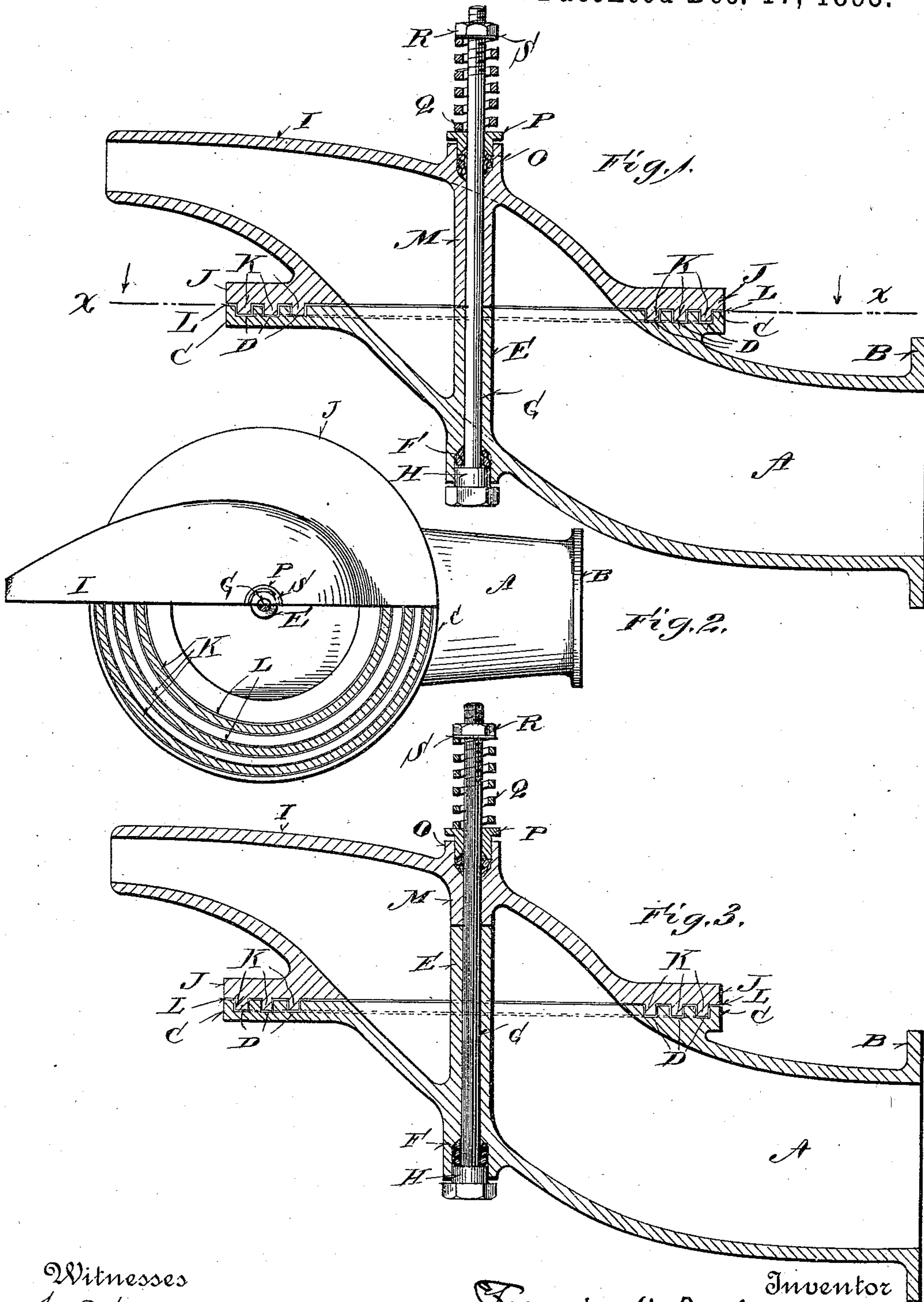


(No Model.)

F. M. BOOKWALTER.
HYDRAULIC NOZZLE.

No. 551,575.

Patented Dec. 17, 1895.



Witnesses
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UNITED STATES PATENT OFFICE.

FRANCIS M. BOOKWALTER, OF SPRINGFIELD, OHIO.

HYDRAULIC NOZZLE.

SPECIFICATION forming part of Letters Patent No. 551,575, dated December 17, 1895.

Application filed March 27, 1895. Serial No. 543,372. (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, and it is especially designed for use in connection with hurdy-gurdy water-wheels, though applicable to other purposes.

15 My improvements have reference to a water-joint between the fixed and movable sections of the nozzle and to central columns forming the point of bearing between the two sections, and to a central pivot through-bolt, and also preferably a spring to maintain and regulate the bearing between the sections, all as hereinafter more fully described.

25 In the accompanying drawings, on which like reference-letters indicate corresponding parts, Figure 1 represents a longitudinal axial section of my improved nozzle; Fig. 2, a partial elevation and partial section on the line *xx* of Fig. 1, looking in the direction of the arrow; and Fig. 3, a like view to Fig. 1 with the central bearing-columns in contact at one side of the division-line instead of on said line, as in Fig. 1.

30 The letter A designates what I term the "fixed section" of my nozzle, which has a flange B for connection with the pipe that conducts the water. This section has an annular faced-off part forming a plate C, provided with a series, three in the present instance, of annular grooves D. It is further provided with a column E whose axis is coincident with the axis of the grooves D. A stuffing-box F is formed on the outer side of the section A, and a central pivot through-bolt G is fitted to the column E and provided with a shoulder which 45 forms a gland H to pack the stuffing in the box F.

50 The other section of the nozzle, which I term the "discharge-section," is shown at I, and is provided with a faced-off part constituting a plate J, corresponding with the plate C. The plate J has a series, three in the pres-

ent instance, of ribs or beads K, which are annular and match with the grooves D in shape and position, but are slightly smaller, so as to leave the merest space between the ribs and the grooves into which the water fills and forms a water-joint or packing. This space is marked L and is shown as existing between the plates C and J, both inside and outside of the grooves and ribs. It will be observed that the ribs and grooves give the space L a tortuous path with right-angle turns or changes of direction. Such sharp turns prevent the water from flowing and leaking, while the water constitutes a self-packing as well as practically frictionless joint between the stationary and discharge sections of the nozzle. The section is further provided with a column M corresponding in position with the column E, and fitting end to end against it, and forming what I term the "central bearing" between the two nozzle-sections. In Fig. 1 I have shown the point of bearing in line with the division between the nozzle-sections, while in Fig. 3 the point of bearing is at one side of such division-line, rendering one column longer than the other. Accordingly I wish it to be understood that this central bearing may be located at any point within the interior of the nozzle-sections, but preferably as shown in Fig. 1. The axial line of this point of bearing is always, however, coincident with the center from which the ribs and grooves are struck. A stuffing-box O is formed on the outer side of the section I, and a gland P is fitted to it to bear upon the stuffing and also to resist one end of a spring Q which encircles the pivotal through-bolt G, and is more or less compressed by a nut R on said bolt, with an intervening washer S. Thus the degree of pressure between the columns at the bearing-point is regulated by the tension to which the spring is subjected, while the spring affords a constant and uniform pressure, automatically taking up the wear and also sufficiently yielding to permit of the ready turning of the section I to change the direction of the stream.

Thus my improved adjustable nozzle has a central bearing-point, a yielding but constant pressure of one member against the other at the bearing-point, and a water-tight and practically frictionless joint between the sections,

features which give the device the practical qualities necessary for a successful nozzle of the kind to which it belongs.

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

An adjustable nozzle consisting of a stationary section with a central column, a plate having grooves and a stuffing box, a discharge
10 section having a corresponding central column meeting the other column, ribs fitted to said grooves, and a stuffing box, a pivotal through-bolt passing through the columns, a

shoulder on the bolt to form a gland for one box, a separate gland on the bolt for the other 15 box, a spiral spring on the bolt and fitting against the latter gland, and a nut on the bolt acting against the spring, there being a thin space between the meeting faces of the plates and the grooves and ribs. 20

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

FRANCIS M. BOOKWALTER.

Witnesses:

EDWIN L. ARTHUR,
HORATIO J. TORGY.