

No. 673,871.

Patented May 14, 1901.

R. HEWSON.
STEAM TURBINE.

(Application filed Oct. 18, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 2.

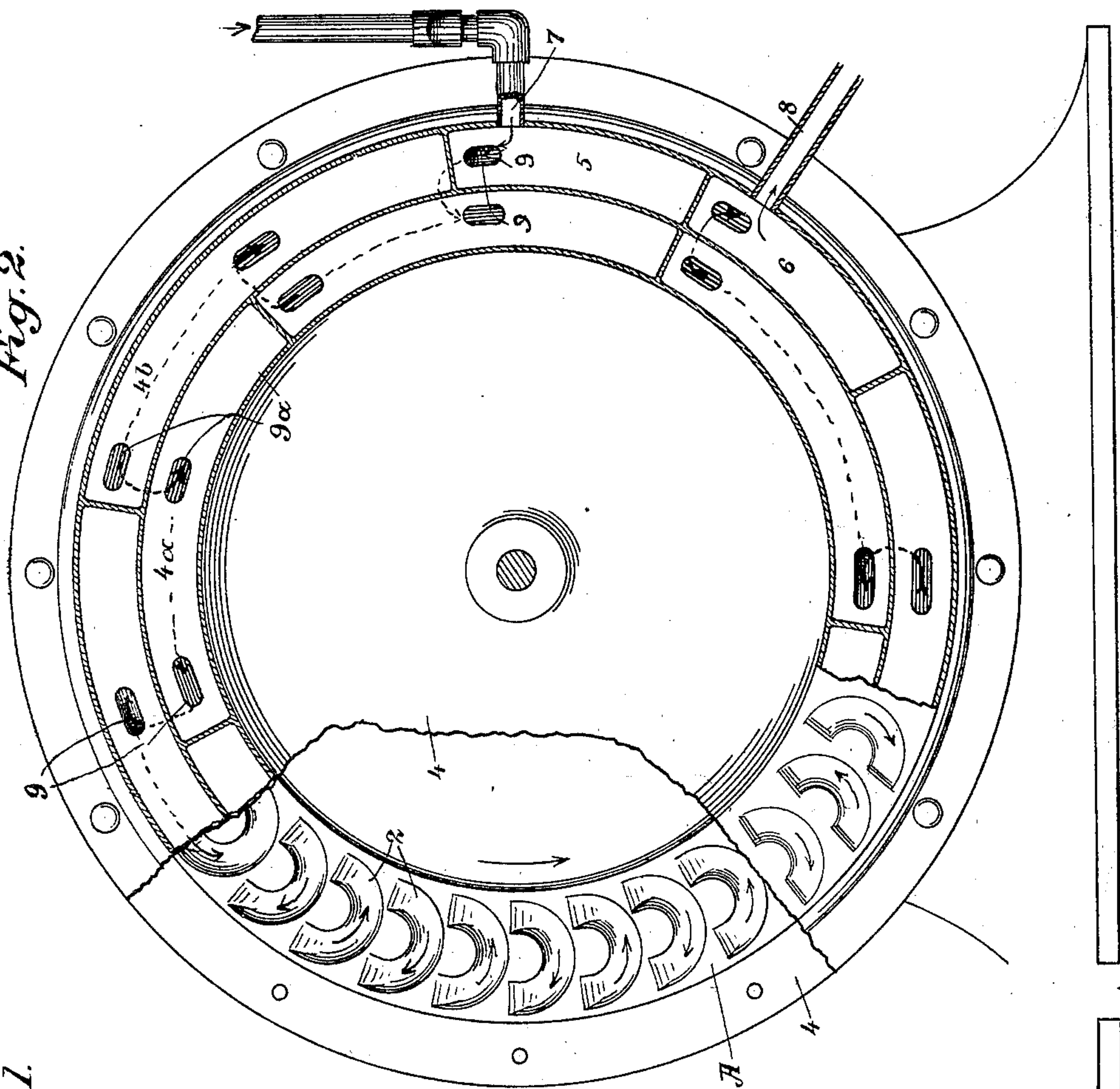
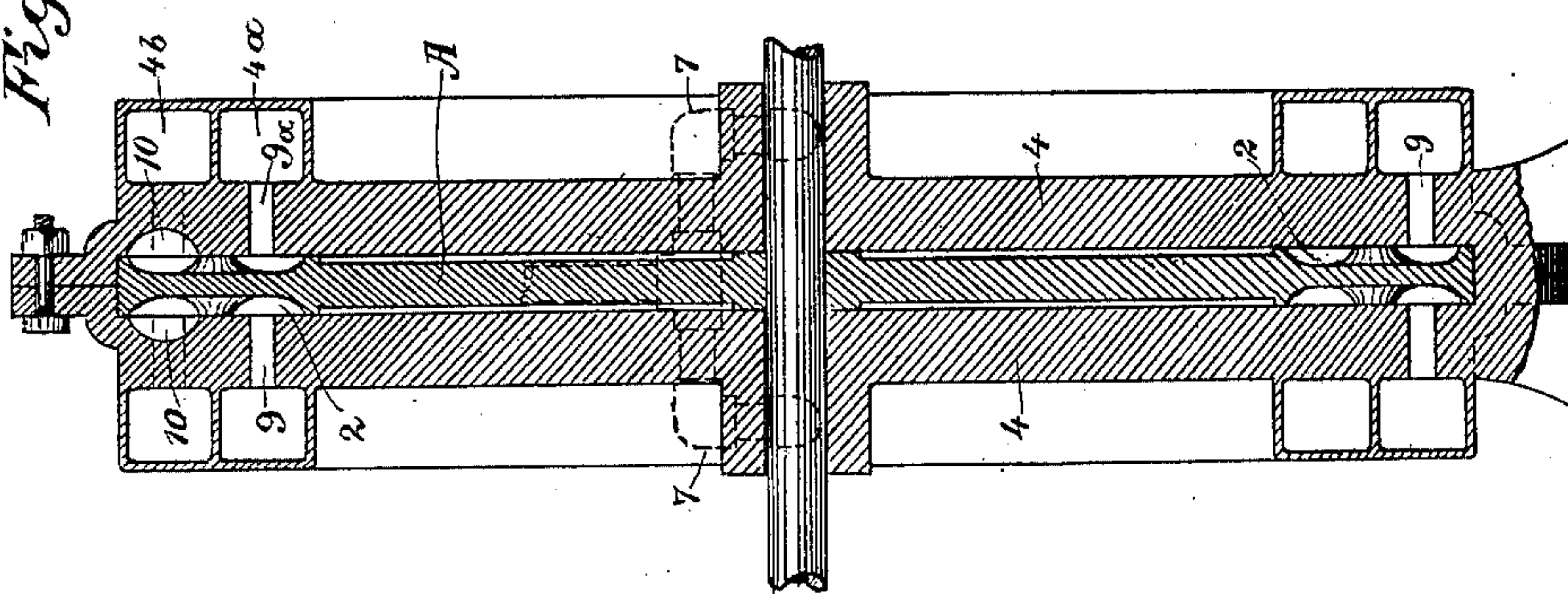


Fig. 1.



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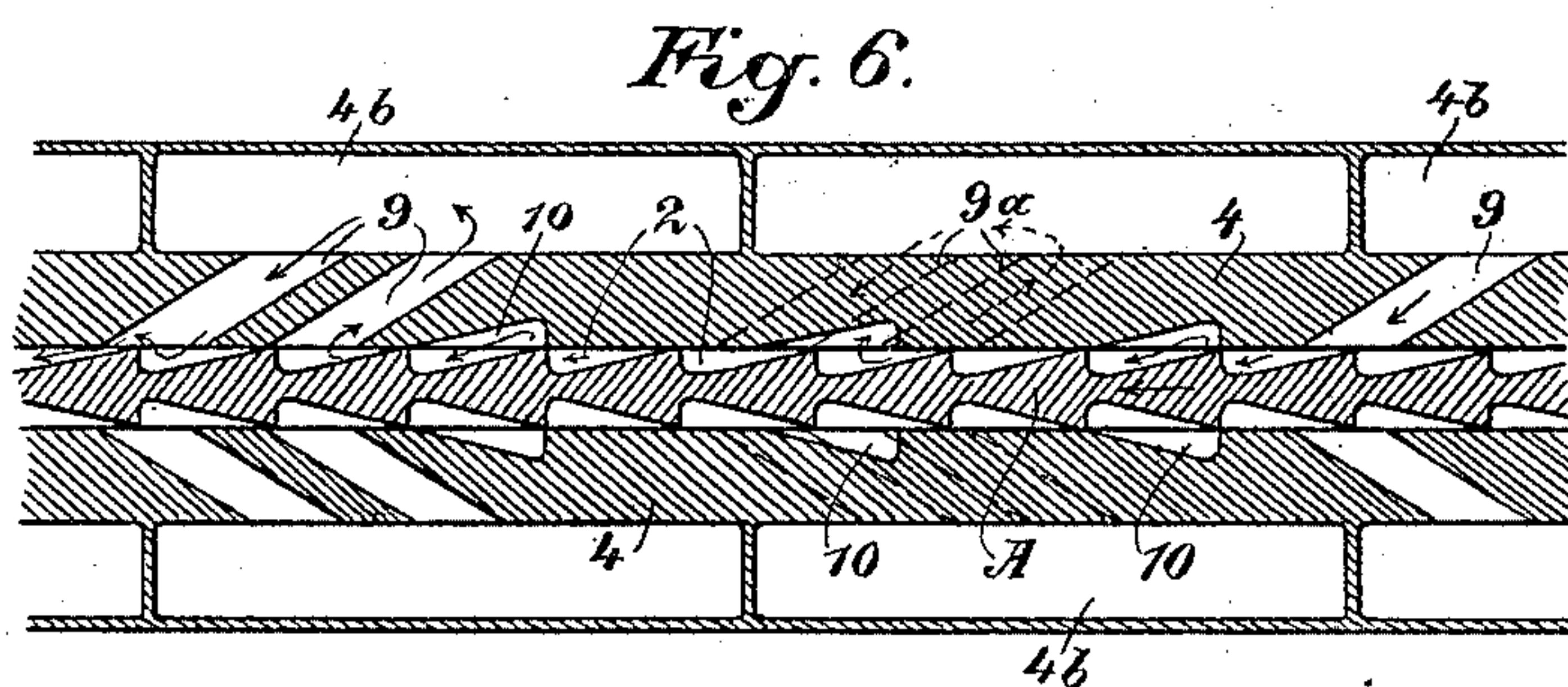
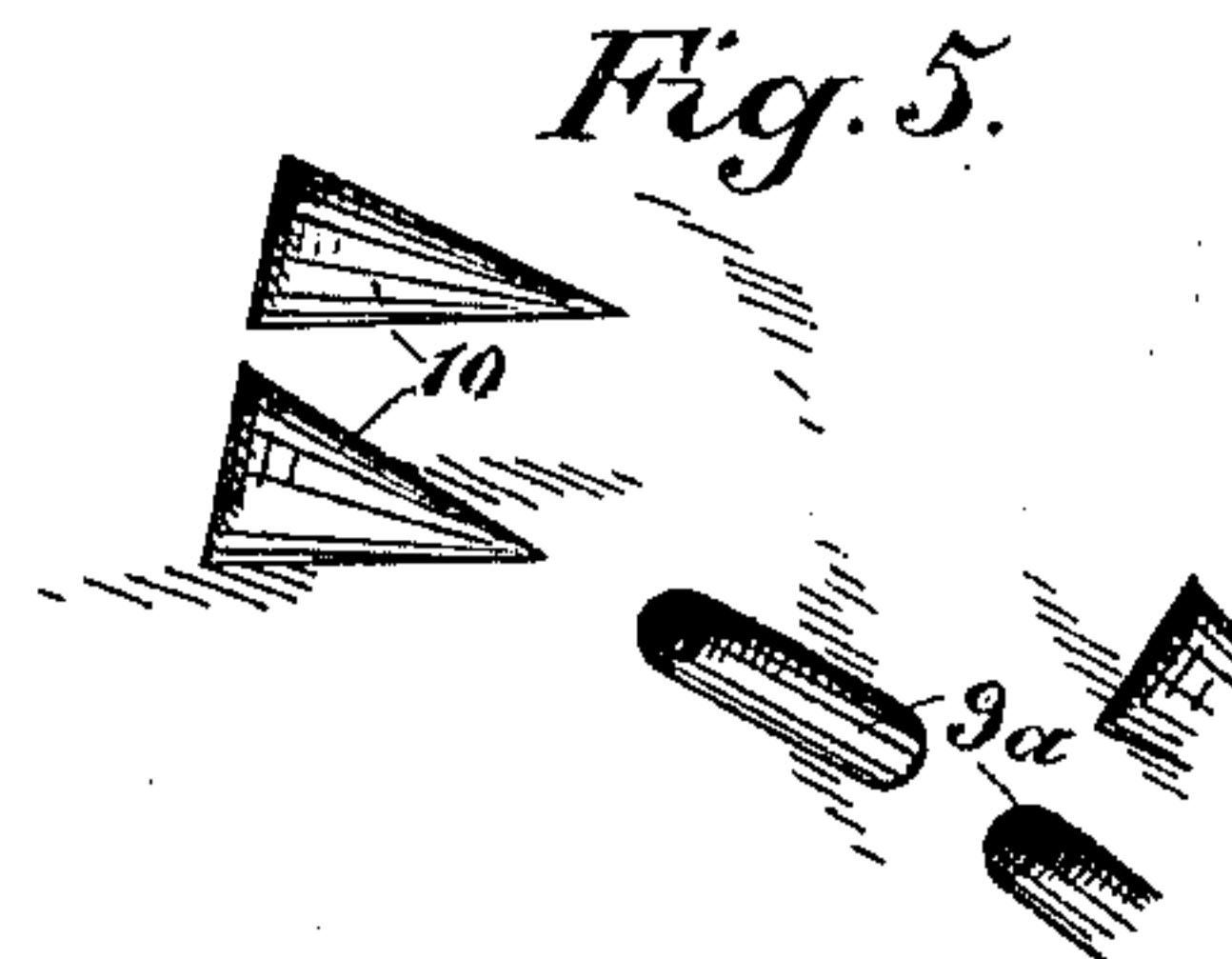
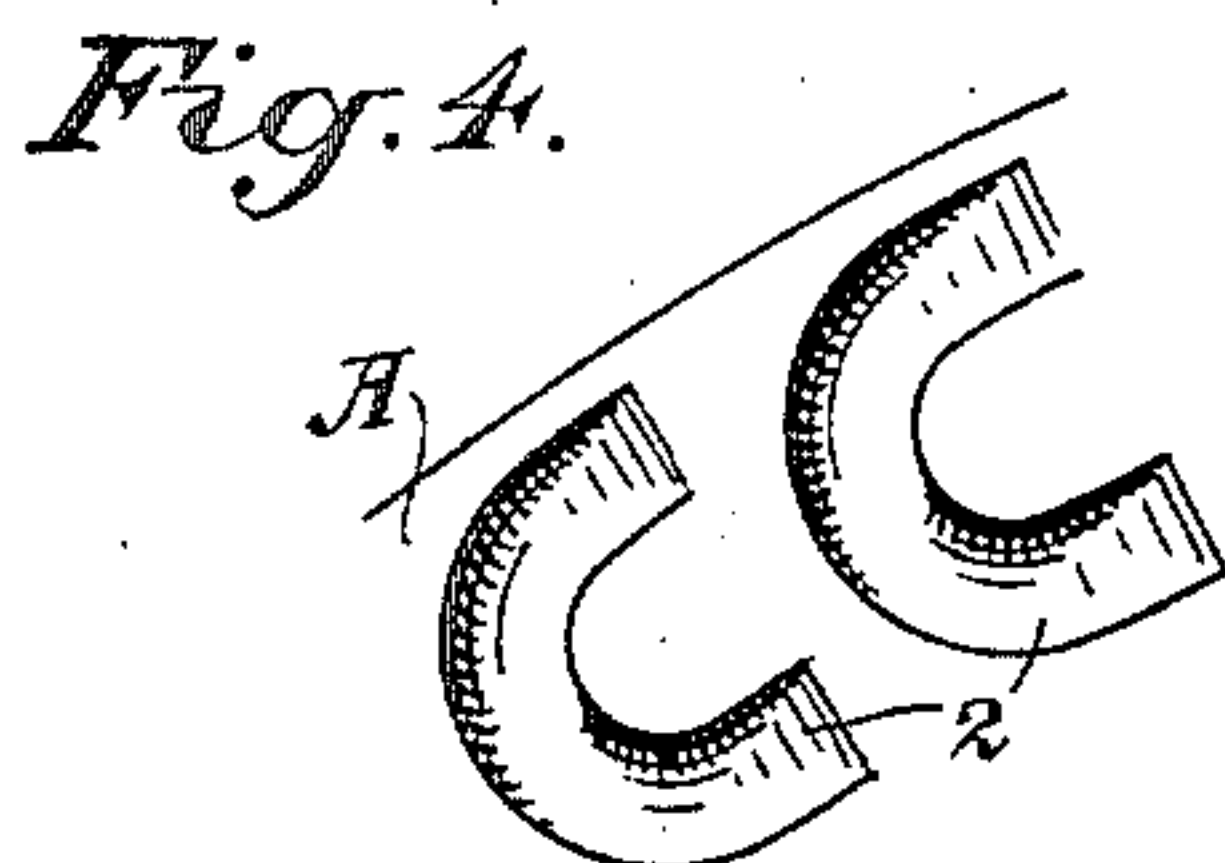
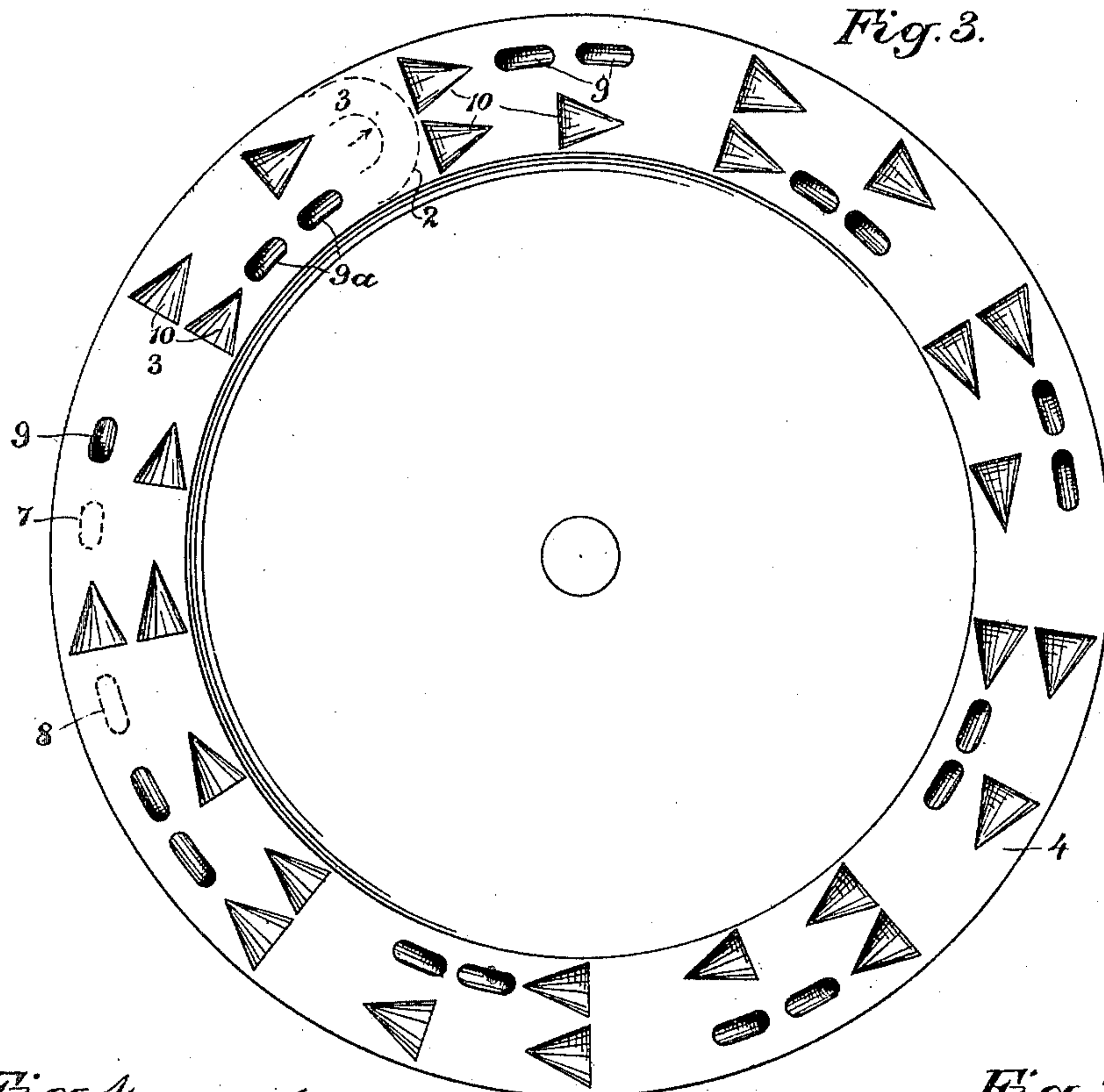
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UNITED STATES PATENT OFFICE.

ROBERT HEWSON, OF SAN FRANCISCO, CALIFORNIA.

STEAM-TURBINE.

SPECIFICATION forming part of Letters Patent No. 673,871, dated May 14, 1901.

Application filed October 18, 1900. Serial No. 33,438. (No model.)

To all whom it may concern:

Be it known that I, ROBERT HEWSON, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Multiple-Expansion Steam-Turbines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus of a class known as "steam-turbines," in which steam or other elastic medium under pressure is employed expansively to propel a disk which is secured to a shaft through which the power is eventually transmitted.

It consists of the parts and the constructions and combinations of parts hereinafter described and claimed.

Figure 1 is a lateral central section through the machine. Fig. 2 is a side elevation, parts being broken away to show the interior construction. Fig. 3 is a view of the interior face of one of the casings. Fig. 4 is a detail of the buckets. Fig. 5 is a detail of the pockets. Fig. 6 is a diagrammatic view showing the buckets and pockets in a straight line.

A is a disk of any suitable or desired diameter, having a series of curved or U-shaped buckets 2 made in its opposite faces, each bucket communicating, respectively, with the exterior and interior of the two concentric rows of chambers in the casing and in such a manner that the steam acts first in one of the buckets, and as the disk revolves it acts upon the next bucket, is then transferred to a chamber of the interior row, from which it again acts with the less pressure caused by its expansion, and is then delivered through a suitable port into an exterior chamber, and again acting expansively from this chamber, thus alternating in these two rows, so that the full power of the elastic medium is employed close to the periphery of the disk. This disk fits closely between two inclosing casings 4 upon opposite sides of the disk, and these exterior casings have pockets or depressions corresponding with the buckets of the disk, so that when the steam has entered either of the buckets and the latter is in line with one of the corresponding depressions the steam acting against the interior of the depression in the stationary casing and exerting its pres-

sure against the bucket of the disk will tend to rotate the latter.

Upon the exterior sides of the casing 4 are the steam and exhaust chambers 5 and 6, and steam is admitted into the first of the steam-chambers through supply pipes or passages 7 and correspondingly exhausted after its power is spent through discharge-passages, as at 8. Passages 9 extend from the steam-chambers 5 through the walls of the casings 4 and open into the buckets of the central revoluble disk A. The chambers may be divided into as many chambers as desired, such as five or more, and they are disposed in two rows, as 4^b and 4^a, concentric with each other in lines adjacent to the periphery of the disk. The casings upon each side are also provided with depressions in the faces against which the disk-buckets revolve, as at 10, and as the disk revolves the buckets 2 pass these depressions, coinciding momentarily with each depression as they pass. Intermediate between these depressions are the full surfaces 3 of the casings, which lie in close proximity with the disk-surfaces, so as to form cut-offs or interrupters to prevent the free flow of the elastic medium through from one to another.

The operation will then be as follows: Elastic medium under pressure being admitted through the inlet-passage 5 will enter the buckets of the wheel—as, for instance, from one of the outer row of chambers 4^b—and the pressure of the steam acting against the bucket will tend to revolve the disk, so that the bucket passes the stop or cut-off surface, which may be indicated as at 3. These surfaces are approximately equal in length to the length of the buckets, so that as the bucket passes this cut-off the elastic medium cannot flow from the source of supply through the bucket into the next space; but the steam momentarily confined during this passage will as soon as the bucket comes opposite the next depressions 10 in the casing be expanded and, acting against the bucket and the casing, will again advance the disk, the steam meantime expanding in proportion to the size of the bucket and the corresponding depression. The bucket still advancing arrives opposite a port 9, which allows the steam to pass into an interior expansion-chamber 4^a,

and from this chamber it returns through the port 9^a to act upon the passing bucket and against a corresponding depression 10. Passing the next cut-off the steam will enter the
 5 next depressions 10 and the passing bucket and will continue to advance the wheel under a reduced pressure. Following this is a port 9, through which the steam or medium under pressure is allowed to expand into one of the
 10 chambers 4^b of the exterior row, where the same expansion and the return of the medium through a port 9^a and the action upon the wheel-buckets is repeated. The medium is thus first caused to act at full pressure upon
 15 the passing buckets, is removed into one of a series of expansion-chambers, then returned to act upon the buckets, each time expanding and becoming reduced in pressure, and so on until the disk has approximately com-
 20 pleted its rotation or until the steam has reached the exhaust-opening, as at 6, when it is allowed to leave the apparatus.

The passages may be gradually increased in size as they become more remote from the
 25 point of supply, so as to allow the expanded medium to pass more readily from one chamber to another.

The course of the steam is indicated by the arrows in Fig. 2, and from these it will be ap-
 30 parent that the steam travels from one receiving-chamber to the other. The steam starts at the steam-inlet pipe and travels continually back and forth through the buckets or depressions in the revolving disk until it
 35 reaches the exhaust-pipe, where it is discharged.

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

40 1. The combination in a steam-turbine, of a disk revolubly mounted upon a shaft having buckets upon opposite sides of its periphery, fixed casings between which the disk is revoluble, said casings having concentric
 45 rows of depressions separated from each other, intermediate sections serving to cut off communication between adjacent depressions, subdivided chambers connected with the casings to which an elastic medium under pres-

sure is admitted and passages leading from 50 said chambers and delivering into the buckets of the disk as they pass.

2. The combination in a steam-turbine of a disk revolubly mounted upon an axle-shaft having buckets formed upon opposite sides 55 of its periphery, fixed casings between which the disk is revoluble and in close contact therewith, concentric rows of depressions formed in said casings, with intervals serving to cut off the adjacent rows of depres- 60 sions, concentric chambers connected with the casings and subdivided, and passages through which an elastic medium under pressure is admitted into the buckets of the disk whereby the latter is impelled, said medium 65 being transmitted by the movement of the buckets from one set of casing depressions to the next adjacent whereby the medium acts expansively within the next set of buckets and passages. 70

3. The combination in a steam-turbine of a disk mounted upon a shaft and revoluble, said disk having buckets formed upon opposite sides near the periphery, fixed casings between and in close proximity with which 75 the disk revolves, two concentric rows of depressions within the casings coincident with the buckets of the disk, surfaces on the casings between the depressions, and of a length approximately equal to that of the buckets 80 whereby the medium admitted into one set of buckets acts to propel the disk, is then carried within the buckets past the intervening cut-off surfaces, and expanded within the next succeeding buckets and casing de- 85 pressions, concentric, subdivided, expansion-chambers and passages connecting with the exterior and interior rows of chambers whereby the elastic medium is transferred alternately from the outer to the inner and the 90 inner to the outer row.

In witness whereof I have hereunto set my hand.

ROBERT HEWSON.

Witnesses:

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 CHAS. E. TOWNSEND.