E. FARRELL.

TEXTILE AND LIKE DRYING CYLINDER.

APPLICATION FILED DEC. 15, 1919.

1,425,083.

Patented Aug. 8, 1922.

4 SHEETS—SHEET 1.

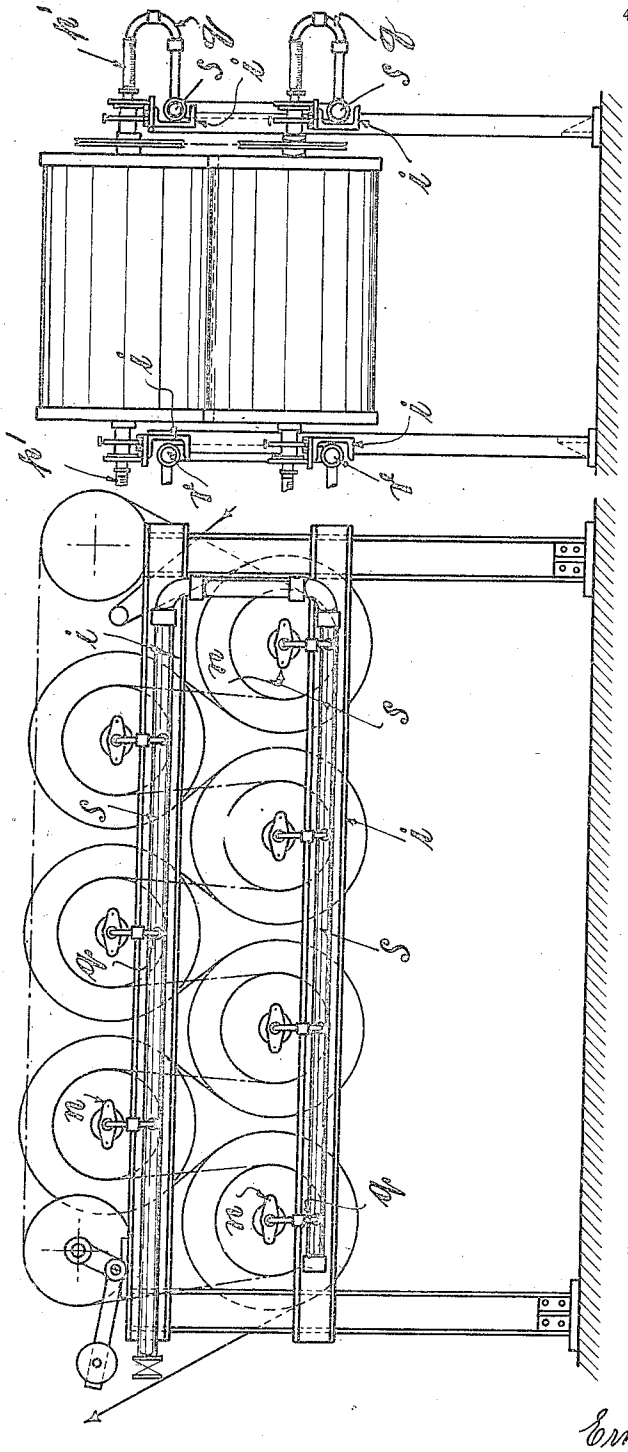


Fig. 2.

Fig. 1.

Inventor:-
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By his Attorney:- Walter Green

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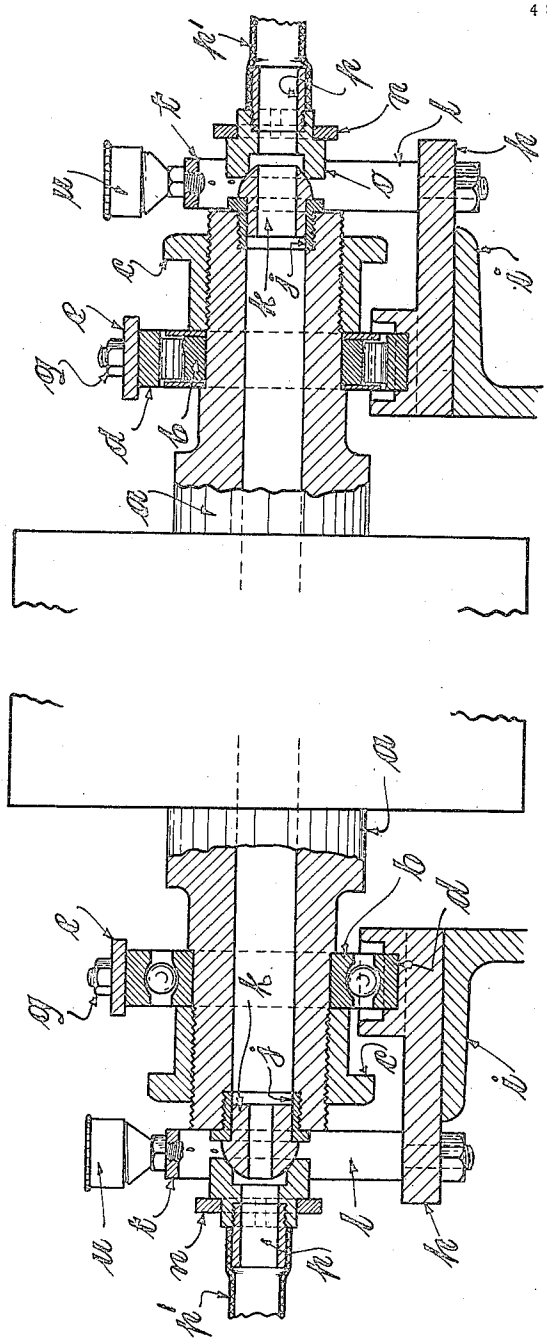


Fig. 3.

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4 SHEETS—SHEET 3.

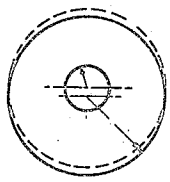


Fig. 6.

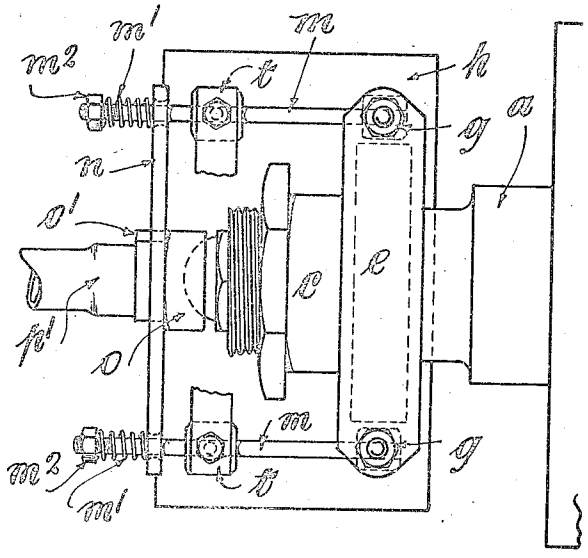


Fig. 4.

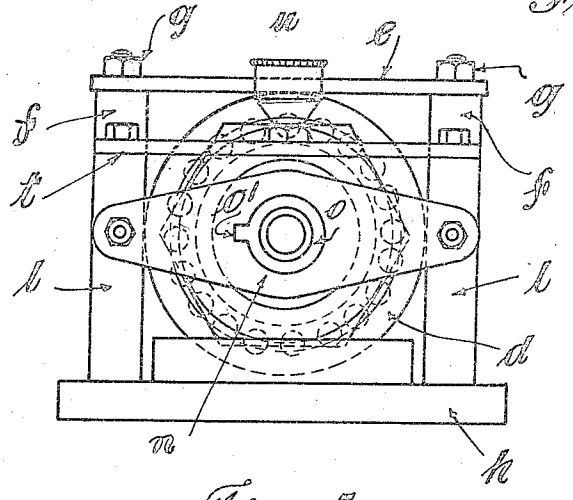


Fig. 5.

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4 SHEETS—SHEET 4.

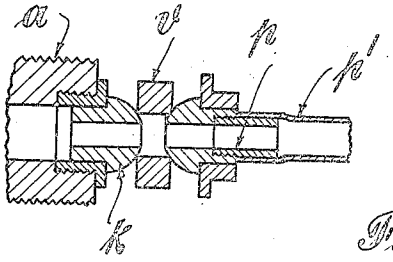


Fig. 7.

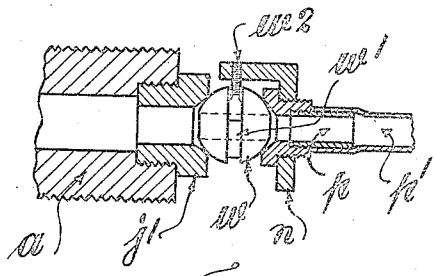


Fig. 8.

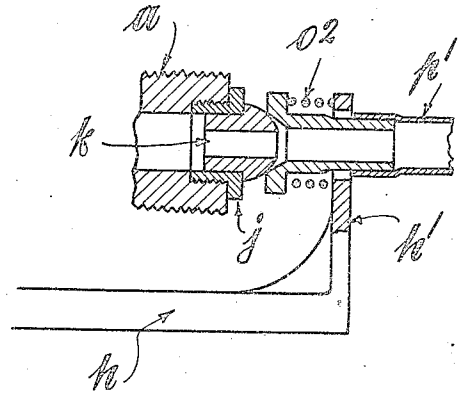


Fig. 9.

Inventor:
Ernest Farrell
By his Attorney:- Walter Swan

UNITED STATES PATENT OFFICE.

ERNEST FARRELL, OF SALFORD, ENGLAND.

TEXTILE AND LIKE DRYING CYLINDER.

1,425,083. Specification of Letters Patent. Patented Aug. 8, 1922.

Application filed December 15, 1919. Serial No. 345,089.

To all whom it may concern:

Be it known that I, ERNEST FARRELL, a subject of the King of Great Britain and Ireland, and resident of Salford, Lancashire, England, have invented certain new and useful Improvements in or Relating to Textile and like Drying Cylinders, of which the following is a specification.

These improvements refer to drying cylinders and the like i. e. cylinders having hollow trunnions through which steam, water or other fluid passes. In particular, the improvements refer to the steam heated cylinders of machines used for drying fabrics. Usually these cylinders are rotatably mounted in doll heads, supported upon the machine frame, the doll heads being hollow and communicating with the frame, which is also hollow and which serves for conveying steam to, or water from the cylinder. To prevent the escape of steam between the cylinder trunnions and the doll heads, fibrous packing is used, the packing being held tightly against the trunnion by an adjustable gland. Owing to the rotation of the trunnion and the weight of the cylinder, the packing soon fails to maintain the desired joint and leakage of steam or water takes place. To prevent this as much as possible the packing requires constant attention, but with say 15 or more cylinders in a machine, the keeping of the joints in good order, entails a considerable amount of labour, time and expense, the packing having also to be frequently renewed.

Owing to the fibrous packing requiring to tightly fit the trunnions and doll heads, the packing adds to the resistance to the rotation of the cylinders, and considerable motive power and heavy gear wheels are necessary to drive the cylinders. Further, with the cylinders journaled in the packing in the doll heads and resting with their full weight on the packing, they are liable to get out of alignment and cause irregularities in the running of the fabric, and when out of alignment are somewhat difficult to realign.

Attempts to overcome the aforesaid drawbacks have been made, for example, the trunnions have been journaled in ordinary bearings separate from the doll heads, the weight of the cylinders being then taken by the said bearings, but the trunnions still requiring to be packed with the fibrous packing in order to provide the required steam or water-tight joints.

The present invention has for one of its objects to entirely dispense with fibrous packing, and to provide a form of metallic joint which will be self-tightening, which will maintain the steam or water-tight connection in spite of the cylinder being out of alignment with the steam inlet and water outlet, and which may, in fact, be purposely adapted to allow of a slight angular movement of one of its parts out of line with the cylinder axis whereby the contacting parts may be effectively lubricated, and which, whilst affording very little resistance to the rotation of the cylinder, will prevent any leakage of steam or water, or reduce it to a degree not hitherto obtained by previously proposed methods. A further object is to combine with said improved jointing means, anti-friction bearings for the cylinder trunnions whereby the cylinders may rotate more freely and truly than heretofore.

According to the invention, the cylinders are each provided with tubular "ball and socket" joints arranged respectively between each of the cylinder trunnions and the steam inlet and water outlet connecting parts, the "ball" and "socket" of each joint being held yieldingly in contact with each other and with the said trunnions and parts, the arrangement also being such that the inlet and outlet connecting parts while free to oscillate in planes parallel with and passing through the longitudinal axis of the cylinder. The term "ball and socket" joint will include a ball-ended part and a socket, a ball and two sockets, of two ball-ended parts and a loose intermediate ring forming two sockets, each part having a central through hole.

In applying the anti-friction bearings to the cylinder trunnions, a ball bearing is provided with one trunnion and a roller bearing with the other trunnion, the inner race ring of each being fixed to the trunnion. The outer race ring of each bearing is held stationary by an arrangement of post secured to a base plate and a cross-bar held to

the posts by nuts. The purpose of thus arranging the bearings is in order to allow of elongation and contraction of the cylinder.

The means for yieldingly holding the aforesaid jointing members in contact with each other, will preferably consist of rods and springs, and a cross-plate, the rods being connected to the parts to which the cross-bar is secured for holding the outer ring of the anti-friction bearings in position.

In the accompanying drawings,

Fig. 1 illustrates a side elevation, and Fig. 2 an end elevation (in part) of a drying machine with the improved jointing means and anti-friction bearings applied thereto. Fig. 3 illustrates to a larger scale a longitudinal elevation (partly broken away and partly in section) of one of the drying cylinders, and a longitudinal sectional elevation of the improved jointing means and bearings, the left hand end being the steam inlet and the right hand end the water outlet. Fig. 4 illustrates a plan (in part) of the steam inlet end of the cylinder.

Fig. 5 illustrates an end elevation of the same end of the cylinder.

Fig. 6 illustrates an end view of one of the ball ended parts of the improved joints and shows diagrammatically the manner of its action.

Figs. 7, 8 and 9 illustrate longitudinal sections of modifications hereinafter described.

Referring to Figs. 3, 4, 5 and 6 *a*, *a* are the trunnions of the cylinder, each of which is usually formed with a plain outer surface in order to slidably and rotatably fit the usual doll heads and also to allow of being packed with fibrous packing within the doll heads. For the purposes of this invention the trunnions are partly turned down to a true surface and partly screw-threaded exteriorly. Upon the plain part of each trunnion and against the shoulder formed by the truing down of the trunnion, is fitted the inner race ring *b* of an anti-friction bearing while upon the screw-threaded part is screwed a sleeve or nut *c* by which the race ring is firmly held to and thereby adapted to rotate with the trunnion. The outer race ring *d* of each bearing is held stationary by a cross-bar *e*, posts *f*, *f*, nuts *g* threaded on to said posts, and a base plate *h*, this latter being formed with a segmental recess to receive a lower part of the outer race ring *d*. The base plate *h* of each bearing is secured to the side frame *i* of the machine.

The anti-friction bearing for the steam inlet end is of the ball type, while that for the water outlet end is of the roller type, so that as the cylinder elongates or contracts, the rollers allow of the endwise movement of the trunnion *a*.

In the end of each trunnion, which is bored and tapped to receive it, is a mild steel bushing *j* while in each bushing is fitted the stem of a further bushing *k*, this latter being made of hard metal and with a semi-spherical or ball end. The opening in such bushing for the water outlet end of the cylinder is larger than that of the bushing for the stem inlet end.

Rigidly secured to each base plate *h* are two further posts *l*, *l* and in such posts and also in the posts *f*, *f* are through holes, arranged at a height corresponding to the height of the longitudinal axis of the cylinder trunnions. Screwing into the holes in the posts *f*, *f* and passing through the holes in the posts *l*, *l* are rods *m*, *m*, these latter extending forwardly beyond the posts *l*, *l* and through holes in a cross-plate *n*, and on that side of the cross-plate furthest from the posts *l*, *l* being each fitted with a spring *m'* and nut m^2.

In each cross plate and coaxial with the trunnions is an opening and fitting said opening is a bushing *o* said bushing being preferably made of hard brass or the like and being a comparatively tight fit in the cross-plate and also being held against rotation by a key or nib *o'*, see Fig. 5, and moving only with the cross-plate. In that part of the bushing *o* facing the bushing *k* is a depression or recess (forming a socket) by which the bushing *o* may engage the ball end of the bushing *k*. Screwing into the bushing *o* is a pipe or conduit *p* on to the projecting part of which fits a light flexible tube *p'*. The other end of each tube *p'* is connected to a metal elbow pipe *q* (see Fig. 2) leading from the steam supply pipe *r* in the case of the steam inlet end of the cylinder and leading to the water drain pipe *s* in the case of the water outlet end of the cylinder.

Under the pressure of the springs *m'*, which may be regulated by the nuts m^2 the recess of each bushing *o* is held in yielding contact with ball end of the complemental bushing *k*. The exterior surface of the ball end of each bushing *k* is preferably made slightly eccentric to the longitudinal axis of the bushing with the result that the bushings *o* as the trunnions rotate, are caused to have slight oscillatory or wobbling movements, as shown diagrammatically in Fig. 6. The effect of such wobbling movements is to cause the contacting surfaces to have a relative sliding action in addition to the rotary motion of each bushing *k*. This action is useful in maintaining the desired joints, there being very little risk of the ball ends of the bushings *k* being scored or grooved, as might be possible with the ball ends made concentric unless well lubricated. Said sliding action is also advantageous in distributing the lubricant used in lubricating the

parts, and allows of less lubricant being used in lubricating the parts than would otherwise be necessary.

A cross bar t secured to the post l serves to support a lubricator u at a point above the bushings, by which a lubricant may be conveniently delivered on to the bushings.

The holes in the plate n through which the rods m, m pass are such as to allow of the free oscillation of the plate, under the wobbling motion of the bushing o which is also allowed for by the flexible tubes p'.

In place of a single ball-ended bushing and a socket-like bushing for each joint, two ball-ended parts may be employed (see Fig. 7) one secured to the trunnion and the other to the cross plate n, while between the two ball-ended parts is a free floating washer v, which constitutes a double socket, any want of alignment of the parts being allowed for by the washer, while still maintaining the joints.

In Fig. 8 a bushing j' having a socket-like recess is fitted to the trunnion, and a like bushing is fitted to the plate n, while between the bushings is mounted a hard metal ball w. In said ball is a through hole, and to prevent the hole being blinded the ball is formed on its exterior with a groove w' into which projects the head part of an inverted T shaped set screw w^2, the ball being free to rotate about the axis of the through hole but not in any other direction.

In both these last described arrangements the ball and socket parts are yieldingly held in contact by the springs m', m' while the plate n and tube p' are free to adapt themselves to any want of alignment of the parts.

In Fig. 9, the bushing o is elongated and a spring o^2 is arranged between the larger end of the bushing and a fixed upright h' of the base plate h, the opening in the upright being large enough to allow of the free oscillation of the bushing relatively to the ball-ended bushing k to compensate for any want of alignment of the bushings. In this arrangement the rods m, springs m' and cross-plate n shown in Fig. 3 are dispensed with but in practice it is preferred to employ the two springs and rods and plate, as they allow of the more convenient and even adjustment of the contacting parts.

From the foregoing it will be seen that all fibrous packing is dispensed with, and the friction or resistance to rotation reduced to a minimum. Further, the joints are effectively maintained with comparatively light springs, and are such as to keep in good working order for long periods without inspection. The reduction in friction is such that a machine with a large number of cylinders can be driven with much less power than heretofore.

What I claim is:

1. In combination, a cylinder with hollow trunnions, anti-friction bearings for each trunnion, and means for supporting and positioning said bearings, conduits for conveying steam or other fluid to and from the cylinder, metal-to-metal ball and socket joints between the trunnions and conduits, one member of each joint being connected to the trunnion and one to the conduit and the member connected to the trunnion being slightly eccentric on its exterior to the axis of the cylinder, means by which the conduit and the member of the joint secured to the conduit are supported so as to be free to oscillate, and means for yieldingly pressing the conduit towards the trunnion, as set forth.

2. In combination, a cylinder having hollow trunnions, conduits for conveying steam or other fluid to and from the cylinder, metal-to-metal ball and socket joints between the trunnions and conduits, one member of each joint being connected to the trunnion and one to the conduit and the member connected to the trunnion being slightly eccentric on its exterior to the axis of the cylinder, means by which the conduit and the member of the joint secured to the conduit are supported so as to be free to oscillate, and means for yieldingly pressing the conduit towards the trunnion, as set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ERNEST FARRELL.

Witnesses:
HENRY JUNCA,
N. HARRIS SETTLE.