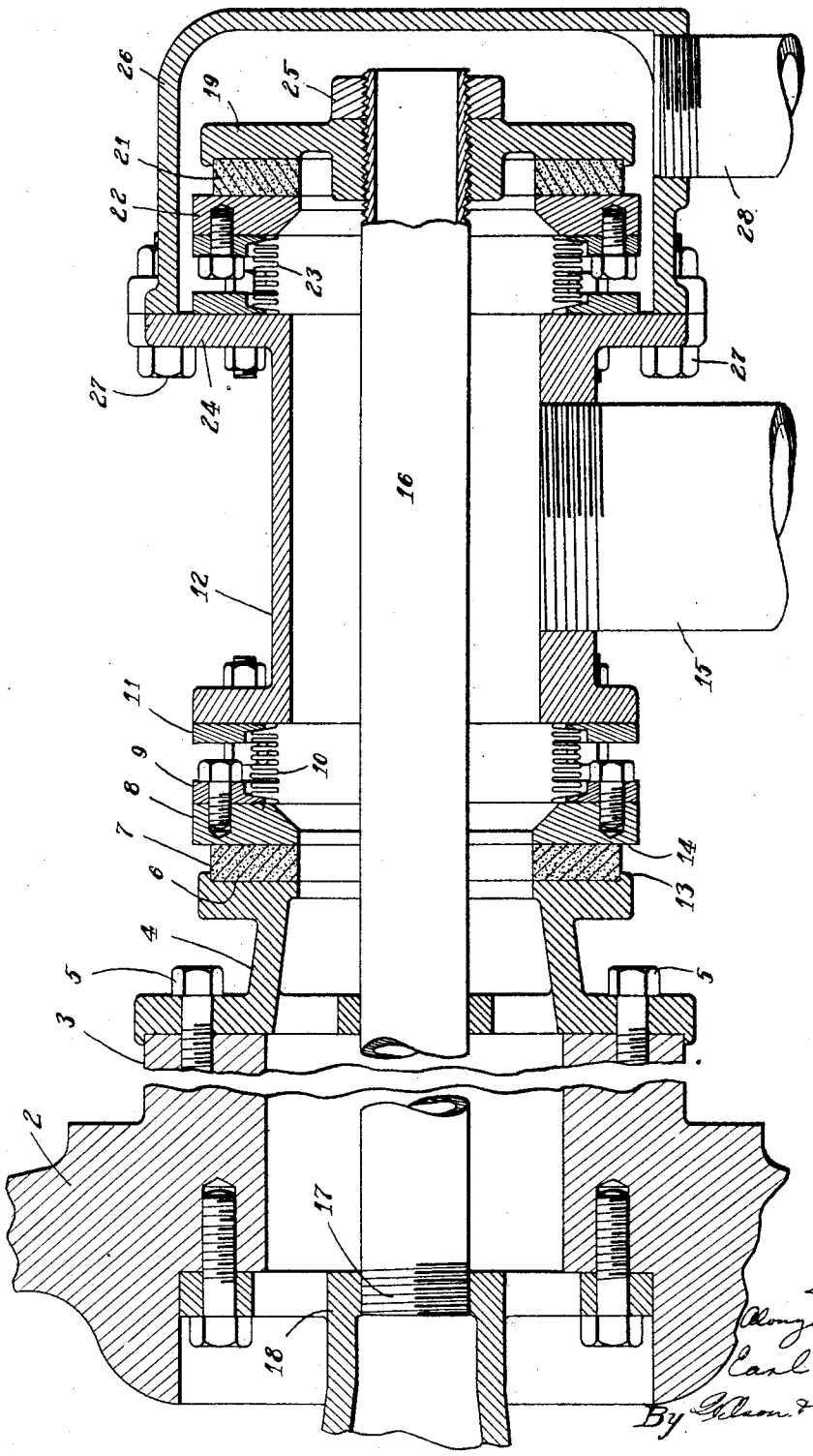
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STEAM FITTING

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STEAM FITTING.

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This invention relates to steam fittings especially designed and adapted for application to the end of a hollow rotating body such, for example, as the journal of a drying cylinder used in a paper making machine, and in certain respects is an improvement on our applications for U. S. Letters Patent, Serial Nos. 751,941, 751,942 and 751,943, filed Nov. 24, 1924.

In said prior applications steam fittings of this type are disclosed embodying certain novel features whereby a low friction, steam tight joint is automatically maintained between the rotating journal and the non-rotating steam supply fitting. In each case the structure employs a stationary part or support against which is taken the thrust of the steam pressure tending to unseat the steam fitting. In each case also the steam fitting includes a condensate return or outlet pipe fixed in the fitting. Said applications further disclose and claim broadly an expansible metal bellows or sylphon in the steam supply conduit functioning to automatically maintain a low friction, steam tight joint regardless of variations in steam pressure and to allow for certain displacements of the steam supply fitting and piping incidental to expansion and contraction of the parts.

The present invention aims to utilize our prior inventions without use of the stationary support against which the steam thrust was taken, and to this end comprehends broadly a steam supply fitting having one or more steam joints of the sylphon-backing type and including means secured to the rotating journal or cylinder for taking the steam thrust. As a result, the steam fitting is maintained in operative relation to the rotating journal by means directly associated with the journal as distinguished from being dependent upon extraneous means. This makes for greater practicability and eliminates outside contingencies such, for example, as the problem of maintaining the thrust resisting support in a stationary position.

Another purpose is to provide a steam fitting of the character described which is automatically balanced in the sense that the joints betwen the rotating and non-rotating parts are maintained in steam tight, low friction contact regardless of variation of the steam pressure.

Another purpose is to provide a novel condensate outlet or return, characterized by a condensate outlet pipe secured to the rotating journal and serving as the prime means for maintaining the steam supply and condensate outlet fittings in operative relation to the journal. By holding the parts in this relation the condensate pipe serves to resist the pressure of the steam tending to unseat the steam fitting from the journal. In this regard we have provided an adjustment in connection with the condensate return pipe whereby the pressure on the steam joints may be varied or adjustment may be made for take up of wear.

A further object is to provide a simple and practical construction of the character described which may be readily applied to any cylinder journal and which will serve in a practical and satisfactory manner the purposes intended.

Our invention further contemplates broadly the provision of a rotating and a non-rotating conduit held, one seated against the other, by a part secured to the rotating conduit and extending through the non-rotating conduit and acting against the latter through the intermediary of a sylphon. This organization preferably, but not necessarily, includes a second sylphon backing one of the bearing members in the joint between the conduits.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawing.

The figure is a fragmentary, longitudinal vertical section through a steam fitting embodying our invention showing its application to a hollow rotating journal or trunnion.

In this case only a small portion 2 of one end of a drying cylinder is shown and the trunnion or journal 3 on said end is shortened, it being manifest that the journal revolves in a suitable bearing, not shown. To the end of this journal or rotating conduit is applied the steam fitting or non-rotating conduit, in this instance a supplemental part 4 being secured by bolts 5 to the end of the journal, this supplemental part providing a rotating bearing face 6. Against this bearing face is seated a bearing disk 7, preferably of some suitable composition, such, for example, as carbon impregnated with graphite. Against the bearing disk is seated a non-ro-

tating member 8 which in turn is secured by clamps 9 as disclosed in our application, Serial No. 751,942, to a flexible, axially expansible, metal bellows known as a sylphon, designated by 10, preferably formed of copper, which in turn is secured by similar clamps 11 to one end of a non-rotating steam supply conduit 12. The bearing disk 7 is retained from displacement by a flange 13 on the rotating part 4 and the flat surface 14 between the parts 7 and 8 permit a certain amount of play in a vertical plane between the steam fitting and the journal occasioned by expansion and contraction of pipes. Steam is supplied to the conduit 12 by a vertical pipe 15 which, together with a vertical condensate outlet pipe described later, supports the fitting. The steam fitting in so far as the steam inlet function thereof is concerned, is completed in this instance by a condensate outlet or return pipe 16 extending through the conduit 12 and secured at 17 to the rotating journal or cylinder, in this instance through the agency of a bracket 18 bolted to the latter, and a steam joint or fitting between the outer end of this pipe and the end of the conduit remote from the journal. On the outer end of said pipe 16 is adjustably secured a bearing part 19 against which is seated a bearing disk 21. A non-rotating bearing part 22 seats against the bearing disk 21 and is secured to one end of a sylphon 23, the opposite end of which is secured to a flange 24 on the conduit 12, the sylphon being clamped at its end to the contiguous parts in the same manner as the sylphon 10. The part 19 is threaded on the pipe 16 and, therefore, may be adjusted longitudinally thereon for the purpose of putting all of the parts between the journal part 4 and the part 19 under slight compression whereby the sylphons will yieldingly hold the bearing parts in contact. By means of a lock nut 25 the bearing part 19 may be secured in any adjusted position. The parts thus far described complete and comprise what may be termed a steam fitting in the sense that they provide a complete structure applicable to the journal for supplying steam thereto. The part 16 need not, necessarily, be in the form of a pipe since it functions to hold the steam fitting in operative relation to the journal and to resist the thrust of the steam pressure tending to unseat the steam fitting from the journal. An additional function is performed by making this part 16 in the form of a condensate outlet or return pipe. This pipe 16 discharges at its outer end into a housing 26 secured by bolts 27 to the flange 24 on the conduit 28 which, as above mentioned, serve to aid in supporting the seating.

From the foregoing it will be apparent that in addition to the steam supply fitting, a condensate supply fitting is attached to one end thereof or in such manner as to connect with the outer end of the return pipe 16 to carry away the discharging condensate. It will be further observed that in the present embodiment of our invention a partition is provided between the interior of the steam supply and condensate outlet fittings comprising the pipe 16 and parts 19, 21, 22 and 23, which include a steam joint, the non-rotating part of which is backed by a sylphon.

In operation the cylinder 2 rotates and inasmuch as the condensate outlet pipe 16 is secured to the cylinder, this pipe, together with the part 19 rotates. It will be apparent, therefore, that there are two joints having rotating and non-rotating parts, one joint being at each end of the steam supply fitting and each such joint having a non-rotating part backed by or responsive to the action of a sylphon. Steam is supplied to the revolving cylinder through the fitting described above and the condensate gathered from the interior of the cylinder, by any suitable means well known in this art, is discharged through the pipe 16 and condensate outlet fitting also described above. The steam, in addition to its function of heating the cylinder, is utilized to act on the sylphons and non-rotating bearing parts to keep the several bearing parts in contact to prevent leakage of steam or other fluid at the joints. The object, broadly, of obtaining a steam controlled joint, is disclosed in our prior applications above mentioned but the application thereof in the present case is novel. In this instance, the steam pressure acts on both the sylphons 10 and 22 and the bearing parts 8 and 22 in such manner as to maintain the bearing parts in steam tight contact regardless of variations in the steam pressure without, however, imposing undue pressure and consequently friction on such bearing parts at the higher pressures. It will be apparent, therefore, that the steam joints are balanced and that any elongation of the pipe 16 under the higher temperatures, or displacement due to contraction or expansion of the pipes 15 and 28, is taken care of by expanding or flexing of the sylphons. These sylphons likewise enable the bearing parts to be responsive to the action of the steam or other fluid pressure and consequently allow for constant take up due to wear. With this construction and principle of operation, steam tight joints will be maintained over a remarkably long period as compared with prior constructions which required constant care and attention and adjustment in order to prevent loss of steam. Another important advantage of the present type of construction is that the friction and consequent wear on the joints is remarkably small with the result that the life of the joints is increased far beyond the prior practice.

It should be expressly understood that the term "steam" as used in the claims means any fluid, and that the invention defined by the

claims may be applied with such other fluids.

While we have illustrated but a single embodiment of our invention, it should be understood that changes might be made in the construction and arrangement without departing from the spirit and scope of the invention, as expressed in the appended claims.

We claim:

1. In combination, a hollow rotary journal, a steam supply fitting, a steam joint between said fitting and journal and a condensate outlet pipe holding said fitting in operative relation to said journal.

2. In combination, a hollow rotary journal, a steam supply fitting seated against one end thereof, and means including a condensate outlet pipe rotating with the journal and serving to hold said fitting in operative relation thereto.

3. In combination, a hollow rotary journal, a steam supply fitting seated against one end thereof, a condensate outlet pipe passing through the fitting and fixed to the journal, and a sylphon action between said pipe and journal for holding said fitting in operative relation to the journal.

4. In combination, a hollow rotary journal, a steam supply fitting, a condensate outlet fitting, and a condensate outlet pipe discharging into the condensate outlet fitting and holding said steam supply fitting in operative relation to the rotary journal.

5. A combined steam supply fitting and a condensate outlet fitting for a hollow rotary journal both maintained in operative relation to the journal by a condensate outlet pipe connected to the journal.

6. In combination with a steam fitting for application to the end of a hollow rotating journal, a condensate outlet fitting, and a condensate outlet pipe secured to the journal and serving to hold the steam fitting against the journal.

7. In combination with a steam fitting for application to the end of a hollow rotating journal, a condensate outlet fitting, a steam joint between the steam fitting and the journal including a yieldable bearing part backed by a sylphon, and a condensate outlet pipe secured to the journal and serving to hold the steam fitting against the hollow journal.

8. In combination, a hollow rotating journal, a steam fitting having a steam joint bearing against the journal, one part of which joint is backed by a sylphon, and a condensate outlet fitting applied to the end of the steam fitting remote from the journal and having a steam joint including a bearing part backed by a sylphon and having also a condensate outlet pipe holding the steam fitting against the hollow journal.

9. In combination, a hollow rotary journal, a steam supply fitting, a condensate outlet fitting, a steam joint between the journal and steam supply fitting, a partition separating the interior of the steam supply fitting and the condensate outlet fitting including a condensate outlet pipe extending through the steam supply fitting and attached to the journal and including also a steam joint within the condensate outlet fitting between a non-rotating part and a part rotating with said pipe, each of said steam joints including a yieldable bearing part and a sylphon backing such part.

10. In combination, a hollow rotary journal, a steam supply fitting having a sylphon attached to each end and a steam inlet intermediate its ends, a steam joint between one sylphon and the journal, a second steam joint including a rotating and a non-rotating part, the latter of which is attached to the other sylphon, and means extending through the steam fitting connecting the rotating part of said steam joint to the rotating journal and serving to hold the steam fitting in operative relation to the said journal.

11. In combination, a hollow rotary journal, a steam supply fitting having a sylphon attached to each end and a steam inlet intermediate its ends, a steam joint between one sylphon and the journal, a second steam joint including a rotating and a non-rotating part, the latter of which is attached to the other sylphon, means extending through the steam fitting connecting the rotating part of said steam joint to the rotating journal and serving to hold the steam fitting in operative relation to the said journal, and a condensate outlet housing embracing the second mentioned steam joint and attached to the steam supply fitting, said means comprising a condensate outlet pipe discharging into said condensate outlet housing.

12. The combination of a hollow rotary journal, a steam supply fitting, the delivery end of which has a bearing part seating against the end of the journal, a condensate outlet fitting attached to the end of the steam fitting remote from the journal, a condensate pipe attached to the journal extending through the steam fitting and equipped within the condensate fitting with a bearing part forming part of a partition between the condensate fitting and the steam fitting, and means forming the remainder of said partition including a bearing part seated against the bearing part on the condensate pipe, and a sylphon acting between the steam fitting and the third mentioned bearing part and serving to seat the latter.

13. In combination, a steam fitting for application to the end of a hollow rotating journal, a steam joint between the journal and steam fitting including a yieldable part backed by a sylphon, a condensate outlet fitting associated with the end of the steam supply fitting remote from the journal including a steam joint having a rotating and a non-rotating part, a sylphon backing the

non-rotating part and acting between it and the steam supply fitting, and a condensate outlet pipe connecting the rotating bearing part and the journal.

14. A steam fitting for application to the end of a hollow rotating journal including a conduit having a sylphon attached to each end thereof and a steam inlet between said ends, a steam joint between one end of said conduit and the hollow rotating journal including a non-rotating part backed by the sylphon, a part extending through said conduit and secured at one end to the journal and equipped at its opposite end with a bearing part, and a steam joint between said bearing part and the opposite end of said conduit including a non-rotating bearing part backed by the sylphon on the adjacent end of the conduit.

15. In combination, a rotating and a non-rotating conduit, and means including a sylphon and a part secured to the rotating conduit and extending through the non-rotating conduit and acting through the sylphon to hold the non-rotating conduit seated against the rotating conduit.

16. In combination, a hollow rotating conduit, a hollow non-rotating conduit seated against said rotating conduit, and means holding said non-rotating conduit against said rotating conduit to maintain a fluid-tight joint therebetween comprising a part extending through the non-rotating conduit and secured to the rotating conduit, and a fluid-tight joint between said part and the non-rotating conduit including a bearing part backed by a sylphon.

17. In combination, a hollow rotating journal, a non-rotating conduit adapted to seat against one end of the journal, means passing through the conduit and secured to the journal for holding the conduit in operative relation thereto, a fluid-tight joint between the conduit and journal and another between the conduit and said means, each point including a part backed by a sylphon.

18. In combination, a hollow rotating journal, a steam supply fitting for application to the end of said journal, a condensate outlet fitting attached to said steam supply fitting, the means separating the interior of said fittings comprising a condensate outlet pipe extending through the steam supply fitting and secured to the journal, and a steam joint including a rotating bearing part fixed to the pipe and a non-rotating bearing part backed by a sylphon.

19. In combination with a hollow rotating conduit, a bearing disk seated against the end of the conduit, a non-rotating bearing part seated against said disk, a sylphon attached to said non-rotating bearing part, a non-rotating conduit attached at one end to said sylphon, a sylphon attached to the opposite end of said non-rotating conduit, a second non-rotating bearing part attached to the opposite end of the second mentioned sylphon, a bearing disk against which the latter non-rotating bearing part seats, a rotating bearing part against which the last mentioned bearing disk seats, and means securing the last mentioned rotating bearing part to the rotating conduit.

20. The combination set forth in claim 19 in which said means extends through the non-rotating conduit.

21. The combination set forth in claim 19 in which said non-rotating conduit is a steam supply conduit and said means is a condensate outlet pipe extending through the steam supply conduit.

22. The combination set forth in claim 19 including means for effecting axial adjustment of the last mentioned rotating bearing part with respect to the rotating conduit.

23. The combination set forth in claim 19 in which said non-rotating conduit is a steam supply conduit and said means is a condensate outlet pipe extending through the steam supply conduit, and including a housing enclosing the steam joint and sylphon at the end of the non-rotating conduit remote from the rotating conduit, into which housing the condensate pipe discharges.

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