No. 816,020. PATENTED MAR. 27, 1906.

H. LENTZ.

GUIDING MEANS FOR TURBINES.

APPLICATION FILED OCT. 17, 1905.

2 SHEETS—SHEET 1.

Fig. 2

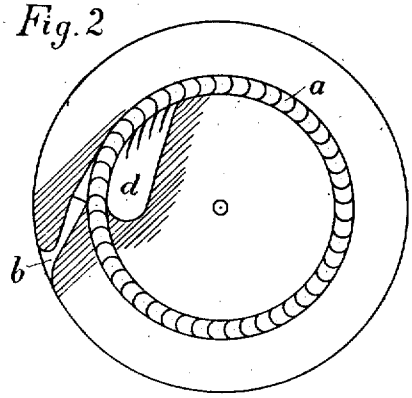


Fig. 1

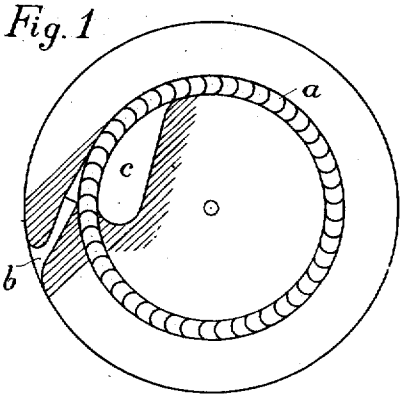


Fig. 3

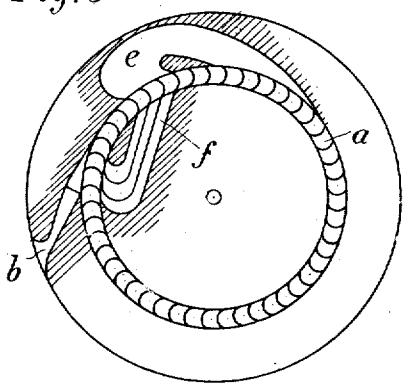


Fig. 4

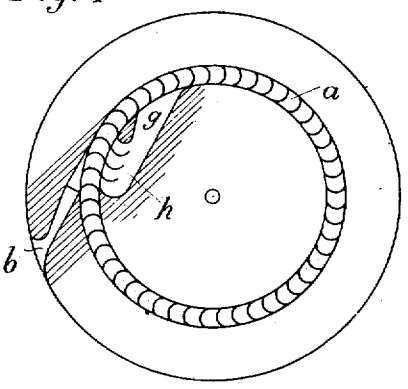
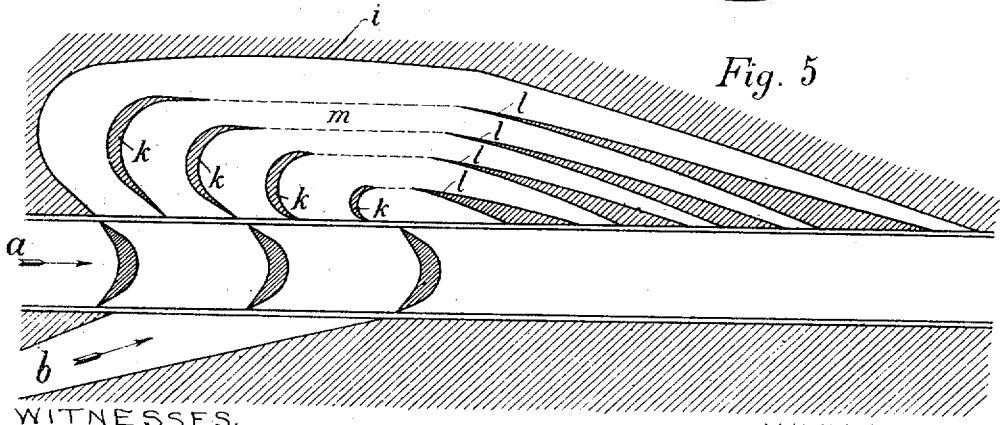


Fig. 5



WITNESSES;

A. Donnelly

F. H. Logan.

INVENTOR,

HUGO LENTZ,

BY J. H. Berrigan

HIS ATTORNEY

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2 SHEETS—SHEET 2.

Fig. 6

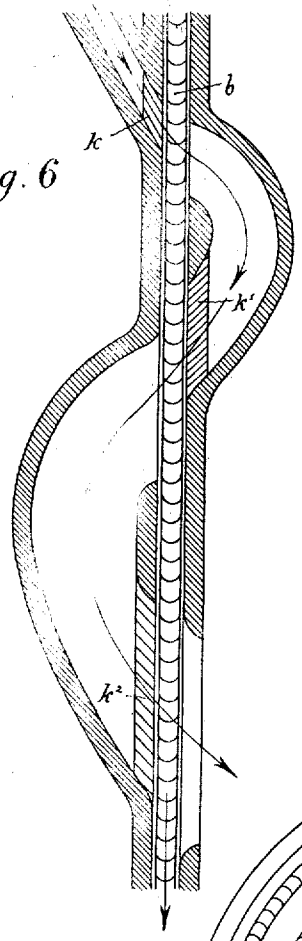


Fig. 7

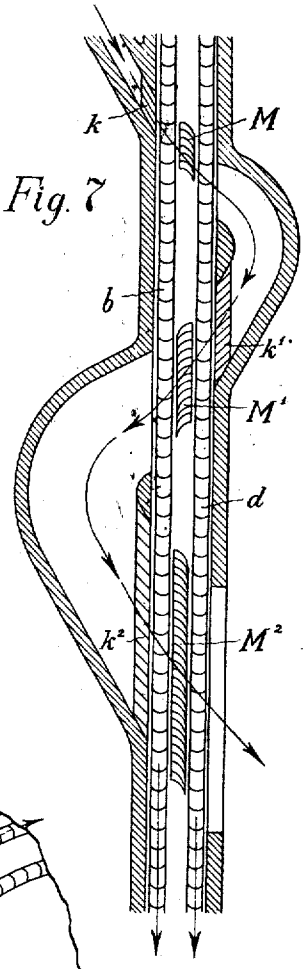
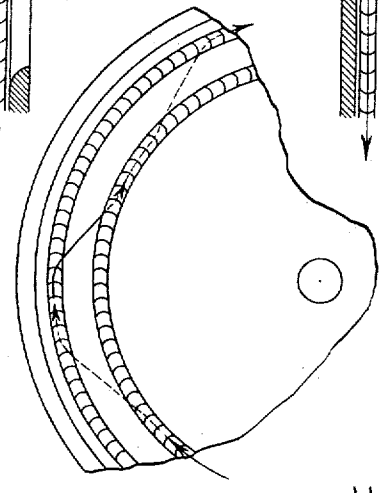


Fig. 8



WITNESSES;

A. Donnelly

F. H. Logan

INVENTOR,

HUGO LENTZ,

BY Thos. H. Corrigan.

HIS ATTORNEY

UNITED STATES PATENT OFFICE.

HUGO LENTZ, OF BERLIN, GERMANY.

GUIDING MEANS FOR TURBINES.

No. 816,020. Specification of Letters Patent. Patented March 27, 1906.

Application filed October 17, 1905. Serial No. 283,092.

To all whom it may concern:

Be it known that I, HUGO LENTZ, a subject of the German Emperor, residing at 10/11 Potsdamerstrasse, Berlin, Germany, have invented a new and useful Guiding Means for Steam and Gas Turbines; and I do hereby declare the following to be a full, clear, and exact description of the same.

The object of this invention is to provide, in combination with a turbine running-wheel or a succession of such running-wheels, reverse guiding means whereby pressure medium after it has usefully acted upon the paddles of such wheel or succession of wheels shall be again returned to said wheel or succession to again drive the same.

The improvements hereinafter described particularly consist in the location within a guide-channel of a reverse guiding means of one or more fixed blades or the like constituting internal partitions wherein the individual threads of steam or other pressure medium are controlled as desired, and, as hereinafter described, wherein the pressure medium is accumulated.

In order to cause the jets of steam or other pressure medium to repeatedly act upon the same wheel or upon a succession of wheels, it has been proposed to employ, especially at both sides of the wheel-rim, canals or chambers arranged in such a way that the steam is repeatedly returned to the running-wheel. The existing or earlier structures employing such canals are not, however, satisfactory. The canals do not confine or direct the jet sufficiently to prevent losses by diffusion, or else are so closed as to not only cause material losses of energy by friction and eddies, but give unfavorable outlets. If the outlets are large, the steam is guided in the canal only upon the impacting walls of the wheel-paddles, while the individual threads of steam are not properly controlled and do not work advantageously upon the wheel. If to overcome this the canal-outlets are contracted, the steam is chocked or throttled and the pressure is decreased.

The improvements hereinafter described and shown in the accompanying drawings overcome the defects above recited.

Referring to the accompanying drawings, showing several embodiments of my invention, Figure 1 is a side view of a turbine-wheel, and shows a simple reverse space or canal, which is open inwardly. Fig. 2 is a side view of a turbine-engine employing a single re-presenting device according to my improvements. Fig. 3 is a view similar to the previous ones, but showing the re-presenting canal divided by several partitions. Fig. 4 shows the stream-guiding plates or partitions at the incoming end of the re-presenting canal. Fig. 5 is an enlarged view showing a re-presenting canal according to my invention provided with discontinuous blades or partitions and with an accumulating-chamber. Figs. 6 and 7 show in section details of single and plural wheel machines provided with the serpentine guideways with jet-guiding blades or partitions as devised by me for repeatedly subjecting the wheel or wheels to the action of the pressure medium. Fig. 8 shows diagrammatically the action of the pressure medium upon a radial wheel, especially when the inventions illustrated in Figs. 6 and 7 are employed.

The re-presenting or directing chamber is according to my invention provided with a plurality of fixed blades of any desired length.

As shown in Fig. 2, the running-wheel *a*, provided with the impact-paddles, may pass between a supply-nozzle *b* and a re-presenting canal, (*c* in Fig. 1,) wherein a number of fixed blades or partitions *d*, shorter than the length of the reversing or re-presenting canal or chamber, are located. As shown in Fig. 3, such partitions or fixed blades may extend entirely through the length of the re-presenting canal, thus dividing the same into a plurality of closed reversing or re-presenting channels *f*, or, as shown in Fig. 4, the re-presenting canal may contain one or more fixed blades or partitions *g*, which entirely extend through the canal, and other blades *h*, which lie in the canal for only part of its length at the entrance end thereof, for instance. Again, as shown in Fig. 5, blades *l* and *k* may be fixed in the re-presenting canal at both ends thereof, leaving a free space *m* between the same. As described hereinafter, this space *m* may constitute an "accumulating-chamber." Repeated injections or returns of the pressure medium to the same wheel may be secured by providing a serpentine re-presenting canal or continuations of the guideway, as shown, for instance, in Fig. 3.

Especially referring to Fig. 5, it will be seen that the invention may comprise a series of short curved blades *k k k k*, which like

those shown in my pending application Serial No. 253,753 and in my Letters Patent No. 797,130, dated August 15, 1905, may be gradually smaller in the direction of the movement of the wheel (and they may also be progressively narrower) adapted to deflect or return the pressure medium in the form of separate and controlled threads or jets into separate channels formed between superimposed plates or guides, (here indicated by letters *l l l l*,) which extend one beyond another, so as to directly guide the jets or threads of the pressure medium to the paddles of the wheel. As shown, the plates *k* and *l* are not connected, and as a result a chamber *m*, which I prefer to call an "accumulating-chamber," is formed between said sets of blades. From this accumulating-chamber the pressure medium is directed in the form of guide-jets by means of the plates *l* directly to the impact-faces of the paddles.

I have found that the employment of separate catching or deflecting blades *k* and a plurality of guiding-plates *l* not only results in an advantageous form of collection-compartment or accumulating-chamber and a compensation for the different and differently-distributed jets of steam or other pressure medium, but also more thoroughly regulates the return injection or reintroduction of the pressure medium upon the running-wheel with a very uniform distribution.

If the blades or guiding-plates *l* are made of gradually thicker metal or otherwise formed so as to have the passages gradually narrow toward their exit ends, the steam accumulates, as it were, in the space of chamber *m* under increasing pressure in order to return in uniform manner upon the wheel.

The modification of my invention which is shown in Figs. 6, 7, and 8 employs a nozzle continuation which corresponds to a flat curved serpentine chamber, (see also Fig. 3.) which repeatedly traverses the running-wheel *b*, Fig. 6, or running-wheels *b* and *d*, Fig. 7. As is shown, the serpentine chamber may gradually enlarge toward its exhaust-outlet. Referring to Fig. 6, it will be seen that the guiding devices $k\ k'\ k^2$ may be placed in the serpentine raceway to control and direct the impact of the steam by dividing the same upon the paddles of the wheel. If desired, Fig. 7, guiding devices $M'\ M^2$ may be fixed between successive running-wheels where two or more are used. The guiding devices k, k', and k^2 or $m'\ M^2$, or both, are preferably inclined in the direction of rotation of the wheel. Fig. 8 shows the guiding of a jet of steam so as to repeatedly strike the paddles of a radial turbine.

What I claim, and desire to secure by Letters Patent, is—

1. In a turbine-driven engine, a turbine running-wheel provided with paddles and a guide-canal for receiving pressure medium after it has left said wheel and again directing it against the paddles of the wheel, said guide-canal containing a plurality of catching-blades, and a plurality of inclined blades, the two sets of blades being separated by a space constituting a pressure-accumulating chamber, and the inclined blades being formed to provide discharge-passages which gradually narrow from their receiving ends toward their outlets.

2. In a turbine-engine, turbine running-wheels provided with paddles and a guide-canal for receiving pressure medium after it has left said wheel and again directing it against the paddles of the wheel, said guide-canal containing a plurality of catching-blades and a plurality of inclined blades, the two sets of blades being separated by a space constituting a pressure-accumulating chamber, and the inclined blades being so formed as to provide discharge-passages which have outlets narrower than the body of said passages.

3. In a turbine-engine, a turbine running-wheel provided with paddles and a guide-canal for receiving pressure medium after it has left said wheel and again directing it against the paddles of the wheel, said guide-canal containing a plurality of catching-blades and a plurality of inclined blades, the two sets of blades being separated by a space constituting a pressure-accumulating chamber and the inclined blades being gradually thickened from their receiving ends to their discharge ends.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HUGO LENTZ.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.