

(No Model.)

F. M. BOOKWALTER.
HYDRAULIC NOZZLE.

No. 566,736.

Patented Sept. 1, 1896.

Fig. I.

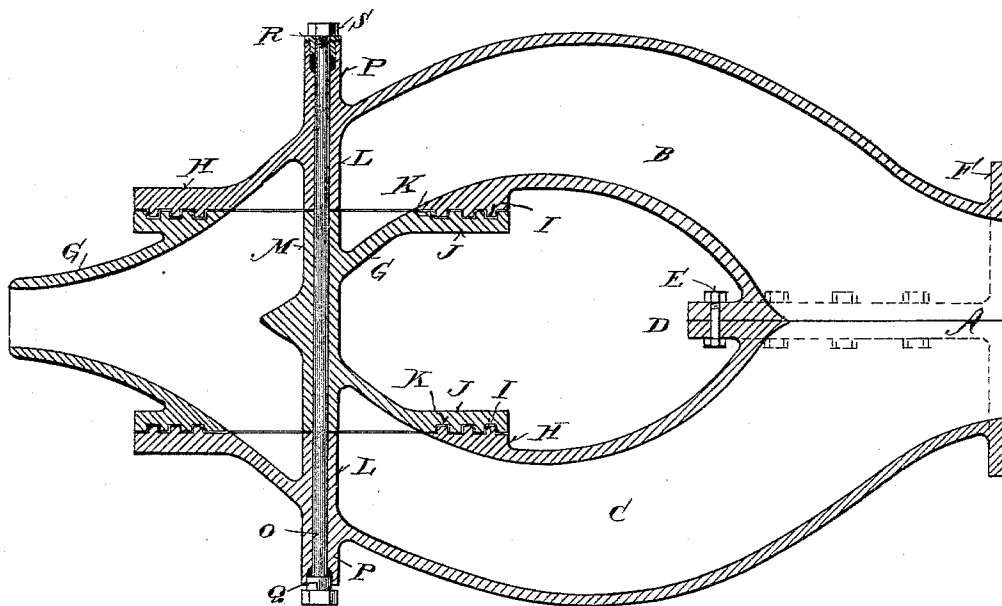


Fig. 2.

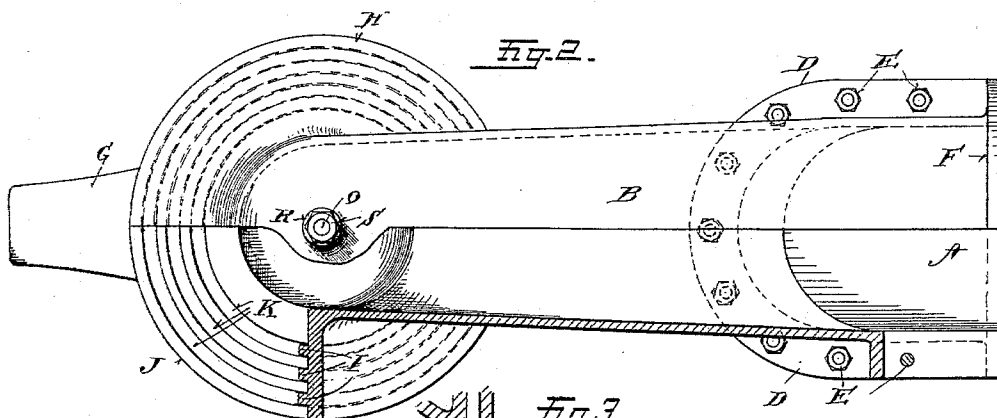
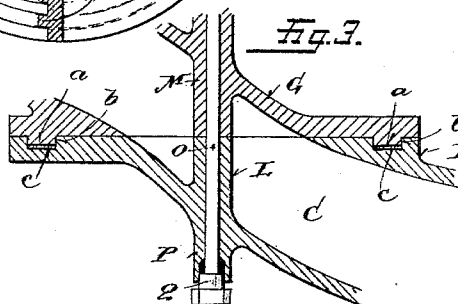


Fig. 3.



WITNESSES:

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FRANCIS M. BOOKWALTER, OF SPRINGFIELD, OHIO.

HYDRAULIC NOZZLE.

SPECIFICATION forming part of Letters Patent No. 566,736, dated September 1, 1896.

Application filed December 12, 1895. Serial No. 571,850. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS M. BOOKWALTER, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Hydraulic Nozzles, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in hydraulic nozzles, being specially designed for use in connection with hurdy-gurdy water-wheels, but it is useful in other connections.

15 The invention consists, essentially, of a fixed section divided into two branches and of a movable section rotatably fitted to and between said branches, and practically balanced in such a position by the lateral thrust of the water from one branch being balanced
20 by the lateral thrust of the water from the other branch, by means of a continuous curved form of contour of the branches and movable section, the curve of either branch
25 and its adjacent part of the movable section being substantially like the curve of the other branch and its adjacent part of the movable section.

30 In some respects the present invention is similar to the invention set forth in an application filed by me for hydraulic nozzles on March 27, 1895, Serial No. 543,372.

35 In the accompanying drawings, on which like reference-letters indicate corresponding parts, Figure 1 is a longitudinal sectional view of my improved hydraulic nozzle. Fig. 2 is a side elevation with a portion of one branch of the stationary section broken away and shown in section to facilitate the illustration, and Fig. 3 a detail section showing a
40 modified form of joint.

The letter A designates the stationary section of my nozzle, which section is composed of a branch B and a branch C, the two branches
45 being secured together by means of flanges D and bolts and nuts E. A flange F of the nozzle adapts it to be connected with the water-supply pipe. The object in making this section in separate branches is to permit the
50 ready insertion between the branches of the movable interlocking section G. To form this connection, each of the branches B and

C is faced off to form a boss or plate H, each having annular ribs or beads I, while the movable section G has similar bosses or plates
55 J, each provided with annular grooves or recesses K, adapted to receive the ribs or beads I. The joint between such ribs or beads and such grooves or recesses is just free enough to permit a fine film of water to enter into
60 the joint to form a packing, and at the same time a water-joint. The rectangular shape of the beads or ribs and the recesses or grooves constitutes sharp angles or corners, which, in practice, have the effect of preventing the
65 escape or the leakage of the water, as it will not, in such a thin film of flow, perceptibly leak past so many sharp turns, but keep this joint sufficiently free to permit such filling with water.

70 I further construct the branches B and C each with a hollow column L and a movable section G with a hollow column M. The column M abuts the column L, thus forming the actual touching points between the movable
75 section and the stationary branches. A through-bolt or rod O passes through the several columns, which it snugly fits, thus forming a central pivot or connection and maintaining the thin space in the joint described
80 more perfectly. Stuffing-boxes P prevent leakage around the bolt or rod O, and shoulder Q on the rod at one end and a separate thimble R on the rod at the other constituting glands for these stuffing-boxes, while a
85 nut S draws the parts properly together.

90 It will be seen that as the water enters the section A and divides into the branches B and C it passes along until the two streams enter the movable section G.

95 The curvature of each branch and of the adjacent part of the movable section is a continuous curvature, and such curvature of one branch and its adjacent part of the movable section is the same as the curvature of the
100 other branch and its adjacent part of the movable section. Thus the water enters the movable section from the opposite sides at the same time and at the same angle, and so the lateral thrust of either stream is met and counterbalanced by an equal lateral thrust of the other stream. Hence there is no tendency of the movable section to move laterally toward the other branch of the stationary

section and thereby draw upon the through-bolt and tend to open the joint between the movable and stationary sections. This similarity and sameness of curves also avoid all
5 impediments or stoppage of the streams, and consequently this improved nozzle is adapted to the highest heads or greatest pressures and will work with as much facility and as little leakage as if the heads were low and
10 the pressure light, so that this movable section may be said to be balanced between the two branches, and by the term "balanced" it is obvious that I mean that the devices which maintain it in position are not subjected to
15 severe strains caused by the lateral thrust of the stream, and that such joints are not opened by such action of the streams.

From Fig. 3 it will be observed that I have modified the form between the movable sections and the branches and have shown a
20 gland *a*, this fitting in the recess *B*, with a packing *C*, thus constituting a stuffing-box joint as another suitable joint.

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

1. In a hydraulic nozzle, the combination with a stationary section divided into branches, each branch being substantially

equally curved, of a movable section rotat- 30
ably mounted between said branches and having its parts adjacent to the said branches also substantially equally curved, the curve of each branch and its adjacent part of the movable section being also continuous where- 35
by said movable section receives water from each branch with equal effect, and whereby it is practically balanced between said branches, and a suitable interlocking-joint between the branches and said movable sec- 40
tion.

2. In a hydraulic nozzle, the combination with a stationary section constructed in parts bolted together, each part having a branch provided with a plate having beads, and with 45
a stuffing-box and columns, of a movable section having plates each with grooves to receive respectively the beads of the stationary plates, and having also a column, and a through-bolt passing through the stuffing-boxes and 50
said column.

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

FRANCIS M. BOOKWALTER.

Witnesses:

E. E. STEWART,
CHASE STEWART.