No. 812,795. PATENTED FEB. 13, 1906.

H. KELLER.

BUCKET FOR TURBINES.
APPLICATIONFiled NOV. 16, 1904.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses:
H. Keller
A. F. Macdonald.

Inventor:
Huldreich Keller.

By Allen M. Davis.
Att'y.
To all whom it may concern:

Be it known that I, Huldreich Keller, a citizen of Switzerland, residing at Berlin, Germany, have invented certain new and useful Improvements in Buckets for Turbines, of which the following is a specification.

The present invention relates to the construction of buckets for elastic-fluid turbines, and has for its object to overcome certain objections which have heretofore existed and also to increase the efficiency of the turbine by improving the action of the buckets contained therein.

In the accompanying drawings, which are attached to and made a part of this application, Figures 1 and 2 are sectional views showing the former bucket construction and illustrating the passage of motive fluid through the pockets or passages. Figs. 3 and 4 represent embodiments of my invention as applied to turbines having a single row of buckets, and Fig. 5 is a sectional view of a turbine element having a double row of buckets made in accordance with the invention.

Referring to Fig. 1, represents a bucket-wheel or stationary element having buckets 2 and U-shaped pockets 3 between the buckets. Fluid is discharged into the pockets by a nozzle or other device 4. The motive fluid, which may be steam, air, or gas, passes through the nozzle and enters the pocket 3. The width of the fluid stream issuing from the nozzle is indicated by 56, while the width of the pocket at this point is indicated by 78, the latter being much greater than the former. It is to be noted that the passage is of uniform width from end to end. In passing through the pocket the steam or other fluid hugs the walls thereof and expands slightly toward the discharge end. If the path 78 is relatively large, the jet of steam entering the pocket with great velocity creates in its vicinity a considerable relative vacuum. In other words, the pressure of the jet in the pocket near the entrance is less than that of the entering jet. The tendency to the creation of a vacuum is less at the entrance than at more distant points. As the distance from the point of admission increases a fall in pressure takes place according to the position of the nozzle.

This fall in pressure has been found to bear a definite relation to the character of the pocket and becomes greater the more nearly the form of the pocket approaches that of a closed space. In other words, the smaller the opening the greater will be the relative vacuum created. The fall of pressure may, as shown by experiment, be so great that the fluid stream passing out of the pocket is turned away from the wall toward the middle of the bucket, as shown in Fig. 2. Obviously this gives rise to disturbances in the turbine which decrease its efficiency. In order to prevent the objection above referred to, the pocket is made narrower on the inlet than on the outlet side. This can be done in a variety of ways—such, for example, as by turning a groove of suitable shape in the surface of the bucket-containing element either before or after the buckets are cut.

In Fig. 3 the wall 11 of the pocket has substantially the same width as the fluid stream and gradually increases in width toward the exhaust or discharge side.

In Fig. 4 the wall 11 is cut on a slant to further decrease the tendency of the fluid stream to create a relative vacuum and cause the stream to turn on itself. Other things being equal the narrower the wall is at the point of admission the less will be the resistance offered to the entering fluid.

In Fig. 5 is shown a construction suitable for double buckets receiving motive fluid from the same or different nozzles. In this case the walls 11 of opposite buckets meet in a relatively sharp point at the inlet end and gradually increase in width toward the discharge end.

It will be seen that in Figs. 3 to 5, inclusive, the width of the pocket at the inlet end is little or nothing and gradually increases in width by an amount conditioned on the width of the stream. By reason of this the stream freely enters the pockets, and the tendency for it to turn on itself and create eddies, &c., is avoided. It is also to be noted that less resistance is offered to the passage of the fluid.

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 in other ways.

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

1. An element for an elastic-fluid turbine containing a plurality of buckets and passages, each passage being substantially U-shaped in form and narrow at the inlet end with respect to the fluid stream, and wider at the discharge end than the fluid stream.

2. In a turbine, the combination of a nozzle, a bucket-carrying element arranged to receive fluid from the nozzle, the width of the wall on the inlet side of each bucket being less than on the discharge side, and pockets between the buckets which are substantially U-shaped in form and increase in width toward the discharge end.

3. In an elastic-fluid turbine, the combination of fluid-discharging means, an element situated in front of the said means which is provided with a double row of buckets and substantially U-shaped passages between the buckets, the walls forming said passages increasing in width from the inlet to the exhaust.

In witness whereof I have hereunto set my hand this 18th day of October, 1904.

HULDREICH KELLER.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.