No. 849,859. PATENTED APR. 9, 1907.

J. SCOTT.

WATER MOTOR.

APPLICATION FILED JAN. 29, 1906.

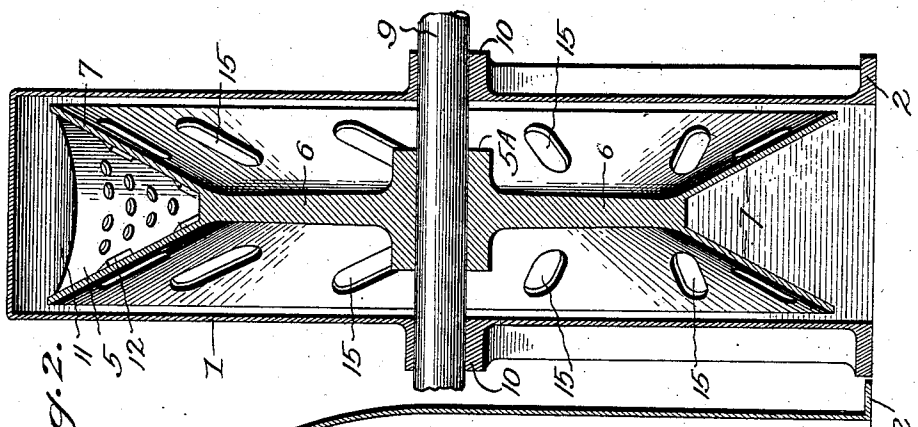

Fig. 2.

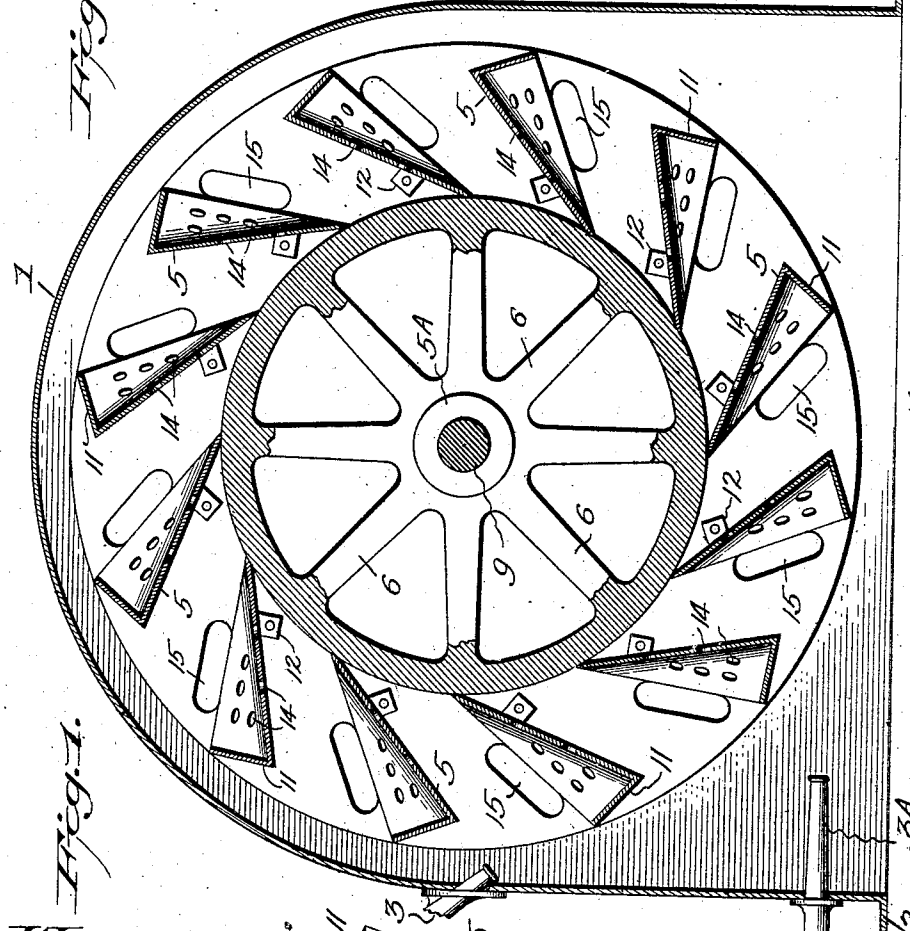

Fig. 1.

Fig. 4.

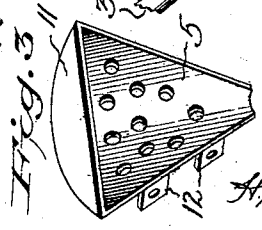

Fig. 3.

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UNITED STATES PATENT OFFICE.

JAMES SCOTT, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO THE NEW ENGLAND ELECTRIC COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

WATER-MOTOR.

No. 849,859. Specification of Letters Patent. Patented April 9, 1907.

Application filed January 29, 1906. Serial No. 298,465.

To all whom it may concern:

Be it known that I, JAMES SCOTT, a citizen of the United States of America, residing at the city and county of Denver and State of Colorado, have invented a new and useful Water-Motor, of which the following is a specification.

My invention relates to improvements in water-motors; and the objects of my invention are, first, to provide a form of water-motor and buckets that will not carry water around with it as it rotates; second, to provide a form of water-motor and bucket that will readily shed its water the instant the operative force of the jet of water has spent its force against it; third, to provide a water-motor and bucket which will prevent backlash of the water. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical section through the center of my water-motor. Fig. 2 is a central vertical end section of Fig. 1. Fig. 3 is a perspective view of one of the water-motor buckets, and Fig. 4 is a section through one of the buckets.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1 designates a hollow supporting and an inclosing casing which I use where the water-motor is to be used in shops or factories, but which may be dispensed with when the motor is used in outdoor operations—such as mining, quarrying, and for other purposes. This casing surrounds the motor on all sides and is provided with a base 2, the bottom of which is open, and one or two or more apertures may be formed in it to receive one or two or more hydraulic water-discharging nozzles, two of which, 3 and 3^A, are illustrated in operative relation to the buckets 5 of the wheel.

My wheel comprises a hub portion 5^A, spokes 6, and a flaring V-shaped sheave-rim portion 7. These several members are preferably cast into an integral wheel; but, if preferred, it may be built up in sections of steel or other suitable metal.

I provide the hub of the wheel with an axial bore and then fit and secure to it a shaft 9, which may be journaled in boxes 10, formed in the casing, or may be journaled in boxes formed in suitable pedestals adapted to be secured to masonry or other suitable foundations.

In the tread of the sheave portion of the wheel I place at equidistances apart throughout the circumference of the wheel a plurality of water-jet-impact buckets, preferably enough of them to allow them to be placed close enough to expose a short tangential water-impact plane of each as the wheel rotates. These buckets are of a V or wedge shape in outline and have a tapering concaved cup-shaped body portion throughout their length that diverges from the narrowest out to their broadest and deepest end, which is preferably curved outward, as shown; but they may also for some characters of work be made square across. The deepest end is closed by an end plate or cap 11. These buckets are preferably made independent of the wheel and are preferably secured to the inside of the opposite sides of the V-shaped peripheral flanges of the wheel by rivets or bolts.

In order to arrange the buckets so that they can be readily attached to and detached from the flanges, I preferably provide each side of them with depending lugs 12, preferably placing a lug adjacent to each end on each side and providing them with apertures through which bolts or nuts may be inserted. These buckets are positioned in the V-shaped flanges at an oblique angle to the radial lines of the wheel and with their cap ends inclined inwardly toward the bottom of the flanges and with the open side of the deepest edge of the cup at the edge of the peripheries of the two flanges and with their narrow edge resting against the bottom or tread of the flanges.

The buckets are either riveted or bolted to the flanges by either bolting or riveting the lugs of the buckets to them. The buckets are thus tilted at an angle that permits them to receive the full force of the full jet discharging from one or more nozzles at the bottom of the deepest part of the cup and against the bottom and inside of the cup at a short distance on each side of the angle formed in the bottom of the cup portion of bucket by the end cap and the bottom of the bucket.

The bottom of the cup is provided with a number of apertures 14, which extend from

the inner narrow and shallow end of the bucket to within a short distance of the corner at the junction of the bottom with the end cap of the bucket, a short portion of the bottom of the bucket, representing about one-third of the length of the bucket, being left imperforate. The perforations in the bottom of each bucket permit the air and water that is imprisoned between the buckets and that is thrown back against the back of each bucket from the bucket preceding it to escape, and thus prevents backlash of the water and allows the air and water to escape, as will be more fully explained hereinafter.

In the side of each peripheral flange of the wheel I form an aperture 15, which I position about centrally of the length of each bucket, and I make this aperture of oblong form and of about one-half the length of the bucket. These apertures form water-discharge outlets on each side of the curved end of the bucket, as the jet or jets of water divide at the center of the curved ends of the buckets and blow in opposite directions and pass out of these apertures clear of the buckets and wheel.

The operation of my improved water-motor and bucket is as follows: One or two or more jets of water from a nozzle or nozzles operatively connected to a supply of water under pressure and positioned to deliver the water-jets in a tangential line against the apex or deepest corner of the cup of the bucket drive the buckets before them, and thus rotate the water-motor with great velocity. The number of revolutions per minute depends on the pressure and velocity of the water-jet; but from several hundred to several thousand revolutions per minute is the common velocity of a water-motor, and when rotating at a high speed they carry around with them considerable air, and the wheels in common use also carry around with them considerable water; but in my water-motor and bucket the air helps to eject the water from the buckets after it has spent its power on the bucket and prevents backlash of the water against the back of following bucket, their action in this respect being as follows: When the jet of water strikes a bucket, it strikes it above the perforations in the deepest curved upper end portion of the bucket and the water divides, part flowing around the curved end to the outlet-aperture in the flange of the wheel on one side and part flowing to the opposite side and out of the outlet in that side flange, while the air that is held between the buckets is by the high rotative speed of the wheel forced through the small apertures in the bottom of the bucket and blows or forces any water that may not discharge from between the buckets after they have passed beyond the plane of the jet from them. Consequently by this construction a high-velocity wheel not only does not carry any water over with it, but the resistance of the air is less, as it can flow through the apertures of each bucket as the wheel rotates, and consequently offers less resistance to the rotation of the wheel.

My invention is simple, strong, and practical and is easily and cheaply made and repaired.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a water-motor, a rotary wheel, a wedge-shaped rim at the periphery of said wheel, a plurality of buckets having a wedge-shaped tapering concaved chamber or cup portion terminating in an end cap secured in said wedge-shaped peripheral rim, water-outlets in each side of said rim at each side of each bucket, and a plurality of air-escape apertures in the bottom of each of said buckets.

2. In a water-motor, a wheel rotatably mounted, having a wedge-shaped rim consisting of two radially-diverging flanges arranged to form a V-shaped space between them, a plurality of wedge-shaped water-jet-receiving buckets, having a tapering concaved cup portion terminating in an end cap, and secured between said flanges, a water-outlet aperture through each flange on each side of each bucket, and a plurality of air-escape perforations through the bottom portion of the bottom of each bucket.

3. In a water-motor, a water-wheel having a hollow wedge-shaped peripheral rim composed of two flanges, diverging from a rim portion, a plurality of wedge-shaped buckets secured in said rim, having an outwardly-curved end, a plurality of air-escape perforations directly through the bottom portion of each of said buckets, and a water-outlet aperture through each flange at the side of each bucket.

4. In a water-motor, the combination of a suitable casing, a water-nozzle, and a water-motor rotatably mounted in said casing, comprising a spoked wheel having a V-shaped peripheral rim, with a water-receiving wedge-shaped bucket, having a concaved cup portion terminating in a curved end closed by a curved cap, a plurality of air-escape apertures in the bottom of each bucket, and water-discharge apertures through the sides of said V-shaped rim between each pair of buckets, as specified.

5. In a water-motor, the combination with a water-nozzle, of a rotatably-mounted wheel, comprising a hub and a rim portion, said rim portion comprising two diverging flanges projecting radially from said rim at flaring angles from said rim, and forming a V-shaped space between them, a plurality of buckets each of which is wedge-shaped and each of which comprises a tapering concave cup portion terminating in a curved end at

its broadest and deepest end and closed at this end by a cap, a plurality of air discharging and escape perforations in the lower narrower end of the bottom of the cup portion of said bucket, water-outlet apertures in each side flange of said wheel at the side of each bucket, and means for detachably securing said buckets in operative water-impact relation to said water-nozzle.

6. In a water-motor, the combination of the supporting-shaft rotatably journaled, a water-motor secured to said shaft, and a plurality of water-discharging nozzles arranged in operative water-impact relation to said wheel, said water-motor consisting of a V-shaped peripheral rim and wedge-shaped buckets, having a diverging cup-shaped body, terminating in a curved end closed by a rearwardly-sloping cap, a plurality of air-escape perforations through the bottom of the lower and narrower portions of each of said buckets, and water-outlets through both sides of said V-shaped rim at the sides of each bucket, as set forth.

7. In a water-motor, the combination of water-jet-discharging nozzles, and the rotatably-journaled shaft, with the water-motor having the V-shaped rim, and the V-shaped buckets, provided with a plurality of air-escape perforations through the narrower and tapering portion of each of said buckets, an imperforate water-impact portion at the wider portion of each bucket and above said air-escape perforations, and water-outlets in the opposite sides of said rim midway of the length of each bucket, as set forth.

8. In a water-motor, the combination with a rotatably-mounted shaft, the casing and water-jet-discharging nozzles, of a wheel having a V-shaped peripheral rim, containing lateral water-outlet passages, and buckets secured in said rim, each of which contains a water-impact portion arranged in the water-impact path of said nozzles, a plurality of perforated air-escape passages adjacent to the water-impact portion through the bottom of each bucket, and depending lugs arranged and adapted to be secured to said rim portion, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES SCOTT.

Witnesses:
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