Apr. 17, 1923. 1,452,147

C. W. DAKE

PACKING FOR STEAM TURBINES

Original Filed June 21, 1918

Fig. 1.

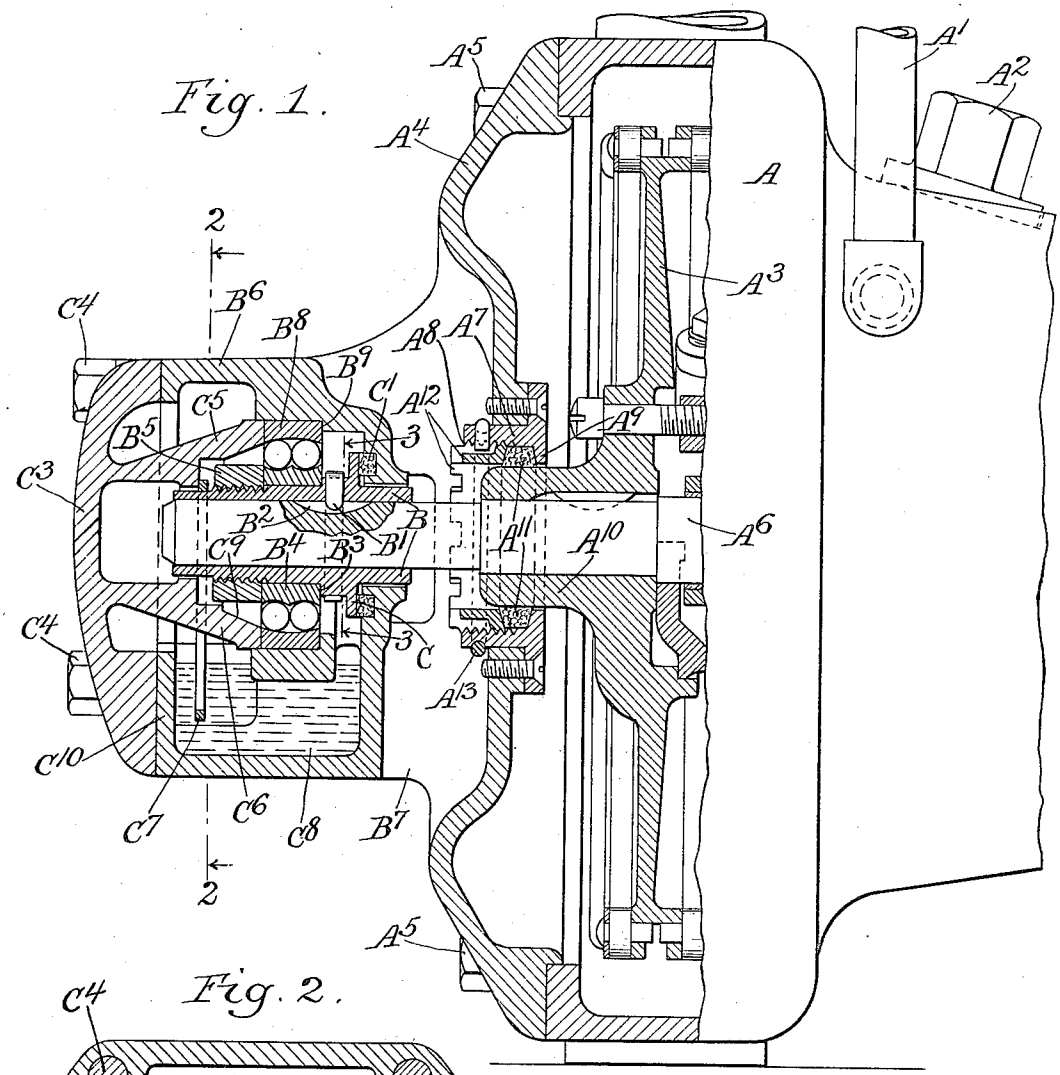


Fig. 2.

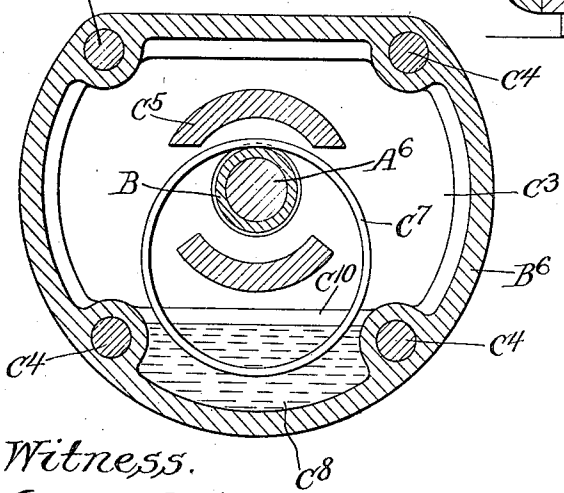
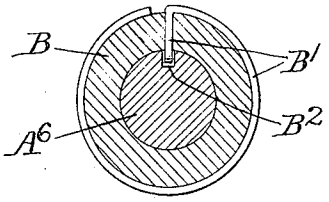


Fig. 3.



Witness.
Edward T. Wray.

Inventor.
Charles W. Dake.
by Wilkinson & Curtis
Attorneys.

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UNITED STATES PATENT OFFICE.

CHARLES W. DAKE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE PYLE-NATIONAL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

PACKING FOR STEAM TURBINES.

Original application filed June 21, 1918, Serial No. 453,991. Renewed March 21, 1921. Patent No. 1,377,755, dated May 10, 1921. Divided and this application filed March 10, 1919. Serial No. 281,890.

To all whom it may concern:

Be it known that I, CHARLES W. DAKE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Packings for Steam Turbines, of which the following is a specification.

My invention relates to improvements in packings for steam turbines and the like, as shown in Patent No. 1,377,755 of which the present application is a division. It has for one object to provide a new and improved form of packing, means for adjusting it and holding it in position whereby the leakage from the pressure chamber about the turbine shaft may be reduced to a minimum.

Other objects of my invention will appear from time to time in the specification.

My invention is illustrated more or less diagrammatically in the accompanying drawings wherein—

Figure 1 is a longitudinal section of a part of the turbine;

Figure 2 is a section along the line 2—2 of Figure 1;

Figure 3 is a detail section along the line 3—3 of Figure 1;

A is a turbine housing. Steam is adapted to be fed into it through a steam pipe A^1 and valve housing A^2 to drive the bucket wheel A^3. This housing A is preferably continuous on one side as shown and is closed on the other side by a removable diaphragm A^4 held in position by bolts A^5. A^6 is the turbine shaft upon which the rotor or wheel A^3 is mounted and with which it rotates. This shaft is supported at the motor end of the machine by bearings not here illustrated. The diaphragm A^4 is centrally apertured as indicated and this aperture is closed by a removable collar A^7 held in position by screws as indicated. This removable collar is interiorly screw-threaded as at A^8 and flanged as at A^9. The hub A^{10} of the wheel projects outwardly through the collar just clearing the flange A^9. A^{11} is a packing contained within the collar A^7 resting against the flange A^9 adapted to be compressed by the screw-threaded gland A^{12}, so as to make a steam tight joint between the ring A^7 and the hub. This gland is screw-threaded in the collar A^7 and is serrated as indicated and engaged by holding spring A^{13} which holds it against rotation though, of course, the spring may be drawn out and rings applied for the necessary usual adjustment.

The end of the shaft A^6 extends out beyond the diaphragm A^4 and is slidably mounted within a sleeve B. This sleeve is held against rotation on the shaft by a spring key B^1 projecting in through a perforation in the sleeve to engage a curved key seat B^2. The arrangement is such that when the parts are in the position shown in Figure 1, the spring key snaps into the key seat and holds the seat in rotation with respect to the shaft. If you pull the sleeve longitudinally along the shaft, however, the inclined surface of the key seat will cause the spring key as it engages it to ride up until the key has left the key seat and thus the sleeve may be easily withdrawn. The sleeve B is shouldered as at B^3 and the inner race B^4 of the ball bearing is clamped against the shoulder by the nut B^5 on the sleeve B. B^6 is a bearing cap supported by arms B^7 on the diaphragm A^4. This bearing cap is bored out to engage the outer ball race B^8 of the shaft supporting ball bearings and is shouldered as at B^9 to engage such outer ball race.

The sleeve B is flanged as at C and this flange engages a felt packing C^1 in the wall of the bearing cap. A removable cover C^3 on the outer end of the bearing cap closes it, being held in position by bolts C^4. This cover has two segmental conical partition walls C^5 C^6 adapted to engage upper and lower sides of the ball race B^8 and clamp that ball race in position in the bearing cap. The reason why the members C^5 C^6 are segmental is to leave room for an oil ring C^7 which rides on the outer end of the sleeve B and carries oil up from the oil well C^8 in the bearing cap. This oil runs down the inclined surface C^9 to oil the ball bearing and a certain amount of oil, of course, works its way in between the sleeve and shaft to oil those parts so that sliding movement may take place when desired. The oil pocket C^8 is bounded on its outer side by the wall or dam C^{10} so that when the cover C^3 is taken off the oil does not run out of the pocket and the bearing may be adjusted and parts removed or changed without losing oil.

Clearances are such that the oil ring might bounce or jump out of its position and it is held by the cap C^3 where it belongs and stays there at all times. The only way you can get the oil ring out is by withdrawing the cap C^3.

When it is desired to dismount the apparatus, the cap C^3 can be drawn out and the bearing may be inspected or drawn off if need be or if the whole assembly is to be taken down you release the gland A^{12}, unscrew the screws A^5, and the whole diaphragm and bearing cap could be taken off thus exposing the whole inside of the turbine without in any way changing the adjustment of the ball bearing. Of course, the important thing is to make it possible to take down the machine without changing the adjustment of the ball bearing or without making it necessary to have expensive and expert help do the work.

It will be evident that while I have shown in my drawings an operative device, still many changes might be made both in size, shape and arrangement of parts without departing materially from the spirit of my invention, and I wish, therefore, that my drawings be regarded as in a sense diagrammatic.

I claim:—

1. The combination with a cylindrical member of an apertured plate through which it projects, a sleeve interiorly threaded located within said aperture outwardly flanged to engage the plate, inwardly flanged to surround the cylindrical member, a gland being in screw-threaded engagement with the sleeve and a packing surrounding the member and adapted to be compressed by the gland against the member between it and the inner flange, the sleeve being apertured, a spring ring having an inwardly radially extending finger passing through said aperture, the gland being serrated to be engaged by said spring finger whereby it may be locked against rotation, a ball bearing, means for holding it in position, a sleeve in fixed relation with such bearing, a shaft mounted in the sleeve and a spring held key carried by the sleeve adapted to penetrate it and engage and hold the shaft against rotation with respect to the sleeve without interfering with the longitudinal movement of the shaft with respect to the sleeve, a key seat in the shaft having radially extending walls to engage the key and cause the shaft and sleeve to rotate in unison and curved end walls adapted to guide and gradually force the key out of engagement with the keyed seat when the shaft is moved longitudinally with respect to the sleeve.

2. In a steam turbine, a housing, a cover therefor, a shaft, a wheel, a hub therefor mounted upon the shaft, the hub projecting outwardly through the cover, a packing bushing in the cover surrounding and in engagement with the hub, a packing gland engaging said packing bushing and spring locking means adapted to hold the gland in position in engagement with the bushing.

3. A bearing packing gland comprising a ring threaded about a part of its exterior and of reduced exterior diameter about the unthreaded portion of its exterior, a plurality of slots across one of its ends and a plurality of exterior grooves in register with said slots and extending throughout a part of the exterior length of the ring, the surface of the other end of said ring inwardly inclined.

4. A bearing cover stuffing box comprising a cylinder threaded throughout a portion of its interior, channeled about one end of its outer circumference and carrying at one end a radial flange extending outwardly and inwardly from its interior and exterior surfaces.

5. A bearing cover stuffing box, comprising a cylinder threaded throughout a portion of its interior, channeled about one end of its outer circumference, one or more perforations inside said channel, a radial flange on one end of the cylinder extending outwardly and inwardly from its interior and exterior surface, the inner portion of said flange increasing in thickness toward the inner surface of the cylinder.

In testimony whereof, I affix my signature in the presence of two witnesses this twentieth day of February, 1919.

CHARLES W. DAKE.

Witnesses:

MARION L. INGRAHAM,

EDITH L. PORTER.