(No Model.) 2 Sheets—Sheet 1.

E. A. EDWARDS.

STEAM MOTOR.

No. 504,493. Patented Sept. 5, 1893.

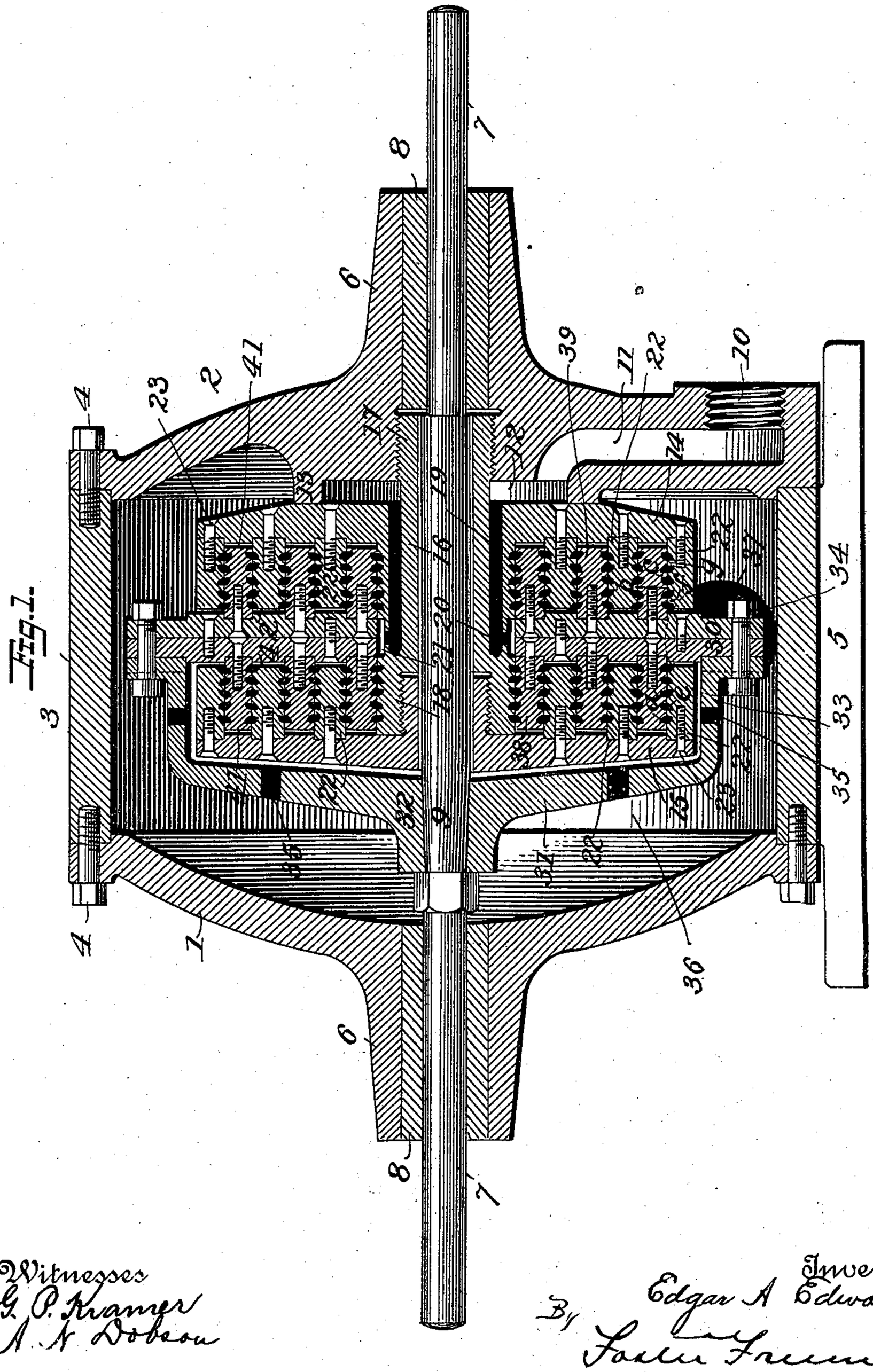

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

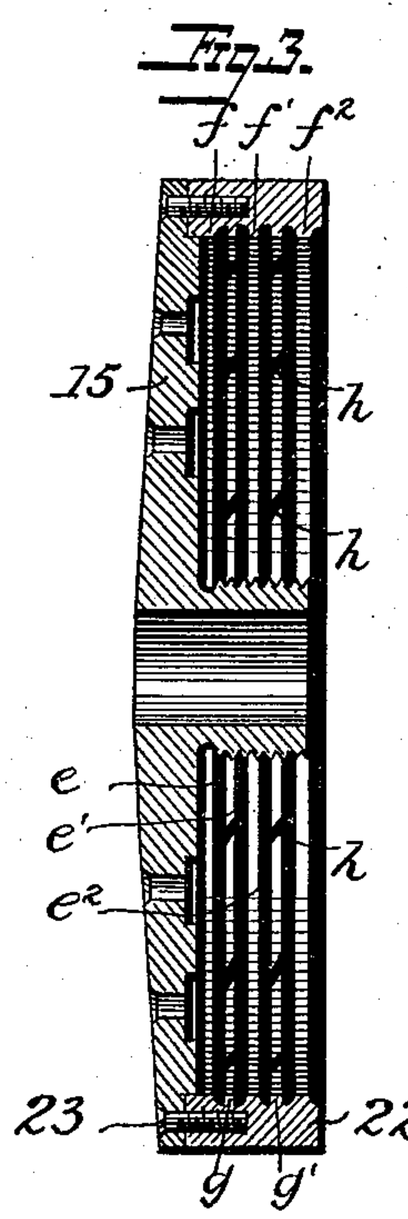


Fig. 2.

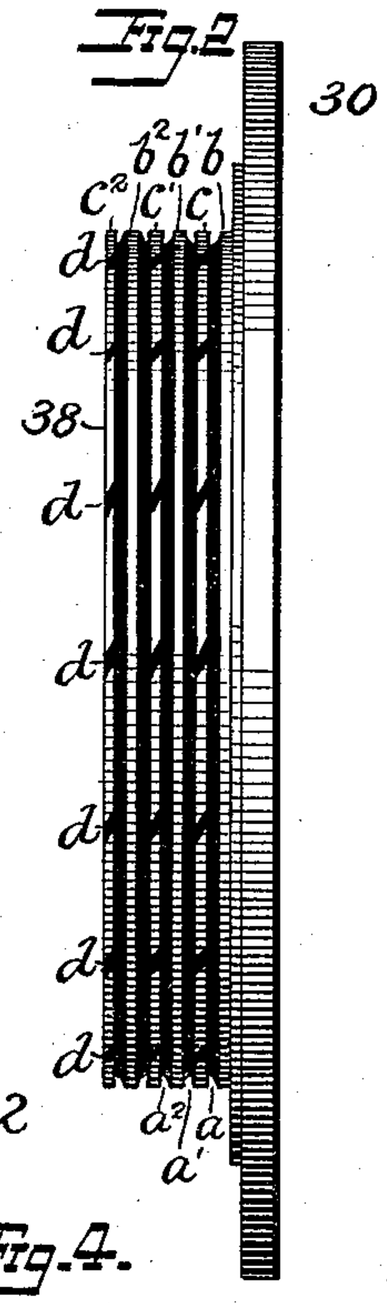
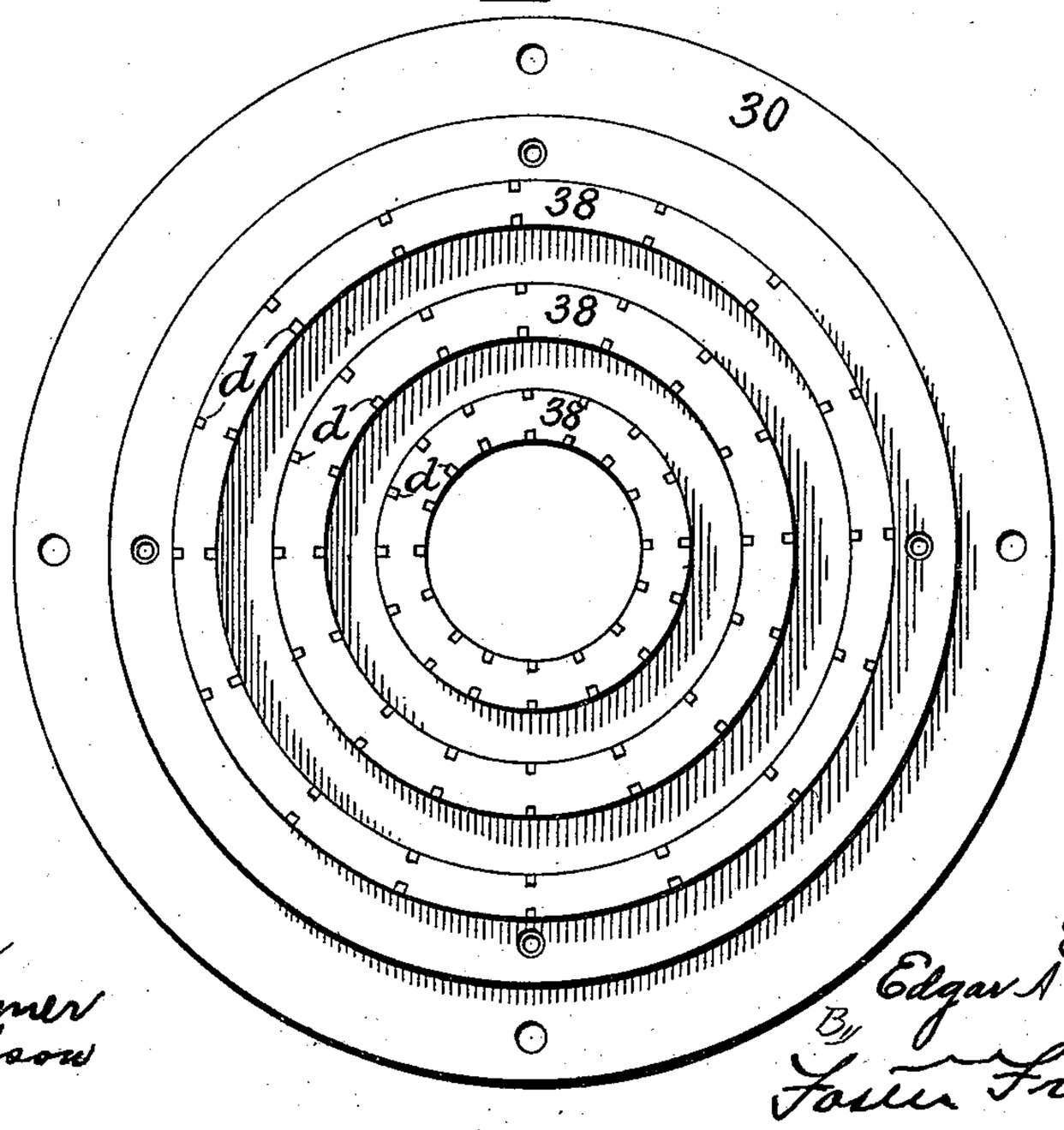


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDGAR A. EDWARDS, OF CINCINNATI, OHIO.

STEAM-MOTOR.

SPECIFICATION forming part of Letters Patent No. 504,493, dated September 5, 1893.

Application filed June 9, 1893. Serial No. 477,077. (No model.)

To all whom it may concern:

Be it known that I, EDGAR A. EDWARDS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Steam-Motors, of which the following is a specification.

My invention relates to what are broadly known as steam motors, and more particularly to that class of steam motors, which involve what is commonly understood as the turbine system of impact and reaction, and it has for its object to improve and simplify the construction and arrangement of such motors, and especially to increase their capacity and efficiency, without materially increasing the size of the structure, and at the same time to utilize to the greatest extent possible the expansion of the motor fluid, especially under relatively high pressures, and to these ends my invention consists in a motor embodying the various features of construction and arrangement of parts and having the mode of operation substantially as hereinafter more fully set forth.

Referring to the accompanying drawings, wherein I have illustrated one embodiment of my invention, Figure 1, is a longitudinal, vertical sectional view of the motor. Fig. 2, is a side elevation of a portion of the propeller wheel. Fig. 3, is a longitudinal, vertical section of one of the stationary disks, showing one of the grooved rings, the remainder being removed for the purpose of clearness; and Fig. 4, is an end elevation of the propeller wheel.

As above intimated, one of the special objects of my present invention is to provide a motor having the greatest possible efficiency, and which shall at the same time be small, compact, simple, cheap and not liable to get out of order, and which shall be capable of running at a very high rate of speed, and in which the steam or other motor fluid may be most economically utilized, especially when used under relatively high pressures, so that the full effects of the impact and reaction of the steam, throughout its expansive cycle are effectively employed.

The motor is provided with a suitable casing forming an internal chamber in which the operative parts of the engine are inclosed, and it will be observed that I avoid the use of stuffing-boxes, or anything of that character, and so arrange the parts as to avoid the leakage or steam and friction, and attain the greatest working area, in the smallest practical construction. The casing, as shown, consists of the heads 1, 2, united by a ring or short cylinder portion 3, the parts being secured together in any suitable way, as by bolts 4, and being mounted or supported on a suitable base 5. The heads 1, 2, extend laterally outward in opposite directions, to form bearings 6, through which passes the shaft 7, suitable bearing sleeves 8, being preferably interposed between the shaft and the bearings on the heads. The head 2, is provided with an inlet 10, for the steam or other motor fluid, and from this inlet there is a passage 11, extending to an annular recess 12, for distributing steam to the opposite parts of the motor.

The operative parts of the motor or engine, consist essentially of two plates 14, 15, which are fixedly mounted within the chamber of the case in any suitable way, and between which rotates a propeller wheel 30, connected to the shaft 7, both the propeller wheel and the plates being provided with grooves or recesses on their adjacent faces, in the manner hereinafter described.

In the present embodiment, I have shown the plate 14, as provided with a head 16, having lateral extensions, one of which is screw-threaded at 17, and secured in a screw-threaded recess in the head 2, while the other end is provided with a screw-threaded recess 18, in which fits the screw-threaded projection on the plate 15. The head 2 is provided with an extension or ring 13, against which the plate 14, bears, and it will thus be seen that both plates 14, and 15, are thus securely mounted and rigidly supported on the head 2, and while I find this a practical and satisfactory way of mounting the plates, it is evident that they may be otherwise mounted, the essential feature being that they shall be securely held in position independent of the rotating shaft.

The hub is provided with a series of passages 19, extending from the annular chamber 12, parallel with the shaft, where they meet

radial passages 20, opening into what is termed the "steam-chest" 21, surrounding the hub between the fixed plates.

The adjacent or inner faces of the fixed plates 14, 15, are provided with a series of rings or members 22, and these rings or members are secured to the plates in any suitable manner, as by the screws 23, or may be made integral therewith, and it will be understood that while I have shown three such members in the present instance, there may be any desired number, concentrically arranged on the inner faces of the plates. These members are properly spaced so as to leave concentric grooves 24, between them, in which rotate the rings of the propeller wheel.

The propeller wheel 30, is shown as composed of two plates, secured together, although of course, it may be made of a single plate, and this is mounted on a suitable support or carrier 31, which in turn, is mounted on the shaft 7, in any suitable way, it being shown with a tapered bearing 32, fitting a tapered portion 9, of the shaft 7, and being secured thereon by a suitable nut. The carrier is provided with a flange 33, to which the propeller wheel is secured in any suitable way, as by bolts 34, and the flange of the carrier is provided with suitable openings 35, for the free passage of the exhaust steam to the exhaust chamber 36, whence it is discharged through the exhaust outlet 37, after it has performed its work.

The propeller wheel 30 is provided on each side with a series of rings or members 38, 39, arranged so as to fit and rotate in the spaces or recesses 24, in the stationary wheels, and these rings may be formed integral with the wheel, or as is preferred, and illustrated in the drawings, they are separate rings secured to the wheel by bolts or other equivalent devices. It will be understood that there will be as many rings on each side of the propeller wheel as there are recesses in the faces of the stationary plates. These stationary rings and rotating rings are provided on their inner and outer faces with suitable concentric grooves and rings, as more clearly illustrated in Figs. 2 and 3. Thus, in Fig. 2, I have shown the exterior surface of one of the rings 38, of the propeller wheel, and it will be observed that there is a series of circumferential grooves a, a', a^2, leaving a series of rings b, b', b^2, and c, c', c^2, &c., the rings b, being complete rings, and the rings c, being divided into segments by the inclined grooves d.

It will be understood that while I have shown a definite number of alternate rings and grooves, any desired number may be used, depending upon the size of the parts of the motor, and to a greater or less extent upon the pressure of the steam or motor fluid to be used, and the area or size of the grooves and rings will vary in accordance with the circumstances of any particular case. The rings or members 22, of the stationary plates are likewise formed with corresponding rings and grooves, one being shown in detail in Fig. 3, in which there is a series of grooves e, e', e^2, &c., separated by complete rings f, f', f^2, &c., and segmental rings g, g', &c., these segments being formed by the angular grooves h. It will be seen that when the parts are in operative position, the complete rings on the propeller wheel correspond in position with the segmental rings on the plates, and vice versa, the complete rings on the plates correspond with or are opposite to the segmental rings on the wheel.

As above intimated, one of the principal objects of the present construction is to provide a motor in which the steam can act and react on the operative parts as many times as possible or practicable, before it is discharged into the exhaust chamber, thereby utilizing all the expansive force of the steam, and by reference to Fig. 1, it will be seen that as the steam passes in a substantially longitudinal direction from the steam-chest 21, it produces a series of impacts and reactions on the inclined faces of the segments of the adjacent surfaces of the wheel and stationary plates, and thence passes into the spaces 41, between the ends of the rings or members 38, and 39, and the stationary disks, which may with propriety be termed auxiliary steam-chests, and in which the steam, if perchance it has been wire-drawn in its passage through the grooves, practically recovers its normal condition, and then passes again in a substantially longitudinal direction toward the rotating wheel, producing a series of impacts and reactions, until it reaches the spaces 42, between the rings or members 22, on the plates and the propeller wheel, where the same operation is repeated, and the steam again passes in a substantially longitudinal direction through the next series of grooves, and so on until it reaches the exterior of the wheels and disks, and passes into the exhaust chamber with its expansive force practically exhausted. In this way, it will be observed, that I am enabled to utilize the steam to the best advantage and secure a large number of impacts and reactions within a comparatively small compass, all of which coact in producing the rotation of the wheel.

It will be understood that in actual practice, there is a clearance between the rotating and stationary rings of several thousandths of an inch, in order to prevent any friction, and the steam in its passage above described, acts as a practical cushion, tending to prevent mechanical contact of the parts.

While I have thus specifically described and illustrated a perfect embodiment of my invention, sufficient to explain the principles thereof, it is evident that the details of construction and arrangement of parts may be varied, and the same principles of operation carried out, and I do not, therefore, limit myself to the structures shown.

What I claim is—

1. A motor, comprising stationary and rotating members, the said members intermesh-

ing and having a series of grooves and rings upon their inner and outer circumferential faces, substantially as described.

2. A motor, comprising stationary and rotating concentric members, the said members intermeshing and having a series of grooves and rings upon their inner and outer circumferential faces, substantially as described.

3. A motor, comprising a set of stationary members and a set of rotating concentric members, the said members intermeshing and having a series of grooves and rings upon their inner and outer circumferential faces, and a centrally located steam-chest, the arrangement being such that the steam passes from the chest successively through the grooves and rings on the adjacent circumferential faces of the separate members, substantially as described.

4. A motor, comprising a series of stationary members or rings, a series of rotating members or rings, the said members intermeshing, and each member having a series of alternate complete and segmental rings upon its inner and outer circumferential faces, the arrangement being such that the complete rings on one member are opposite the segmental rings on the other member, substantially as described.

5. A motor, comprising stationary plates provided with concentric rings or members, a rotating wheel also provided with concentric rings or members, the members on the wheel intermeshing with the members on the stationary plates, and each of the members being provided with a series of grooves and rings upon their inner and outer circumferential faces, substantially as described.

6. A motor, comprising stationary plates having a series of inwardly projecting concentric members or rings, a rotating wheel having outwardly extending concentric members or rings intermeshing with the members of the plates, each of the members provided with a series of grooves and rings upon their inner and outer circumferential faces, substantially as described.

7. A motor, comprising stationary plates having a series of concentric rings or members, a rotating wheel having a series of concentric rings or members intermeshing with the rings of the stationary plates, each member being provided with a series of grooves and rings upon its inner and outer circumferential faces, a centrally located steam-chest, and a series of auxiliary steam-chests, said auxiliary steam-chests being located between the successive series of grooves and rings, substantially as described.

8. A motor, comprising stationary plates having a series of inwardly projecting concentric members, a rotating wheel having a series of outwardly projecting rotating members on each side intermeshing with the members of the stationary plates, each of the members being provided with a series of grooves and rings upon their inner and outer circumferential faces, a centrally located steam-chest, a series of auxiliary steam-chests arranged alternately adjacent to the stationary plates and rotating wheel, the arrangement being such that the steam passes from the central steam-chest substantially in a longitudinal direction outwardly to the first auxiliary steam-chest, then substantially in a longitudinal direction inwardly to the next auxiliary steam-chest, and acting by impact and reaction on the rings and grooves in the members between the respective chests, substantially as described.

9. A motor, comprising stationary plates having connected to their inner faces a series of concentric members, a rotating wheel having connected to each side thereof a series of concentric members, each of the members being provided with a series of grooves and rings upon its inner and outer circumferential faces, a carrier supporting said wheel, a shaft supporting the carrier, a centrally located steam-chest, a hub having steam inlet passages therein, and a case inclosing the plates and wheel, supporting the shaft and provided with inlet and outlet steam passages, substantially as described.

10. A motor, comprising stationary plates having a series of concentric members, a hub supporting said plates, a wheel provided with a series of concentric members intermeshing with the members of the plates, the members and the hub being provided with a series of grooves and rings on their adjacent faces, a steam-chest centrally located in the hub, and steam passages through the hub leading to said steam-chest, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDGAR A. EDWARDS.

Witnesses:
F. L. FREEMAN,
ALLE N. DOBSON.