

1,180,806.

J. W. VEDDER.
PIPE JOINT.
APPLICATION FILED OCT. 7, 1915.

Patented Apr. 25, 1916.
3 SHEETS—SHEET 1.

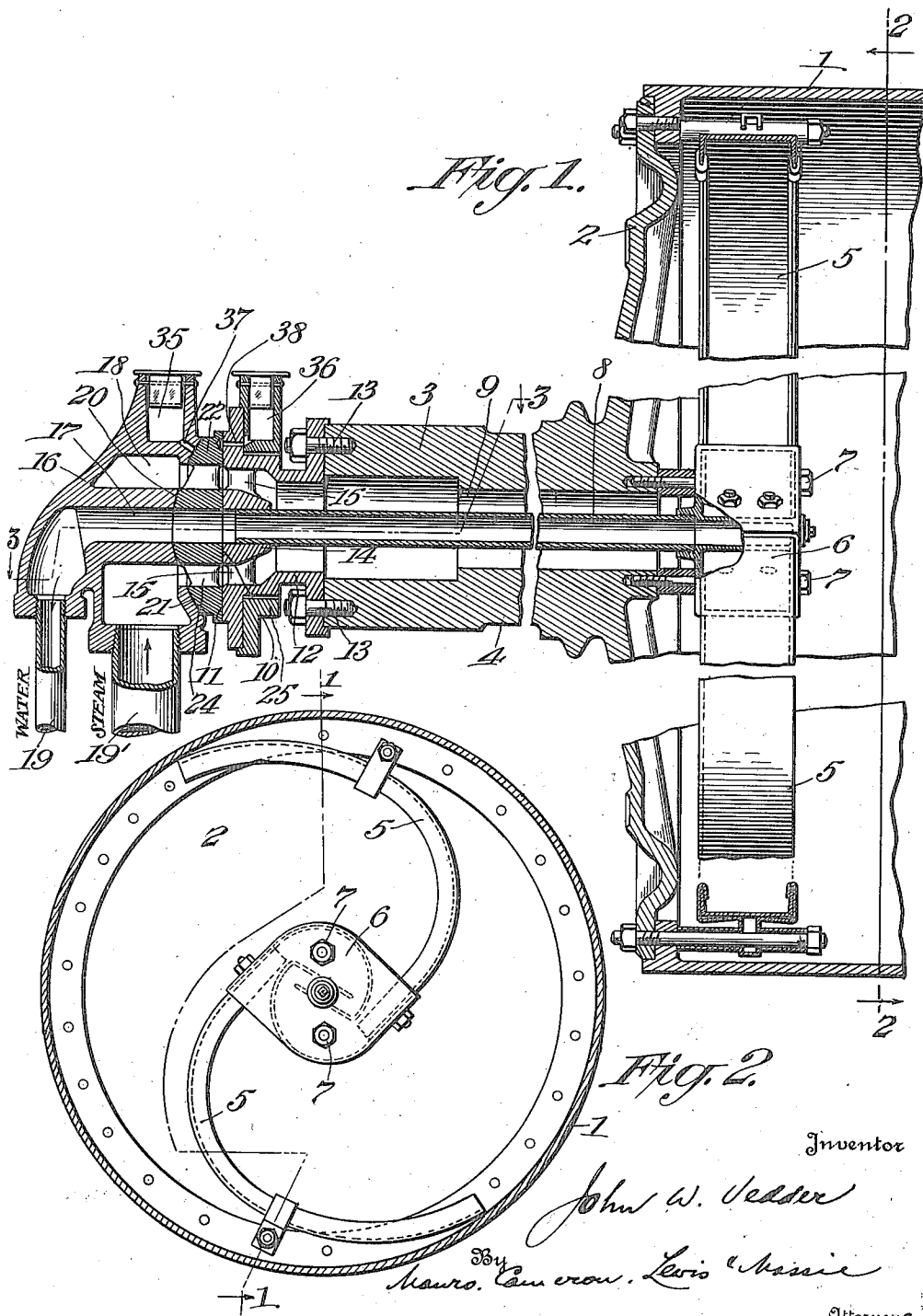


Fig. 2.

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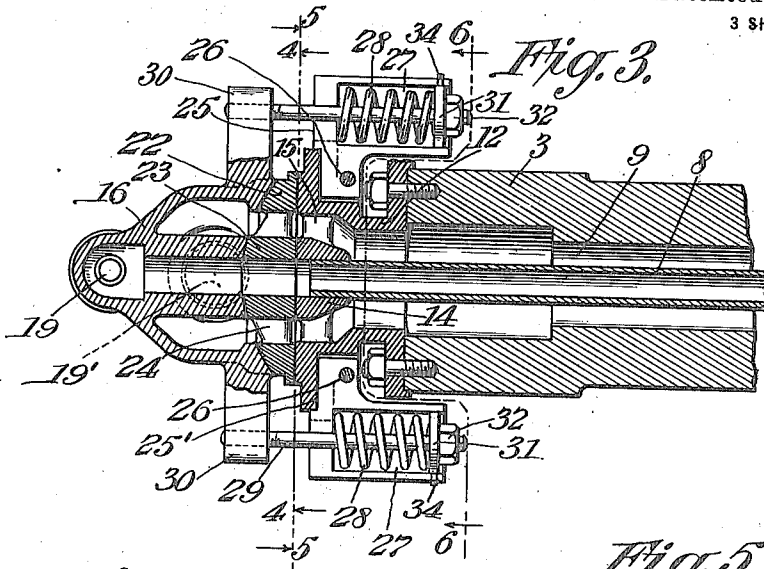


Fig. 4.

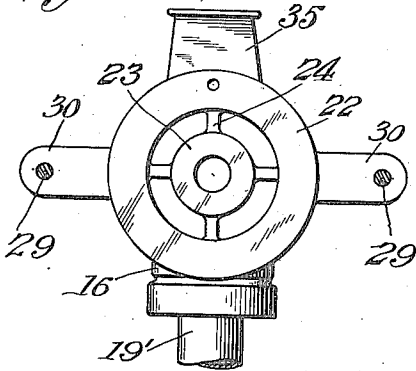


Fig. 5.

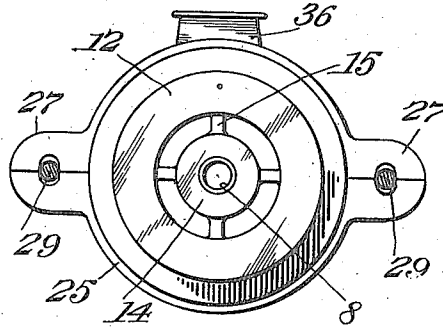
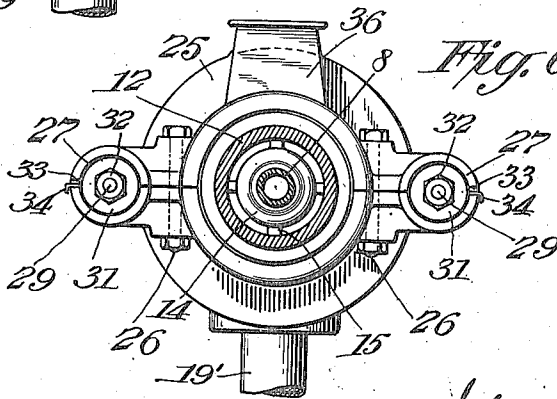


Fig. 6.



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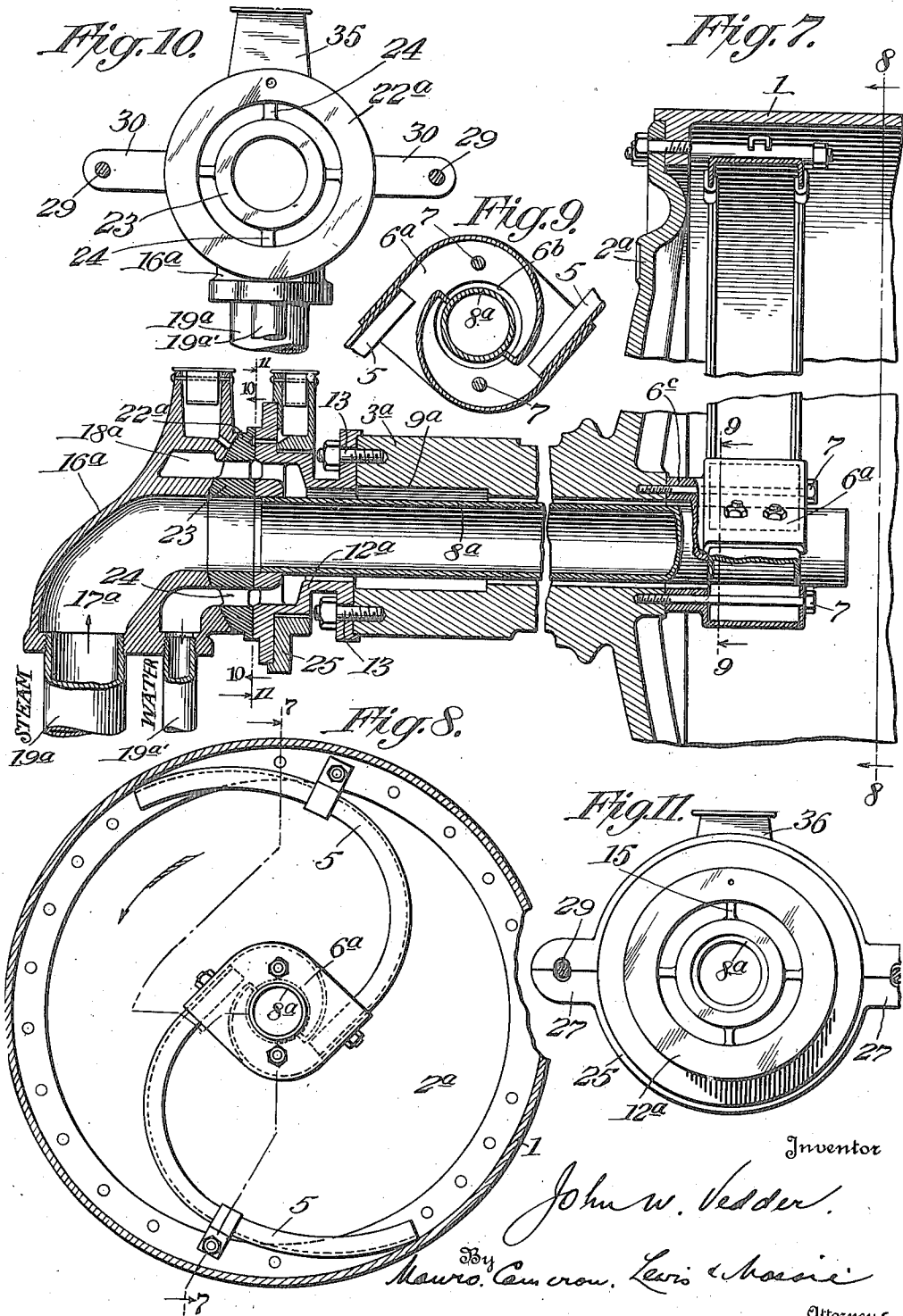
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UNITED STATES PATENT OFFICE.

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PIPE-JOINT.

1,180,806.

Specification of Letters Patent.

Patented Apr. 25, 1916.

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To all whom it may concern:

Be it known that I, JOHN W. VEDDER, a citizen of the United States, and a resident of Wilmington, Delaware, have invented a new and useful Improvement in Pipe-Joints, which invention is fully set forth in the following specification.

The invention relates particularly to pipe-joints adapted for maintaining tight connection between two pairs of pipes or ducts, one of which pairs is stationary and one of which pairs is rotating.

A construction embodying the invention is especially adapted for use with the rotating drums that form parts of paper-drying machines, each of the drums of which machines is provided at one end with a hollow trunnion, through which steam is supplied to heat the drum and through which the water of condensation is removed from the drum.

Prior to my invention it was customary to use mechanisms similar to that set forth in the patent to Savery, No. 635,512. The device of the Savery patent operates very satisfactorily when the water of condensation is removed from the drum by means of a stationary siphon. But, in the modern high-speed paper-making machines dippers are employed which revolve with the drum, the water-discharge pipe communicating with the inner ends of the dippers, and thus making necessary a joint between the rotating and non-rotating parts of the water duct. Attempts have been made to adapt the Savery construction for use with revolving dippers by permitting the water-discharge pipe F to rotate in the wall of the abutment G, which wall separates the steam-inlet space from the water-discharge space. It has been found that when the pipe F is permitted to rotate, the steam finds its way through the wall around the pipe and enters the water-discharge space, building up a pressure therein which seriously interferes with the free discharge of the water.

The principal object of my invention is to provide an improved and simple construction which makes it impossible for the steam to escape into the water space, both the steam and water ducts being maintained intact and tight throughout. In attaining this object, I provide a rotating steam and water duct having two passages, one of which surrounds the other, and I provide a non-rotating part also having two passages, one

of which surrounds the other, the said inner and outer rotating and non-rotating passages registering respectively with each other.

The invention can be embodied in a number of different ways, and, in the accompanying drawings I have shown two embodiments of the inventive idea. It will be understood that the drawings are for illustrative purposes only, and are not intended to limit the scope of the invention, the appended claims being relied upon for that purpose.

Of the drawings:—Figure 1 is a longitudinal sectional view taken along the line 1—1 of Fig. 2, and showing one end of a drier roll or drum having a combined steam and water duct embodying my invention; Fig. 2 is a vertical transverse sectional view through the drum on the line 2—2 of Fig. 1, showing the dippers; Fig. 3 is a horizontal sectional view taken along the line 3—3 of Fig. 1; Fig. 4 is a view taken along the line 4—4 of Fig. 3 looking toward the left; Fig. 5 is a view taken along the line 5—5 of Fig. 3 and looking toward the right; Fig. 6 is a sectional view taken along the line 6—6 of Fig. 3; Fig. 7 is a view similar to Fig. 1 taken along the line 7—7 of Fig. 8, and showing another embodiment of the invention; Fig. 8 is a view similar to Fig. 2, taken along the line 8—8 of Fig. 7; Fig. 9 is a detailed sectional view taken along the line 9—9 of Fig. 7; Fig. 10 is a view taken along the line 10—10 of Fig. 7 looking toward the left; and, Fig. 11 is a view taken along the line 11—11 of Fig. 7 looking toward the right.

Referring to the drawings, 1 represents a rotatable roll, drum or the like, of a paper-making or other similar machine, the drum being closed at the end by the head 2. The head 2 has connected to it, and preferably formed integrally therewith, a hollow trunnion 3 having a bearing surface 4, by means of which the trunnion and the drum are rotatably supported in a suitable bearing not shown. The hollow trunnion 3 serves as a part of a combined steam and water duct, as will be fully described. For removing the water from the interior of the drum, a rotating device is provided which preferably comprises two dippers 5—5 as shown. The outer ends of the dippers are positioned near the periphery of the drum and the inner ends connect with a receiv-

ing chamber 6, which is secured to the head 2 by means of suitable bolts 7—7. The chamber 6 is provided with a discharge aperture which communicates with a water discharge passage in the hollow trunnion. In the construction illustrated in Fig. 1, the aperture is centrally positioned and communicates with a rotating water discharge pipe 8, which is positioned centrally in the passage 9, extending longitudinally through the trunnion 3. The said passage 9 serves to conduct steam into the drum in the way that will be described. As clearly illustrated, especially in Fig. 2, the chamber 6 is formed with partitions or webs which serve to retain a small quantity of water for all positions of the drum, thus providing a water seal to prevent the escape of steam from the drum into the suction pipe 8. The ends of the rotating parts of the steam and water passages terminate in two concentric bearing surfaces 10 and 11, preferably forming parts of a single plane surface. Preferably, these bearing surfaces are formed on a separate ring 12, which is secured to the end of the trunnion 3 by means of bolts 13—13. The ring 12 is formed with a central hollow hub 14 into the aperture of which the pipe 8 tightly fits. The hub 14 is connected to the main body part of the ring by means of spokes 15—15.

Opposite the end of the trunnion 3 is located a stationary non-rotating abutment 16, having inner and outer passages 17 and 18, registering respectively with the pipe 8 and the passage 9. The inner passage 17 communicates with the pipe 19, which, in the construction shown in Fig. 1, leads to a place of water discharge. The outer passage 18 communicates with a pipe 19', which leads from a place of steam supply. The walls surrounding the inner passage 17 and the outer passage 18 are formed at their ends with bearing surfaces 20 and 21. Preferably, the bearing surfaces are spherically curved, and, as shown, they form parts of a single spherical surface.

Preferably, suitable joint means are interposed between the bearing surfaces 20 and 10, and between the bearing surfaces 21 and 11. In the preferred embodiment of the invention the joint means consists of a single valve disk 22, which is formed with an outer ring having bearing surfaces shaped to fit the surfaces 21 and 11, and a hollow inner hub 23 having bearing surfaces shaped to fit the bearing surfaces 20 and 10. The hollow hub 23 is connected with the ring by means of suitable spokes 24. The aperture through the hub, and the spaces between the hub and the ring, register respectively with the rotating and non-rotating water and steam passages already described. It will be observed that the joint means, which in the present construction

consist of the inner and outer parts of the disk 22, are positioned between the rotating ring 12 and the non-rotating abutment 16, and are out of register with the passages in these parts, thus leaving the passages substantially unobstructed. The outer bearing means is outside of the outer passages, and the inner bearing means is between the outer passages and the inner passages. The disk 22 may be described as floating, as it is without positive connection with either the rotating trunnion or the non-rotating abutment. It is entirely free to turn or to remain stationary, in accordance with the forces acting upon it, and it is free to adjust itself vertically or otherwise, to compensate for minor changes in the relative positions of the said parts. The spherical surface at one side of the ring permits the parts to move angularly to some extent without interfering with the connection. It frequently happens that, because of faults or inaccuracies in initially assembling the parts or because of subsequent wear, or because of expansion or contraction of the pipes, the axis of the drum and trunnion is out of alinement with the axis of the abutment, sometimes as much as half an inch. The joint construction is such that the parts are free to assume such non-alining positions, the disk keeping the joint tight.

The bearing surfaces of the ring 12, the disk 22, and the abutment 16, are accurately ground, and these several surfaces when in contact with each other serve to effectively prevent the escape of steam and water from their respective passages. In order to hold the said bearing surfaces in close contact, a suitable resilient mechanism is provided, and for purposes of illustration I have shown one that is similar to the one shown in the patent to Savery, before mentioned.

In the construction illustrated, a ring 25 surrounds the ring 12, having a bearing thereon at 25'. The ring 25 is formed in two parts, which are joined by bolts 26—26. The ring 25 is provided with two sockets 27—27, in which are located coil springs 28—28. Bolts 29—29 are secured in lugs 30—30 on the abutment 16, and these bolts extend into the sockets 27—27, and are surrounded by the springs 28—28. At the ends of the bolts are washers 31—31, and nuts 32—32 by means of which the bolts can be tensioned and the springs compressed. Preferably, the sockets 27—27 are provided with slots 33—33 into which project fingers 34—34 on the washers, these fingers preventing the washers from turning. It will be apparent that by turning the nuts 32—32, a resilient force can be applied to hold the several before-described bearing surfaces in contact. In practice, the parts are so adjusted that the bearing surfaces are held in

sufficiently firm contact to prevent leakage under normal conditions; but if the pressure in the steam passage or in the water passage, for any reason, exceeds a safe pressure the springs will yield to permit the bearing surfaces to separate slightly and relieve the excess pressure. The disk 22 thus serves as a safety valve. Preferably, oil is supplied to the several bearing surfaces from the oil reservoirs 35 and 36, provided respectively on the abutment 16 and the ring 25. Suitable oil holes 37 and 38 lead from the oil reservoirs to the bearing surfaces.

By the foregoing description the mode of operation has been made clear, and extended further reference thereto is unnecessary. It is sufficient, to point out that the steam enters through the pipe 19', and is conducted through the passage 9 to the end of the drum, where it discharges into the interior of the drum. As the steam condenses, the water of condensation collects in the bottom of the drum from which it is lifted by means of the dippers 5—5, and discharged through the pipes 8 and 19.

In Figs. 7 to 11, I have illustrated another embodiment of the invention which is very similar to that already described, except that the proportions of the inner and outer passages are different, so as to adapt the device for the carrying of steam in the inner passage and water in the outer passage. A receiving chamber 6^a is provided at the inner ends of the dippers, and this is provided with a large central opening through which the large central steam pipe 8^a extends. The receiving chamber communicates with the outer passage 9^a through the trunnion 3^a by means of an annular slot or opening 6^b. The receiving chamber is provided with an annular flange 6^c, which contacts with the head 2^a of the drum, thus completing the passage for the flow of water. A ring 12^a, similar to the ring 12 already described, is provided at the end of the trunnion 3^a, and registering with the openings in this ring is an abutment 16^a similar to the abutment 16 already described, except that the openings are different in size, the inner one 17^a for steam being larger, and the outer one 18^a for water being smaller. A water pipe 19^a' communicates with the opening 18^a and a steam pipe 19^a communicates with the opening 17^a. A valve disk 22^a is provided, similar to the disk 22, except for the differences in the sizes of the openings. The several bearing surfaces are held in contact by mechanism similar to that already described.

What is claimed is:—

1. A combined steam and water duct comprising a rotating part and a non-rotating part which are spring-pressed together longitudinally and one of which is free for limited movement transversely of the other,

each part having two passages one of which surrounds the other, the outer passages and the inner passages being respectively in end-wise register with each other, and a floating joint disk between the said parts rotatable independently of both of them and having passages registering respectively with the said outer passages and the said inner passages.

2. A combined steam and water duct comprising a rotating part and a non-rotating part which are spring-pressed together longitudinally and one of which is free for limited movement transversely of the other, each part having two passages one of which surrounds the other, the outer passages and the inner passages being respectively in end-wise register with each other, and joint means between the said parts rotatable independently of both of them.

3. A combined steam and water duct comprising a rotating part and a non-rotating part which are spring-pressed together longitudinally and one of which is free for limited movement transversely of the other, each part having two passages one of which surrounds the other, the outer passages and the inner passages being respectively in end-wise register with each other, and a floating joint disk between the two parts rotatable independently of both of them.

4. A combined steam and water duct comprising a rotating part and a non-rotating part which are spring-pressed together longitudinally and one of which is free for limited movement transversely of the other, each part having two passages one of which surrounds the other, the outer passages and the inner passages being respectively in end-wise register with each other, and a floating joint disk between the two parts rotatable independently of both of them, the bearings at one side of the disk forming a single plane surface and the bearings at the other side of the disk forming parts of a single spherical surface.

5. A combined steam and water duct comprising a rotating part and a non-rotating part, each part having two passages one of which surrounds the other, and a disk between the said parts having passages registering with the aforesaid passages.

6. A combined steam and water duct comprising a rotating part and a non-rotating part, each part having two passages one of which surrounds the other, and a disk between the said parts having passages registering with the aforesaid passages, the bearings at one side of the disk forming parts of a single plane surface and the bearings at the other side of the disk forming parts of a single spherical surface.

7. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having

- independent concentric passage registering respectively with the passages in the rotating member, and joint means positioned between the rotating member and the abutment out of register with the said passages therein, the said means bearing against the rotating member and against the abutment outside of the outer passages and between the outer passages and the inner passages.
8. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, and joint means positioned between the rotating member and the abutment out of register with the said passages therein, the said means bearing against the rotating member and against the abutment outside of the outer passages and between the outer passages and the inner passages, the contacting bearing surfaces at one side of the said means being plane and those at the other side being spherical.
9. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, and a floating disk positioned between the rotating member and the abutment and having independent openings registering respectively with the inner and outer passages in the rotating member and the abutment.
10. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, and a floating disk positioned between the rotating member and the abutment and having independent openings registering respectively with the inner and outer passages in the rotating member and the abutment, the said disk having bearings against the rotating member and against the abutment outside of the outer passages and between the outer passages and the inner passages.
11. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, and a floating disk positioned between the rotating member and the abutment and having independent openings registering respectively with the inner and outer passages in the rotating member and the abutment, the said disk bearing against the rotating member and against the abutment outside of the outer passages and between the outer passages and the inner passages, the contacting bearing surfaces at one side of the disk being plane and those at the other side being spherical.
12. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, and a floating disk positioned between the rotating member and the abutment and having independent openings registering respectively with the inner and outer passages in the rotating member and the abutment, the said disk having bearings against the rotating member and against the abutment outside of the outer passages and between the outer passages and the inner passages, the contacting bearing surfaces at one side of the disk forming parts of a single plane surface and those at the other side forming parts of a single spherical surface.
13. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, and a floating disk positioned between the journal and the abutment and having independent openings registering respectively with the inner and outer passages in the rotating member and the abutment, the said disk having plane bearings against the rotating member outside of the outer passage and between the outer passage and the inner passage, and spherical bearings against the abutment outside of the outer passage and between the outer passage and the inner passage.
14. The combination of a rotating member having independent concentric longitudinal passages terminating at approximately the same plane, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, joint means positioned between the rotating member and the abutment out of register with the said passages, the said joint means having bearings against the rotating member and the abutment outside of the outer passages and between the outer passages and the inner passages, and means for yieldingly pressing the said member and abutment toward each other.
15. The combination of a rotating member having independent concentric longitudinal passages, a non-rotating abutment having independent concentric passages registering respectively with the passages in the rotating member, a disk positioned between the rotating member and the abutment out of register with the said passages, the said disk having bearings against the rotating member and the abutment outside

of the outer passages and between the outer passages and the inner passages, and means for yieldingly pressing the said member and abutment toward each other.

5 16. The combination of a hollow rotating member, a rotating pipe centrally positioned in the central opening of the rotating member and terminating near the end thereof, a non-rotating abutment having independent concentric passages registering respectively with the pipe and the member opening, and a disk positioned between the journal and the abutment having openings registering with the said pipe and the said member opening.

17. The combination of a hollow rotating drum, a hollow trunnion for the drum, a dipper secured within the drum to rotate therewith, a rotating pipe within the hollow trunnion connected at one end to the dipper, an abutment at the outer end of the trunnion transversely adjustable relatively thereto and having two passages one of which surrounds the other, the said passages being respectively in endwise register with the said pipe and with the said trunnion opening outside of the pipe, and a floating joint disk between the outer end of the trunnion and the abutment having concentric passages therein, the inner passage registering with the said pipe and with the inner passage of the abutment, and the outer passage registering with the trunnion opening outside of the pipe and with the outer passage of the abutment.

18. The combination of a hollow rotating drum, a hollow trunnion for the drum, a dipper secured within the drum to rotate therewith, a rotating pipe within the hollow trunnion connected at one end to the dipper, an abutment at the outer end of the trunnion transversely adjustable relatively thereto and having two passages one of which surrounds the other, the said passages being respectively in endwise register with the said pipe and the said trunnion opening

outside of the pipe, and a floating joint disk between the said abutment and the said trunnion having passages therein registering respectively with the said pipe and with the said trunnion opening outside of the pipe.

19. The combination of a hollow rotating drum, a hollow trunnion for the drum, a dipper secured within the drum to rotate therewith, a rotating pipe within the hollow trunnion connected at one end to the dipper, means providing a water seal between the interior of the drum and the said rotating pipe, an abutment at the outer end of the trunnion and transversely adjustable relatively thereto and having two passages one of which surrounds the other, the inner passage continuously registering with the pipe and the outer passage continuously registering with the trunnion opening outside of the pipe, and a floating joint disk between the said abutment and the said trunnion having passages therein registering respectively with the said pipe and with the said trunnion opening outside of the pipe.

20. The combination of a hollow rotating drum, a hollow trunnion for the drum, a dipper secured within the drum to rotate therewith, a rotating pipe within the hollow trunnion connected at one end to the dipper, an abutment at the outer end of the trunnion having two passages one of which surrounds the other, the inner passages registering with the said pipe and the outer passage registering with the trunnion opening outside of the pipe, and a disk between the said abutment and the said trunnion having passages registering respectively with the aforesaid passages in the abutment.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN W. VEDDER.

Witnesses:

H. J. FEENEY,
EDWARD MARTIN.