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CYLINDER SUPPORTING ARRANGEMENT

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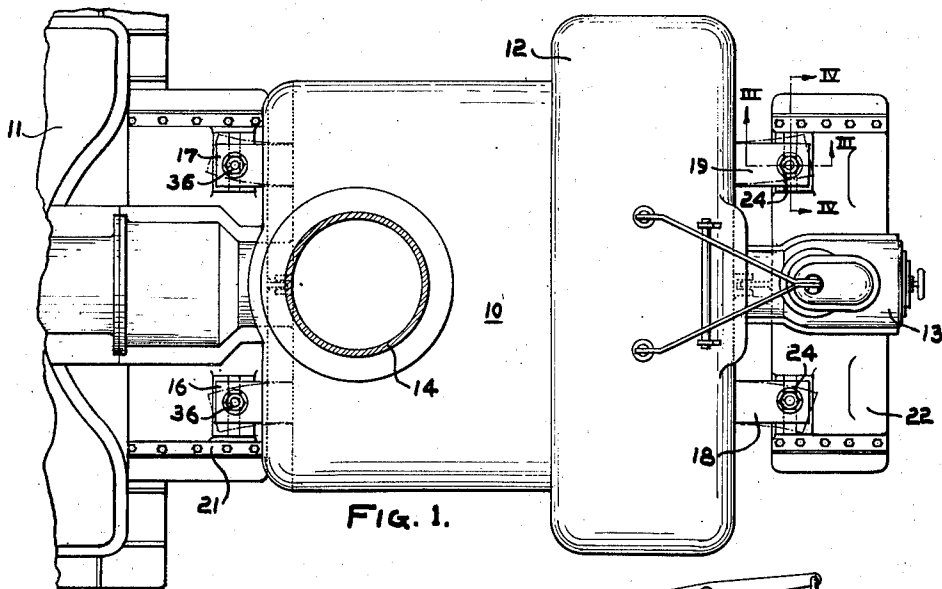


FIG. 1.

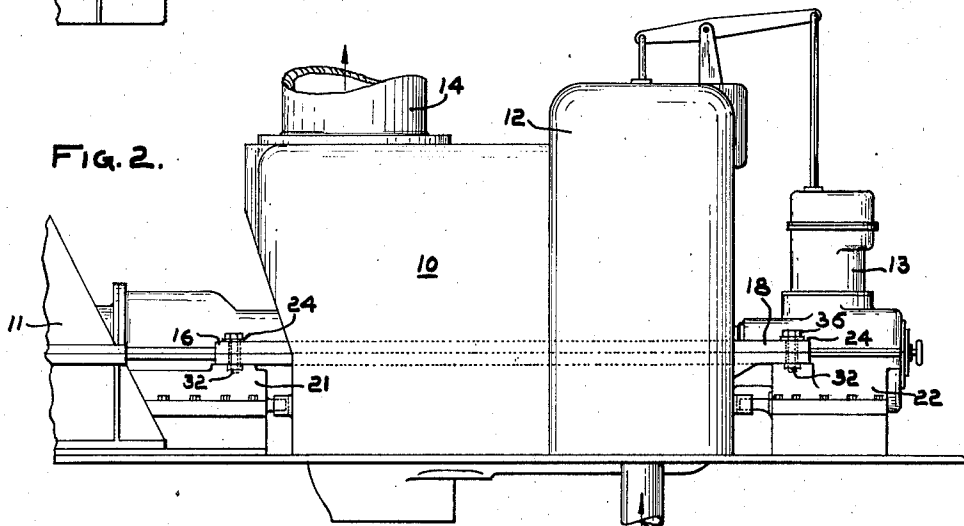


FIG. 2.

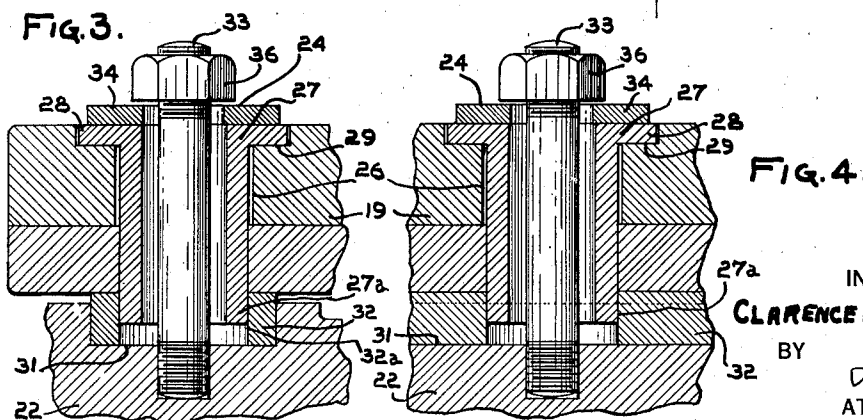


FIG. 3.

FIG. 4.

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CYLINDER SUPPORTING ARRANGEMENT

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5 Claims. (Cl. 248—2)

My invention relates to supporting means for apparatus subject to changes in temperature resulting in expansion and contraction thereof, and more particularly to means for securing the apparatus to its support for limited movement of the former relative to the latter.

It has been proposed to support turbines and similar structures by lugs extending horizontally from the casing thereof and resting upon pedestals, and to interconnect the lugs and pedestals in such a manner that the former may move transversely relative to the latter upon expansion or contraction of the casing.

One form of such connection between the lugs and pedestals consisted of a transversely extending key immovably secured to and projecting from the underside of each lug, and closely but slidably received in a transversely extending groove or keyway in the upper surface of the pedestal. Theoretically, this permitted the lugs to slide laterally on the pedestals towards and away from each other as the casing expanded or contracted. In actual practice, however, it has been found that upon heating and expansion of the casing, the lugs, due to uneven heating thereof, tend to twist about a vertical axis. This twisting, even when of relatively small degree, is sufficient to cause binding of the keys in the keyways, thus preventing free transverse movement of the lugs on the pedestals.

In accordance with my invention I provide a novel key connection between the lugs and pedestals permitting the lugs to twist and at the same time freely slide laterally relative to the pedestals.

Therefore, an object of my invention is the provision of connecting means between the supporting lugs of a casing and the pedestals therefor, permitting free twisting movement and lateral sliding movement of the lugs relative to the pedestals upon expansion and contraction of the casing.

A further object of my invention is the provision of connecting means between the supporting lugs of a turbine casing and the pedestals therefor, which will not bind upon distortion of the lugs due to uneven heating and expansion of the latter.

These and other objects are effected by my invention as will be apparent from the following description and claims, taken in connection with the accompanying drawing forming a part of this application, in which:

Fig. 1 is a plan view in elevation showing the high pressure and a portion of the low pressure

cylinders of a two-cylinder tandem turbine generator unit.

Fig. 2 is a side view in elevation of the structure of Fig. 1;

Fig. 3 is an enlarged sectional view taken along the line III—III of Fig. 1; and,

Fig. 4 is an enlarged sectional view taken along the line IV—IV of Fig. 1.

In the drawing, numeral 10 indicates the high pressure cylinder, and numeral 11 the low pressure cylinder, of a two-cylinder tandem turbine generator unit. The high pressure cylinder 10 is provided with a steam chest 12 of conventional structure, providing for the admission of operating steam to said cylinder; the steam admission being controlled by governor mechanism 13. The exhaust steam from the high pressure cylinder passes through conduit 14 to the low pressure cylinder 11. A novel key construction 24 connects the lugs to their pedestals for free horizontal twisting movement and limited transverse sliding movement of the lugs relative to the pedestals.

The horizontally-extending lugs 16, 17, 18 and 19 are continuations of the flanges connecting the upper and lower halves of the cylinder casing. The lugs 16 and 17, at the coupling end of the cylinder, rest upon a fixed pedestal 21, which, preferably, is a portion of the low pressure cylinder base. The lugs 18 and 19, at the opposite end of the high pressure cylinder, rest upon a sliding pedestal 22. Each of the four lugs is connected to its pedestal by a novel key arrangement 24.

Each of the lugs 16, 17, 18 and 19 is provided with a vertical bore 26 extending entirely there-through. Mounted in each bore is a sleeve member 27, of a cylindrical form, and preferably provided with a flange 28 at the upper end thereof, which flange is received in a countersunk recess 29 provided therefor in the upper surface of each lug. The sleeve 27 is of such a length as to project below the bottom surface of the lug a material distance, as at 27a. It will be noted that while the lower half of each lug, that is, the part carried by the lower half of the casing, closely fits the sleeve 27, the upper half of the lug, which is integral with the upper half of the casing, loosely fits the sleeve, whereby some relative movement of the upper half of the casing with respect to the lower half thereof may occur.

The pedestals 21 and 22 have flat horizontal upper surfaces, said surfaces being provided with transversely extending grooves 31, of such dimensions as to slidably receive keys 32. Each key 32

is provided with a centrally located vertically extending hole 32a closely receiving the projecting portion 21a of the sleeve 27. Stud 33 extends vertically from the pedestals at the centerline of the grooves, passing through the sleeves 27. These studs are of a diameter materially less than the internal diameter of the sleeves 27 whereby the lugs and the sleeves mounted therein, together with the keys 32, may move transversely in the grooves 31 a limited distance. Preferably, the outer ends of the studs 33, which extend above the upper surface of the lugs, are provided with means, such as a washer 34 and nut 36, for preventing material movement of the lugs vertically with respect to the pedestals.

It will be seen that by this construction the lugs may twist in a horizontal plane about the studs 33 due to the cylindrical connection between the lugs and the sleeves 27. Preferably, the portion 27a of the sleeve 27, which projects below the lower surface of the lugs and is received in the key 32, is cylindrical in the same manner as the remainder of the sleeve 27. With such a construction, twisting of the lugs about a vertical axis may occur by turning of the portion 27a of the sleeve 27 in the hole 32a of the key 32, even if binding of the lugs on the sleeves occurs due to uneven expansion of the upper and lower halves of the lugs.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In combination, mechanism having a casing subject to changes in temperature causing it to expand and contract, a pedestal at each end of the casing, lugs integral with the casing and resting on the pedestals for supporting said casing, and means connecting the lugs and pedestals for transverse and twisting movement of the former relative to the latter in a horizontal plane while preventing relative longitudinal movement of said lugs and pedestals.

2. In combination, mechanism having a casing subject to changes in temperature causing it to expand and contract, a pedestal at each end of the casing, lugs integral with the casing and resting on the pedestals for supporting said casing, and vertically extending cylindrical members connecting the lugs and pedestals for transverse and twisting movement of the former relative to the latter in a horizontal plane while preventing relative longitudinal movement of said lugs and pedestals.

3. In combination, mechanism having a casing

subject to changes in temperature causing it to expand and contract, a pedestal at each end of the casing, lugs integral with the casing and resting on the pedestals for supporting said casing, and means connecting the lugs and pedestals for transverse and twisting movement only of the former relative to the latter in a horizontal plane, said means comprising sleeves extending vertically through each lug and projecting a material distance therebelow, keys having holes there-through rotatably receiving the projecting portions of the sleeves, said pedestals having transversely extending grooves in their upper surfaces slidably receiving said keys, and studs mounted in the pedestals and extending vertically through the sleeves, said studs being of a diameter materially less than the internal diameter of the sleeves.

4. In combination, mechanism having a casing subject to changes in temperature causing it to expand and contract, a pedestal at each end of the casing, lugs integral with the casing and resting on the pedestals for supporting said casing, and means connecting the lugs and pedestals for transverse and twisting movement only of the former relative to the latter in a horizontal plane, said means comprising members having upper cylindrical portions extending vertically through each lug and lower portions projecting a material distance therebelow, keys rotatably receiving the projecting portions of the sleeves, said pedestals having transversely extending grooves in their upper surfaces receiving the keys for sliding movement of the latter therein, and means for limiting said sliding movement.

5. In apparatus including a casing subject to changes in temperature causing it to expand and contract, a pedestal at each end of the casing and lugs integral with the casing and resting on the pedestals for supporting said casing; means for connecting the lugs to the pedestals and comprising members having upper lug-engaging portions and lower key-engaging portions, said lug-engaging portions extending vertically through the lugs and being cylindrical whereby the lugs may turn on the members in a horizontal plane, keys having holes therethrough rotatably receiving the key-engaging portions of said members, the pedestals having transversely extending grooves in their upper surfaces receiving the keys for sliding movement of the latter therein, said members having axial bores extending from end to end thereof, said bores and cylindrical portions being concentric, and studs mounted in the pedestals and extending vertically through said bores, and the holes in the keys, said studs being of smaller diameter than the bores and holes whereby sliding movement of the members and keys in the grooves is limited.

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