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TURBINE

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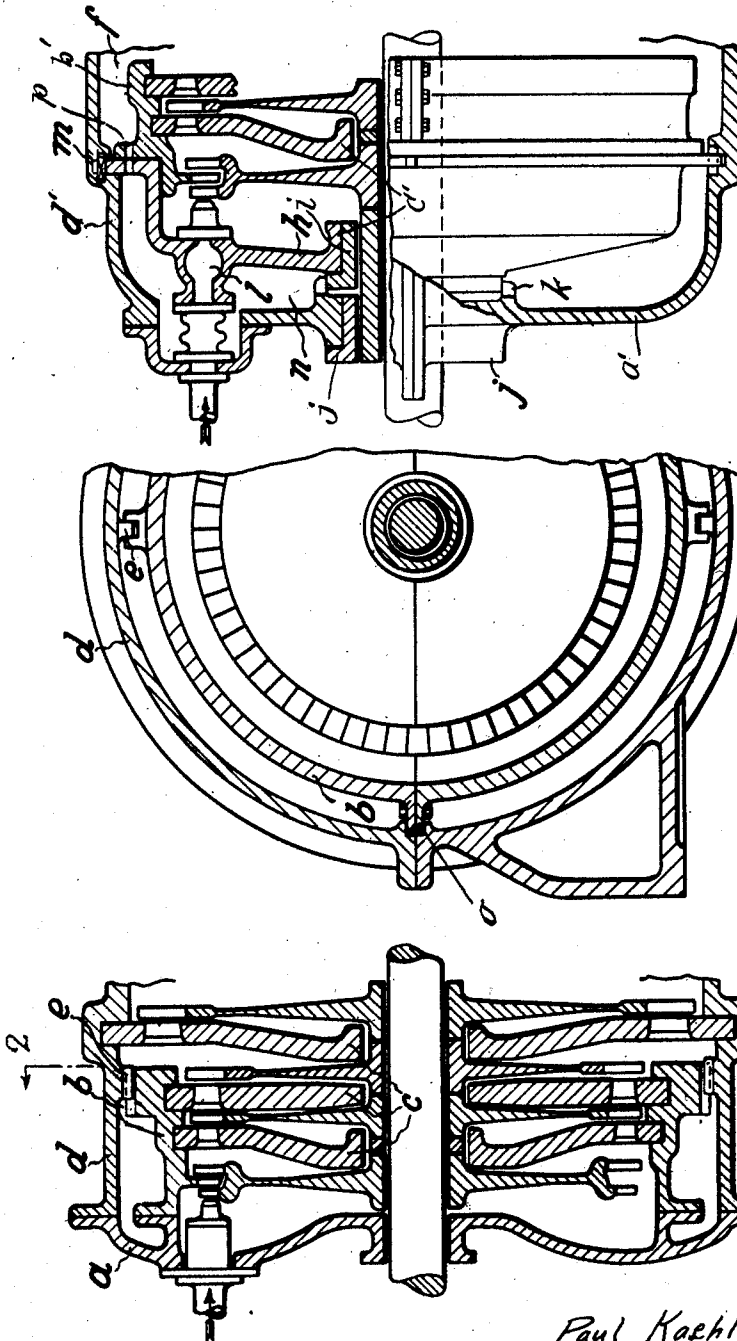


Fig. 3

Fig. 2

Fig. 1

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TURBINE.

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My invention covers gas or steam-driven turbines and more especially such operating at high pressures and temperatures. The object of my invention is to at least partially protect the casing against direct contact with the driving medium of high pressure and temperature by providing a partition.

Suggestions have already been put forward to prevent direct contact of the driving medium with the walls of the casing, by providing a partition in the casing.

This partition consists of several parts, which are simply held together by supports lodged against the outer cylinder of the casing. Naturally the radial stresses of the partition due to the influence of the pressure and temperature of the driving medium are transmitted to the wall of the casing and must be taken up by the latter. Difficulties arise at higher pressures and temperatures inasmuch as the resultant forces cause an undesirable deformation of the casing.

This evil is avoided by my invention. The partition fixed in the casing has free play radially and axially and is only secured against tangential displacement. This arrangement of the partition totally or partially protects the casing against contact with the driving medium of high pressure and temperature, and, owing to its own contact with the driving medium of high pressure and temperature, can follow the resultant stresses without being hindered by the casing, so that injurious stresses in the casing are avoided. The partition is appropriately so designed that it can take up the stresses due to the presence of the driving medium without affecting the casing. In order to reduce the stress of the pressure on the partition, it is advisable to connect the space between the casing and the partition with a low pressure stage and thus to graduate the drop of pressure between inner and outer pressure.

The annexed drawing illustrates two designs of the new turbine construction. Figs. 1 and 2 show one of the designs, Fig. 1 being a longitudinal section and Fig. 2 being a section along the line 2—2 of Fig. 1; Fig. 3 represents the other design.

In Figs. 1 and 2 *a* is the front end plate of the casing. This casing consists of one piece and is rigidly connected with the cylindrical shell *d* of the casing by means of a flange. Inside the casing, a cylindrical partition *b* consisting of several parts is fixed to the cylindrical shell. The diaphragms *c* of the high pressure stages are fixed to the inner side of this partition with a certain amount of play, whilst the diaphragms of the other stages are attached to the shell of the casing, likewise with a certain amount of play. The space intervening between the outer side of the partition *b* and the inner side of the shell of the casing is connected with the stage situated immediately behind the partition and therefore exercises a pressure which, on the one hand, is less than the highest pressure within the partition, but, on the other hand, greater than the pressure prevailing at the outside of the casing: The partition *b* can freely expand axially and radially relatively to the casing but is, however, brought to four given points of the circumference, separated in angles of 90 degrees, namely by means of cams *e* on the wall of casing *d* and special cams *o* which engage corresponding notches in the casing wall *d*.

In the design illustrated by Fig. 3 the front end of the casing *a'* and the cylindrical shell *d'* are in one piece, but horizontally divided. In this case the partition is completely separated from the shell *d'*, the partition *b'* and the casing with the front plate *a'* and shell *d'* being sealed at the shaft by the glands *i* and *j*. The gland *i* is outwardly, the gland *j* inwardly connected with space *n* intervening between the partition and the outer wall of the casing, the space *n* in turn being connected to a low-pressure stage of the machine as by a suitable passage *p* through the abutting portions of the partition and end plate. The partition is composed of a one-piece end *h* and a multi-part cylinder *b*, which all are firmly connected with each other. End *h* also contains the nozzle boxes. The partition is stabilized (centered) toward the turbine-casing, in the casing by cams *h* which are located on the casing-front wall near the shaft and which overreach the stuffing-boxes *i*. For the further stabilization of the partition in the casing, guides *m* are provided on the casing-front wall *d*. The partition must, however, not be prevented in any case, through its stabilization, from expanding axially and radially.

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dially as required by its contact with the driving-medium of high pressure and high temperature.

What I claim is:

- 5 1. In a turbine, a casing, a partition in the casing which protects the casing against direct contact with the driving medium of high pressure and high temperature, means positioning the partition with respect to the casing to permit expansion of the partition without affecting the casing, and means adapting the said partition to take up the stresses due to the pressure of the driving medium without affecting the casing.
- 10 2. In a turbine, a casing, a partition in the casing, spaced from the casing, which protects the casing against direct contact with the driving medium of high pressure and high temperature, means positioning the partition with respect to the casing to permit expansion of the partition without affecting the casing, and means adapting the said partition to take up the stresses due to the pressure of the driving medium without affecting the casing, the space intervening between the casing and the partition being in communication with a stage of lower pressure of the turbine.
- 15 3. In a turbine, a casing, a multi-part partition in the casing which protects the casing against direct contact with the driving medium of high pressure and high temperature, means positioning the partition with respect to the casing to permit expansion of the partition without affecting the casing, and means adapting the said partition to take up the stresses due to the pressure of the driving medium without affecting the casing.
- 20 4. In a turbine, a casing, a partition in the casing, spaced from the casing, which protects the casing against direct contact with the driving medium of high pressure and high temperature, means positioning the partition with respect to the casing to permit expansion of the partition without affecting the casing, and means adapting the said partition to take up the stresses due to
- 25 5. In a turbine, a casing, a partition in the casing, comprising a one-piece end and a multipart cylinder, the said parts rigidly associated, and means positioning said partition with respect to the casing, adapting it to expand axially and radially without being hindered by the casing, but securing it against tangential displacement, said partition adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature.
- 30 6. In a turbine, a casing and a shaft, a partition in the casing, comprising a multi-part cylindrical body and a one-part plate, an opening in the plate through which the shaft passes, and means to seal the plate at the shaft.
- 35 7. In a turbine, a casing and a shaft, a partition in the casing adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature, an opening in the partition through which the shaft passes and a seal at this opening.
- 40 8. In a turbine, a casing and a shaft, a partition in the casing adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature, an opening in the partition through which the shaft passes, a stuffing box at this opening to seal the partition at the shaft and means for centering the stuffing box with respect to the casing.
- 45 9. In a turbine, a casing, a partition in the casing adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature, and nozzle boxes for the admission of the driving medium positioned in the partition.

the pressure of the driving medium without affecting the casing, the space intervening between the casing and the partition being in communication with a stage of lower pressure of the turbine.

5. In a turbine, a casing, a partition in the casing, comprising a one-piece end and a multipart cylinder, the said parts rigidly associated, and means positioning said partition with respect to the casing, adapting it to expand axially and radially without being hindered by the casing, but securing it against tangential displacement, said partition adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature.

6. In a turbine, a casing and a shaft, a partition in the casing, comprising a multi-part cylindrical body and a one-part plate, an opening in the plate through which the shaft passes, and means to seal the plate at the shaft.

7. In a turbine, a casing and a shaft, a partition in the casing adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature, an opening in the partition through which the shaft passes and a seal at this opening.

8. In a turbine, a casing and a shaft, a partition in the casing adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature, an opening in the partition through which the shaft passes, a stuffing box at this opening to seal the partition at the shaft and means for centering the stuffing box with respect to the casing.

9. In a turbine, a casing, a partition in the casing adapted to protect the casing against direct contact with the driving medium of high pressure and high temperature, and nozzle boxes for the admission of the driving medium positioned in the partition.

In testimony whereof I affix my signature.

PAUL KAEHLER.