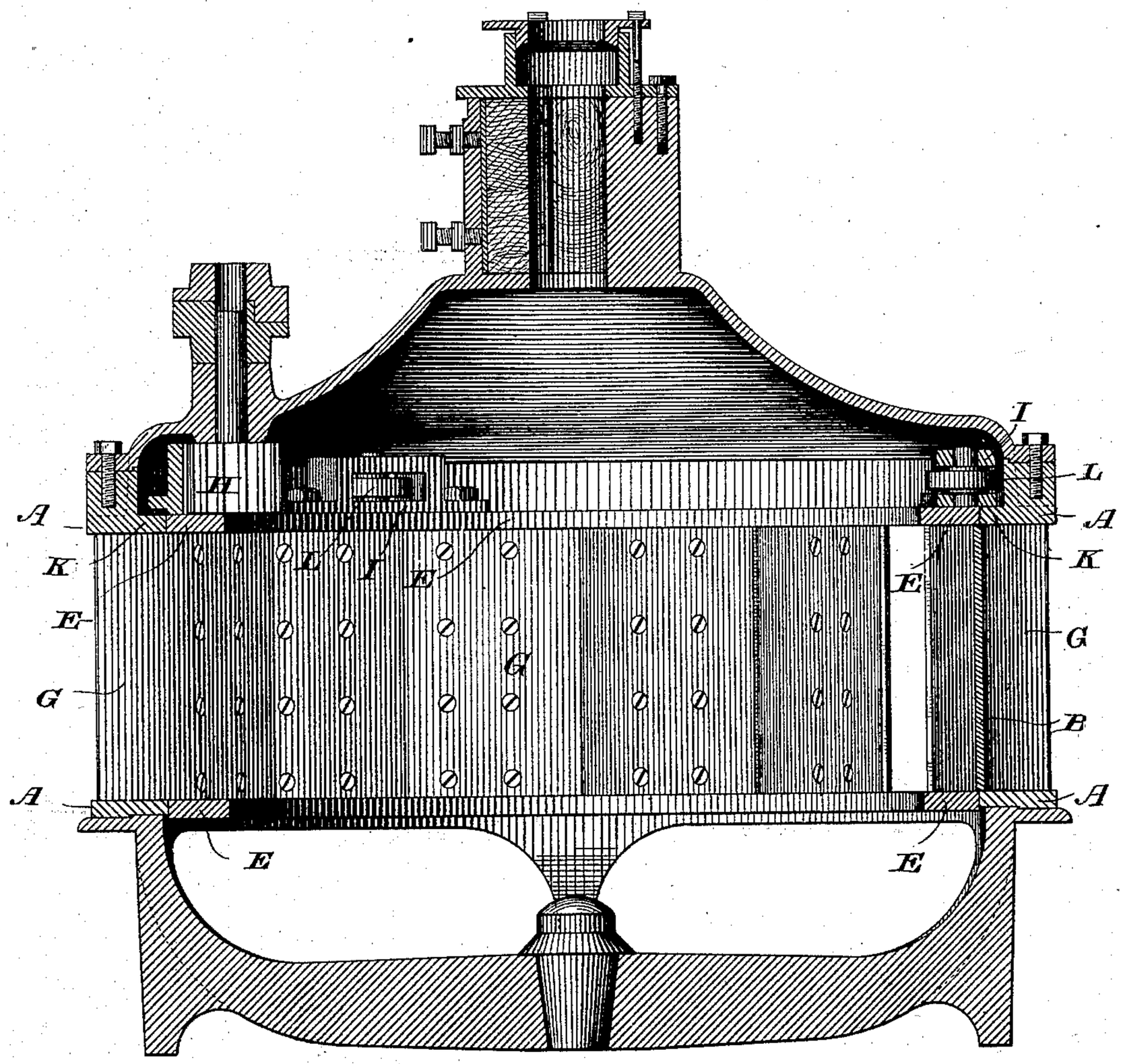
(No Model.) 3 Sheets—Sheet 1.

N. F. BURNHAM.

TURBINE WHEEL.

No. 274,884. Patented Mar. 27, 1883.

Fig. 1.



WITNESSES

Wm. A. Skinkle

Edwin A. Newman.

INVENTOR

Nathan F. Burnham

By his Attorneys,

Baldwin, Hopkins, & Peyton.

(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

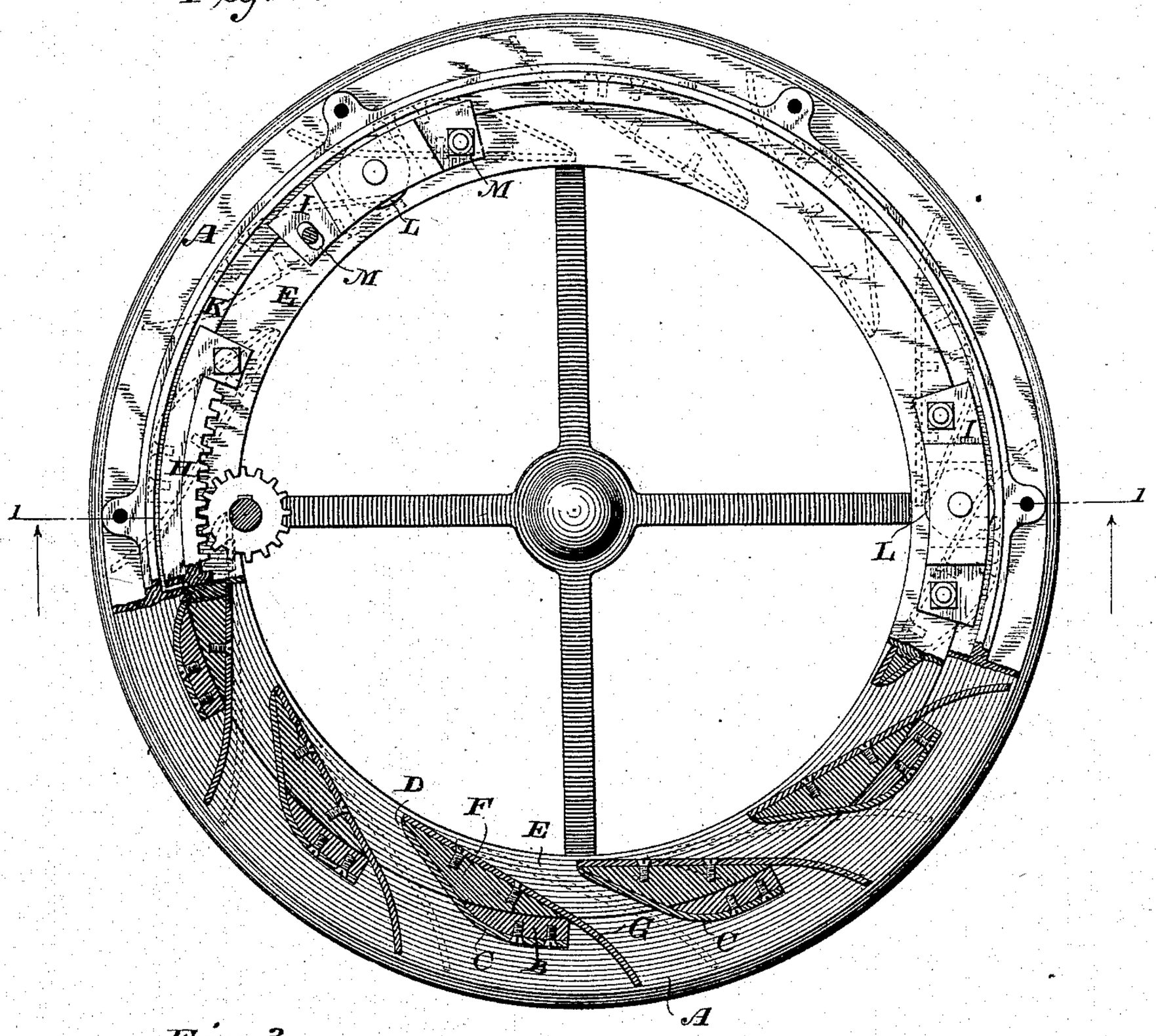
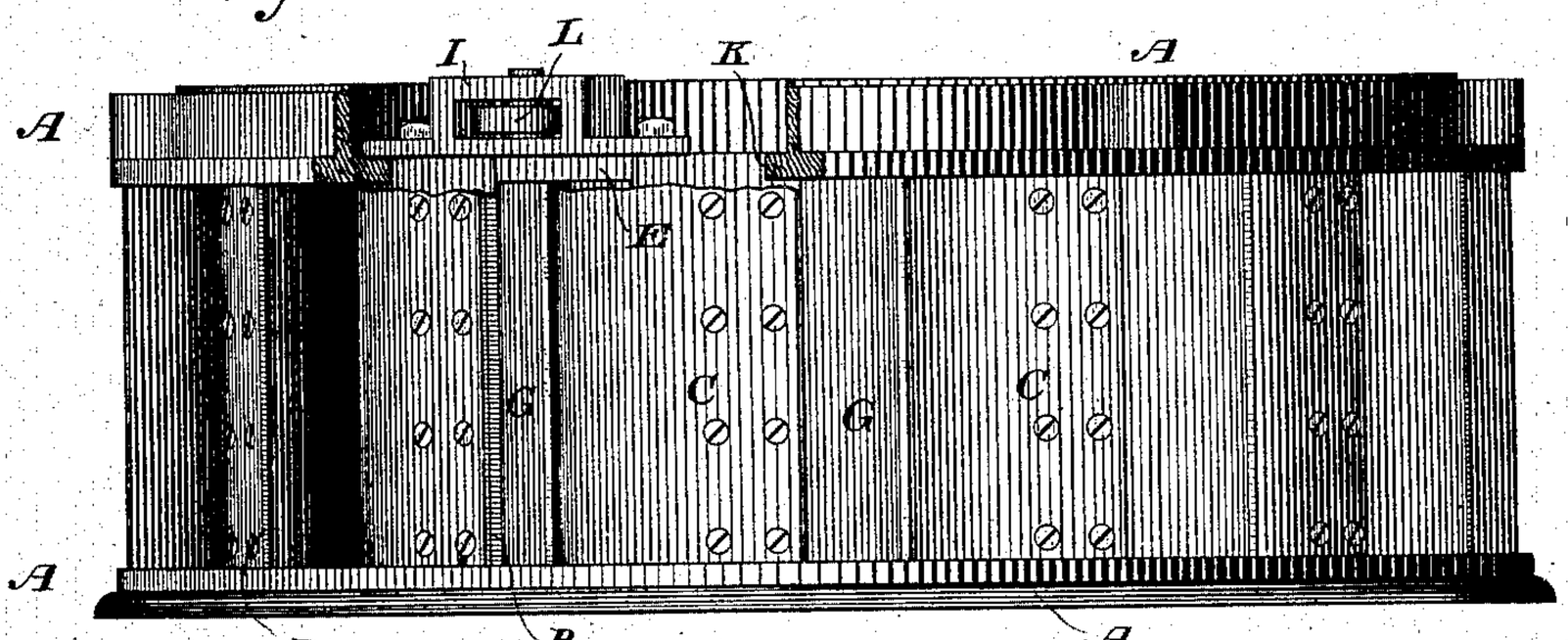


Fig. 3.



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Wm A. Skinkle

Edwin A. Newman,

INVENTOR

Nathan F. Burnham

By his Attorneys

Baldwin, Hopkins, & Peyton.

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Fig. 4.

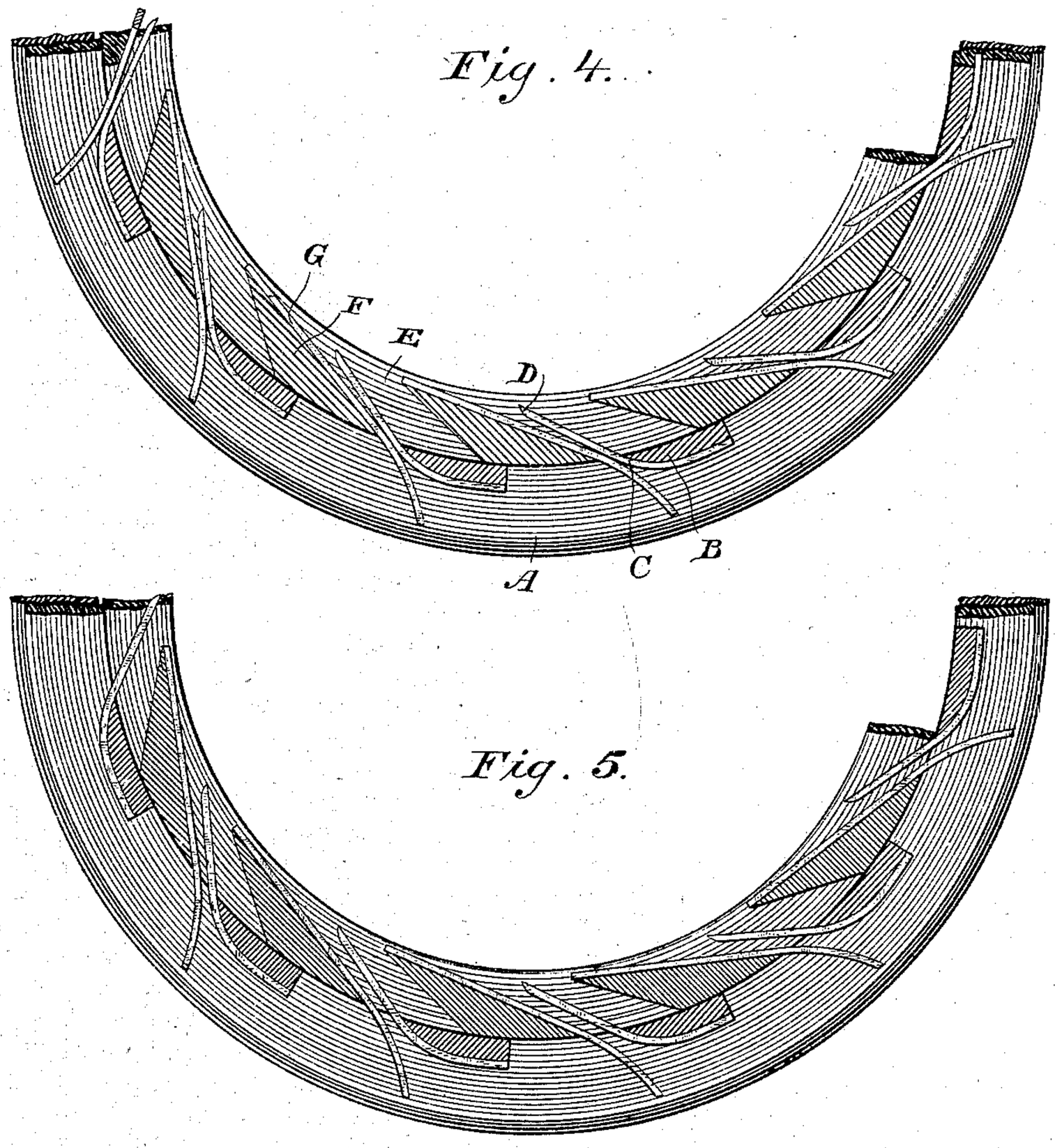

Fig. 5.

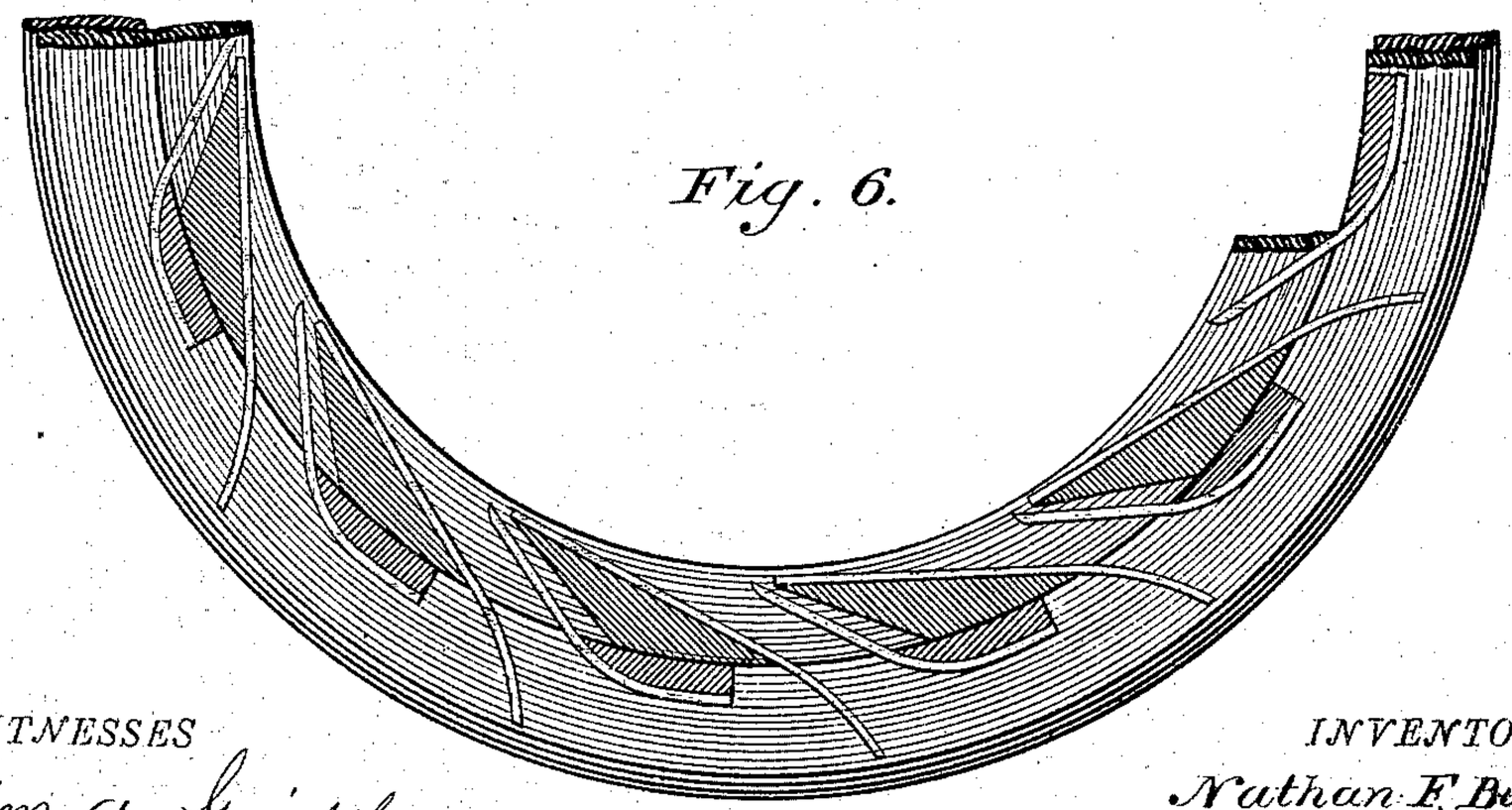

Fig. 6.

WITNESSES

Wm. A. Skinkle,

Edwin A. Steuman,

INVENTOR

Nathan F. Burnham

By his Attorneys

Baldwin, Hopkins & Peyton

UNITED STATES PATENT OFFICE.

NATHAN F. BURNHAM, OF YORK, PENNSYLVANIA.

TURBINE WHEEL.

SPECIFICATION forming part of Letters Patent No. 274,884, dated March 27, 1883.

Application filed December 7, 1882. (No model.)

To all whom it may concern:

Be it known that I, NATHAN F. BURNHAM, of York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Turbine Wheels, of which the following is a specification, when taken in connection with the accompanying drawings, of which—

Figure 1 is a vertical central section of a turbine-wheel case, drawn on line 1 1 of Fig. 2, embodying my improvements. Fig. 2 is a top or plan view of the same, partly in section; and Fig. 3 is a side elevation of the same, partly in section. Fig. 4 is a segment showing the gates closed. Fig. 5 is the same showing the gates slightly opened, and Fig. 6 the same showing the gates a little farther open.

The object of one part of my invention is to provide for smoothly admitting the water between the gates from without and smoothly delivering it to the wheel after it has passed the gates, so as to avoid any obstruction or break in the current, and to get its full momentum to bear upon the wheel according to the quantity that is admitted by opening the gates more or less.

The object of the other part of my invention is to provide for sustaining and centering the inner rings or movable part of the casing which is operated to open or close the gates.

The drawings do not illustrate the wheel proper, as that is not necessary.

Referring to the letters upon the drawings, A indicates the upper and lower fixed rings of the outside of the casing, which are connected by means of the posts B, shaped as shown in cross-section in Fig. 2. To these posts B are secured the curved plates C, beveled, as at D, upon their extreme inner ends.

E E indicate the inner movable rings, which are connected by means of the posts F, shaped as shown in cross-section in Fig. 2. To these posts F are secured the plates or gates G, curved slightly at their outer ends, as shown in Fig. 2.

At H is shown a rack and pinion for moving the inner rings to open and close the gates. The inner rings are supported by means of segmental plates or brackets I, bolted to the upper movable ring and bearing upon an annular ledge, K, of the upper fixed ring of the casing. The segmental brackets are provided with friction or guide wheels L, which serve to center the inner rings within the outer rings, so that the former may be moved sufficiently to open and close the gates with minimum resistance and maximum facility. One or both of the bolt-holes M in the brackets may be elongated for the purpose of accurate adjustment of the brackets and their guide-wheels. Thus it will be observed that the inner rings are suspended from the brackets, and the guide-wheels keep them centered and at all times in proper relation to the fixed parts of the casing.

By reference to the dotted lines in Fig. 2 and to the full lines in Figs. 4, 5, and 6, it will be seen that the gates may all be closed tightly or opened widely as the full lines illustrate them; but if the gates are opened at all, no matter how little or how much, there is a large bell-mouthed opening on the outside to admit water, and a slightly-flaring opening from within, like that of a hose-nozzle, to deliver the water from its passage through the gate-openings directly to the wheel. The result of this construction is, that the form in cross-section of the column of water entering through the gate-openings and impinging against the wheel within is always the same, its dimensions only differing as the gates are opened more or less; also, that there is no impediment or break in the inflowing current, no matter whether the gates be opened much or little, and also that both a funnel-opening for receiving the water into the gate-passage and a bell-mouthed or nozzle-mouthed delivery structure for directing the water to the wheel are provided. These features of construction utilize the utmost force of the water at all times and deliver a smooth, unbroken column of water through each gate-passage, of much or little volume, according to the extent to which the gates are opened.

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

1. The combination, with the outer fixed rings, A, of the posts B and inwardly-projecting plates C, so placed relatively to the posts F as to leave a bell-mouthed opening, substantially as described.

2. The combination, with the upper and lower movable rings, of the gate-posts F and

the outwardly-projecting plates or gates, curved or flaring at their outer ends, substantially as described.

3. The combination, with the outer fixed and inner movable rings and their posts B and F, of the plates C and G, all constructed and arranged substantially as and for the purposes set forth.

4. The combination, with the outer structure of the case, of the movable inner rings, of the brackets I, of the guide-wheels L, and an annular ledge, K, substantially as and for the purposes set forth.

In testimony whereof I have hereunto subscribed my name this 5th day of November, A. D. 1882.

NATHAN F. BURNHAM.

Witnesses:

WALTER B. WHITE,

WM. BEITZEL.