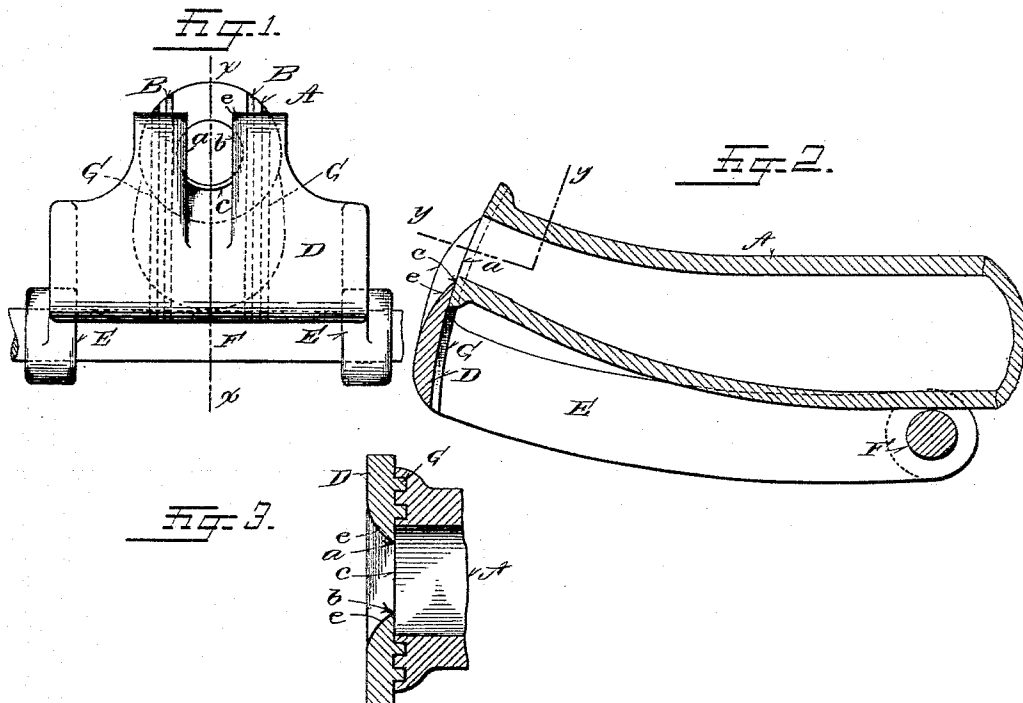


(No Model.)

F. M. BOOKWALTER & W. W. TYLER.
NOZZLE FOR WATER WHEELS.

No. 531,897.

Patented Jan. 1, 1895.



Witnesses
Jas. C. Lantry
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UNITED STATES PATENT OFFICE.

FRANCIS M. BOOKWALTER AND WILLIAM W. TYLER, OF SPRINGFIELD, OHIO,
ASSIGNORS TO THE JAMES LEFFEL & COMPANY, OF SAME PLACE.

NOZZLE FOR WATER-WHEELS.

SPECIFICATION forming part of Letters Patent No. 531,897, dated January 1, 1895.

Application filed February 27, 1894. Serial No. 501,678. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS M. BOOKWALTER and WILLIAM W. TYLER, citizens of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Nozzles for Water-Wheels, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in nozzles for use in connection with that class of water wheels known as hurdy gurdy wheels, and the object of the invention is to control the amount of water which shall pass into the buckets of the wheel from the nozzle which directs the water to them by reducing the size of the stream independently of the size of the nozzle.

In an application for Letters Patent of the United States filed by us February 5, 1894, Serial No. 499,101, for improvements in water wheels, we provide for controlling the amount of water by diverting more or less of the stream issuing from the nozzle aside from, or outside of, the buckets.

In this present invention, instead of diverting the stream by a diverter, we reduce the stream by a reducer. This reducer may be operated by hand and set in fixed positions with respect to the nozzle orifice, or it may be operated automatically, both of which plans are set forth in our said former application.

In the accompanying drawings on which like reference letters indicate corresponding parts, Figure 1, represents a view looking at the reducer, at its rear side, and toward the mouth of the nozzle; Fig. 2, a sectional view of the nozzle on the line *x x* of Fig. 1; Fig. 3, a sectional view on the line *y y* of Fig. 2.

The letter A designates a nozzle of suitable contour to adapt it for use especially in connection with that class of water wheels known as hurdy gurdy wheels, wherein buckets are provided to receive a stream of water and be operated upon by the impact and reactionary effects of the stream. This nozzle differs, however, from the ordinary nozzle in the provision of grooves or beads B, transversely or circularly in or on the face of the discharge end, for a purpose presently to appear; and it fur-

ther differs in forming the face of its discharge end on a curve, for a purpose also to presently appear. This nozzle is mounted and held in the proper position with respect to the wheel with which it is to be used.

The letter C refers to a beam by which the nozzle is held, such beam forming a part of the structure with which the nozzle may be used.

Our stream reducer consists of a blade, wall or movable body D, adapted to travel across and against, or substantially against, the discharge end of the nozzle. In the present case this reducer is connected to arms E, which are mounted upon a shaft F as their center of movement. The arms with the reducer may be operated more or less across the stream or the bore of the nozzle by automatic means or hand devices, or by a combination or arrangement involving both; an illustration of which is set forth and illustrated in our said application above referred to.

The reducer is provided with beads G, (or grooves,) to match the nozzle face, according to whether it has grooves or beads, for the purpose of forming a joint that will substantially prevent the leakage of water between the nozzle face and the reducer. These joints run in straight lines and are made by these matching male and female parts.

As shown the reducer is formed with three cutting edges or corners *a, b, c*. The edges *a* and *b* stand at the sides of the stream to cut off portions of it at each side. If the reducer is adjusted far enough across the nozzle the cutting edge *c* will come into operation and cut off a portion of the bottom of the stream. Thus the stream is reduced by taking it off at two or three sides.

The inner face of the reducer adjacent to the cutting edges forms a shoulder, obstruction, or wall which opposes the stream, while the edges proper have a knife-like action so as to shear off the stream, as it were, in a clean-cut and decided manner. For this purpose it will be noticed that the reducer is beveled off, as shown at *e*, in the several figures, so as to make the edges proper sharp. This form also prevents excessive dripping of water and a sort of hanging of the water upon the reducer, which might otherwise occur to

a greater or less extent. Thus it will be understood that our reducer opposes or obstructs the water, and thereby holds a portion of it back in the nozzle, while it forms a sharp decisive cutting edge or cutting edges, by which the portion of the stream which is allowed to escape, is decisively cut or sheared off from that which remains or is held back.

We have shown and described our stream reducer as working in an arc across the face of a nozzle, but it is to be understood that should it be arranged so as to operate in the same manner upon the stream other than in an arc, or other than with the convex and concave surfaces as shown, or without any convexity or concavity of such surfaces it would still be within the scope of our invention.

Having thus fully described our invention,

what we claim as new, and desire to secure by Letters Patent, is—

The combination with a nozzle, of a movable stream reducer having a slot or bifurcation whereby three surfaces are presented, each surface being beveled, said reducer being adapted to be adjusted across the face of the nozzle, and the width of said slot or bifurcation being less than the diameter or bore of the nozzle, substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANCIS M. BOOKWALTER.

WILLIAM W. TYLER.

Witnesses:

OLIVER H. MILLER,

W. M. MCNAIR.