

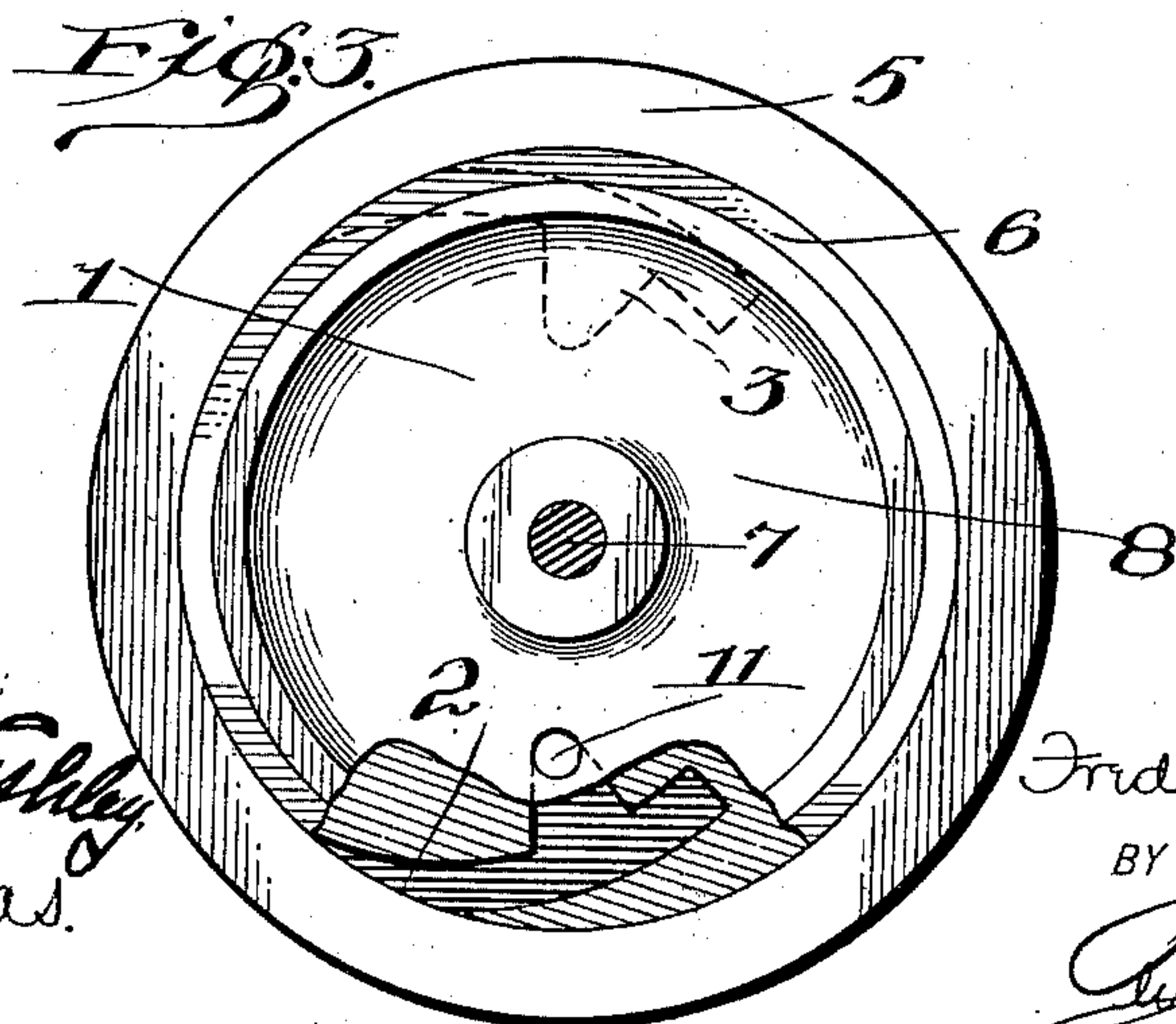
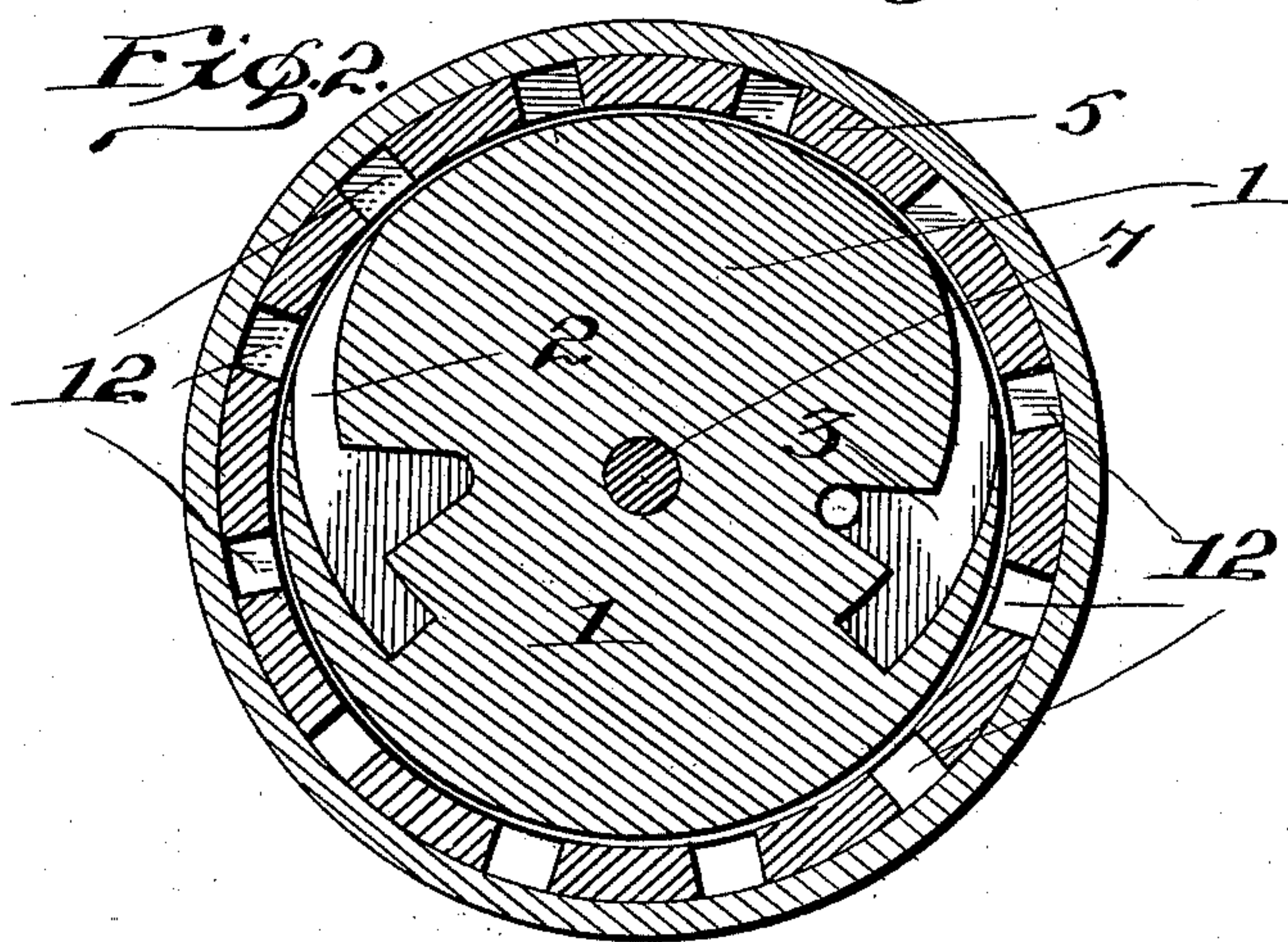
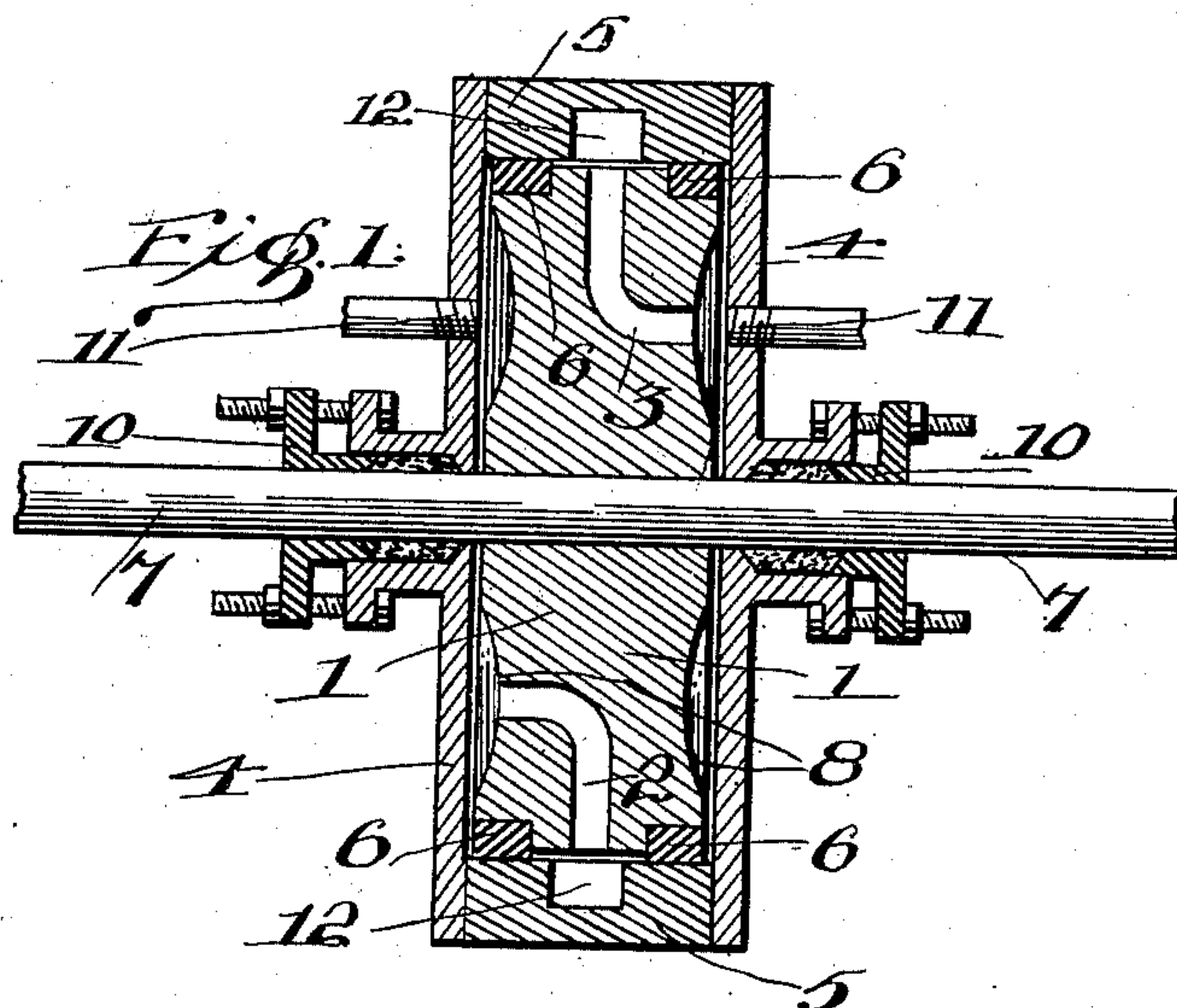
No. 748,294.

PATENTED DEC. 29, 1903.

F. J. MACKENZIE.  
TURBINE ENGINE.

APPLICATION FILED JULY 7, 1903.

NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FREDERICK J. MACKENZIE, OF TRENTON, NEW JERSEY.

## TURBINE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 748,294, dated December 29, 1903.

Application filed July 7, 1903. Serial No. 164,519. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK J. MACKENZIE, a citizen of the United States, and a resident of Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Turbine-Engines, of which the following is a specification.

My invention relates to an improvement in turbine-engines, and has for its object to improve and simplify the construction thereof, and particularly to make them reversible.

The scope of my invention will be defined in the claims.

Figure 1 is a section of my invention, taken longitudinally of the shaft. Fig. 2 is a cross-section taken through the disk. Fig. 3 is a side view with the plate or disk removed.

Corresponding parts in all the figures are denoted by the same reference characters.

While the turbine-engines are well known as being economical producers of power and as possessing many advantages of compactness, simplicity, and ease of running over ordinary reciprocating engines, one trouble with their use in many places has been the inability to reverse them.

By my invention while simplifying the construction and design of the turbine generally I have also produced a design which is capable of reversal.

Referring to the drawings, 1 represents the disk, which is mounted upon a shaft 7, said shaft being supported in suitable bearings. This disk is provided with two sets of channels 2 and 3, extending from the side of the disk inwardly and outwardly in a curved direction to the periphery of the disk, preferably at or about the middle thereof. These channels are adapted to act as vanes, which receive the impact of the steam upon their curved surfaces, and thereby act to turn the disk. The two sets of channels 2 and 3 extend from opposite sides of the disk and are oppositely curved, so that one set, 2, will turn the disk in one direction and the other set, 3, will turn the disk in the opposite direction. The disk is surrounded by a casing which is removed from the sides of the disk a sufficient distance to form a steam-chest at each side thereof, but forms a steam-tight joint

with the periphery of the disk. These steam-chests are preferably formed by concaving or recessing the sides of the disk, as shown at 8. The sides of the casing consist of two disks or plates 4 and the periphery of the casing of a ring 5. The plates 4 are provided with stuffing-boxes 10, adapted to form a steam-tight joint about the shaft. They are also each provided with inlet or exhaust openings 11, to which steam-supply pipes or exhaust-pipes are connected, dependent upon the desired rotation of disk 1. Preferably the periphery of the disk is provided with steam or packing rings 6, whereby the tightness of the joint is obtained and may be easily kept in order. The ring 5, forming the periphery of the casing, is provided with a plurality of pockets 12.

The operation of my device is as follows: Steam is admitted through one of the passages 11 to one of the steam-chest chambers—for instance, the one to the right in Fig. 1. This communicates with the channels 2 and pockets 12, which serves to rotate the disk in one direction. The steam for passing through these channels impinges upon the curved surfaces thereof to turn the disk and upon its escape from the channels enters the exhaust-passage 11 and is allowed to escape. In order to reverse the direction of rotation, steam is cut off from the passages 2 and is admitted to the steam-chest upon the other side of the disk, from whence it enters the passages 3, and thereby acts to rotate the disk in the opposite direction. It will thus be seen that the reversal of the engine is accomplished by any means which will shift the supply of steam from one pipe to another. Moreover, the efficiency of action in one direction is as great as in the other. It is evident that the invention is adapted for compound engines.

I do not desire to be understood as limiting myself to the details of construction and arrangement as herein described and illustrated, as it is manifest that variations and modifications may be made in the features of construction and arrangement in the adaptation of the device to various conditions of use without departing from the spirit and scope of my invention and improvements. I therefore reserve the right to all such varia-



tion and modification as properly fall within the scope of my invention and the terms of the following claims.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A reversible turbine-engine, comprising a casing having pockets, a rotatable disk having an impact-surface on each side thereof, a steam-chest at each side of said disk, and a passage at each side of said casing serving as a steam inlet or exhaust according to the direction in which it is desired to rotate the disk, substantially as described.

2. A reversible turbine-engine, comprising a casing having pockets, a rotatable disk having a curved channel or vane on each side thereof, a steam-chest at each side of said disk, and a passage at each side of said casing serving as a steam inlet or exhaust according to the direction in which it is desired to rotate the disk, substantially as described.

3. A reversible turbine-engine, comprising a casing having pockets, a rotatable disk having a curved channel or vane extending from each side thereof to its periphery, a steam-chest at each side of said disk, and a passage at each side of said casing serving as a steam

inlet or exhaust according to the direction in which it is desired to rotate the disk, substantially as described.

4. A reversible turbine-engine, comprising a casing having pockets, a rotatable disk having a curved channel or vane extending from each side thereof to its periphery, a steam-chest in each side of said disk, and a passage at each side of said casing serving as a steam inlet or exhaust according to the direction in which it is desired to rotate the disk, substantially as described.

5. A reversible turbine-engine, comprising a casing having pockets, a rotatable disk having channels or vanes, a steam-chest at each side of said disk, and a passage at each side of said casing serving as a steam inlet or exhaust according to the direction in which it is desired to rotate the disk, substantially as described.

In testimony whereof I have signed my name in the presence of the subscribing witnesses.

FREDERICK J. MACKENZIE.

Witnesses:

E. F. RANDOLPH,  
T. P. BURNS.