R. H. RICE.

FRAME FOR TURBO DRIVEN MACHINES.

APPLICATION FILED AUG. 16, 1913.

1,155,162. Patented Sept. 28, 1915.

Fig. 1.

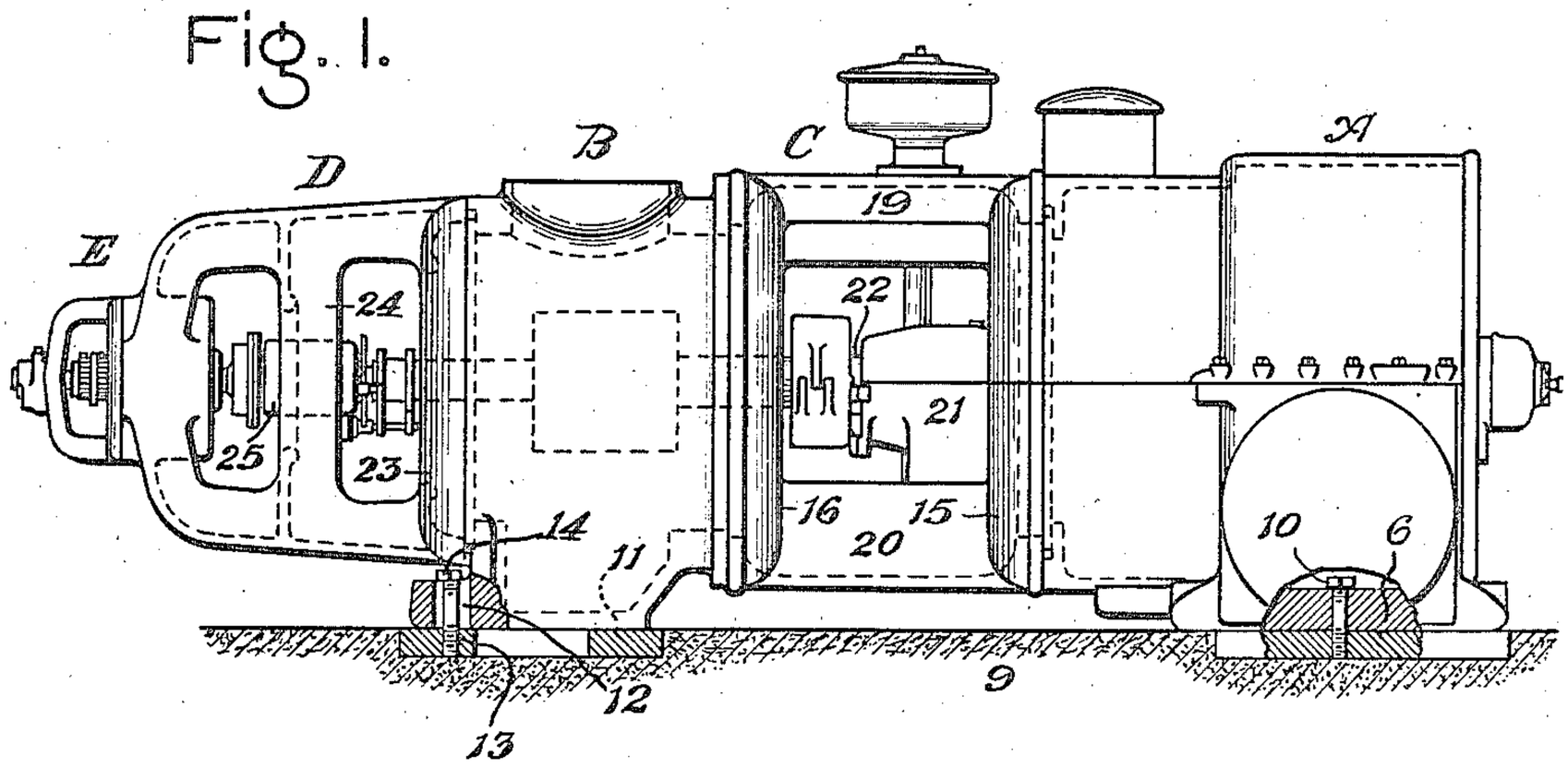


Fig. 2.

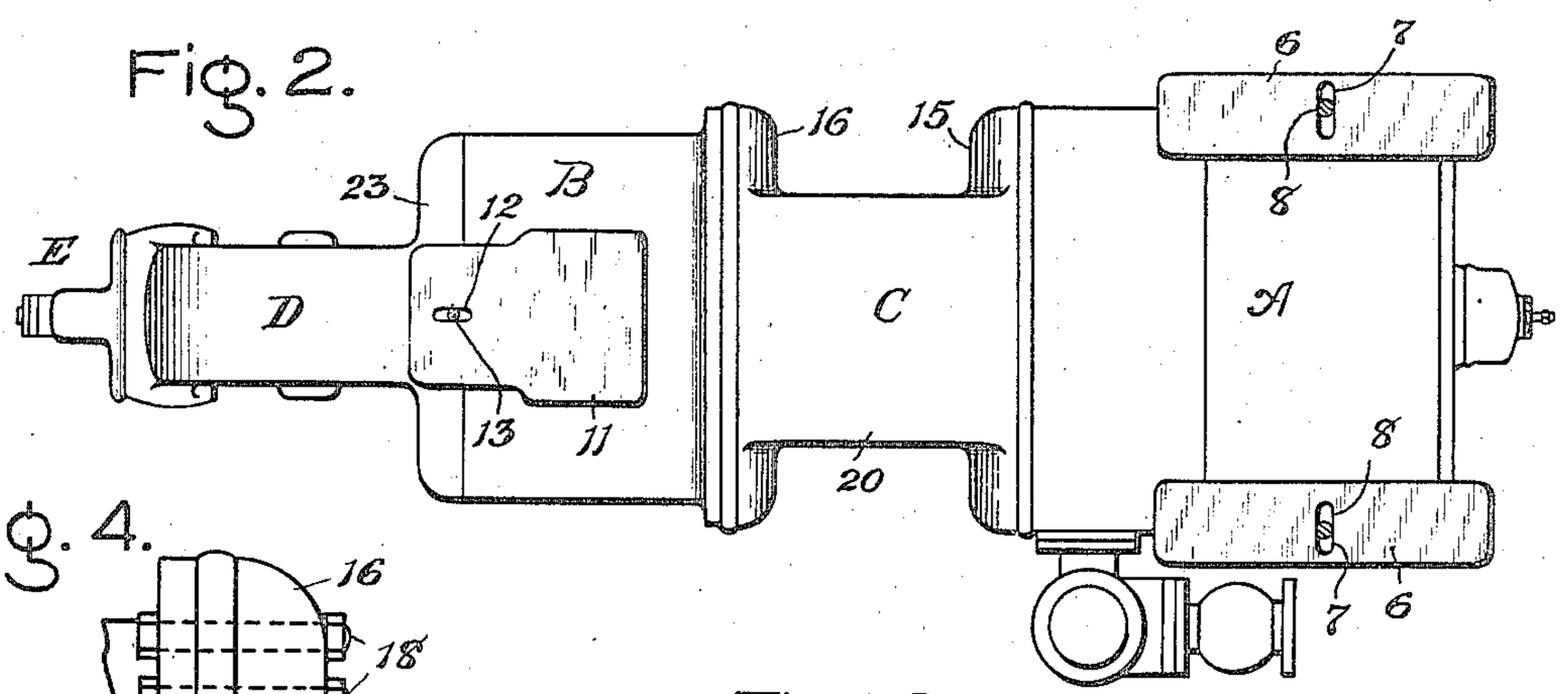
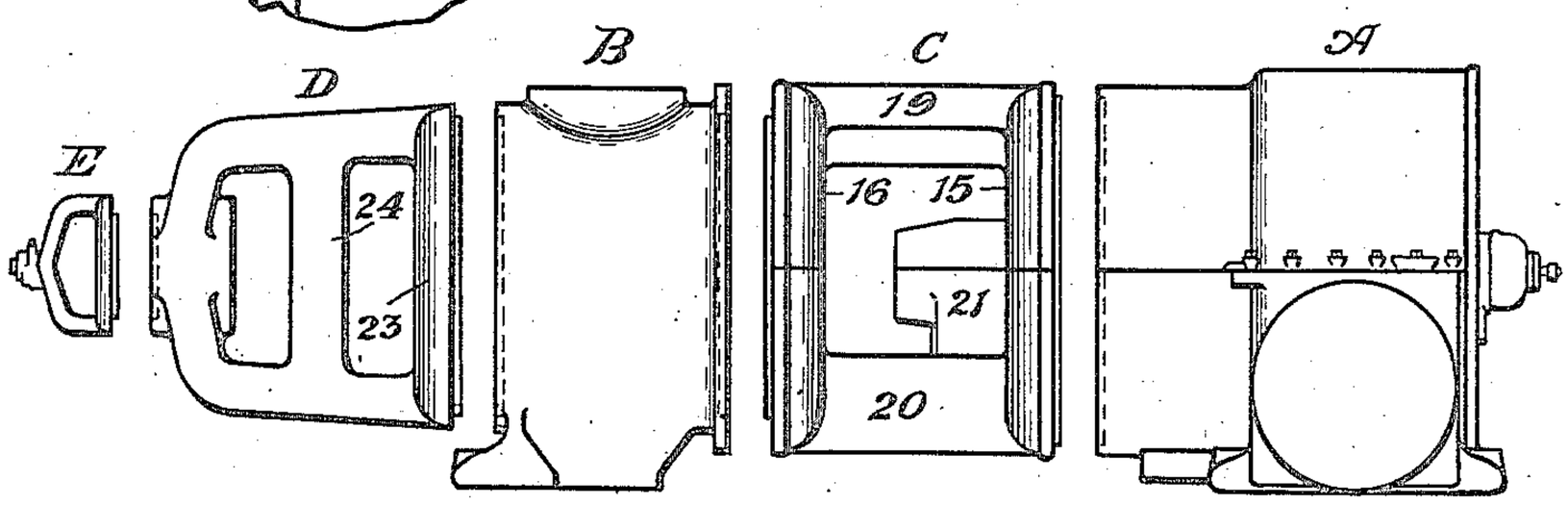


Fig. 4.

Fig. 3.



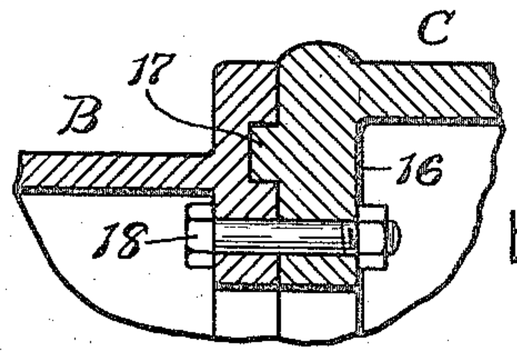


Fig. 5.

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UNITED STATES PATENT OFFICE.

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FRAME FOR TURBO-DRIVEN MACHINES.

1,155,162. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed August 16, 1913. Serial No. 785,118.

To all whom it may concern:

Be it known that I, RICHARD H. RICE, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Frames for Turbo-Driven Machines, of which the following is a specification.

This invention relates to horizontal direct-connected turbine-driven sets, and its object is to provide a frame for such a machine which will be free from the danger of distortion by reason of unequal expansion and contraction of its several parts; which will sustain rigidly the stresses due to its weight and the inertia of rotating masses; which will be easy to assemble and take down, and will be economical to build.

In a horizontal turbine-driven machine, as in many other machines, it is important to maintain an accurate alinement of the shaft. This is not easy to accomplish where all the parts are secured to a bed plate, owing to the unequal expansion and contraction of the turbine end as compared with the rest of the machine. Moreover, a bed plate cannot always be made stiff enough to withstand the stresses tending to distort the machine.

My invention aims to overcome these difficulties and to provide a frame for a turbine-driven set which, while permitting freedom of expansion and contraction, will rigidly maintain the shaft in perfect alinement, and all parts of the machine in good operative relation, besides sustaining all the stresses due to rotation.

The invention is applicable to horizontal turbo-generators, turbine-driven air compressors, and other direct-connected turbine-driven machines.

For the sake of illustration I have selected a turbo-generator, and in the accompanying drawing—Figure 1 is a side elevation of a turbo-generator embodying my invention; Fig. 2 is a bottom plan view of the same; Fig. 3 is an exploded side elevation; Fig. 4 shows a portion of the joint between the generator casing and the connecting member, and Fig. 5 is a section of said joint.

The frame illustrated is composed essentially of five parts meeting preferably on vertical planes. When fastened together, these parts constitute a stiff girder, sufficiently deep in a vertical longitudinal plane to support rigidly the weight of the parts and also to resist torsional stresses. Part A of this girder frame is the turbine casing which is composed of a cylindrical casting made in halves meeting on a horizontal plane and firmly bolted together. The casing has the usual heads, and may be regarded as a tubular section of the girder, being stiff and deep in a vertical plane. It has two longitudinal sole-plates 6, one on each side. In each plate is a transverse slot 7 to fit over the end of a screw-threaded stud or bolt 8 anchored in a concrete or other foundation 9. A nut 10 is screwed upon the stud but does not clamp the sole-plate tightly, leaving it free to slide laterally when the casing expands or contracts.

Part B is the frame of the generator whose rotor is indicated in dotted lines. This portion of the frame is a cylindrical casting which, like part A, may be regarded as a tubular section of the girder, of considerable vertical depth and corresponding stiffness. On its under side, this part has a single sole-plate 11 resting on the foundation 9 and having a longitudinal slot 12 extending perpendicular to the slots 7 to fit a screw-threaded stud 13 provided with a nut 14. Part B is not tightly clamped by this nut, but is free to expand lengthwise. The slot 12, in fact, provides for a longitudinal expansion of the entire frame.

Part C has two heads 15, 16 adapted to be secured respectively to the approximate ends of the parts A and B, preferably by a tongue and groove joint 17 and through bolts 18, as shown in Figs. 4 and 5. Said heads are integrally connected by upper and lower beams 19, 20, so that this part constitutes an open vetrical girder section whose compression member 19 and tension member 20 are wide and deep enough to withstand all distorting stresses due to the weight and momentum of the rotating shaft, turbine bucket wheels and generator rotor. Integral with the part C is a journal box 21 for the shaft 22.

Part D is an open frame forming a vertical girder section and having at one end a head 23 for attachment to the end of the generator frame, part B. An upright integral transverse post 24 forms a support for the journal box 25 for the shaft 22. The outer end member of the part D serves as

the stator frame for the exciter, whose rotor shaft is coupled to the end of the shaft 22. An outboard bearing for the rotor shaft is carried by the part E which is bolted to the end member of the part D.

When assembled as shown in Fig. 1 the frame is in effect a single rigid girder of considerable vertical depth, which rests easily upon the foundation at only three points. The turbine end can expand both laterally and longitudinally, when heated by the steam, without in any way impairing the alinement of the shaft. Torsional strains due to the revolving bucket wheels and generator rotor and tending to twist the parts A and B out of proper relation are efficiently resisted. The weights of the intermediate and overhanging portions are sustained by the stout and inflexible vertical girder members C and D.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A girder frame for a horizontal turbine-driven set composed of a turbine casing having sole plates supporting it at two points, a casing for the driven element having a sole plate supporting it at a single point, said sole plates thus forming a three-point support for the set, and a rigid vertical girder section uniting said casings.

2. A girder frame for a horizontal turbine-driven set composed of a turbine casing having sole plates supporting it at two points, a casing for the driven element having a sole plate supporting it at a single point, said sole plates thus forming a three-point support for the set, and a rigid vertical girder section uniting said casings and provided with a journal box for the shaft.

3. A girder frame for a horizontal turbine-driven set, composed of a casing for the turbine having sole plates containing transverse slots for fastening devices and supporting it at two points, a casing for the driven element having a sole plate containing a longitudinal slot for a fastening device and supporting it at a single point, said sole plates thus forming a three-point support for the set, and a rigid open girder section connecting said casings.

4. A girder frame for a horizontal turbine driven set comprising a casing for the turbine, a casing for the driven element, a girder section uniting said casings, sole plates forming a three-point support for said casings, and having slots therein, and fastening devices connected to the casing and passing through said slots.

In witness whereof, I have hereunto set my hand this 4th day of August, 1913.

RICHARD H. RICE.

Witnesses:
FRANK G. HATTIE,
G. L. HUTCHINS.