

No. 771,450.

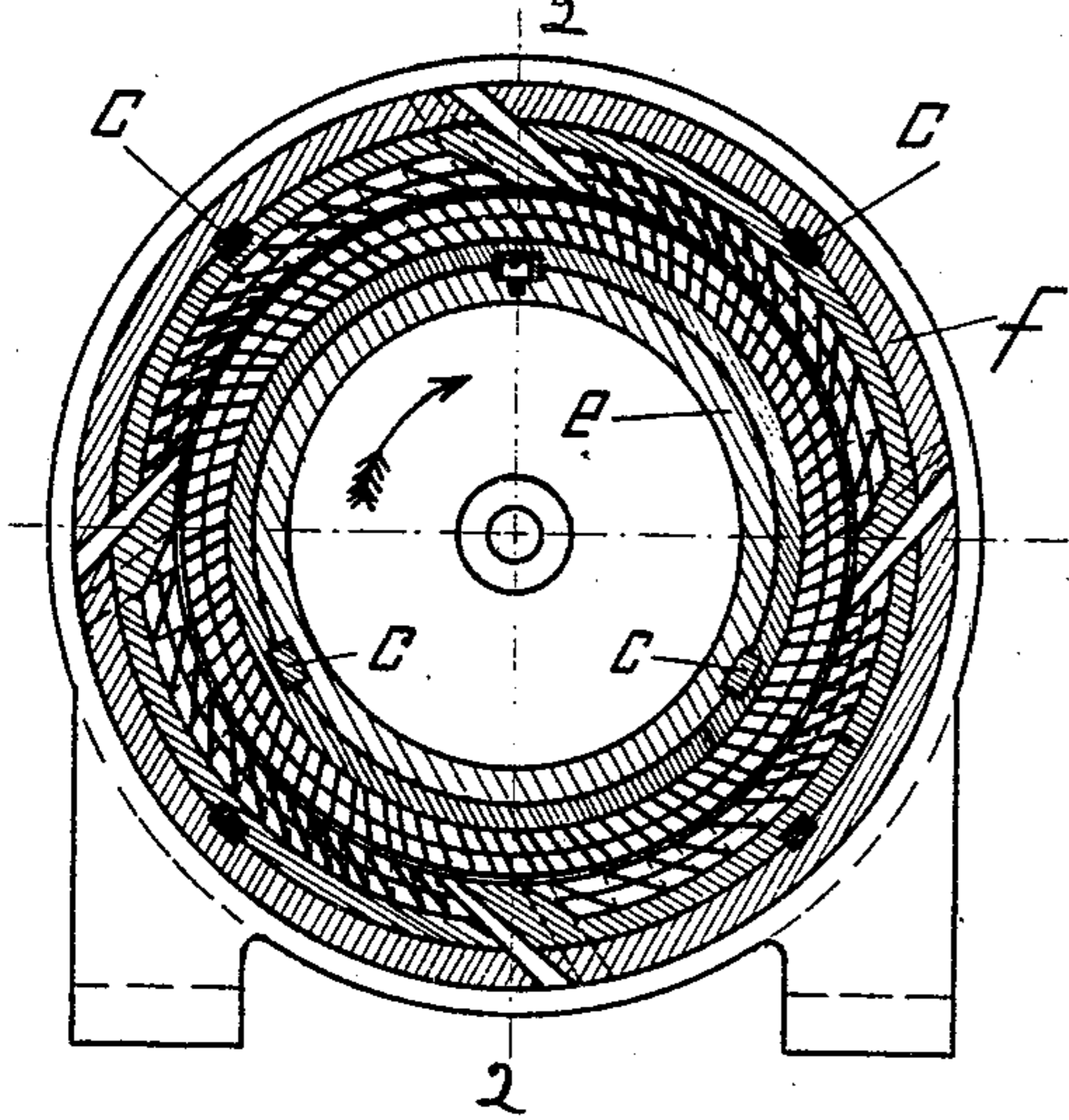
PATENTED OCT. 4, 1904.

G. ZAHIKJANZ.  
TURBINE.

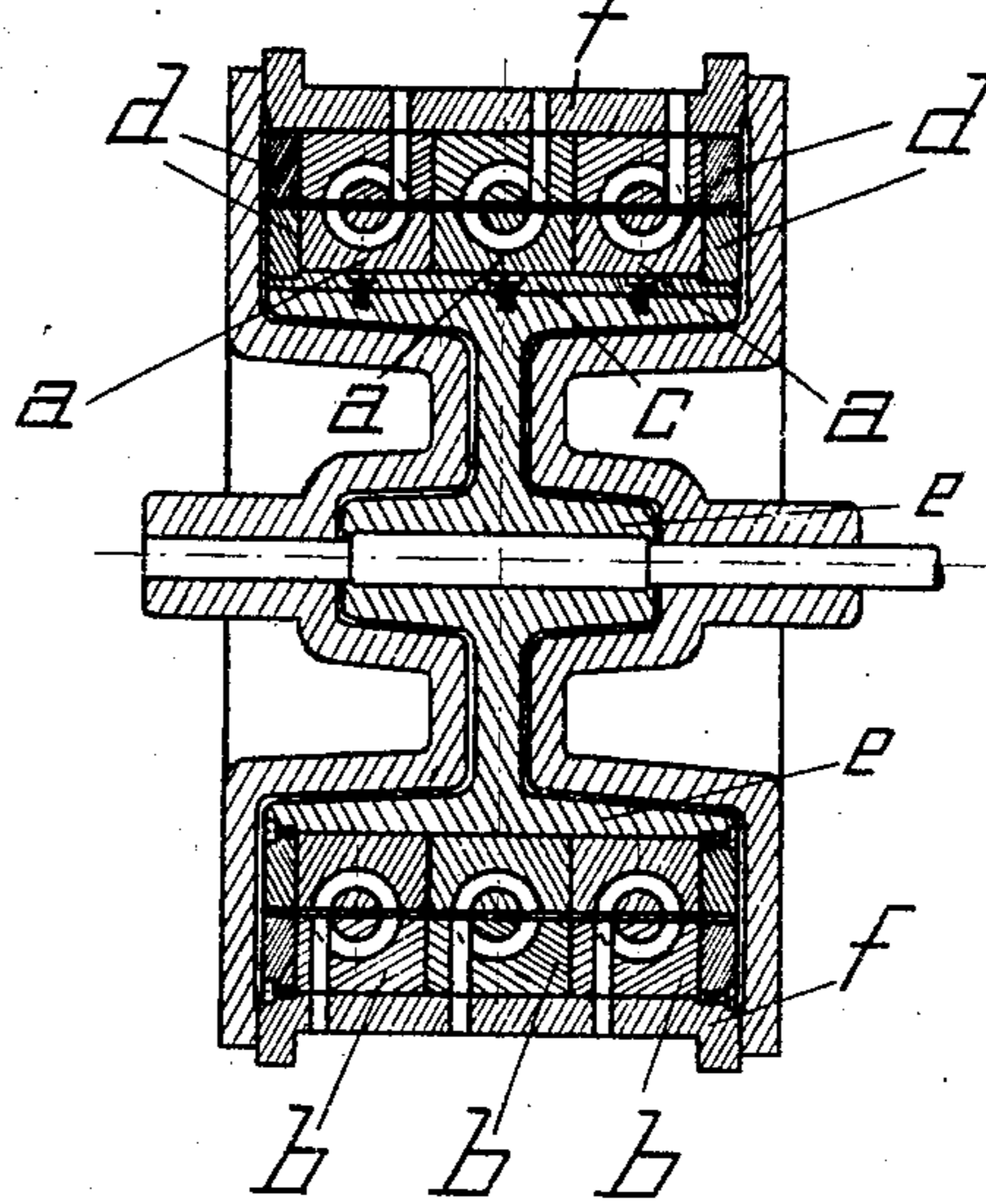
APPLICATION FILED MAY 21, 1903.

NO MODEL.

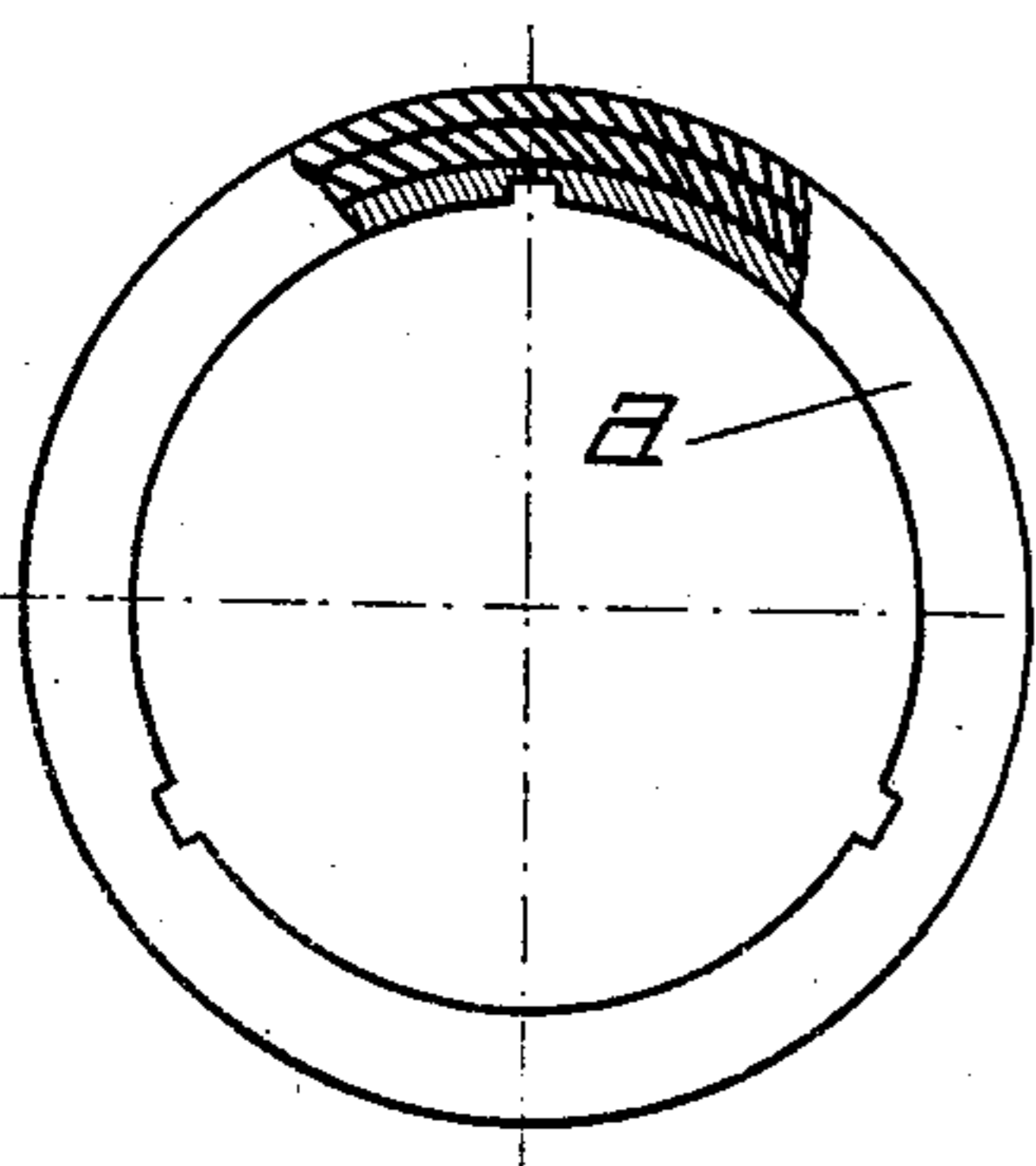
*Fig. 1.*



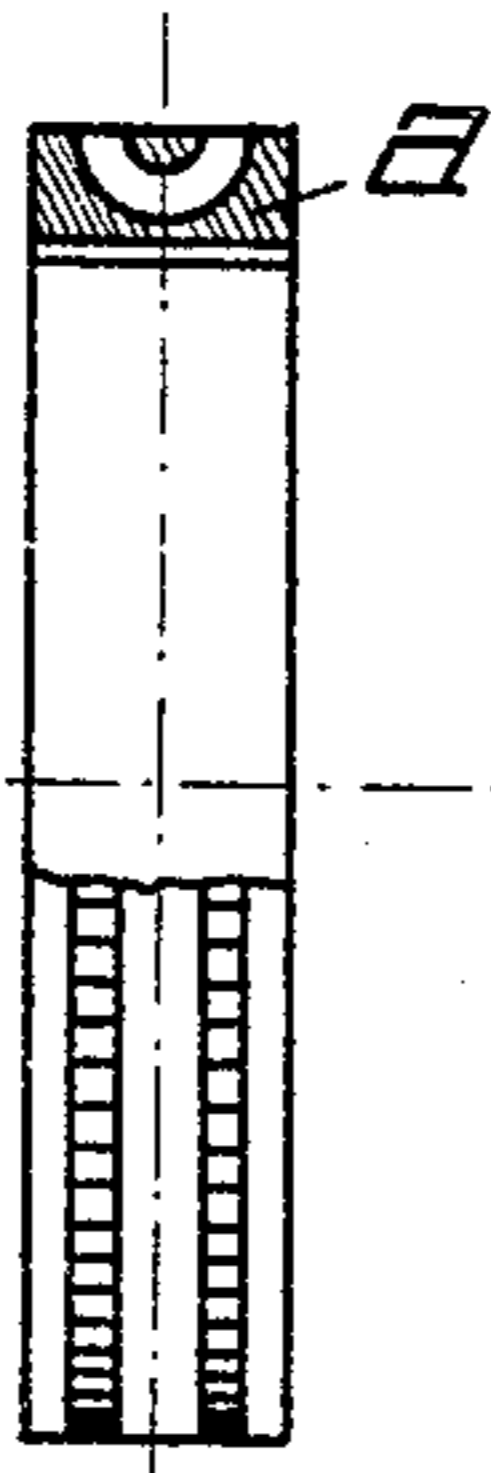
*Fig. 2.*



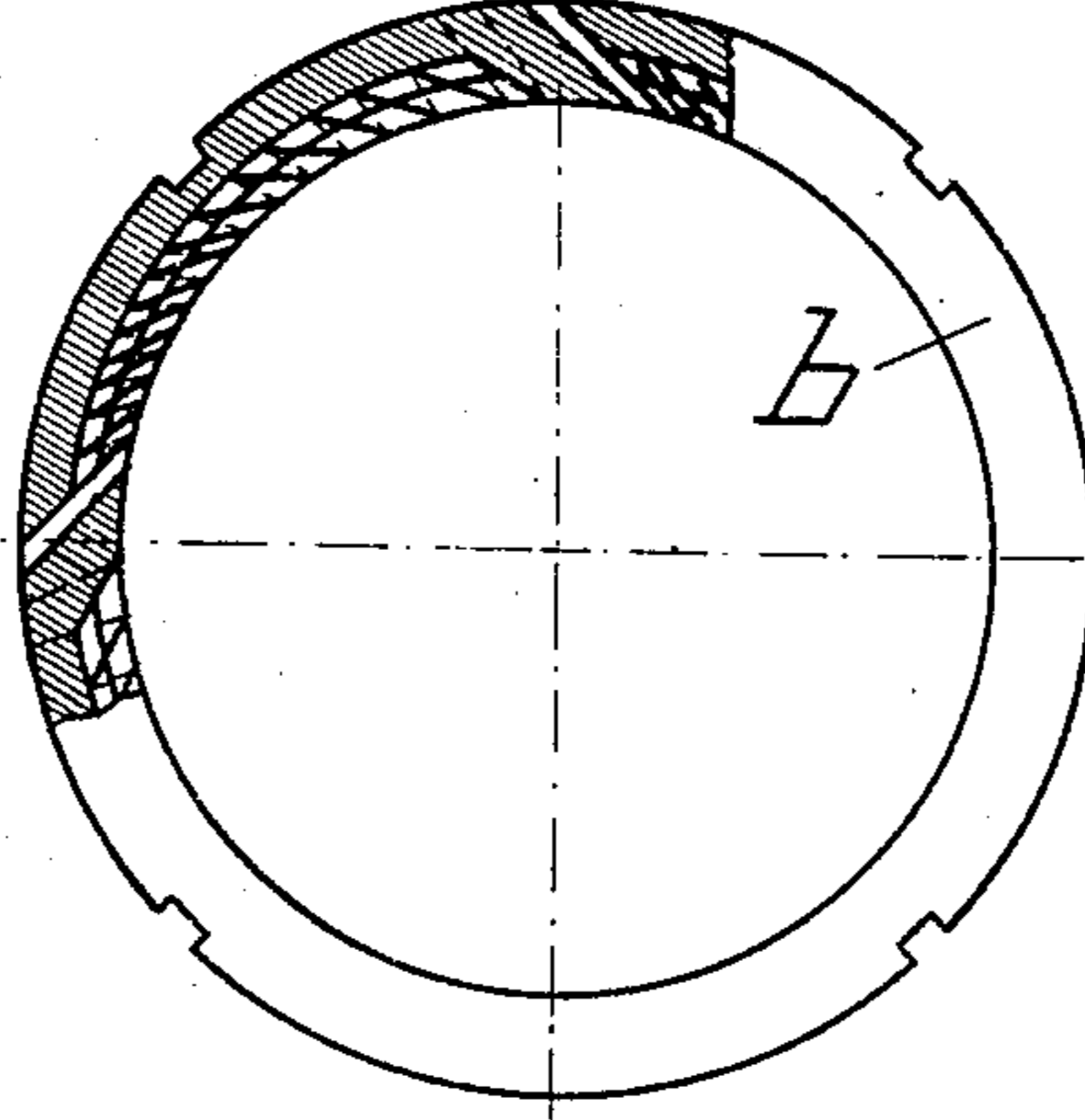
*Fig. 3.*



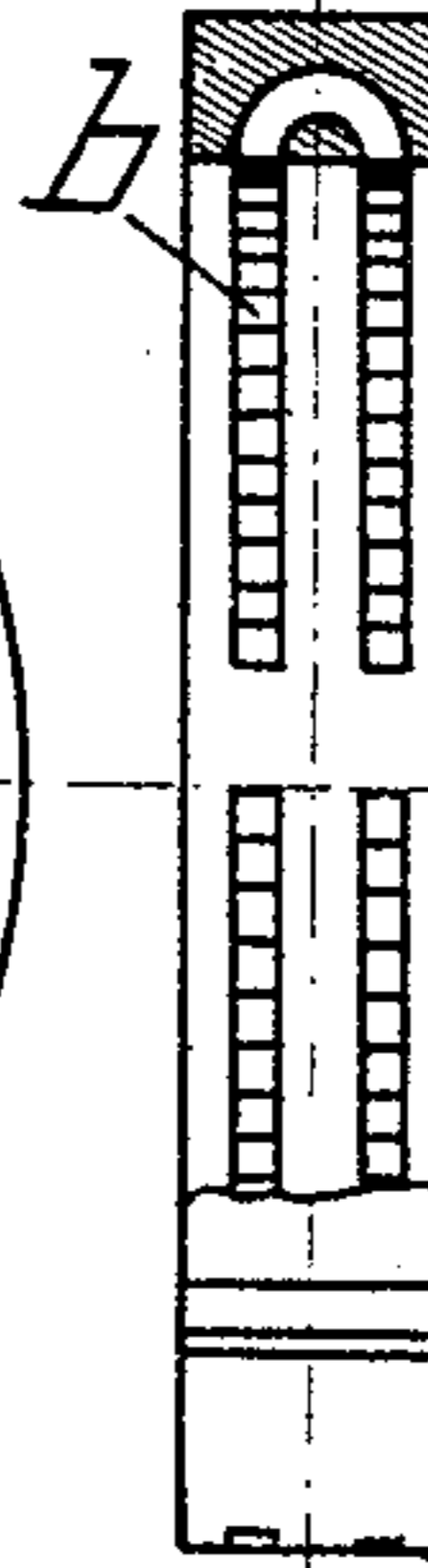
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



Witnesses:  
Henry Hasper,  
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# UNITED STATES PATENT OFFICE.

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## TURBINE.

SPECIFICATION forming part of Letters Patent No. 771,450, dated October 4, 1904.

Application filed May 21, 1903. Serial No. 158,067. (No model.)

*To all whom it may concern:*

Be it known that I, GABRIEL ZAHIKJANZ, a subject of the Emperor of Russia, and a resident of Berlin, Germany, have invented certain new and useful Improvements in Tur-

5 turbines, of which the following is a specification. My invention relates to turbines intended to be driven by steam, gases, vapors, or liquid under pressure. It refers most particularly to turbines in which U-shaped guide and rotary channels form one or more spiral coils of windings whose axes encircle the turbine-axis; and it consists of certain novel features hereinafter described and claimed.

15 Reference is to be had to the accompanying drawings, in which—

Figure 1 is a sectional view of a steam-turbine with coils constructed according to my invention. Fig. 2 is a cross-sectional view of 20 Fig. 1 on the line 2 2. Fig. 3 is a front view, partly in section, of the rotary member of a coil-ring. Fig. 4 is a side view, partly in section, of Fig. 3. Fig. 5 is a front view, partly in section, of the guide member of a coil-ring. 25 Fig. 6 is a side view, partly in section, of Fig. 5.

The turbine, as shown by Figs. 1 and 2, has three coils consisting each of four systems of windings. I construct each coil in form of a 30 pair of rings, so that a rotary ring *a* and a guide-ring *b* constitute together an independently-working coil-ring. The two members of each coil-ring (separately represented by Figs. 3, 4 and 5, 6) are respectively fitted into 35 recesses provided in the opposing faces of a rotary frame *e* and to a guide-frame *f*, the parts being secured in any convenient way—as, for instance, by means of keys *c*—against circular displacement and by means of lateral 40 rings *d* against axial displacement. This construction of coils allows of various practical applications. By fitting different numbers of coils of the same, as well as of different patterns, I am enabled to form steam-turbines of 45 different outputs. By replacing one of the coils in the turbine-rim with a pair of simple iron rings without any channels I am enabled to

form a turbine capable of increasing its output on replacing these simple rings with rings forming a coil. On the other hand, by re- 50 versing one or more of the coils I am enabled to form a turbine with reversible motion. My invention has besides said features the advantage of extremely facilitating the manufacture and the duplication of parts, as well as 55 the repairs and alterations.

The invention may be variously modified. Thus the rotary members of several coils may be united into one ring. In the same way the guide members of the same coils may be united 60 into one ring. Further, the two rings of a coil instead of being situated one over the other may receive the U-shaped channels laterally, so as to be fitted to a guide and a rotary frame side by side. Further, the rings 65 may have any other cross-section instead of being rectangular, as represented.

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

1. A turbine comprising two members one 70 rotatable relatively to the other, and a plurality of independently-removable rings secured to the opposing faces of each of said members and provided with channels arranged to form a spiral path for the driving medium. 75

2. A turbine comprising two members one rotatable relatively to the other, and cooperating rings secured to the opposing faces of each of said members and provided with channels arranged to form a spiral path for the 80 driving medium.

3. A turbine comprising two members one rotatable relatively to the other, and a plurality of independently-removable rings secured to the opposing faces of said members 85 in pairs, the rings of the same pair having channels adapted to register and to form a spiral path for the driving medium, the path of one set or pair of rings having a direction or pitch opposite to that of another set or 90 pair, so that the turbine may be reversed by substituting one set of rings for another.

4. A turbine comprising two members one rotatable relatively to the other, and a plu-

ality of coöperating rings arranged in pairs  
on the opposing surfaces of the said members  
and provided with channels adapted to regis-  
ter and to form a spiral path for the driving  
5 medium, said path being continuous within  
the two rings of one pair.

In testimony whereof I have signed my name

to this specification in the presence of two sub-  
scribing witnesses.

GABRIEL ZAHIKJANZ.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.