the wedging means, a packing ring between the wedging means and the case, a beveled ring on the packing ring, a dog to engage the beveled ring to move the packing ring and the wedging means, and means to hold the dog in adjustable position. 85

27. The combination with packing of contractible means arranged around and adapted to compress the packing, wedging means to contract the contractible means, a case 90 around the wedging means, a packing ring between the wedging means and the case, a beveled ring on the packing ring, a dog to engage the beveled ring to move the packing ring and the wedging means, means to hold the dog in adjustable position, and a spring 95 fastened to the dog and adapted to contact with the wedging member.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 29th day of October, 1910.

JOHN HAHN.

In presence of—

JAMES R. TOWNSEND,
OLIVE DIFFENDERFER.