No. 634,969. Patented Oct. 17, 1899.

A. WAHLE.

ROTARY STEAM MOTOR OR ENGINE.

(No Model.) (Application filed Feb. 14, 1898.)

2 Sheets—Sheet 1.

Fig. 1.

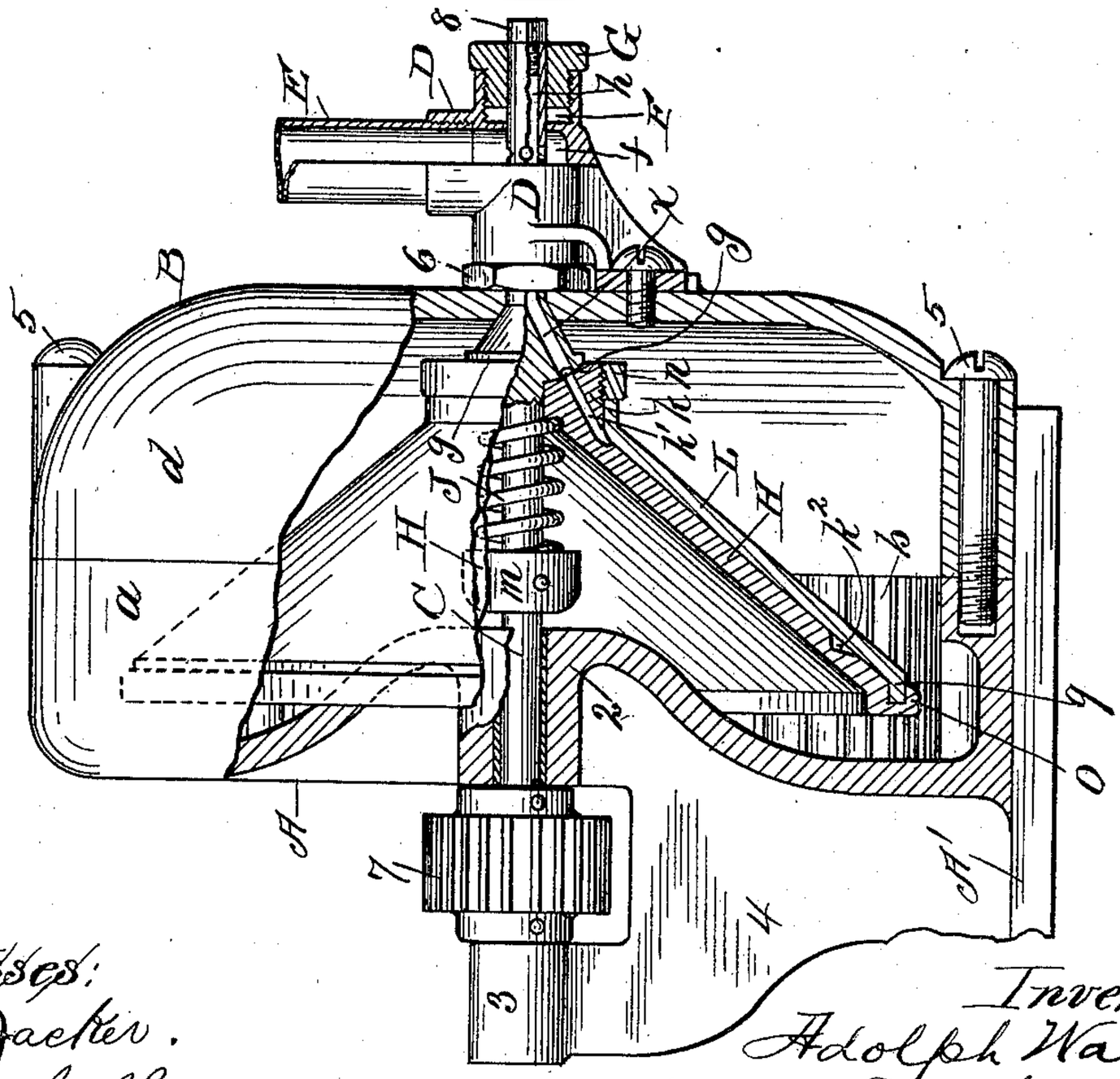
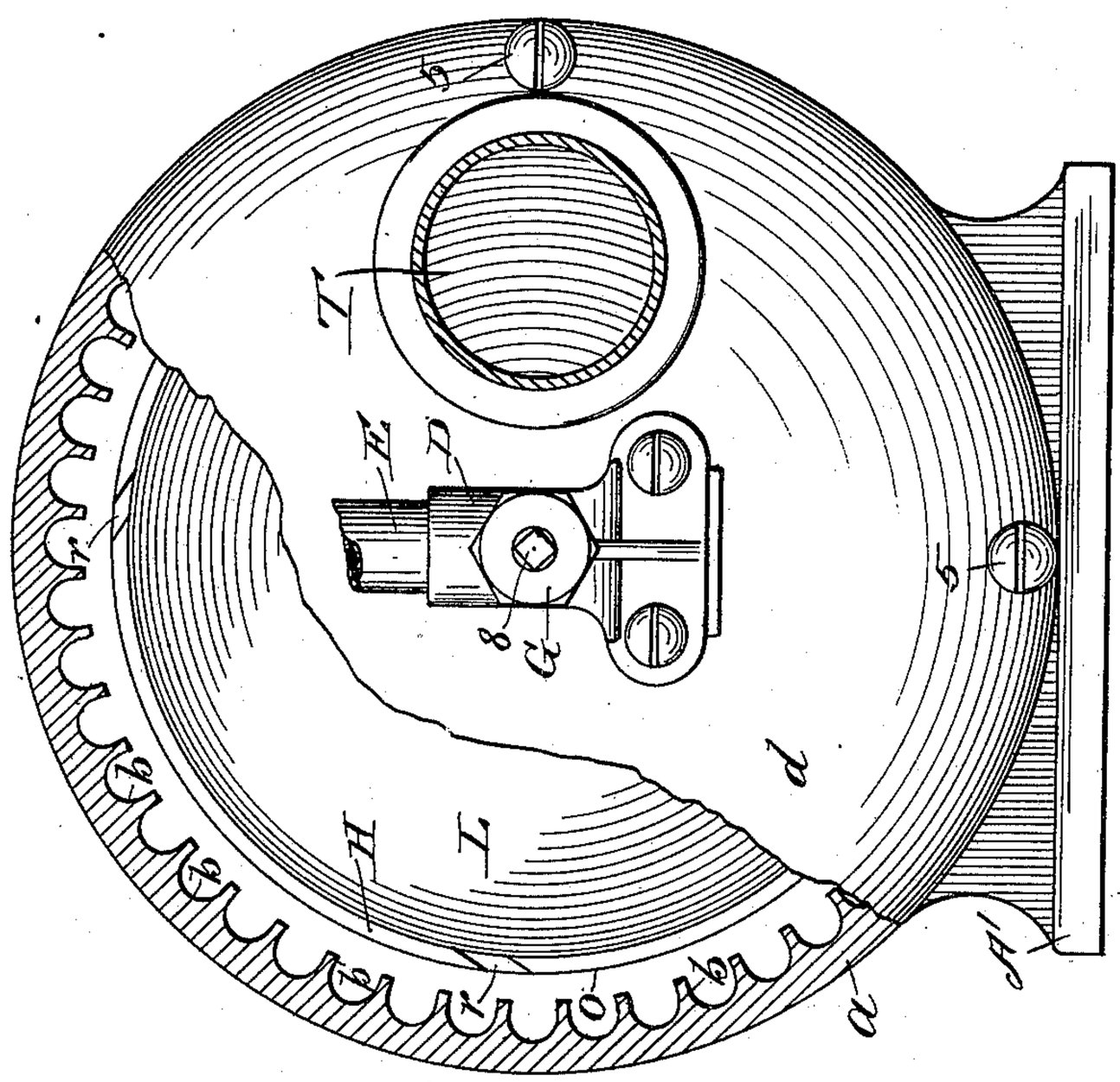


Fig. 2.



Witnesses:
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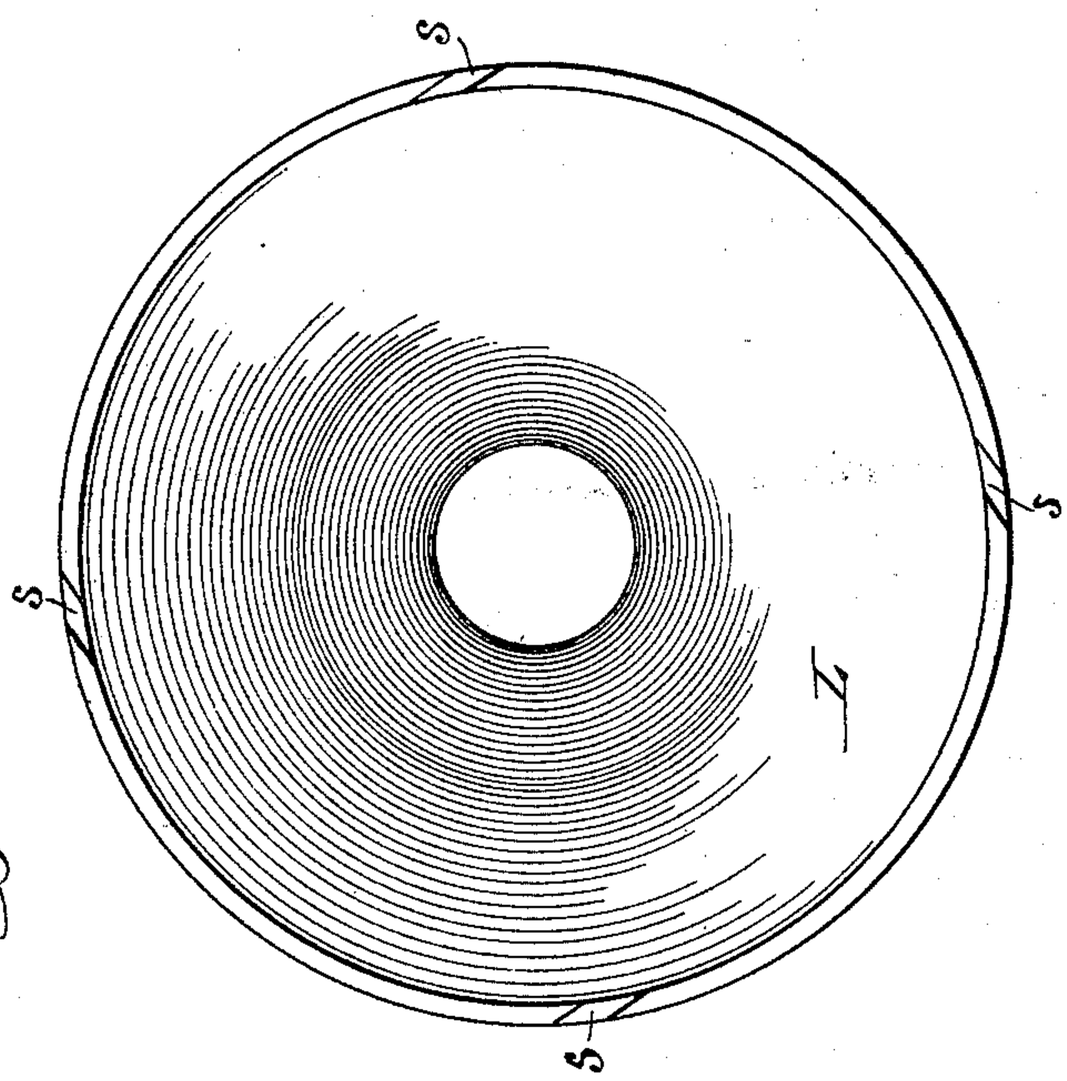

Fig. 4.

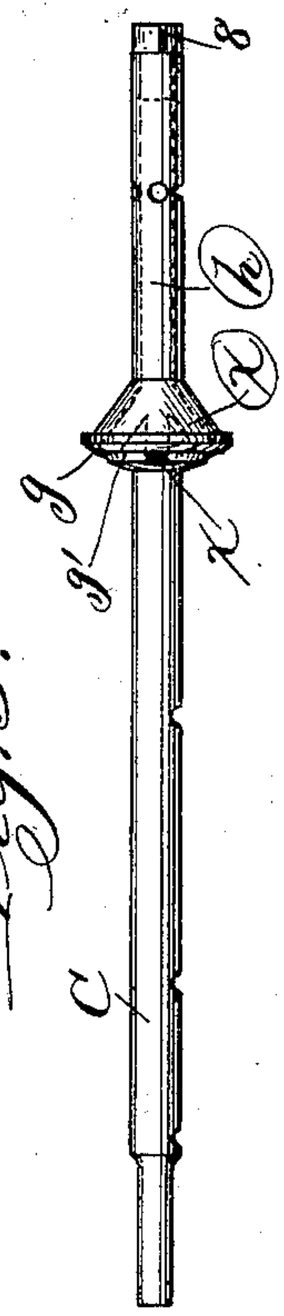

Fig. 5.

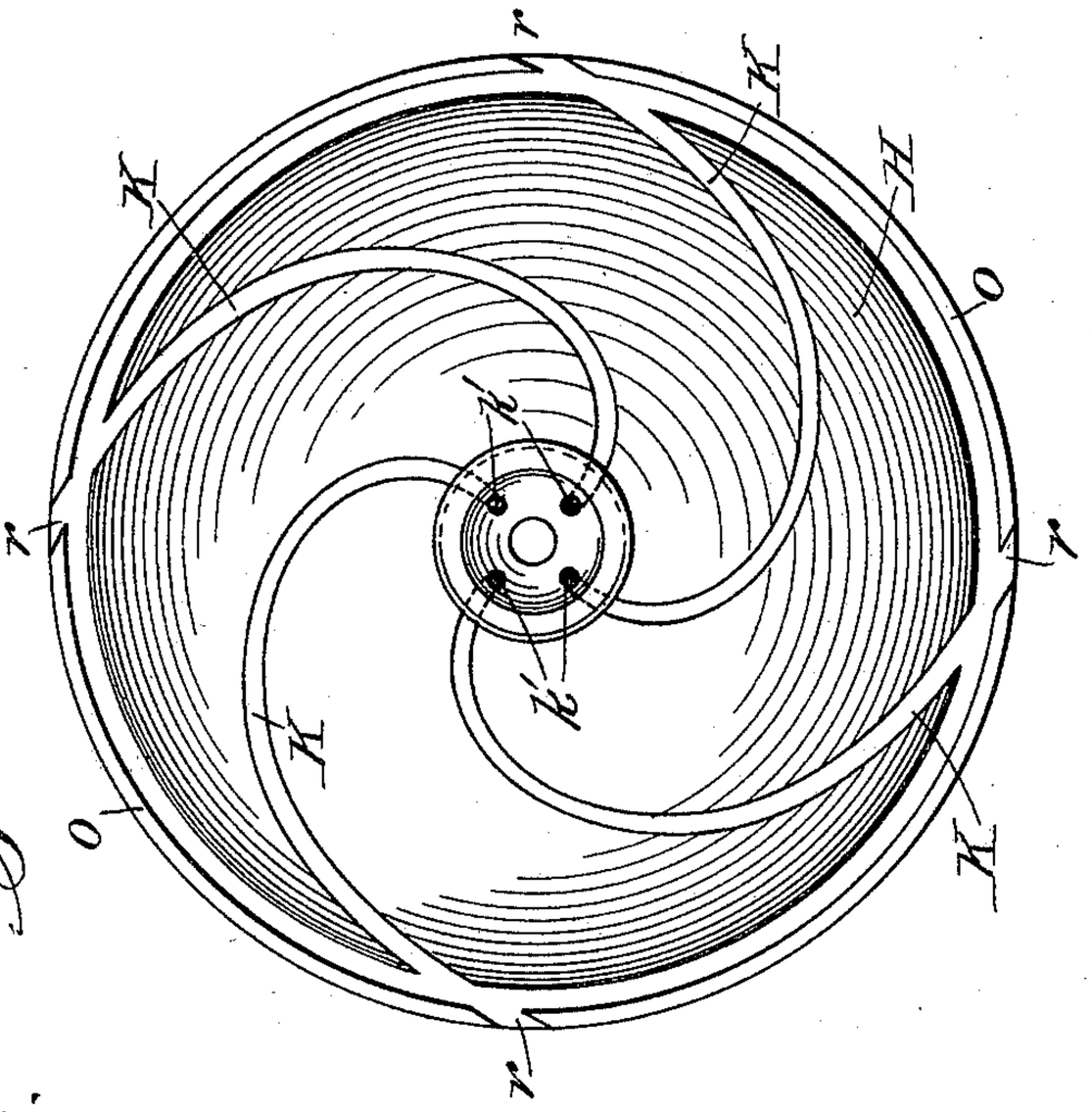

Fig. 3.

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UNITED STATES PATENT OFFICE.

ADOLPH WAHLE, OF DAVENPORT, IOWA.

ROTARY STEAM MOTOR OR ENGINE.

SPECIFICATION forming part of Letters Patent No. 634,969, dated October 17, 1899.

Application filed February 14, 1898. Serial No. 670,218. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH WAHLE, a citizen of the United States, and a resident of Davenport, in the county of Scott and State of Iowa, have invented certain new and useful Improvements in Rotary Steam Motors or Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings and to the letters and numerals of reference marked thereon.

My invention relates to rotary steam motors or engines; and its object is to provide a simple and economically-constructed steam-turbine wheel in which the power is applied in a centrifugal manner, so that the full pressure of the steam can be exerted thereon first nearest the point of greatest resistance—namely, the fulcrum or center of revolution—and then expends its force during its outward course at points of less resistance, until as it issues from the turbine it exhausts its final effort by an impact whereby the maximum results are obtained. This I accomplish by the mechanism hereinafter fully described, and as particularly pointed out in the claims.

In the drawings, Figure 1 is a side elevation of my invention, showing a part of the casing broken away and showing a part of the turbine in section. Fig. 2 is a rear elevation thereof, showing part of the casing broken away. Fig. 3 is a front view of the inner funnel-shaped part of the turbine wheel. Fig. 4 is a rear view of the outer funnel-shaped part of the same. Fig. 5 is a side view of the shaft of the motor.

In the drawings, A and B represent the front and rear halves of the casing of my improved motor, between and within which the turbine is housed. The front half A has a suitable base-plate A′ cast integrant therewith, and has a circular-shaped casing or shell *a*, the edges of which are flanged backward, so as to provide it with short cylindrical sides, the inner surface of which is provided with lengthwise corrugations *b*. The center of this front half of the shell *a* is preferably sunken in and provided with a suitable bearing 2 for the drive-shaft C, and a short distance removed from and in front of this bearing is another bearing 3, supported by legs 4, cast integrant with and consisting of two suitable webs of metal projecting forward from shell *a*. The rear half of the casing consists of a bowl-shaped shell *d*, corresponding in diameter to shell *a*, and has its edges bearing and held against the annular edges of said shell to form a butt-joint by set-screws 5. The shaft C passes through but does not necessarily have bearings in the center of shell *d*, although said opening is kept steam-tight by a suitable nut 6.

The rear end of shaft C extending beyond shell *d* is journaled in suitable bearings in the ends of a tubular boss D, supported by a bracket secured to and projecting from the rear of shell *d*. The bore of the central portion of this boss is considerably greater in diameter than in the end portions thereof and forms an initial steam-chamber *f*, and it has a short stub leading up from this initial chamber, to which an intake steam-pipe E is connected. Beyond the rearmost bearing-surface provided by this boss D the diameter of the bore is enlarged for the reception of packing F, which is held in place by the gland-nut G.

The shaft C has a gear 7, secured thereon between its bearing in the shell *a* and the forward bearing 3 thereof, and is preferably of the same diameter from said gear 7 to a point near where it passes through shell *d*. At this latter point it is increased in diameter so as to provide a shoulder *g*, the forward face of which is inclined at a more or less obtuse angle to the plane of the center of revolution of said shaft, and the rear side of which is cone-shaped and has a portion journaled in the bearing opening in shell *d*, if desired. That portion of shaft C in the rear of shoulder *g* is made hollow to provide a longitudinal steam-passage *h* therethrough from the pipe E to the said shoulder *g*. Its rear end is stopped by a suitable plug 8, and that portion of it revolving in the initial steam-chamber *f* is provided with a series of radial steam-ports, communicating with said initial steam-chamber and the said steam-passage *h*.

The forward end of steam-passage *h*, which terminates just about back of the rear cone-shaped side of shoulder *g*, has a series of steam-conduits *x* diverging therefrom, preferably at equal distances apart, which extend through said shoulder, preferably at right angles to

the forward inclined surface thereof, in which latter I make a concentric circular groove g', which connects the forward ends of said conduits. Surrounding shaft C and secured against the forward face of shoulder g is a central boss k of a steam-turbine H. The face of the boss bearing against shoulder g is concaved so as to conform to the inclination thereof, and it is provided with a series of central delivery-ducts k', corresponding in number to conduits x and open to and extending in alinement with the same through the boss and to and discharging into the grooved chutes K in the exterior surface of said turbine.

Turbine H is of a funnel shape, and it is held firmly against shoulder g by the pressure of a strong coil expansion-spring J, surrounding shaft C, against the inner side of its central boss by a collar m, suitably keyed to said shaft. A plain nut on shaft C could be made to answer the same purpose. I prefer the means described and shown, however.

The chutes K are preferably simple grooves of sufficient depth made in the outer inclined surface of its funnel-shaped exterior, and their course in transit from the boss k to its rim o describes an evolute. In order to close these chutes K, the turbine is provided with a corresponding funnel-shaped cover L, the central opening of which is flanged, so as to fit snugly over the cylindrical sides of boss k, which latter has a portion screw-threaded, and is engaged by a nut n to secure said cover tightly in place. The rim o of the turbine terminates in the transverse plane of the corrugations b of shell a and is flanged outward and backward slightly, so as to form an annular channel or groove 8, within which the outer circular edges 9 of the cover are seated and confined by the manipulation of said nut n. The outer ends of chutes K find outlet by openings r and s, made in a tangential plane through the rim o and edges 9 of the cover.

The operation of my invention is substantially as follows: The steam enters the initial steam-chamber from the intake-pipe and then passes through the steam-ports into the hollow bore or steam-passage in the rear portion of shaft C. From the steam-passage it passes into and through the diverging conduits in the shoulder g of said shaft and then enters the ducts leading to the chutes in the turbine, and then finally passes into said chutes and out through the openings in the rim thereof, whereupon it is expelled forcibly against the corrugations of the shell a. When the steam leaves the conduits and ducts, its effort is to travel in a straight line. This tendency when it enters the chutes and its constant disposition to fly off on a tangent as it traverses the curved chutes cause the turbine to revolve. This revolution is further materially assisted by the forcible expulsion of the steam in a tangential direction from the rim of said turbine against the corrugations of the shell a, after which the steam exhausts from the turbine chamber out through the exhaust-opening T in the rear shell d, as shown.

While not as desirable as the construction I have hereinbefore described, it is apparent that other constructions could be devised that would permit the steam to find access and be delivered centrally to the turbine hereinbefore described. All such modifications I desire to be considered as contemplated within the spirit of my invention, the principal feature of which is said turbine.

What I claim as new is—

1. In a rotary steam motor or engine, a suitable shaft, a central-delivery turbine mounted thereon the outer surface of which is conical and is provided with chutes traversing it in proper direction from its circumference to said shaft, and an outside cover therefor the concavity of which conforms to the conical exterior of said turbine, in combination with a suitable case for said turbine having a suitable exhaust-port.

2. In a rotary steam motor or engine, a suitable shaft having its rear portion hollow and connected with a suitable steam-intake, a central-delivery turbine mounted on said shaft, the outer surface of which is conical and traversed by chutes extending from its circumference to and communicating with the hollow portion of said shaft and an outside cover therefor the concavity of which conforms to the conical exterior of said turbine, in combination with a suitable case having an exhaust-port.

3. In a rotary steam motor or engine, a suitable shaft, a central-delivery turbine mounted thereon the outer surface of which is conical and is traversed by chutes extending from its circumference to said shaft, and an outside cover therefor the concavity of which conforms to the conical exterior of said turbine, in combination with a suitable case the inner surface of which is substantially concentric to said turbine and is provided with corrugations against which the peripheral discharge of said turbine impinges.

4. In a rotary steam motor or engine, a suitable shaft having its rear portion hollow and connected with a suitable steam-intake, a central-delivery turbine mounted on said shaft the outer surface of which is conical and traversed by chutes extending from its circumference to and communicating with the hollow portion of said shaft, and an outside cover therefor, the concavity of which conforms to the conical exterior of said turbine in combination with a suitable case the inner surface of the sides of which are concentric to said turbine and is provided with corrugations against which the peripheral discharge of said turbine impinges.

5. In a rotary steam motor or engine, a shaft having its rear portion hollow: its rear end closed: radial steam-ports therein and a suitable shoulder having diverging conduits therethrough communicating with the hollow portion of the shaft, the bearing in which the

hollow portion of said shaft is journaled, having its inner circumference between its ends increased in diameter to provide an initial steam-chamber surrounding said steam-ports, a central-delivery turbine mounted on said shoulder and having ducts therethrough and having an outer funnel-shaped portion the conical exterior of which is traversed by chutes extending from its circumference to and communicating with said ducts and a funnel-shaped cover for said exterior surface of the turbine, in combination with a suitable case for said turbine having an exhaust-port.

6. In a rotary steam motor or engine a shaft having its rear portion hollow and communicating with a suitable steam-intake, and having a suitable shoulder provided with diverging conduits therethrough that connect with the hollow portion of the shaft, a central-delivery turbine mounted on said shaft and having a central boss provided with ducts therethrough and a surrounding funnel-shaped portion the conical exterior of which is traversed by suitable chutes, a cover for turbine, in combination with a collar keyed to said shaft and coil-spring between the same and said turbine and a suitable case for said turbine, as set forth.

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Witnesses:
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