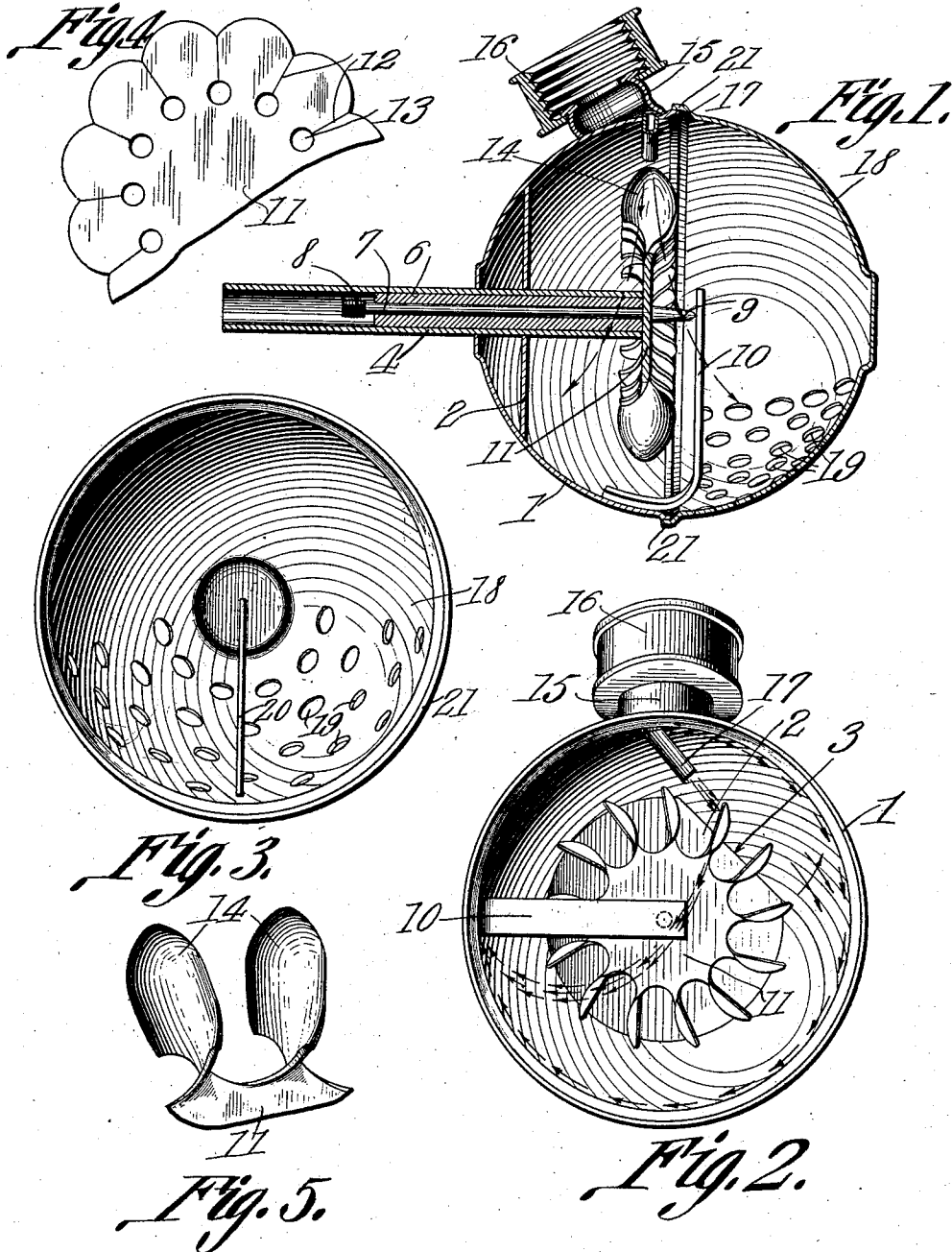


F. H. GROVER.
HYDRAULIC MOTOR.
APPLICATION FILED JAN. 23, 1911.

1,061,937.

Patented May 13, 1913.



Witnesses

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FRANK H. GROVER, OF SEATTLE, WASHINGTON.

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1,061,937.

Specification of Letters Patent.

Patented May 13, 1913.

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To all whom it may concern:

Be it known that I, FRANK H. GROVER, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Hydraulic Motor, of which the following is a specification:

This invention relates to water motors, its object being to provide a light, durable and compact device of this character particularly designed for operating massaging tools, hair drying fans, and other devices for use in the treatment of the hair and body.

A still further object is to provide a motor of this character which is practically noiseless in operation.

Another object is to provide a water motor which is cheap to manufacture, attractive in appearance, and which will not readily get out of order.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter more fully described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings, the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a central vertical section through the motor. Fig. 2 is an elevation of the motor with the cap of the casing removed. Fig. 3 is an interior view of the cap. Fig. 4 is a detail view of a portion of the blank from which the wheel of the motor is shaped. Fig. 5 is a perspective view of a portion of the wheel.

Referring to the figures by characters of reference 1 designates a hollow semi-spherical casing having a reinforcing disk 2 secured within the center portion thereof, said disk having a segmental portion cut away, as indicated at 3 so as to form an inlet opening whereby water is free to pass into the space between the disk 2 and the middle portion of the casing wall. This disk as well as the wall of the casing serves to support a guide sleeve 4 arranged axially within and extending beyond the casing 1 and having a lining 6 of suitable metal in which an arbor 7 is journaled. One end of

the arbor is preferably screw threaded, as indicated at 8, so as to engage a flexible shaft or the like to be driven. This threaded portion is arranged within the sleeve 4, as shown in Fig. 1. The other end of the arbor 7 projects beyond that end of the sleeve 4 located within the casing, and is preferably tapered, as shown at 9, this tapered end being adapted to be touched lightly by one end of a spring strip 10, the other end of said strip being secured to the wall of the casing 1 as shown. This spring serves to hold the arbor against longitudinal displacement without however pressing upon it to an objectionable extent.

Secured to the arbor 7 is a disk 11 one side of which bears against the sleeve 4 and the lining 6 therein. This disk as originally formed, and as shown in Fig. 4, has a scalloped periphery from which extend radial slits or incisions 12, there being circular openings 13 within the disk and at the inner ends of these incisions. Those portions of the disk bounded by the incisions 12 and the scallops at the periphery of the disk, are adapted to be given a one-quarter twist so as to form radiating blades 14, one face of each blade being concaved, as indicated in Figs. 1 and 5, said blade thus being substantially spoon shaped inasmuch as it is concavo-convex both in the direction of its length and in the direction of its width. Each of the blades projects, at its inner end, beyond the side faces of the disk 11 for the purpose hereinafter set forth, but said projecting inner ends of the blades are cut away or open as shown, this being due to the formation of the circular openings 13 in the disk.

Secured upon the casing 1 is a tubular extension 15 having a coupling 16 swiveled thereon and adapted to be placed in engagement with the threaded end of a faucet or the like. A small tube 17, constituting a discharge nozzle, is extended through the casing 1 and opens at one end into the extension 15 while its other end is adapted to direct a jet of water against the outer extremities of the blades 14 as they are successively brought into alinement with the nozzle.

The open end of the casing 1 is adapted to be closed by means of a semi-spherical cap 18 the bottom portion of which is formed with a number of outlet openings 19, a deflecting web 20 being arranged radially

within the lower part of the cap and serving both to reinforce the cap and to control the swirling action of the water discharged into the casing and to direct it to the outlet openings 19.

All parts of the casing as well as the wheel are to be stamped from comparatively thin sheet metal and it will be seen therefore that the complete device is very light. The web 20 serves to prevent buckling of the cap 18, as hereinbefore stated, and the casing 1 is furthermore braced by the disk 2, said disk cooperating with the casing to hold the sleeve 4 against displacement relative to the casing. Moreover the meeting portions of the casing and cap lap, as indicated at 21, thus reinforcing the structure annularly.

In using the motor, the extension 15 is coupled to a supply faucet, pipe or the like and the water is directed from the extension 15 through nozzle 17 and against the middle portions of the outer terminals of the blades 14. By referring particularly to Fig. 1 it will be seen that the nozzle occupies the same plane as does the disk 11. The jet of water, upon striking the outer end portion of a blade, will cause said blade, as well as the disk, to rotate with the arbor 7. Vibration of the wheel due to application of power at points removed from the longitudinal centers of the blades and to the discharge of unequal quantities of water from the two sides of each blade, is thus eliminated, any other vibration occurring as a result of other causes, being eliminated by the retaining spring 10.

It has been found that where a motor casing is formed of very thin metal shaped in the manner shown and described, a ringing sound is often produced, this sound being very objectionable. By providing a compartment between the disk 2 and the adjacent middle portion of the wall of the casing and leaving said compartment open by cutting away a segment of the disk, water is free to flow into the compartment and keep it filled, thus deadening such ringing sound. When the water leaves the blades it is thrown outwardly by centrifugal force and a thin film of water is thus maintained upon the inner surfaces of the casing and cap. This water film positively eliminates the objectionable ringing sound.

In water motors of various types it has been customary to discharge the used water in a single stream from the casing. This, however, has produced an objectionable splashing sound. To eliminate this noise

the openings 19 have been provided, these openings permitting the water to escape in small streams. The web 20, which is arranged adjacent the openings, serves to deflect the water film into the outlet openings, thus preventing the water from backing up in the casing and retarding the rotation of the wheel.

While the blank shown in Fig. 4 has circular openings formed therein, it is to be understood that these openings may be of any other shapes desired.

What is claimed is:—

1. A hydraulic motor, including a casing, a bearing member extending axially therein and therebeyond, an arbor mounted for rotation within said member, a wheel secured to the arbor and revoluble within the casing, said wheel including radially extending spoon-shaped blades having outlets at their inner ends and located beyond the sides of the wheel, a nozzle for directing water successively against the outer end portions of the blades to rotate the wheel, a reinforcing disk connecting said bearing member to the casing and forming a dead water compartment between the disk and casing.

2. A hydraulic motor including a casing, a disk secured therein and having a marginal opening, a bearing member supported by said disk and casing, an arbor journaled within said member, a wheel revoluble with the arbor and having radially extended spoon-shaped blades, yielding means constituting a thrust bearing for the arbor, and a nozzle for directing water successively against the blades during the rotation of the wheel, said blades constituting means for directing the water outwardly to form a film covering the inner surface of the casing.

3. A hydraulic motor including a casing, a bearing member extending axially therein and therebeyond, reinforcing means connecting said bearing member with the casing and cooperating with said casing to form a dead water compartment, an arbor journaled within said member, a wheel revoluble with the arbor, a nozzle for directing a jet of water successively against the blades of the wheel and a cap secured upon the casing and having a plurality of discharge openings.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FRANK H. GROVER.

Witnesses:

T. J. NESTOR,
N. L. COLLAMER.