

(No Model.)

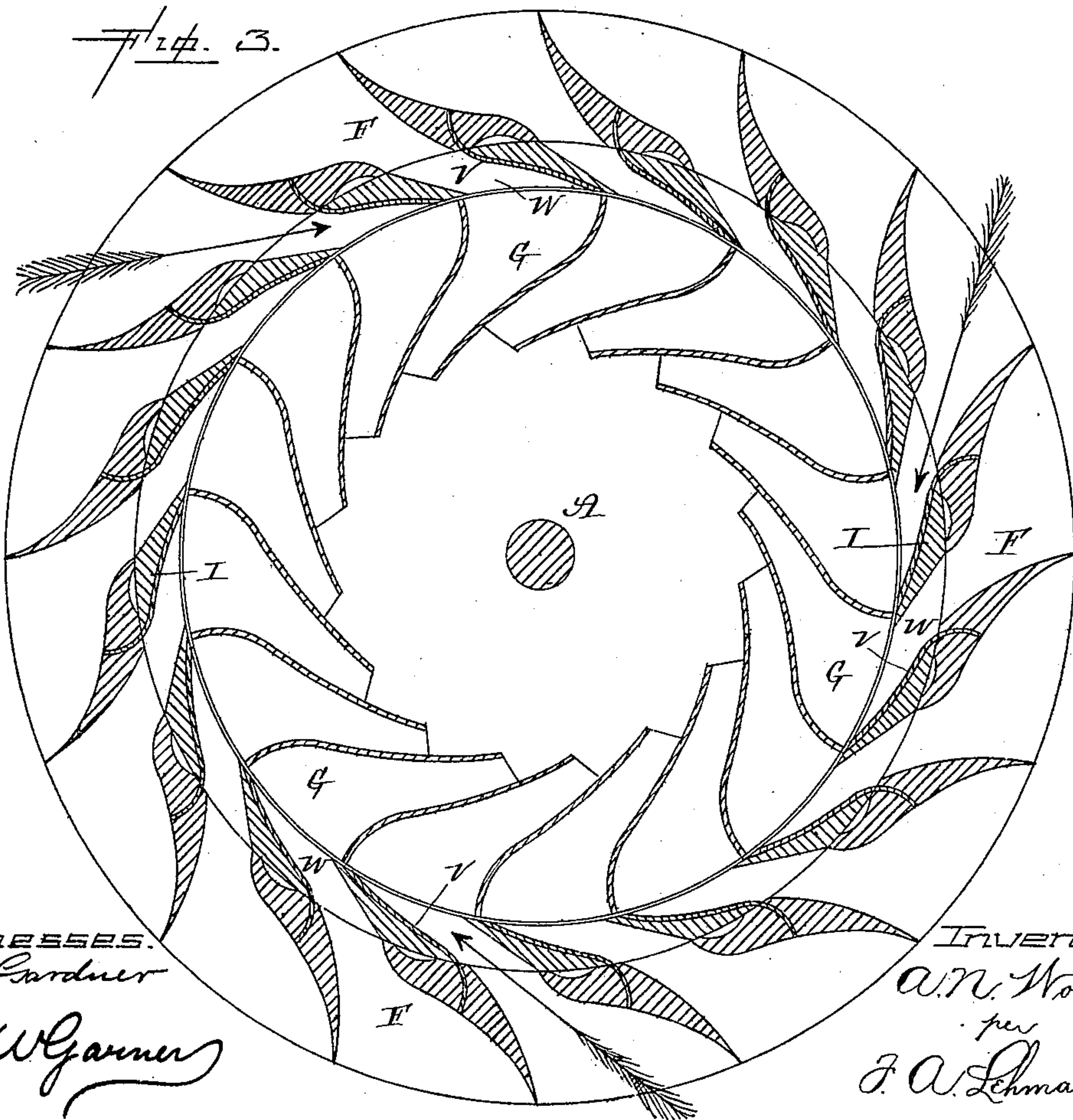
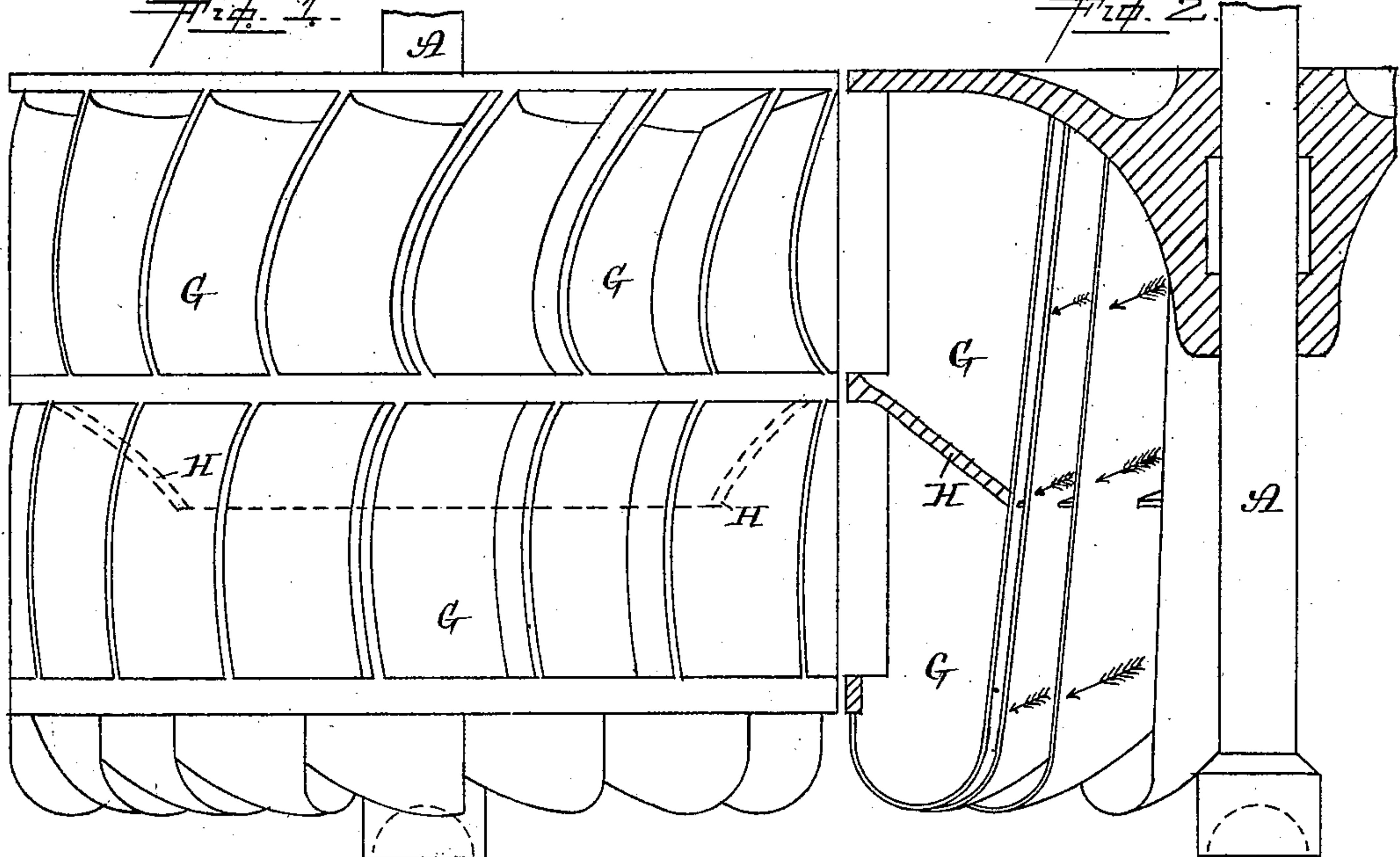
3 Sheets—Sheet 1.

A. N. WOLF.

TURBINE WATER WHEEL.

No. 300,823.

Patented June 24, 1884.



Witnesses.

R. F. Gardner

J. W. Garner

Inventor.

A. N. Wolf

per J. A. Lehmann, atty

(No Model.)

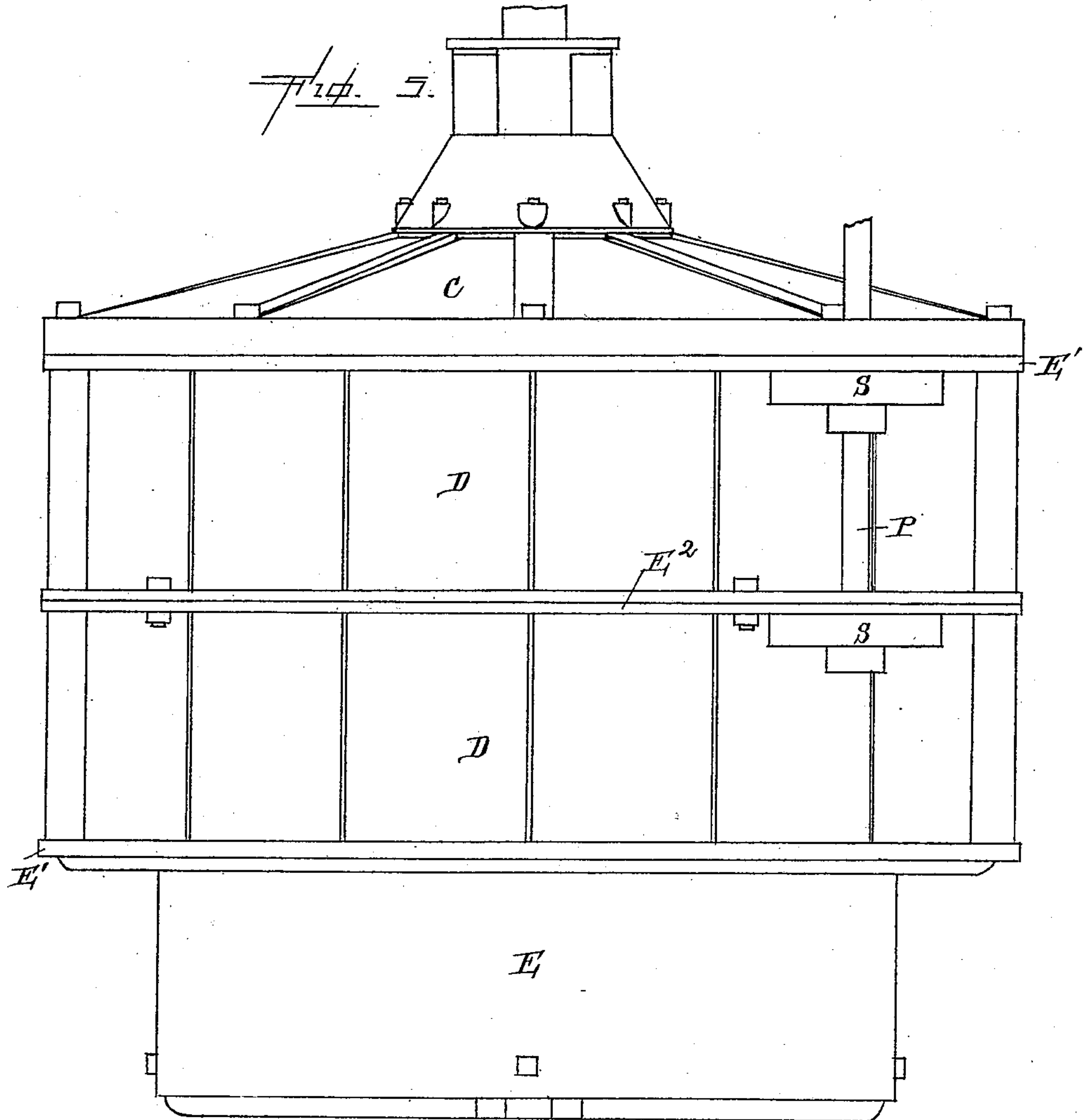
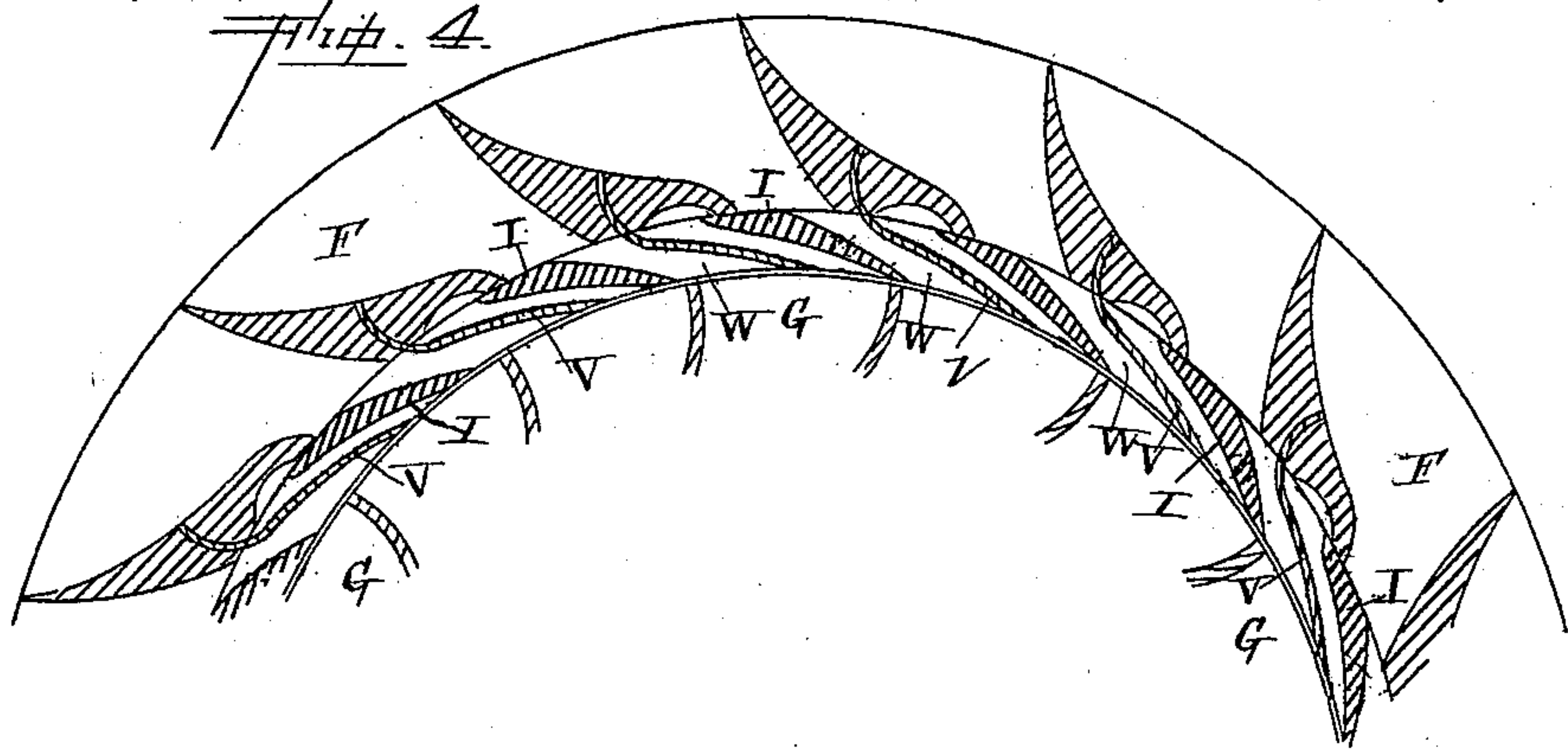
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Louis T. Gardner
J. W. Garner

—Inventor—
A. N. Wolf,
per
F. A. Lehmann, atty.

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3 Sheets—Sheet 3.

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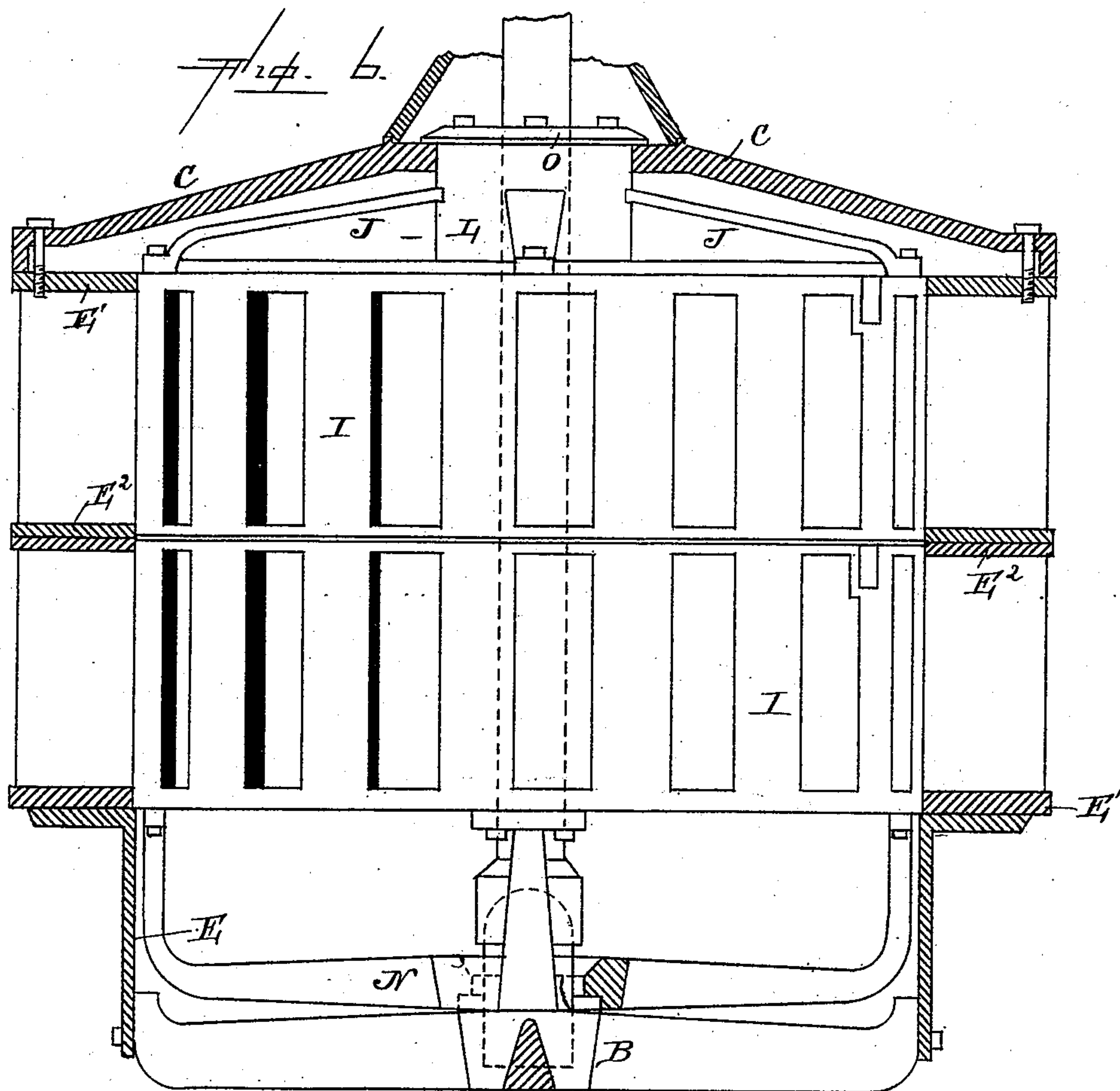


Fig. 7.

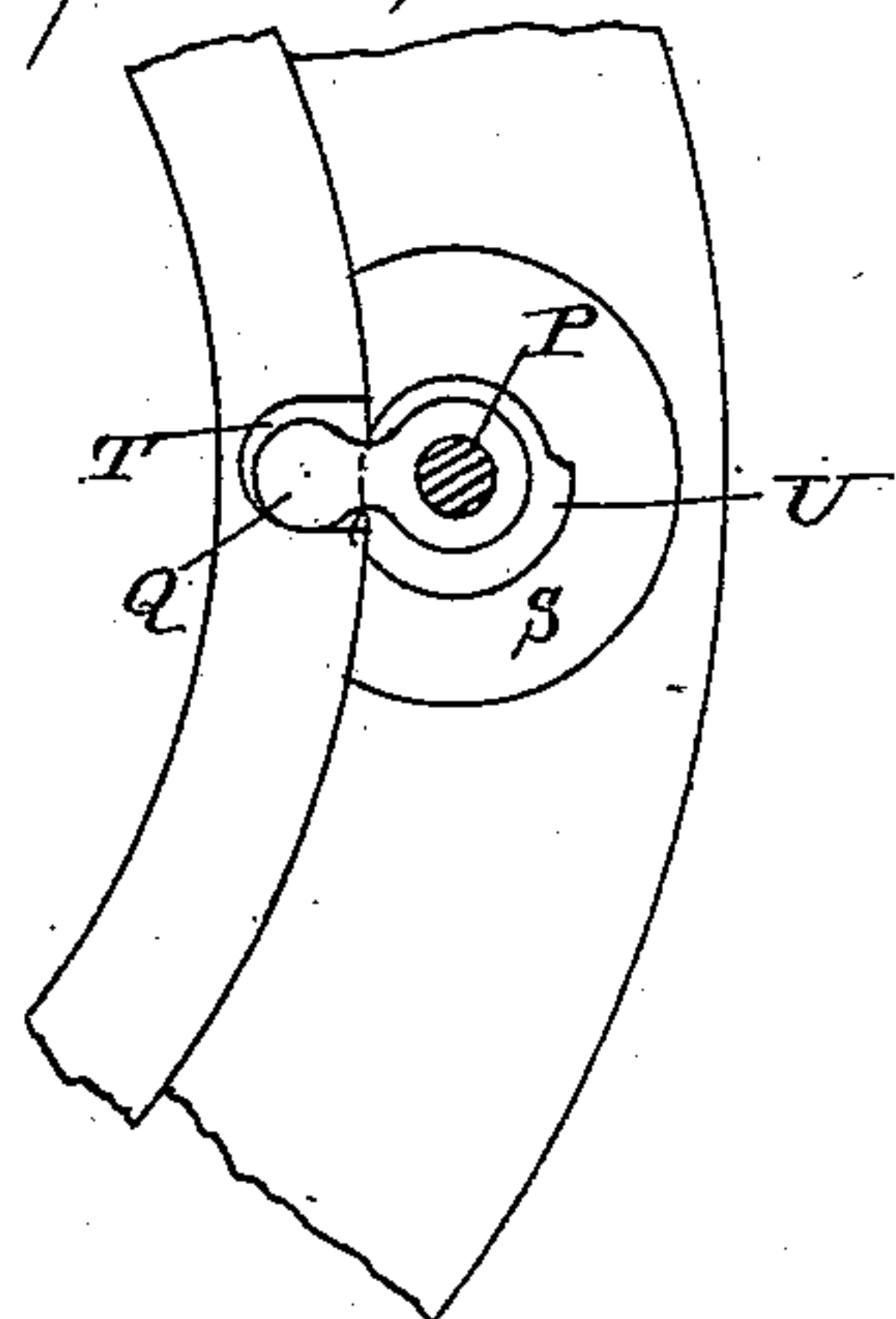


Fig. 8.

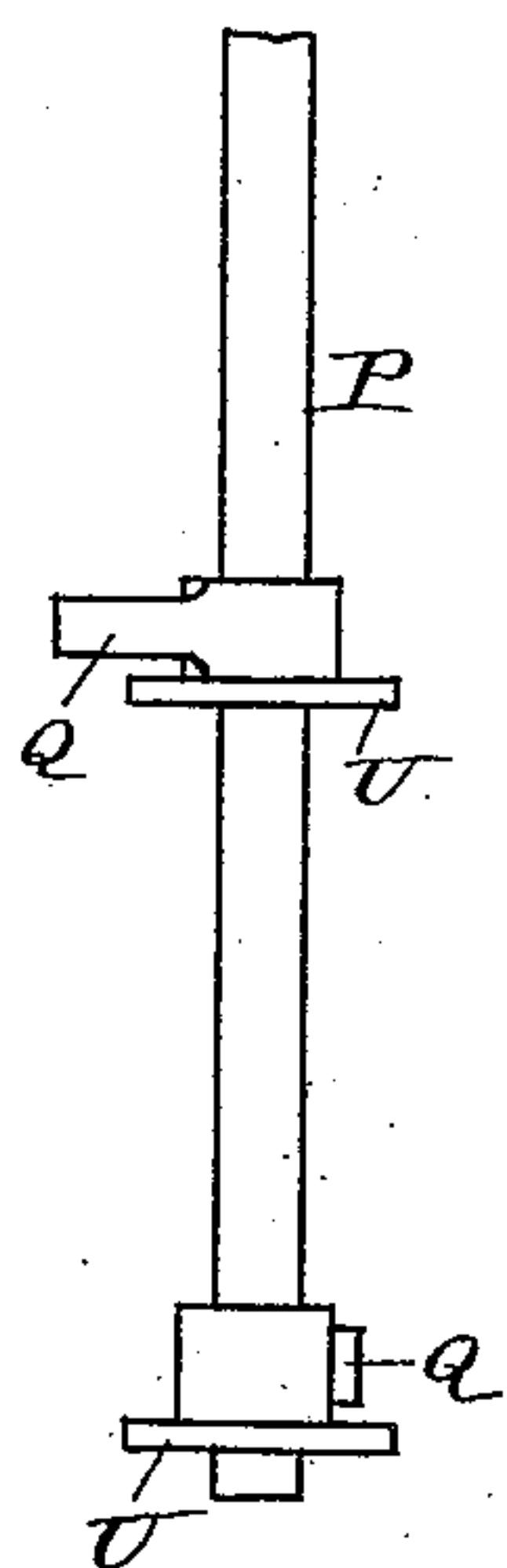


Fig. 9.

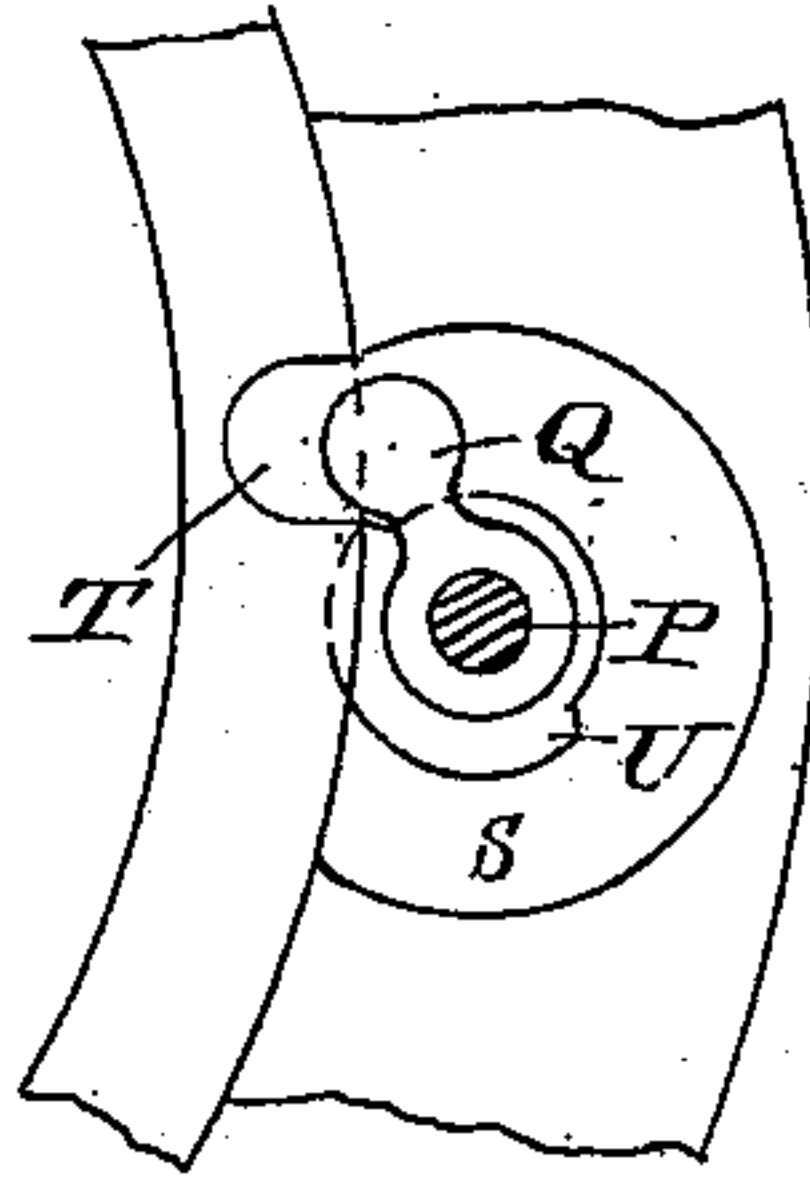
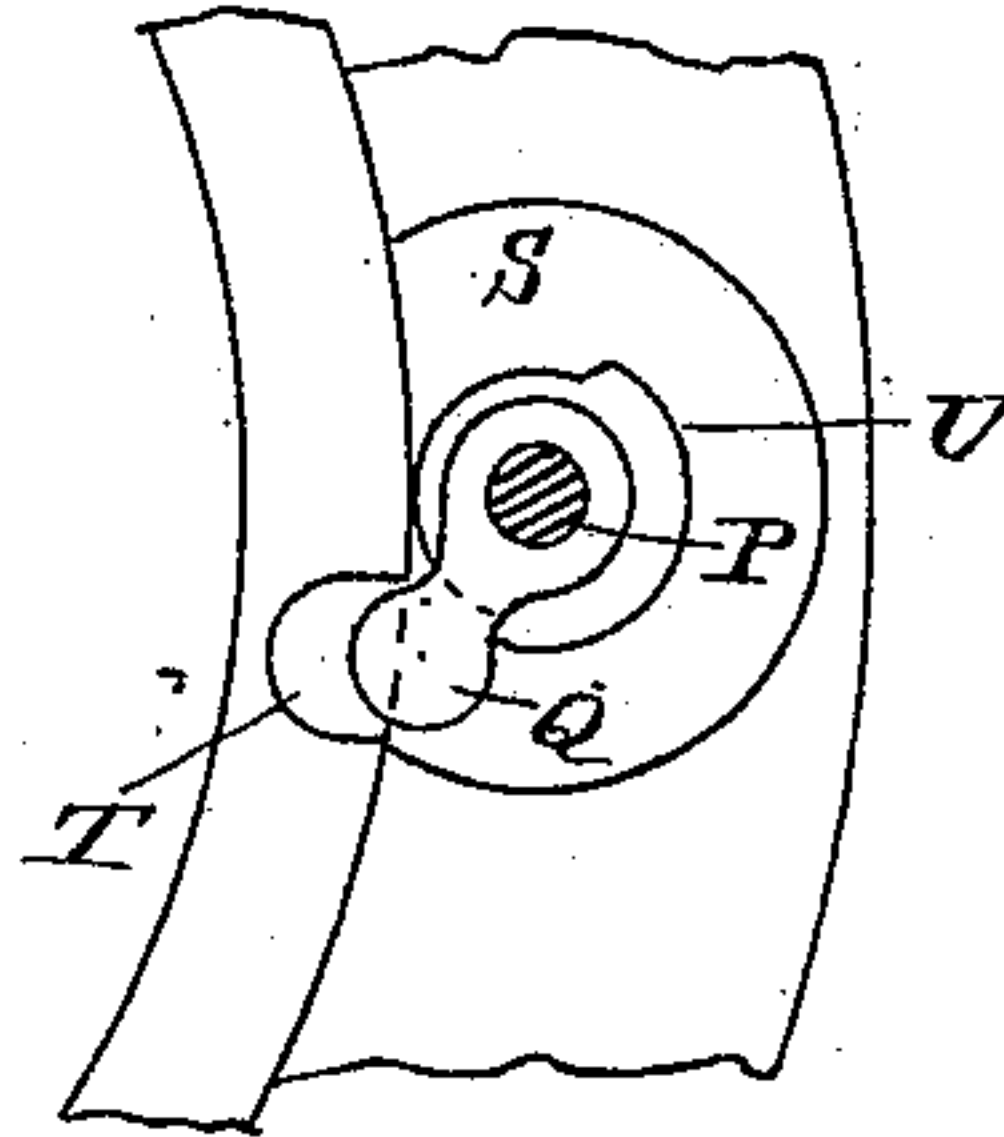


Fig. 10.



—WITNESSES—
Louis F. Gardner
J. W. Garner

—INVENTOR—
A. N. Wolf
per
J. A. Lehmann, atty

UNITED STATES PATENT OFFICE.

ABRAHAM N. WOLF, OF ALLENTOWN, PENNSYLVANIA.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 300,823, dated June 24, 1884.

Application filed October 26, 1883. (No model.)

To all whom it may concern:

Be it known that I, A. N. WOLF, of Allentown, in the county of Lehigh and State of Pennsylvania, have invented certain new and
5 useful Improvements in Turbine Water-Wheels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and
10 use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in turbine water-wheels; and it consists—

15 First. In a water-wheel which is provided with two sets or tiers or buckets, in combination with two separate and independent gates or inside casings, so that the water can be admitted to either tier or set of buckets independently of the other. The object of this part
20 of my invention is to enable the wheel to be run at either half or full power, and to admit the water to either set or tier of buckets independently of the other.

25 Second. In the combination, with a water-wheel provided with two sets or tiers of buckets, of two separate and independent gates or inside casings, and mechanism by means of which the gates will be moved independently
30 of each other. The object of this part of my invention is to operate the two gates or inside casings by means of a single rod or shaft, which is provided with arms or fingers which are placed in such relation to each other that
35 first one gate will be moved and then the other.

Third. In the combination of a water-wheel provided with two tiers or sets of buckets and two gates or inside casings for controlling the admission of the water to the wheel, with a
40 shaft provided with fingers or arms for moving the gates independently of each other, with locking devices for locking each gate in place after it has been moved. The object of this part of my invention is to provide a
45 means for locking each one of the gates in position after it has been moved, so that it will not be affected by the movement of the other part or become opened at any time from any cause.

50 Fourth. In the arrangement and combination of devices, which will be more fully de-

scribed hereinafter, whereby a durable, cheap, simple, and effective turbine water-wheel is produced.

Figure 1 is a side elevation of my wheel by 55 itself. Fig. 2 is a vertical section taken through a portion of the wheel. Fig. 3 is a horizontal section taken through the wheel and its casings on the line Y Y of Fig. 6. Fig. 4 is a detail view showing the relation of the 60 parts when the chutes are closed. Fig. 5 is a side elevation of the wheel and casing complete. Fig. 6 is a similar view showing a portion of the outside casing removed. Figs. 7, 8, 9, 10 are detail views of the operating 65 mechanism for opening and closing the gates.

A represents the shaft to which the wheel is secured, and which is supported upon the stationary step or spider B. The casing in which the wheel is inclosed consists of the top part 70 or lid, C, the two outside casings, D, and the vertical guide E, through which the water is carried away after it has left the wheel. The two parts D of the casing are bolted together, as shown in Fig. 5, the bolts or other clamping 75 devices being passed through the flanges E', which flanges form the bottom of one guide and the top of the other. Each one of these parts D is provided with a series of guides, F, as shown in Figs. 3 and 4, and which guides 80 serve to conduct the water to the wheel in the usual manner.

The water-wheel, which is secured to the shaft A, as shown in Fig. 2, is made in a single casting and provided with two sets or tiers of 85 buckets, G, the upper ends or edges of which are inclined backward, as shown in Fig. 1, while their lower ends are curved downward, as shown in Fig. 2, so that the weight of water will exert its full power upon the wheel before 90 escaping from them. These two tiers or sets of buckets are separated from each other by means of the partition H, which is inclined downward, as shown in Fig. 2, and which partition serves to separate the tiers from each 95 other, so that they are entirely separate and distinct. This partition H forms the bottom of the upper tier, and it is upon this partition that the weight of the water acts, in forcing the wheel around, before it escapes from 100 the upper tier of buckets. By thus providing the wheel with two separate tiers of buck-

ets, either one or both of the tiers may be used in driving the wheel, according to the amount of power that is required.

Between the outer edge of the wheel and the inner edge of the outside casing, D, are placed the two inside casings or gates, I, which are entirely separate and independent in their movements. The upper gate, I, is suspended by means of the rods or braces J, which extend outward from the center of the body L, which surrounds the shaft A, while the lower casing is supported by means of the spider N, which rests upon the stationary spider or support B.

Secured to the top of the body L is a flange, O, which is of greater diameter than the body L, and the opening through which the body L passes. This plate or flange O catches upon the top or lid C of the casing, and supports the upper gate in position. Being entirely disconnected from each other, these two gates can be moved independently of each other, so as to admit water to one tier of buckets alone, or both, as may be desired. The edges of these two gates meet each other just opposite the flanges E², and these flanges E² serve to prevent any leakage of water in between them. Both of these gates I are moved by the vertical shaft P, which is provided with the two arms or fingers Q, which are attached to the shaft at a suitable angle to each other, as shown in Figs. 7 and 8. These fingers are inclosed in the boxes S, which are cast or cored out upon the two parts of the casing D, as shown in Fig. 5; or each may be cast separately and attached thereto in any suitable manner. These arms or fingers, when the shaft P is turned into suitable positions, catch in the recesses or openings T, which are made in the top edges of the two gates I. The fingers or arms Q are set at an angle to each other, as shown, so that when the shaft P is turned the two gates will be moved independently of each other, and not both at once. If the gates were both moved at the same time, it would be impossible to bring either one of the two tiers of buckets of the wheel into use independently of the other. As will be seen in Figs. 8, 9, and 10, when one arm Q is catching in the recess T of its gate, the other arm is turned around at such an angle that it does not engage with its gate. If, for instance, the arm Q were so arranged that the lower gate I is to be opened first, the arm Q which operates the lower gate will have moved its gate around so as to open it to its full extent, and then the arm passes out of its recess just as the upper arm is entering its recess in the upper gate for the purpose of moving that. The continued rotation of the shaft, after the lower gate has been opened, causes the upper gate to also be opened to its full extent, when the water then passes through both gates, and both tiers of buckets of the wheel are brought into use. When the gates are to be closed, the rotation of the shaft P in the opposite direction causes the upper gate to be closed first, and then the lower one.

In order to lock each gate into position after it has been opened, so as to prevent it from being moved by the other gate, or any other accidental cause, the shaft is provided with the two locking-cams U just below the arms Q, and which cams catch in suitable recesses or notches which are made in the edge of the buckets G, and thus serve to prevent the gate from being moved in either direction until the shaft P has been turned sufficiently to first move the cam out of the recess. The relative arrangement of the cams and the arms Q is shown in Figs. 9 and 10, where one of the arms is just leaving its recess T as the other arm is just entering its recess, and one cam has entered its recess just as the other cam is approaching its recess.

Secured to each one of the guides F in any suitable manner is an extension, V, (shown in Figs. 3 and 4,) and which extension extends rearwardly and inwardly entirely through the chutes W. These extensions V serve to contract the whole of the chutes from one end to the other as the gates are being closed. As seen in Fig. 3, these extensions are preferably attached to the guides F by means of slots which are made through the guides, and which extensions, when the gate is opened, bear against the divisions of the gate, so as not to interfere with the free passage of the water. When, however, the gate is closed, these extensions bear against the opposite division of the gate, as shown in Fig. 4.

Having thus described my invention, I claim—

1. The combination of a water-wheel provided with two sets or tiers of buckets, with two separate and independent gates, and a mechanism for operating them alternately, substantially as set forth.

2. The combination of a water-wheel provided with two tiers or sets of buckets, with two separate and independent gates, which are moved alternately by means of a single shaft, so as to bring either one or both tiers of buckets into use, substantially as specified.

3. The combination of a water-wheel provided with two tiers or sets or buckets, with the outside casing, and two separate and independent gates with a single operating-shaft, which is provided with arms or fingers which are set at an angle to each other, substantially as shown.

4. The combination of the outside casing provided with chambers or recesses S, a single shaft, P, provided with the fingers or arms Q, set at an angle to each other, the two gates I, provided with suitable recesses to receive the arms or fingers, and the water-wheel, substantially as set forth.

5. The combination of the outside casing with the shaft P, provided with the fingers Q and the cams U, with the two gates I, provided with suitable recesses, and the water-wheel, substantially as specified.

6. The combination of the upper gate suspended by means of the arms or braces J, with

the lid C, the flange O, the outside casing, and the water-wheel, substantially as shown.

7. The combination of the outside casing with two independent gates, I, and the water-wheel, one of the gates being supported from below and the other from above, substantially as described.

8. The combination of a wheel having two sets or tiers of buckets with two gates and two outside casings, D, which are provided with separate and distinct sets or tiers of guides and chutes, the water-wheel being provided with two sets or tiers of buckets, which buck-

ets are so arranged as to come just opposite each set of guides and chutes, whereby the gates, which are independent of each other, can be moved so as to admit the water to one or both tiers or sets of buckets upon the wheel, substantially as set forth.

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

ABRAHAM N. WOLF.

Witnesses:

EDWARD RUHE,
WINSLOW WOOD.