No. 700,276. Patented May 20, 1902.

L. WILSON.

COOLING MEANS FOR ROTARY MOTORS.

(Application filed July 25, 1901.)

(No Model.) 5 Sheets—Sheet 1.

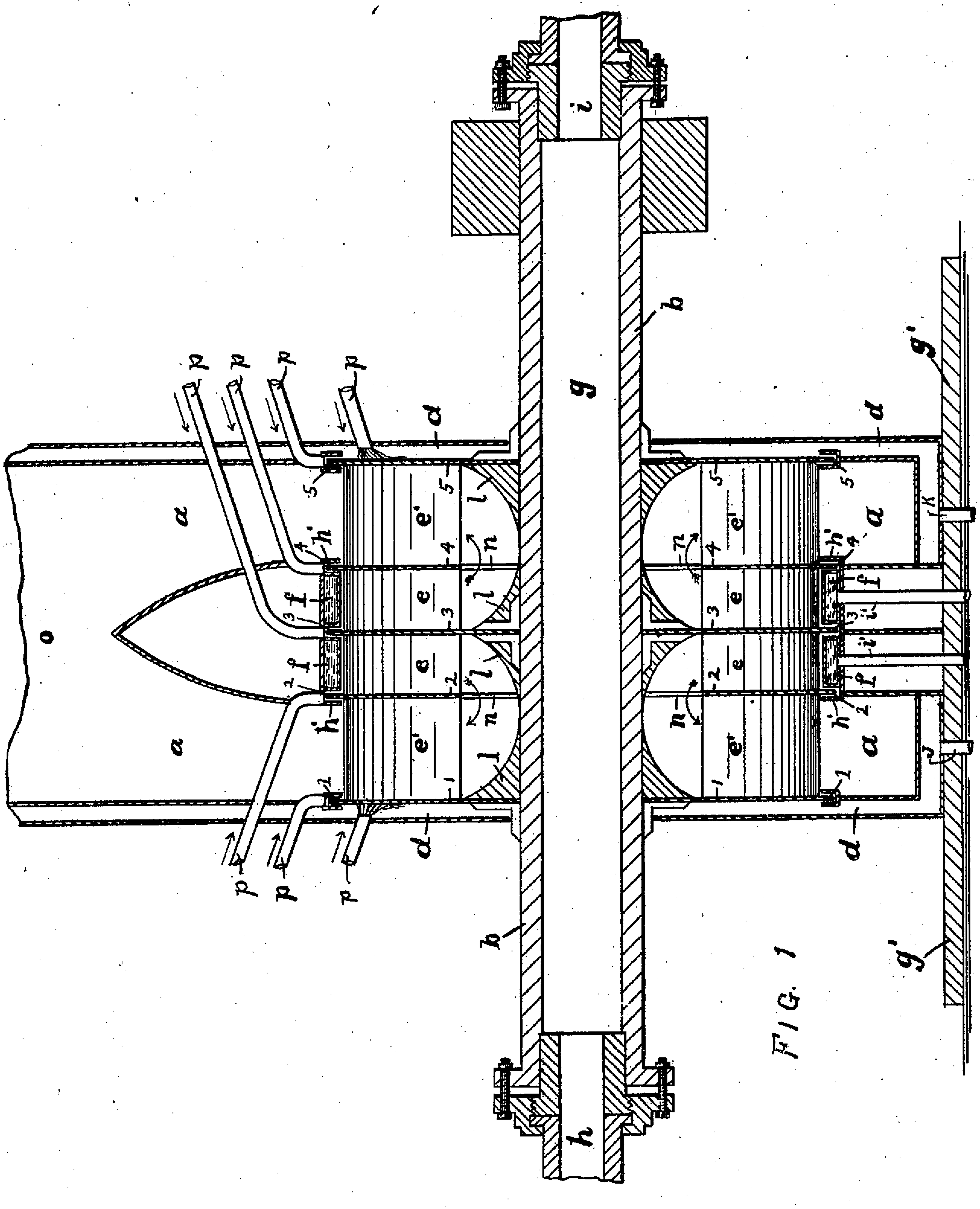

FIG. 1

WITNESSES

L. Lee.

Walter H. Talmage.

INVENTOR:

Lida Wilson

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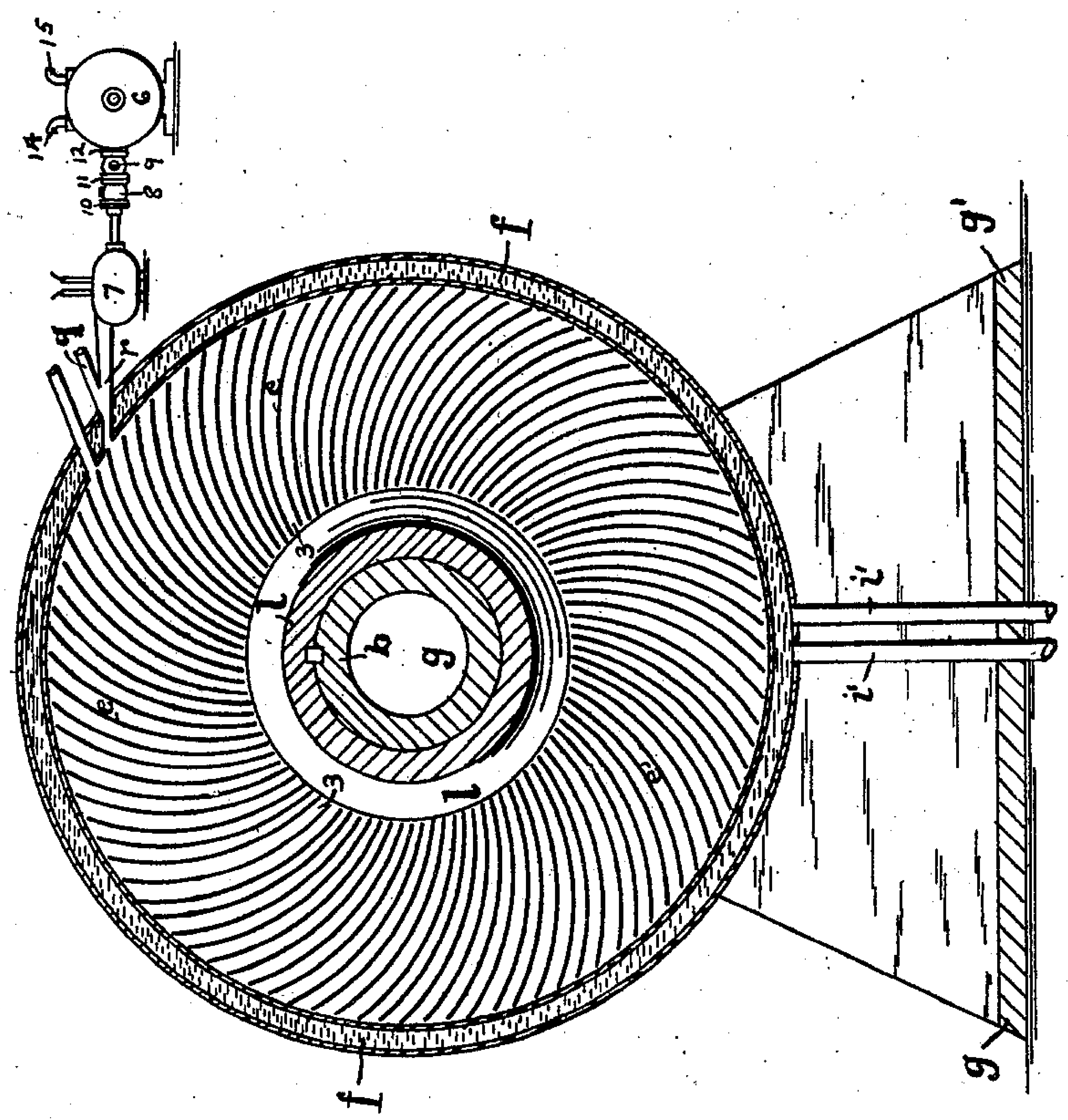

FIG. 2.

WITNESSES:

L. Lee.

Walter H. Talmage.

INVENTOR:

Lida Wilson.

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(No Model.) 5 Sheets—Sheet 3.

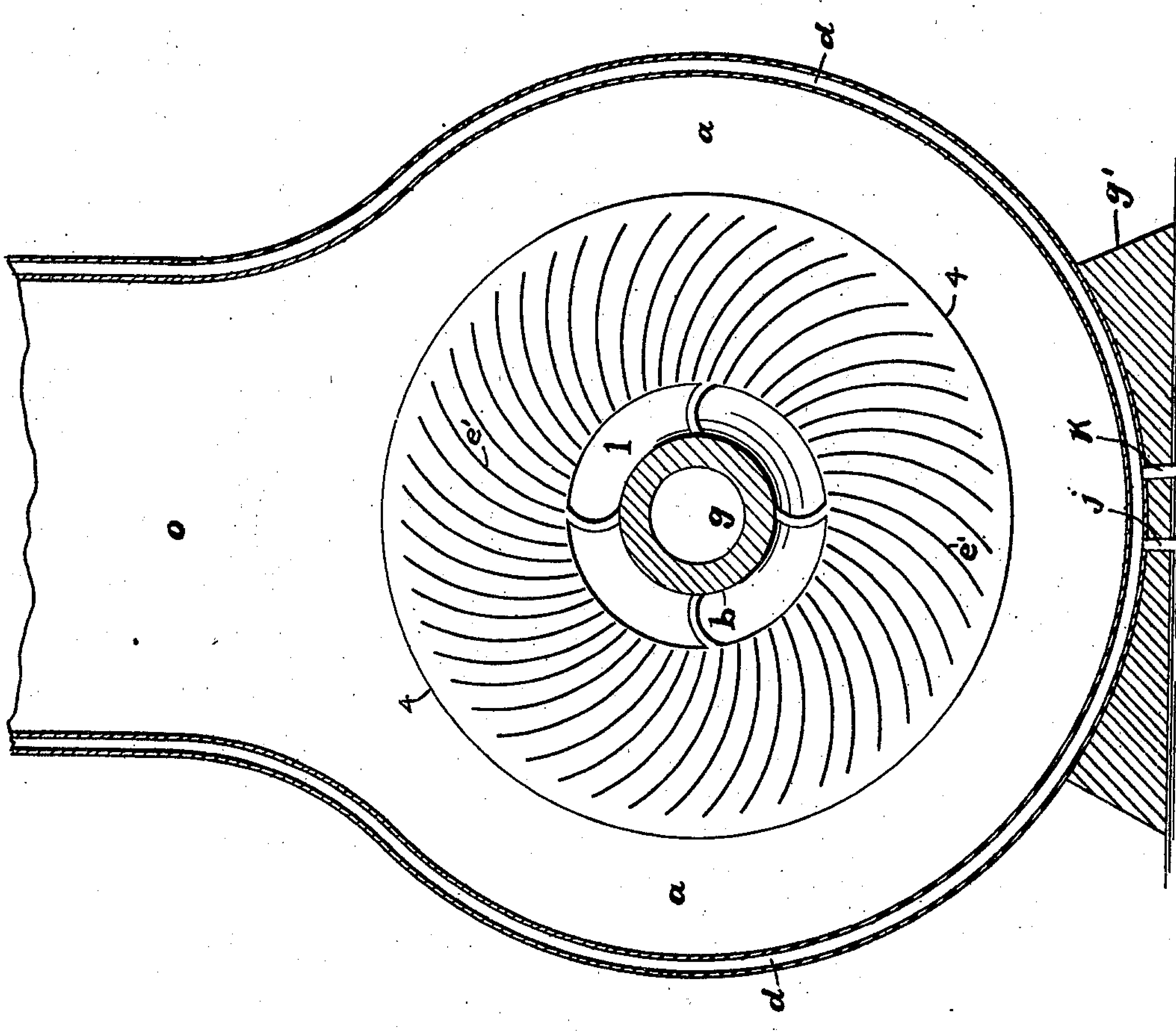

FIG. 3

WITNESSES:
L. Lee,
Walter H. Talmage.

INVENTOR:
Lida Wilson.

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L. WILSON.

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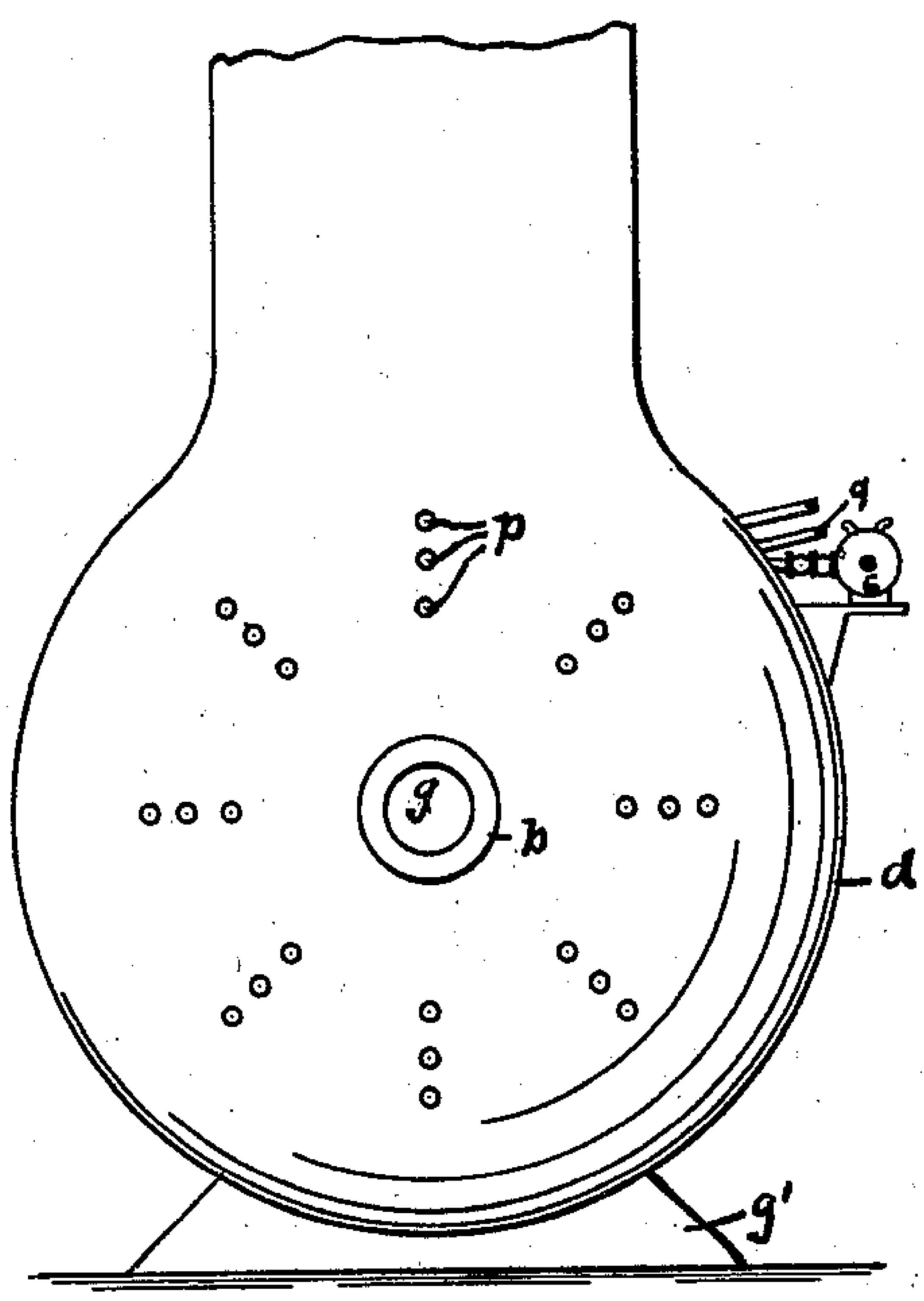

FIG. 4

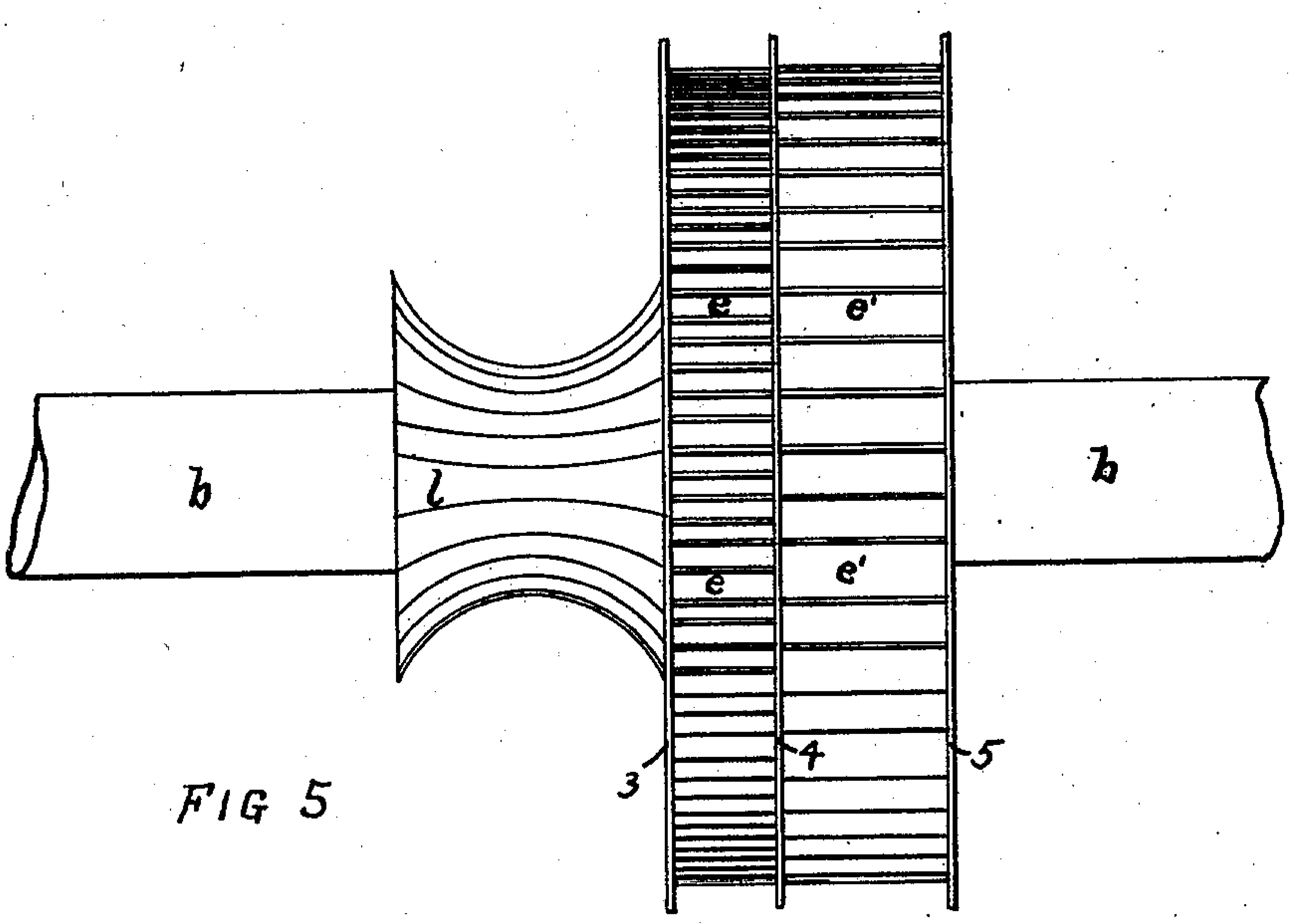

FIG 5

WITNESSES:

L. Lee

Walter H. Talmage

INVENTOR:

Lida Wilson

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 700,276. Patented May 20, 1902.

L. WILSON.

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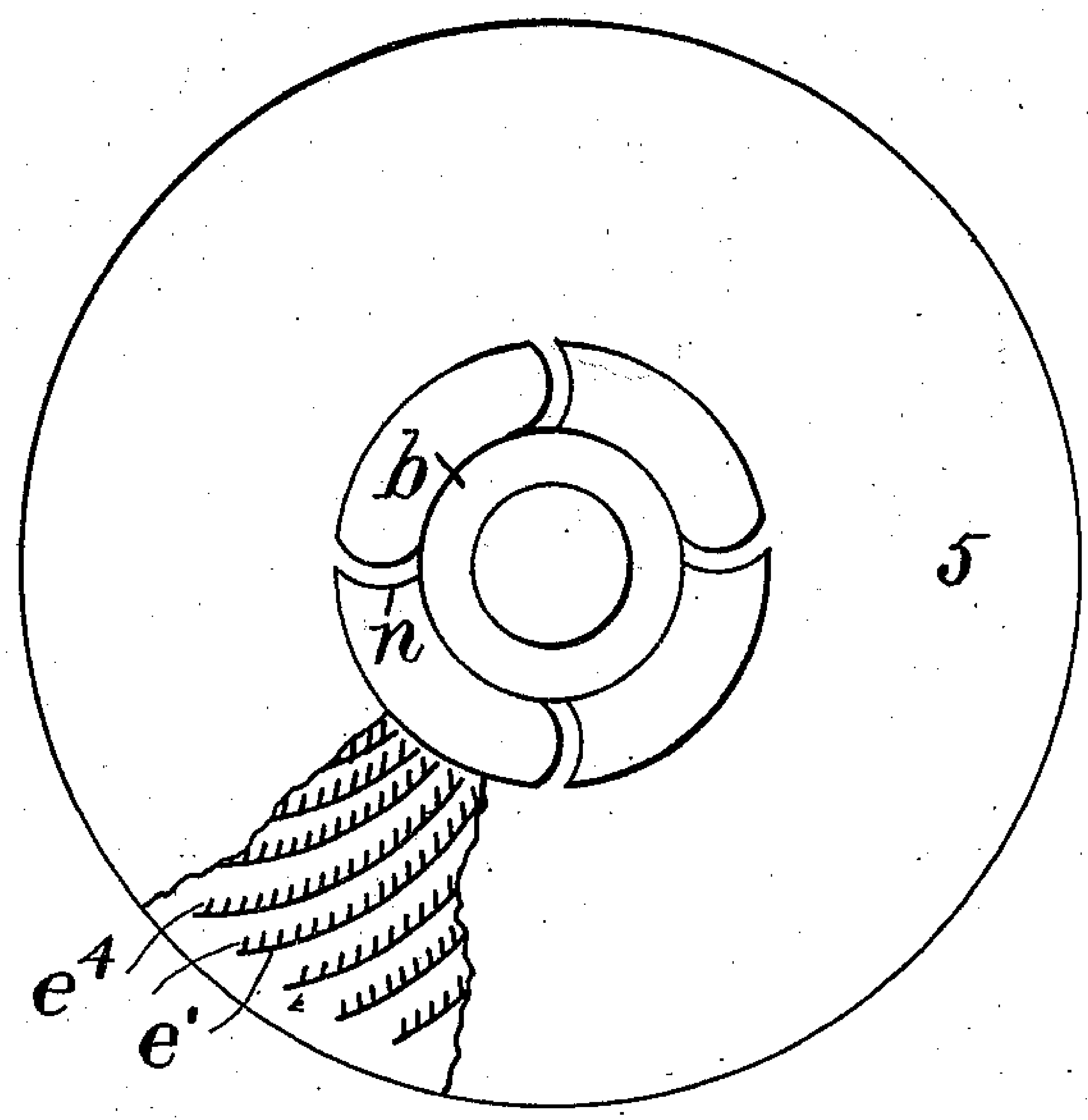

Fig. 6.

Attest:
L. Lee.
Walter H. Talmage.

Inventor.
Lida Wilson, per
Thomas S. Crane, Atty.

UNITED STATES PATENT OFFICE.

LIDA WILSON, OF BROOKLYN, NEW YORK.

COOLING MEANS FOR ROTARY MOTORS.

SPECIFICATION forming part of Letters Patent No. 700,276, dated May 20, 1902.

Application filed July 25, 1901. Serial No. 69,719. (No model.)

To all whom it may concern:

Be it known that I, LIDA WILSON, a citizen of the United States, residing at Pierrepont House, corner Hicks and Montague streets, Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Cooling Means for Rotary Motors, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to rotary motors driven by the impact of hot gas produced by the combustion or explosion of mixtures of air or oxygen with a hydrocarbon, hydrogen, or monocarbon oxid fluid.

For practical reasons it is desirable to have the explosion or combustion chamber as near as possible to the points of impact on the blades of the motor; but owing to the great heat evolved by the combustion of the gases the motor-blades and motor disks or rings and casings exposed to their action would rapidly be injured unless means are provided to modify the heat of the gases before impact thereon or to cool the blades, disks, or rings and other parts of the motor after such impact.

Air has been used to cool the revolving parts; but the heat-carrying capacity of air is so very low, compared with that of water, that it is very inefficient for such a purpose, and the use of water is attended with difficulty, as any impurities in the water will deposit a crust or scale upon the revolving parts and cause them to get out of balance and retard this movement. The crust or scale is also liable to become loosened from time to time and interfere with the rotations. To secure an efficient cooling and to avoid such difficulties in the use of ordinary water, I employ pure rain or distilled water, which is sprayed upon the revolving parts by any well-known suitable device or by compressed air at a suitable pressure. The cheeks of the casing in which the disks or rings revolve should also be cooled by the pure water, which serves as a lubricant and keeps the joint gas-tight. The shaft may be protected by spools, as shown, and, if hollow, by an internal circulation of clean fresh or sea water in contact with those parts of the shaft where exposed to the exhaust-gases escaping from the rotary-motor blades. The temperature of the gases before impact on the blades may be reduced by introducing a liquid which will not deposit a crust or scale, such as pure rain or distilled water suitably sprayed, either mechanically or by compressed air, into the nozzle or outlet leading from the explosion-chamber to the motor-blades.

The accompanying drawings illustrate an arrangement of appliances suitable for driving a shaft revolving horizontally; but the arrangement of the parts may be varied to drive shafting placed vertically.

Figure 1 is a transverse section of a rotary motor provided with my improvements. Fig. 2 is a longitudial section of the primary motor-blades and explosion and cooling apparatus. Fig. 3 is a longitudinal section of the return or exhaust blades and exhaust-chamber; and Fig. 4 is an end view of the motor, exhibiting merely the casing, the cooling-pipes, and explosion-chamber. Fig. 5 is a view of the shaft and motor-wheel detached from its casing, one-half of the wheel being removed to show the spool. Fig. 6 is an end view of the wheel shown in Fig. 5, with the disk 5 partly broken away.

a designates the exhaust-jacket, partially surrounded by an air-jacket *d*. The shaft *b* is formed with bore *g*, connected with pipes *h* and *i* to circulate water therethrough.

The exhaust-jacket *a* and its surrounding air-jacket *d* are attached to a bed-plate g', and the jacket *a* is provided with outlet *o* for the escape of the exhaust-gases. Air may be circulated in the air-jacket *d* by pipes *j* and *k*, if desired. The casing *f*, surrounding the primary motor-blades *e*, is attached to the bed-plate g' and may be formed to serve as a peripheral water-jacket and with cheeks h' to form channels or guides for the edges of the disks to revolve in. The water-jacket on the casing *f* is supplied with inlet and outlet pipes i' to circulate water throughout the same. The motor-wheel is formed with curved primary motor-blades *e* and with or without curved return-blades e'. The blades *e* and e' are attached to disks or plates 1, 2, 3, 4, and 5, of which the disks 1 and 5 are securely and closely attached to the shaft *b* at the opposite edges of the motor-wheel, and the disk 3 is closely attached to the shaft at the middle of the wheel. The return-disks 2 and 4 are arranged at opposite sides of the disks 3, but do not extend to the shaft, being connected therewith by arms n to permit the passage of the gases, which are caused by this construction to return to the periphery of the wheel to escape. The primary blades e are secured between the disk 3 and the opposite disks 2 and 4, while the return-blades e' are secured to the outside disks 1 and 5 and to the return-disks 2 and 4. With this construction the gases which enter between the primary blades at the periphery of the wheel pass within the edges of the return-blades 2 and 4, as indicated by the curved arrows, and then outwardly through the return-blades e' to the exhaust-jacket a. Where no return-blades e' are employed, the gas passes directly through the space between the arms n to the exhaust-jacket a.

The outer or peripheral ends or edges of the primary motor-blades e in Fig. 2 extend as closely as possible to, but without actually touching, the peripheral casing f, and the inner ends or edges of the primary motor-blades e and of the return-blades e' clear the shaft sufficiently to permit the passage of the gases in the direction of the curved arrows from the primary motor-blades e to the return-blades e' or to the exhaust-jacket if the wheel is not provided with exhaust-blades. An increased resisting-surface for the impact of the gas may be formed upon the curved blades by corrugating or ribbing their sides against which the gases chiefly impact in their flow, as shown in Fig. 6, where ribs e^4 are illustrated upon the exhaust-blades e'. Arrows are shown in the passages between the blades to indicate the direction of the flow of the gases, and it will be observed that the ribs are inclined to meet the impact of flow of the gases, and they would consequently be inclined in the opposite direction upon the motor-blades e, as the gases flow in a reverse direction in passing between such blades e'. Spools l are applied to the shaft at the opposite sides of the central disk 3, each spool curved from that disk toward the shaft and on the reverse curve away from the shaft to disk 1 and 5, respectively, so as to guide the gases from the respective primary motor-blades e to the respective return-blades e' or to the exhaust-jacket if there are no exhaust-blades. The casing f may be cooled by a spray or by a water-jacket, and the latter is divided at the middle of its width to form a channel which admits and guides the edge of the disk 3.

The application of cooling fluid to the edges and inner surfaces of the disks is effected by pipes connected at intervals to the channels or guides in which the edges of the respective disks revolve and to which they are fitted as closely as possible without actually touching.

The blades e and the inner surface of the casing f are cooled by jets of pure water supplied through pipes p, arranged at intervals around the casing. Where the pipes to supply pure water pass through the exhaust-jacket a or are elsewhere exposed to heat, they may be coated with a non-conducting material, such as asbestos or magnesia, to prevent the conduction of heat to the cooling fluid. The nozzle or outlet r, which conducts the products of explosion to the periphery of the primary motor-blades e, may be supplied with a pipe q to admit cooling fluid to mingle with the products of explosion before their impact on the blades e and may be sprayed upon by cooling fluid or be surrounded by a jacket through which a cooling fluid may be circulated.

My invention is independent of the means which may be provided to supply the heated gases to the rotary motor; but I have shown in the present drawings in diagrammatic form an explosion apparatus similar to that described in my copending application, No. 61,354, filed May 22, 1901, with title "Appliances for producing and dealing with mixtures of gases." Such apparatus comprises a mixer 6 and an explosion-chamber 7, which may be sprayed upon by cooling fluid or be surrounded by a jacket through which a cooling fluid may be circulated, and the mixer and explosion-chamber connected by a pipe in which there is situated a hand regulating-valve 8, an automatic back-pressure check-valve 9, and flame-proof screens 10, 11, and 12. The mixer 6 is provided with inlets 14 and 15, through which air and hydrocarbon, hydrogen, monocarbon oxid, or other combustible fluid are supplied under pressure to the mixture. The mixing of the air and hydrocarbon or other combustible fluid may also be effected by what is ordinarily known as a "spray-jet" alone or in combination with a mixer; but whatever means may be used for mixing the air and combustible fluid the nozzle or outlet r is supplied with gas under pressure, resulting from the explosion or combustion of the combustible fluid and air in the explosion-chamber 7. When the pressure resulting from such explosion exceeds the pressure in the mixer 6, the automatic back-pressure check-valve 9 immediately closes by its own weight and by the back pressure from the explosion-chamber 7, so that the explosive force of the gas in the explosion-chamber 7 forces itself out through the nozzle or outlet r onto the peripheral ends of the primary motor-blades e, and as soon as the pressure in the explosion-chamber 7 falls below the pressure in the mixer 6 a fresh quantity of mixed combustible fluid and air immediately passes from the mixer 6 through the automatic back-pressure check-valve 9 and enters the explosion-chamber 7, causing a fresh explosion, so that the cycle is repeated indefinitely so long as the hand regulating-valve 8 is allowed to remain open to permit the supply of mixed air and combustible fluid.

It will be understood that the various jets and pipes to supply the pure water would be provided where necessary with automatic back-pressure check-valves and with hand regulating-valves and connections to suitable sources of supply for the pure water.

From the foregoing description it will be seen how the pure water may be applied; but I do not limit myself to the special arrangements of pipes, nozzles, or outlets shown in the drawings. It will also be understood that the use of pure water is not restricted to a rotary motor of the construction shown in the accompanying drawings, but may be applied to any such engine to cool the parts and to lubricate the moving portions approaching contact with stationary parts. Such contacts occur in the motor shown in the accompanying drawings in the channels or guides wherein the outer edges of the disks revolve and where the blades *e* are in close proximity to the surrounding peripheral casing, and in such construction, the formation of any deposit or scale would speedily obstruct and retard the rotations of the disks and would obstruct and retard the revolution of the blades by the accumulation of such matter. The loosening of the scale would also seriously obstruct and retard the motion when the parts are revolving at a great velocity. It will therefore be seen that the use of pure water is a valuable means of lubricating such mechanism without any of the drawbacks which attend the use of ordinary water, which is certain to form a deposit.

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

1. In a rotary motor driven by highly-heated gas, the combination, with the motor-wheel, of a casing having a peripheral water-jacket and a supply, to the points of proximity of the wheel and casing, of pure or distilled water which will not deposit a crust or scale.

2. In a rotary motor driven by highly-heated gas, the combination, with the motor-wheel, of a casing having the cheeks or channels *h'* arranged to form guides for the edges of the motor-wheel disks to revolve in, and such channels being provided with a supply of cooling fluid, substantially as herein set forth.

3. In a rotary motor driven by highly-heated gas having a revolving motor-wheel provided with return-disks, the combination therewith of channels or guides in which the edges of said exhaust-disks revolve, such channels provided with a cooling fluid, substantially as herein set forth.

4. In a rotary motor, the combination, of the exhaust-jacket *a* and the casing *f* and the primary motor-blades *c* with channels or guides for the disks of the motor-wheel to revolve in, the disks 1, 3 and 5 closely secured to the shaft, the other disk or disks secured to the shaft by arms permitting the passage of gas between them, the blades secured to their respective disks, and means for projecting cooling fluid upon the various parts, substantially as and for the purposes set forth.

5. In a rotary motor, the combination of the exhaust-jacket *a*, the return or exhaust blades *e'* and the casing *f* and the primary motor-blades *e* with channels or guides for the disks of the motor-wheel to revolve in, the disks 1, 3 and 5 in a wheel provided with return or exhaust blades, and disk 3 in a wheel without return or exhaust blades, closely secured to the shaft, the other disk or disks secured to the shaft by arms permitting the passage of gas between them, the blades secured to their respective disks, the curved spools *l* applied to the shaft between it and the inner ends of the blades to guide the exhaust-gas from the primary motor-blades *e* around the spools toward the exhaust-jacket or toward the inner ends of the return-blades *e'* if the wheel is provided with return-blades, the gas passing through these blades to the exhaust-jacket *a* and means for projecting a cooling fluid upon the various parts, substantially as herein set forth.

6. In a rotary motor, the combination of the exhaust-jacket *a*, the return or exhaust blades *e'* and the casing *f*, a water-jacket and the primary motor-blades *e* with channels or guides for the disks of the motor-wheel to revolve in, the disks 1, 3 and 5 in a wheel provided with return or exhaust blades, and disk 3 in a wheel without return or exhaust blades, closely secured to the shaft, the other disk or disks secured to the shaft by arms permitting the passage of gas between them, the blades secured to their respective disks, and pipes provided to deliver cooling fluid to the various parts, substantially as herein described.

7. In a rotary motor, the combination of an exhaust-jacket, a wheel having return or exhaust blades, a motor-wheel surrounded by a casing, an explosion-chamber provided with an outlet or nozzle arranged to deliver the products of explosion to the motor-blades, and a pipe supplied with suitable cooling fluid arranged to project such fluid into the said outlet or nozzle to cool the heated gases before their impact on the motor-blades.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LIDA WILSON.

Witnesses:
L. LEE,
WALTER H. TALMAGE.