No. 638,277.

Patented Dec. 5, 1899.

I. RIGDON.

TURBINE ENGINE.

(Application filed Oct. 31, 1898.)

(No Model.)

2 Sheets—Sheet 1.

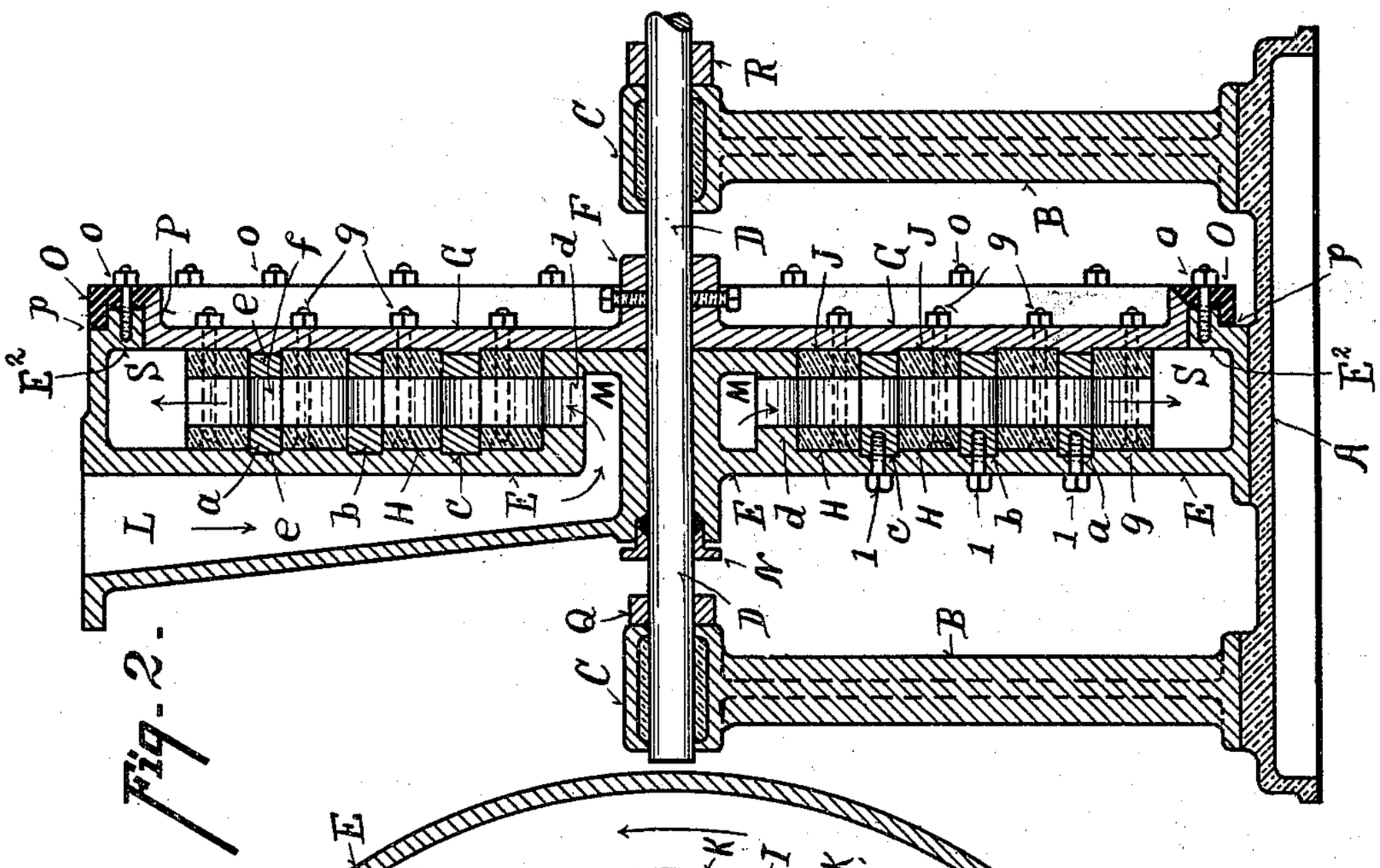

Fig. 2.

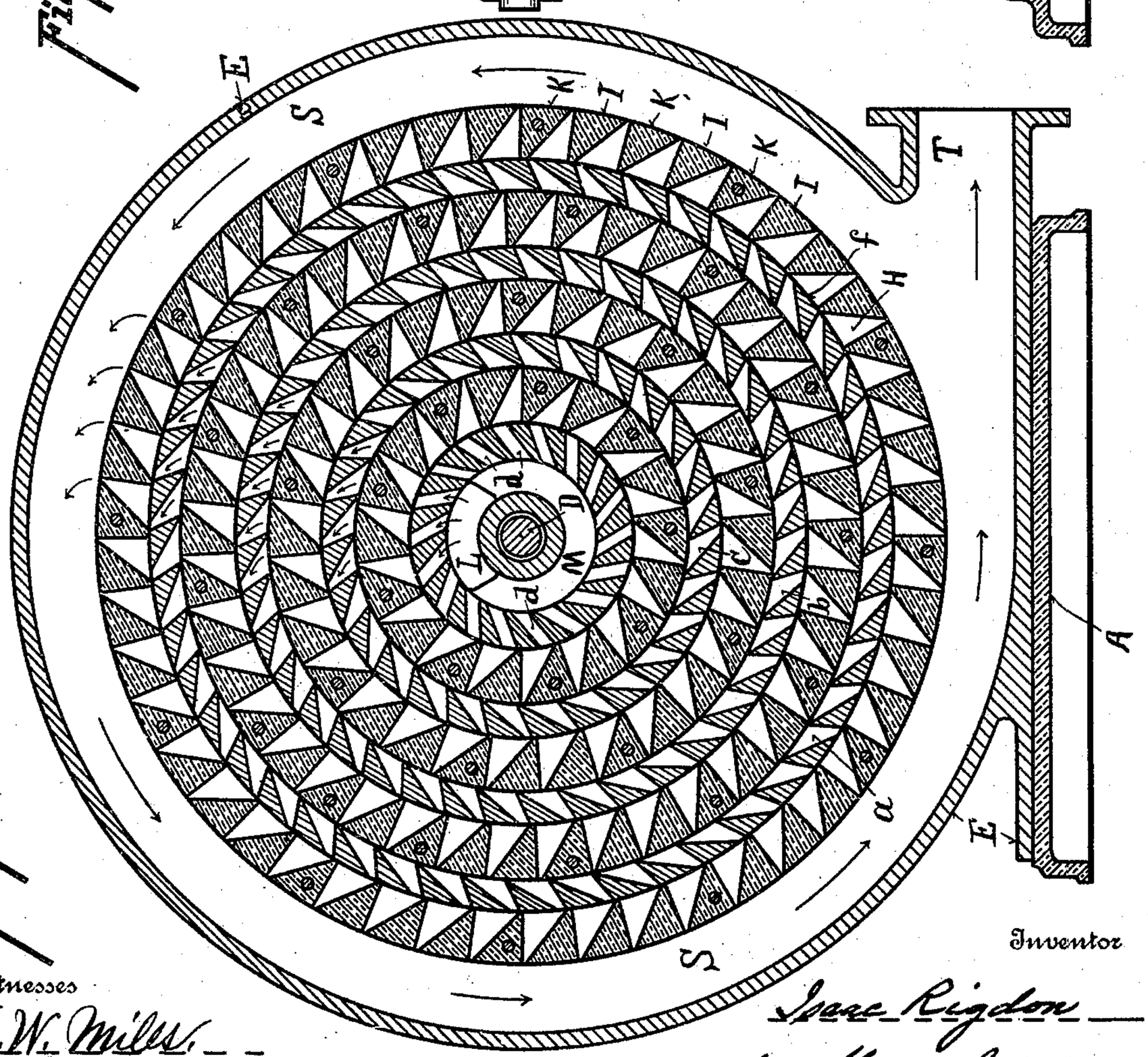

Fig. 1.

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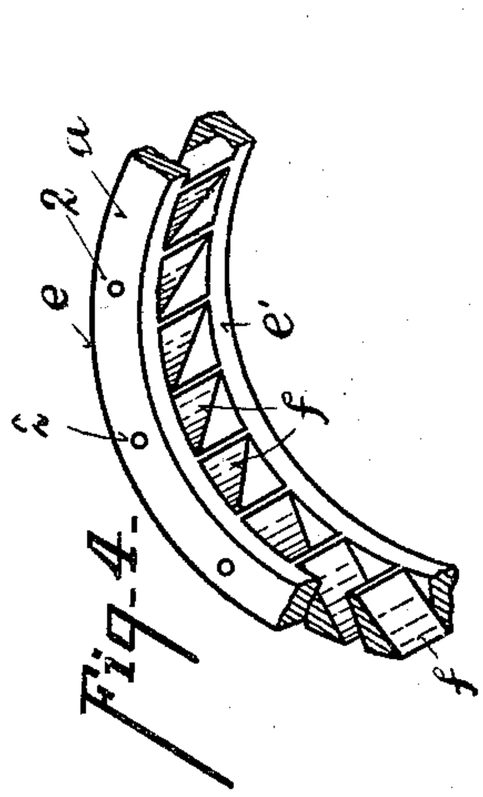

Fig. 4.

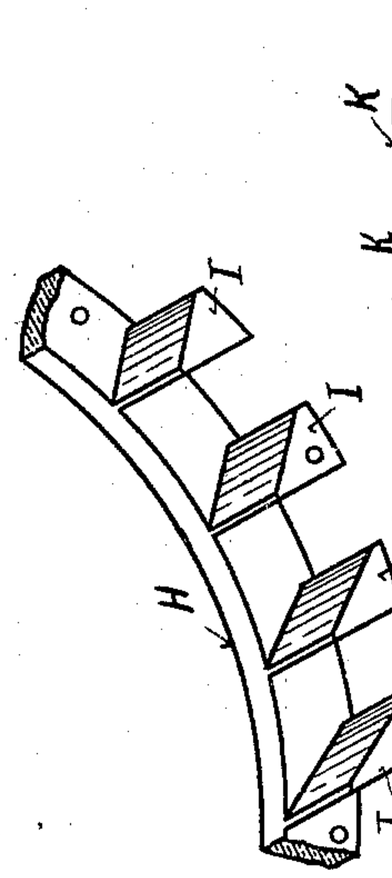

Fig. 5.

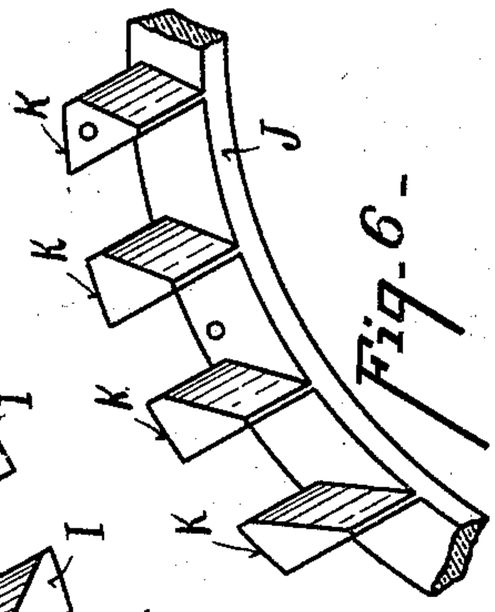

Fig. 6.

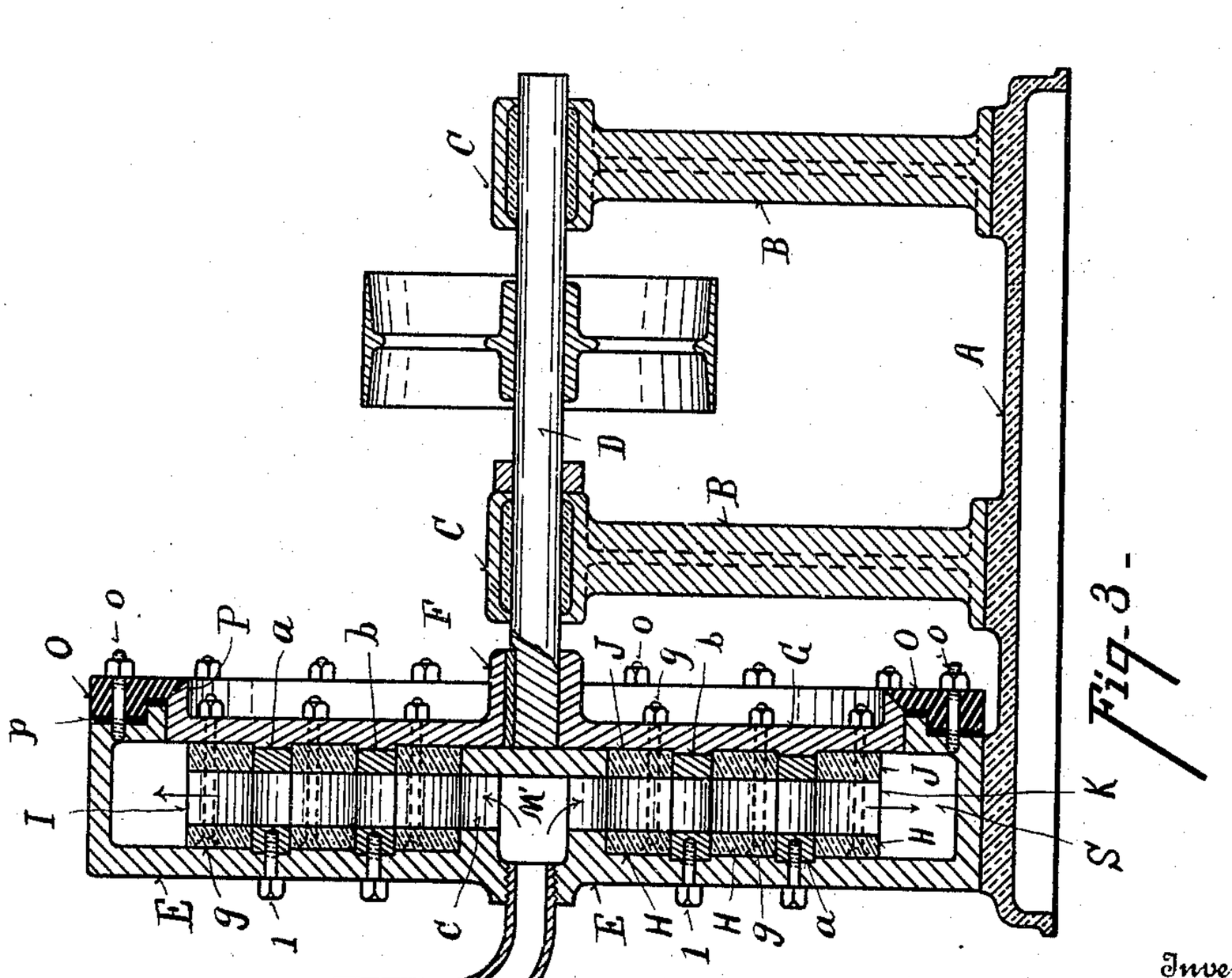

Fig. 3.

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UNITED STATES PATENT OFFICE.

ISAAC RIGDON, OF CINCINNATI, OHIO.

TURBINE ENGINE.

SPECIFICATION forming part of Letters Patent No. 638,277, dated December 5, 1899.

Application filed October 31, 1898. Serial No. 695,008. (No model.)

To all whom it may concern:

Be it known that I, ISAAC RIGDON, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Turbine Engines, of which the following is a specification.

The object of my invention is to provide a turbine engine in which the steam is directed upon a number of concentric series of piston-faces constantly increasing in number from the center to the circumference, supplying the steam to the first piston-ring through a greater discharge area than the discharge area of said ring, thereby utilizing the pressure, direction, velocity, and expansion of the steam in the production of power. Between these concentric piston-faces I dispose concentric chutes, likewise increasing numerically from the center outwardly and connecting radially with the passages formed by the piston-faces to form a series of continuous passages.

The features of my invention are more fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a central vertical section of my turbine. Fig. 2 is a transverse central section from that shown in Fig. 1. Fig. 3 is a modification of Fig. 2. Fig. 4 is a perspective view of a segment of one of the chute-cases. Fig. 5 is a perspective view of a segment of one of the piston-rings. Fig. 6 is a perspective view of the coördinate section of piston-ring.

A represents the bed-plate, on which the supporting-case E and pillow-blocks B are mounted.

C represents the journal-boxes, and D the turbine shaft.

Laterally projected from the supporting-case is a series of concentric chute-rings *e e*, provided with plates *f*, forming passages *a b c*. These rings are shown as bolted to the supporting-case E by bolts 1 tapping into holes 2 of the rings; but they may be made integral with the case or otherwise securely attached. The shaft passes centrally through the supporting-case and is provided with stuffing-box N to prevent the leak of steam. To this shaft, opposite the supporting-case, is attached a rotary piston-disk G, the attachment shown being through the hub F. This disk is also provided with a series of concentric rings H J, laterally projected from the piston-disk intermediate of the concentric chute-rings. These rings are provided with partition-plates constituting piston-faces dividing the rings into an annular series of steam-passages. These rings are preferably constructed of the sections H J, with the triangular-shaped partition-sections I K, having faces inclined in the direction of the line of revolution, dividing the rings into an annular series of passages contracting radially to form reduced discharge-orifices. The chute-rings are likewise provided with angular partition-sections forming an annular series of passages inclined to direct the steam substantially at right angles upon the inclined piston-faces. They are also provided with the contracted discharge-orifices. These partition-sections, both for the piston and chute rings, it will be observed, terminate practically in points upon the inner peripheries of their respective rings, so that the steam in its outward flow is not subjected to any cut-off action; but the chute and piston passages constantly connect radially, whether the piston is stationary or revolving, forming a series of continnous steam-passages, which increase numerically proportionally to the increment of peripheral area of their respective rings. The sections H J of the piston-rings are bolted together and to the piston-disk by bolts *g*, secured by nut *h* or any other appropriate means.

M represents a central steam-chamber provided with a series of discharge-orifices *d*, leading to the steam-passages of the inner piston-ring. The said orifices *d* have a greater discharge area than the discharge area of the steam-passages of said inner piston-ring, thereby maintaining to as great an extent as possible the initial steam-pressure upon the piston-faces of the first piston-ring. They are shown in Fig. 1 as having the same dimensions from the steam-chamber to the first piston-ring.

L represents a steam-inlet pipe communicating with chamber M in any suitable manner. It is shown as tapping through the case E in Fig. 3 at L′ M′, or it may be cored and cast with the case, as shown in Fig. 2.

S represents a discharge-chamber around

the circumference of the turbine, provided with a final exhaust T. This chamber is preferably formed by a flange E′, formed on the periphery of the supporting-case and projecting laterally to the piston-disk, having a downturned end E^2. The piston-disk is provided with a flange P, having a beveled face to engage with the beveled face of a ring O, secured to the supporting-case by bolts *o*. Packing material is inserted between the downturned end E^2 and this ring O to prevent the escape of steam. This ring has the additional functions of forming a bearing for the piston-ring peripheral flange, preventing peripheral vibration, as well as strengthening the parts. In order to adjust the piston-disk to form a proper peripheral bearing with the ring O, I mount shaft compression-collars Q R, bearing against the journal-boxes C.

A slight clearance-space is formed between the downturned end E^2 of the supporting-case and the upper surface of the piston-disk flange inside of the bearing with ring O. A similar clearance-space is left between the upper and lower surfaces of the piston and chute rings and between the ends of the rings and their respective abutting sections of case and disk. Thus no escape of steam is possible, and it is all confined to working piston-faces. Also there is no frictional contact except the peripheral bearing of the piston-disk flange with ring O. It will readily be seen that this construction avoids end thrust of the steam, as the expansion is utilized radially, escapement of steam, and frictional contact of moving surfaces. The expansive force, pressure, direction, and velocity of the steam are all utilized to their greatest efficiency upon a continuous steam-outlet having restricted orifices of discharge numerically increasing proportionally to the increment of peripheral area of their respective rings. It is also obvious that any other medium than steam adapted to be used with my turbine engine is contemplated as within the scope of this invention.

Having described my invention, I claim—

1. In a turbine engine the combination of a stationary supporting-case, a rotary piston-disk mounted on a shaft, a series of concentrically-disposed rings alternately projected from the respective opposing faces of said case and disk, an annular series of outwardly-contracted steam-passages formed in said rings, increasing numerically proportionally to the increment of peripheral area of their respective rings and arranged to constantly intersect radially, forming a continuous radial steam-outlet when the piston-rings with their passages are revolving around the chute-rings with their passages, and a central steam-chamber provided with orifices leading to the passages of the inner ring, having a greater area of discharge than the discharge area of the passages of the inner piston-ring, substantially as specified.

2. In a turbine engine the combination of a stationary supporting-case, a rotary piston-disk mounted on a shaft, a series of concentrically-disposed chute-rings and piston-rings alternately projected concentrically from the respective opposing faces of said case and disk, an annular series of steam-passages formed in said rings contracting outwardly, the piston-passages having faces inclined in the direction of the line of revolution, the chute-passages arranged to direct the steam thereon, the said contracted passages communicating with each other radially to form a series of continuously-open radial passages when the piston-disk is revolving, said passages increasing numerically proportionally to the peripheries of their respective rings, and means for supplying steam to the inner ring, substantially as specified.

3. In a turbine engine the combination of a stationary supporting-case, a series of concentrically-disposed rings projected therefrom, a rotary piston-disk, a series of concentrically-disposed rings projected therefrom intermediate of said chute-rings, the said piston and chute rings having angular partitions terminating substantially in points on the inner peripheries of their respective rings and dividing them into an annular series of outwardly-contracted passages constantly intersecting radially when the parts are in motion, the said partitions and passages increasing outwardly in proportion to the increment of their respective peripheral areas, and means for supplying steam under pressure to the innermost ring, substantially as specified.

4. In a turbine engine the combination of a rotary piston-disk and a stationary supporting-case oppositely disposed, a series of rings concentrically projected from the opposing faces of said disk and case intermediate of each other, the said rings having triangle-shaped partition-sections the apices of which are upon the inner peripheries and the bases on the outer peripheries of the respective rings, thereby dividing said rings into annular series of outwardly-contracted steam-passages, forming a continuously-open steam-outlet radially, increasing numerically outwardly, and means for supplying steam to the inner of said rings under pressure, substantially as specified.

5. In a turbine engine the combination of a rotary piston-disk mounted on a shaft and a stationary supporting-case oppositely disposed, a series of rings concentrically projected from the opposing faces of said disk and case intermediate of each other, the said rings having triangular-shaped partition-sections the bases of which are upon the outer and the apices on the inner peripheries of their respective rings, and dividing the said rings into outwardly-contracted passages substantially V-shaped, forming continuous radial steam-outlets when the piston-rings revolve around the chute-rings, the partitions and passages increasing outwardly numerically proportionally to their respective peripheries, and an inner steam-chamber pro-

vided with passages to the inner ring, substantially as specified.

6. In a turbine engine the combination of a supporting-case, and a rotary piston-disk, concentrically disposed rings projected from their respective opposing faces, chute-passages formed in the chute-rings continuously communicating radially with piston-passages formed in the piston-rings, the said passages being outwardly contracted and increasing proportionally to their peripheries, an inner steam-chamber provided with orifices to the inner piston-ring, an outer discharge-chamber formed around the periphery of turbine, and a ring O secured to the supporting-case and forming a bearing for the periphery of the piston-disk, substantially as specified.

7. In a turbine engine the combination of a rotary piston-disk and a stationary supporting-case oppositely disposed, a series of rings concentrically projected from the opposing faces of said disk and case intermediate of each other, the said rings having triangular-shaped partition-sections the bases of which are upon the outer and the apices on the inner peripheries of their respective rings, dividing the rings into an annular series of V-shaped outwardly-restricted passages, communicating radially with each other at all times, and increasing outwardly numerically proportionally to their respective peripheries, the partition-sections being so arranged that the passages of the chute-rings communicate with the passages of the piston-rings, substantially at right angles thereto, and an inner steam-chamber formed around said shaft having passages to the steam-passages of the innermost ring, substantially as specified.

In testimony whereof I have hereunto set my hand.

ISAAC RIGDON.

Witnesses:
OLIVER B. KAISER,
W. R. WOOD.