J. V. SHAFFER & J. H. REEDY.

PIPE SWIVEL.

APPLICATION FILED JUNE 12, 1914.

1,129,815. Patented Feb. 23, 1915.

Fig. 1

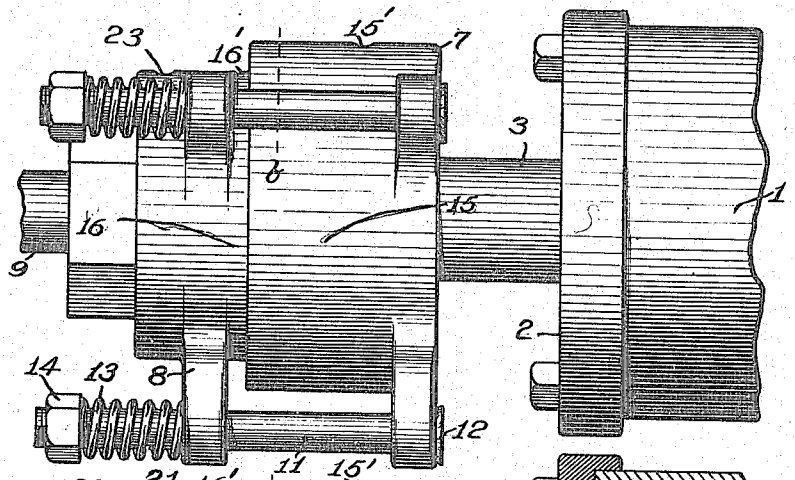
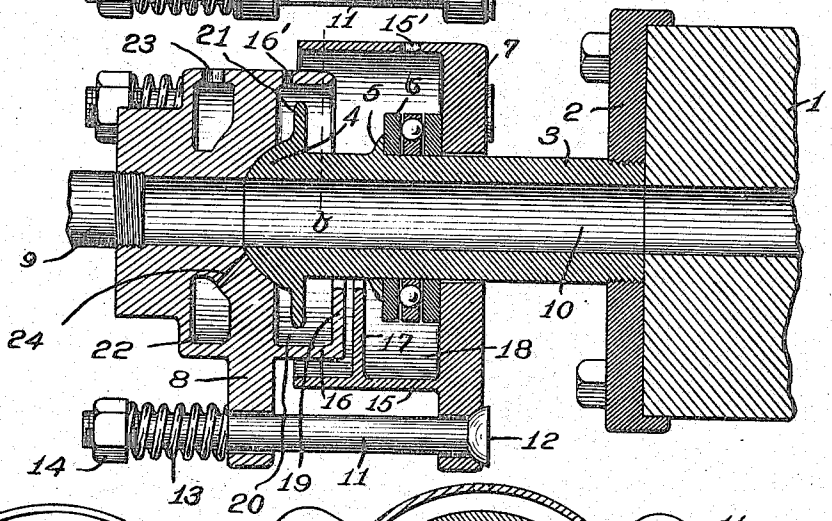


Fig. 2



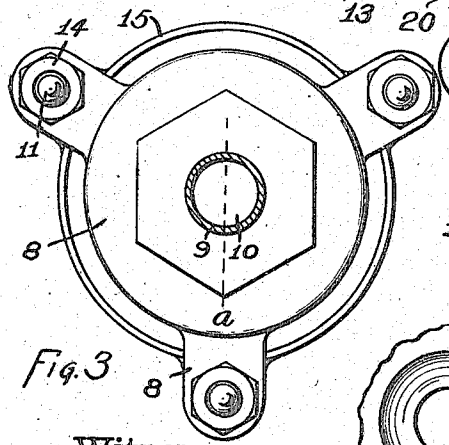


Fig. 3

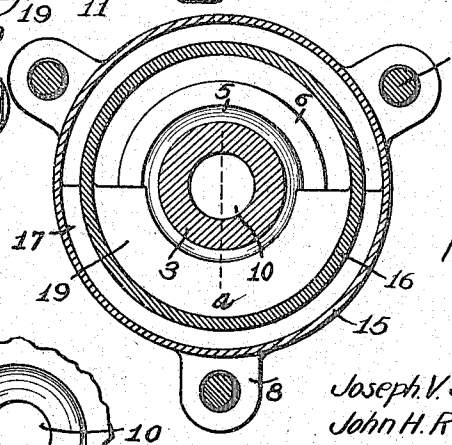


Fig. 4

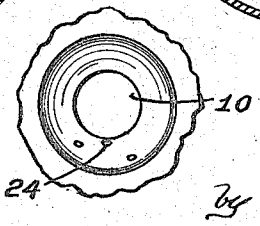


Fig. 5

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UNITED STATES PATENT OFFICE.

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PIPE-SWIVEL.

1,129,815. Specification of Letters Patent. Patented Feb. 23, 1915.

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To all whom it may concern:

Be it known that we, JOSEPH V. SHAFFER and JOHN H. REEDY, citizens of the United States, residing at Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Pipe-Swivels, of which the following is a specification.

This invention pertains to pipe-swivels employed in connection with a stationary pipe element and a rotary pipe element in connection therewith under conditions in which the two pipe elements may not be in perfect alinement with each other, due to faults in original construction or to disturbance brought about by the operation of the machine in connection with which the swivel is employed. For instance, in supplying steam to a rotary drying cylinder in a paper making machine, the drying cylinder may rise from its normal position, due to the wrapping around it of several layers of paper accumulating from a broken web. This elevates the axis of the drying cylinder above the axis of the pipe which supplies it with steam, and the same would be the case with steam-heated calender rolls about a paper making machine.

This invention will be readily understood from the following description taken in connection with the accompanying drawing in which:—

Figure 1 is a side elevation of our improved pipe-swivel applied to the neck of a drying cylinder or other rotary element in connection with which the swivel is to be employed: Fig. 2 a vertical longitudinal section of the same, in the plane of line *a* of Figs. 3 and 4: Fig. 3 an elevation at the left-hand end of Figs. 1 and 2: Fig. 4, a vertical transverse section in the plane of line *b* of Figs. 1 and 2: and Fig. 5 an end elevation, viewed from the right of Fig. 2, of the concave element of the main ball-joint.

In the drawing:—1, indicates the neck of a rotary machine element to which steam or other fluid or liquid is to be supplied through an axial passageway in the neck; 2, a flange secured to the outer end of the neck, 3, a pipe having its inner end secured in the flange, this pipe projecting out axially from the neck and constituting a rotary pipe element unified with the neck; 4, a spherical segment formed concentrically on the outer end of pipe 3, this spherical segment having its convexity facing outwardly; 5, an inwardly facing collar on pipe 3, between the spherical segment and neck 1; 6, a ball thrust-bearing disposed upon pipe 3 and bearing outwardly against collar 5; 7, a flange loosely surrounding pipe 3 between the ball bearing and neck 1, the outer surface of this flange, or the surface to the left of Fig. 2, coming against the ball bearing; 8, a flange disposed at the outer end of pipe 3 and having through it a central aperture in general alinement with the bore of pipe 3, the inner surface of this flange having a segmental spherical concavity fitting the convexity of spherical segment 4; 9, a fixed supply pipe fixedly engaging a hub on flange 8 and communicating with the aperture through the flange, the hub on flange 8, into which pipe 9 is secured being preferably non-circular to facilitate the flange being held by a wrench while pipe 9 is being screwed into it; 10, the bore extending endwise through pipe 3 and communicating with pipe 9 and the bore of neck 1; 11, 3 bolts, arranged in circumferential series, and extending through ears on flanges 7 and 8 and disposed parallel with the axis of pipe 3; 12, convex heads on bolts 11, the convexity of these heads engaging in concave recesses formed at the inner ends of the openings in flange 7 through which bolts 11 pass, the bodies of the bolts being loose in these openings; 13, helical springs surrounding bolts 11 and having their inner ends bearing against those portions of flange 8 through which bolts 11 pass; 14, nuts on the outer ends of bolts 11 and abutting against the outer ends of springs 13 and serving as means for putting those springs under compression and for adjusting the degree of compression; 15, a shell projecting outwardly from flange 7 and concentrically surrounding the ball-bearing; 15′, an oil-hole in the top of shell 15, over the ball-bearing; 16, a shell projecting inwardly from flange 8 and concentrically surrounding pipe 3, within shell 15; 16′, an oil-hole in the upper part of shell 16 near the inner face of flange 8; 17, a partition disposed in shell 15, at right angles to the axis of the shell and extending up to about the horizontal diametrical line of the shell, this partition being disposed between the ball-bearing and the end of shell 16; 18, an oil-cellar formed in the lower portion of shell 15, by partition

17, below the ball-bearing; 19, a partition similar to partitions 17, but formed at the inner end of shell 16, this partition lying between partition 17 and the ball-joint connecting pipe 3 and flange 8; 20, an oil-cellar formed in the lower portion of shell 16 by partition 19; 21, a circumferential flange carried by pipe 3 at the inner portion of ball-joint portion 4, this flange lying within the chamber 20; 22, a cavity formed in flange 8 and concentrically surrounding the axial bore of the flange; 23, an oil-hole leading into oil-cavity 22 through the upper portion of the hub of flange 8; and 24, a series of oil passages leading from cavity 22, through flange 8, and to the concave surface of the flange in which convex member 4 bears.

With the circular parts in the angular arrangement illustrated in the drawing, which is the preferable arrangement, there will be two of the bolts 11 at the top of the system and one at the bottom. The springs manifestly tend to draw the two elements of the ball-joint into close contact with each other at all times while the ball-joint element on the pipe is rotating relative to the fixed ball-joint element on flange 8. This ball-joint is kept tight by the strain put on the springs, and the inward thrust is met by the ball-bearing between flange 7 and collar 5. Oil-cellar 18 may be plentifully supplied with oil to keep the ball-bearing lubricated, and this oil may be readily applied through oil-hole 15′, which oil-hole is free for access due to the fact that two of the bolts 11 are located above in the system, while a single one of the bolts is located below. Oil-cellar 20 is, in the same manner, readily supplied with oil through oil-hole 16′, and flange 21 serves in picking up this oil and in aiding in its delivery to the contacting surface of the ball-joint. Oil-cavity 22 receives its oil through oil-hole 23 and delivers oil more directly to the contacting element of the ball-joint through oil-passages 24. There is a plurality of these oil-holes as seen in Fig. 5, delivering to the contacting surfaces of the ball-joint at various radial distances from the axis of the joint. If pipe 3 should be so constructed or get out of axial alinement with pipe 9, the ball-joint would accommodate this condition and be held in proper tight engagement by the springs. Assuming neck 1 to be on the upper member of a pair of rotary members and to be liable to accumulate a number of layers of material as in the case of the driers or calenders of a paper making machine, neck 1 would rise in its bearing and tend to disturb the relation of the contacting surfaces of the ball-joint, but, two of the three springs being disposed above the axis of the neck, there is a superior elastic closing effect exerted at the top of the ball-joint.

In the particular example illustrated there is but a single passage shown from pipe 9 to and through neck 1, which single passage may be either the inlet or the outlet for the agent flowing through the swiveled joint, though if it be desired that the inflow and outflow both occur through the same neck, as is quite common in paper machine driers, our construction does not at all interfere with the presence of a second pipe passing axially and loosely through the parts.

It is to be observed, in Fig. 2, that the pressure of the steam tends to open the ball-joint and produce leakage, this tendency being overcome by the proper adjustment of the nuts 14. In ball-joint devices in which the pressure of the steam tends to tighten the joint the friction at the joint is beyond control and may exist to a very undesirable degree and result in waste of power and rapid wear at the joint. In adjusting our device the nuts 14 are set up tentatively and then the steam is turned on. When the structure is warmed up then the nuts are to be loosened until leakage occurs after which the nuts are to be tightened up till the leakage ceases. The result is that the joint is held with sufficient tightness to prevent leakage, but with no unnecessary tightness.

We claim:—

1. A pipe-swivel comprising, a pipe, one member of a ball-joint formed on the outer end of the pipe, a first flange carrying the second member of the ball-joint and engaging the first member of the ball-joint, a passageway extending through said flange axially and into communication with said pipe, a collar carried by the pipe, a second flange loosely surrounding said pipe, a ball-bearing disposed between said collar and the second flange, a circumferential series of bolts disposed parallel with the axis of the pipe and connecting the two flanges, convex heads upon the bolts and engaging openings in one of the flanges, springs disposed upon the bolts and abutting against the other flange, nuts for adjusting the degree of compression of the springs, a shell projecting from the second flange and surrounding said ball-bearing and provided with an oil-hole in its upper part, and a partition in said shell serving in conjunction with the second flange in forming an oil-cellar below said ball-bearing, combined substantially as set forth.

2. A pipe-swivel comprising, a pipe, one member of a ball-joint formed on the outer end of the pipe, a first flange carrying the second member of the ball-joint and engaging the first member of the ball-joint, a passageway extending through said flange axially and into communication with said pipe, a collar carried by the pipe, a second flange

loosely surrounding said pipe, a ball-bearing disposed between said collar and the second flange, a circumferential series of bolts disposed parallel with the axis of the pipe and connecting the two flanges, convex heads upon the bolts and engaging openings in one of the flanges, springs disposed upon the bolts and abutting against the other flange, nuts for adjusting the degree of compression of the springs, a shell projecting from the first flange toward the second flange and provided with an oil-hole in its upper part, a partition carried by said shell between the first flange and the second flange and forming in conjunction with the first flange an oil-cellar below said ball-joint, and a collar carried by said pipe at said ball-joint and dipping into said oil-cellar, combined substantially as set forth.

3. A pipe-swivel comprising, a pipe, one member of a ball-joint formed on the outer end of the pipe, a first flange carrying the second member of the ball-joint and engaging the first member of the ball-joint, a passageway extending through said flange axially and into communication with said pipe, a collar carried by the pipe, a second flange loosely surrounding said pipe, a ball-bearing disposed between said collar and the second flange, a circumferential series of bolts disposed parallel with the axis of the pipe and connecting the two flanges, convex heads upon the bolts and engaging openings in one of the flanges, springs disposed upon the bolts and abutting against the other flange, nuts for adjusting the degree of compression of the springs, a shell projecting from the second flange and surrounding said ball-bearing and provided with an oil-hole in its upper part, a partition in said shell and serving in conjunction with the second flange in forming an oil-cellar below said ball-bearing, a shell projecting from the first flange toward the second flange, a partition formed in the last mentioned shell and forming with the first flange an oil-cellar at and below the level of the ball-joint and provided with an oil-hole in its upper part, and a collar carried by said pipe near said ball-joint and dipping into the last mentioned oil-cellar, combined substantially as set forth.

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