

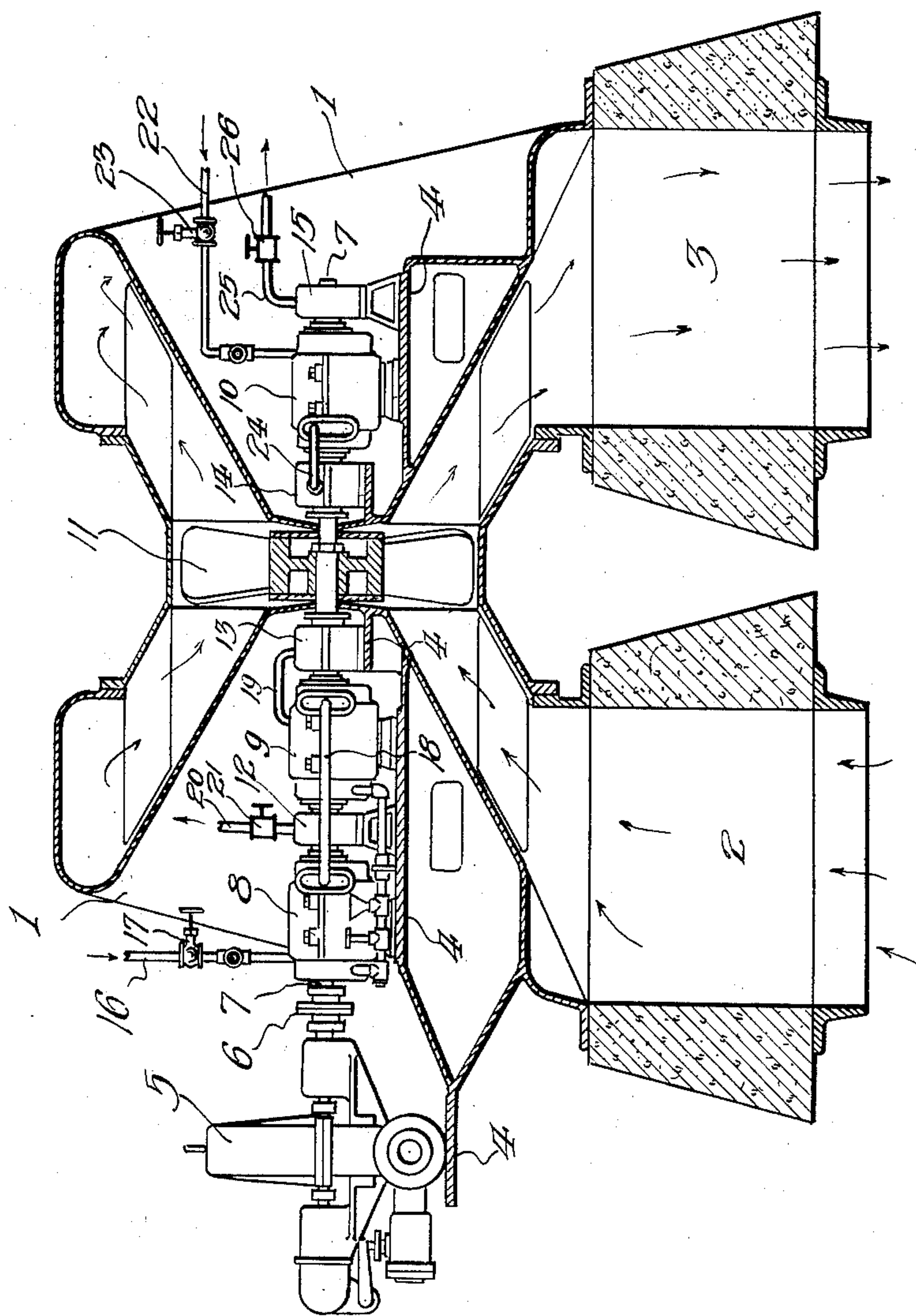
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DEVICE FOR RECIRCULATING HIGHLY HEATED GASES

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DEVICE FOR RECIRCULATING HIGHLY HEATED GASES

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The present improvements relate to a device adapted to circulate and recirculate hot gases, and more particularly to a device adapted to recirculate into a furnace partially or totally spent or used hot gases of combustion.

Fans and blowers which are forms of devices for accomplishing this purpose, are in general use and are subjected to severe temperature conditions. Bearings and such other parts that would be damaged by heat, must be kept out of direct contact with the hot gases that are being recirculated by the fan. In fans or blowers in use at the present time for the purpose specified, the bearings which support the shaft for rotating the fan are located on only one side of the fan, the fan being carried on the free end of said shaft and located within a housing or casing through which the gases are forced by the fan. The bearings are located outside of said housing between the fan and the driving or driven element.

When such fans are built on a large scale for circulating and recirculating the gases in a large furnace, the weight of the fan or rotor combined with the effects of the heat, and the overhanging leverage caused by the fan bearing end of the shaft being unsupported, will often cause the shaft to warp or bend, thus causing the fan to wedge against or strike the housing, or be otherwise rendered inoperative.

The object of the present invention is to provide for bearings on both ends of the driving shaft, i. e., on both sides of the fan, to avoid the strain caused by the overhanging fan driving shaft, which bearings are mounted out of the path of the hot gases to prevent them from being damaged.

The utility of the invention as well as other objects, features and advantages will be more particularly apparent from the following description.

The drawing is a side elevational view, partly in vertical section of a device built according to the present invention.

In the drawing, 1 designates an indented metal housing or casing having a hot gas inlet duct 2 and a gas discharge duct 3.

Plates 4 may be suitably mounted upon the housing 1 to support the mechanical assembly which may comprise a steam turbine 5 joined by means of a coupling 6 to the fan driving shaft 7 which may be driven by said turbine. Suitable bearings may be provided within the casings 8, 9 and 10 to support shaft 7.

Said casings may be adapted to accommodate a liquid cooling medium such as water. The fan 11 may be mounted on shaft 7 and enclosed in the housing 1 in a position between the bearings retained in casings 9 and 10, which are located outside of the housing 1.

In the operation of the apparatus, the spent gases from the furnace (not shown) may be drawn through duct 2 by the fan 11 and forced through the discharge duct 3 into the combustion zone of the furnace (not shown). The temperature of these gases may be rather high, sometimes reaching 2000 degrees F. more or less, depending of course, upon the conditions of the operation wherein they are given off. Such high temperatures may cause the shaft 7 to become quite hot and conduct heat to the bearings supporting it which would, of course, cause damage to said bearings.

In order to cool the shaft and bearings, I may provide boxes 12, 13, 14 and 15 which are suitably packed to retain a cooling liquid such as water and at the same time permit the shaft to rotate. Water or other cooling media may be introduced through the pipe 16 controlled by valve 17 into the bearing-retaining casing 8, passing out of the latter through pipe 18 from which it may flow into the bearing-retaining casing 9. From casing 9 the cooling liquid may pass through pipe 19 into the box 13 where it enters the revolving shaft 7, which contains a passage-way of the conventional type to accommodate such cooling liquid and flows from said shaft into the box 12 and out of the discharge pipe 20 controlled by valve 21. To cool that portion of the shaft on the opposite side of the fan, a similar structure may be employed. Water or other cooling media may be introduced into the bearing casing 10

through pipe 22 controlled by valve 23. Leaving the casing 10 through pipe 24 it flows into the packed box 14 where it enters the shaft 7, which may contain a conventional passageway for cooling liquids, flowing out of said shaft into the box 15 from where it may be discharged through pipe 25 controlled by valve 26.

It will be apparent from the above that I have perfected a device wherein there will occur a minimum of friction and a minimum of strain on the parts thereof. I have placed bearings on both sides of the fan or rotor, thus avoiding the wrenching effected upon bearings positioned on only one side of the fan. It will be seen that with my device the shaft is kept in perfect alignment, thus preventing the fan from wedging against the housing or casing surrounding it.

I claim as my invention:

1. A hot gas recirculating device comprising a housing, a rotatable shaft, a fan mounted on the shaft within the housing, a bearing for the shaft exterior of the housing and having a jacket for cooling medium, a cooling box on the shaft between the fan and the bearing, means for supplying cooling medium to the jacket, a passage connecting said box with the jacket, and a passage within the shaft communicating with said box and having an outlet positioned to cause circulation of the cooling medium through the shaft outside of the housing.

2. A hot gas recirculating device comprising in combination a housing, a rotatable shaft, a fan mounted upon said shaft and positioned within said housing, a plurality of bearings for said shaft exterior of said housing, jackets for said bearings for a cooling medium, cooling boxes on said shaft interposed between the bearings and the housing, means for circulating the cooling medium from the bearings to said boxes and means for circulating the cooling medium from said boxes through those portions of the shaft supported by the bearings.

3. A hot gas recirculating device comprising in combination a housing, a rotatable shaft, a fan mounted upon said shaft and positioned within said housing, bearings for said shaft exterior and on opposite sides of said housing, jackets for said bearings for a cooling medium, cooling boxes for the shaft disposed upon said shaft on each side of each bearing, means for circulating the cooling medium from each of said bearings to a cooling box on one side of said bearing, and passages through said shaft connecting the boxes on each side of the shaft through which cooling medium may be passed.

4. A hot gas recirculating device comprising in combination a housing, a rotatable shaft, a fan mounted upon said shaft and positioned within said housing, bearings for

said shaft exterior and on opposite sides of said housing, jackets for said bearings for a cooling medium, cooling boxes for the shaft disposed upon said shaft on each side of each bearing, means for passing said cooling medium from each bearing to one of said cooling boxes adjacent said fan, and passages through said shaft connecting the boxes on each side of the shaft through which cooling medium may be passed.

In testimony whereof I affix my signature.

JAMES S. MILLER.

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