

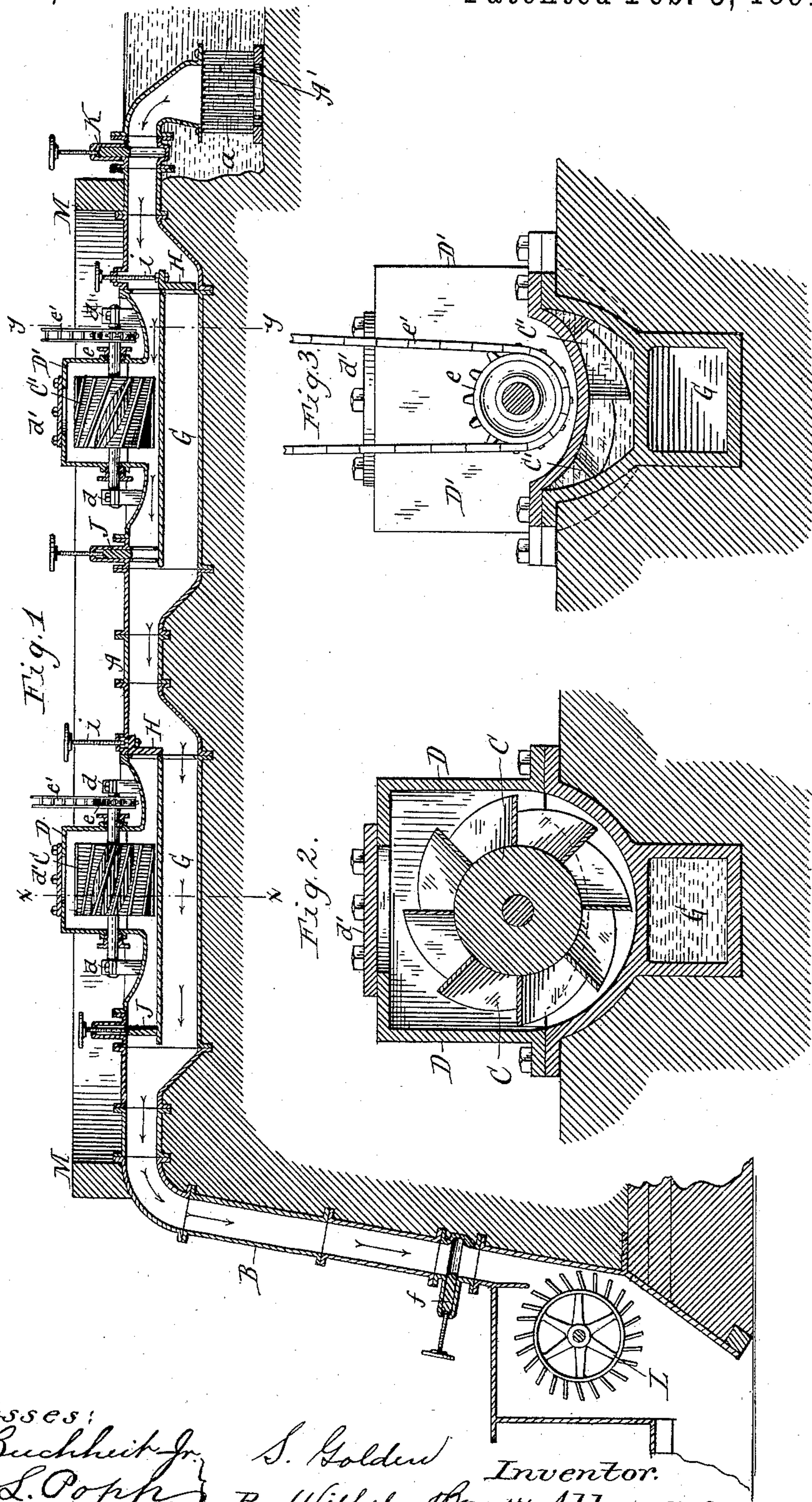
(No Model.)

2 Sheets—Sheet 1.

S. GOLDEN.
WATER MOTOR.

No. 445,551.

Patented Feb. 3, 1891.



Witnesses:

Geo. J. Buchheit Jr.
Theo. L. Poppe }

S. Golden

Inventor.

By Wilhelm Honner, Attorneys.

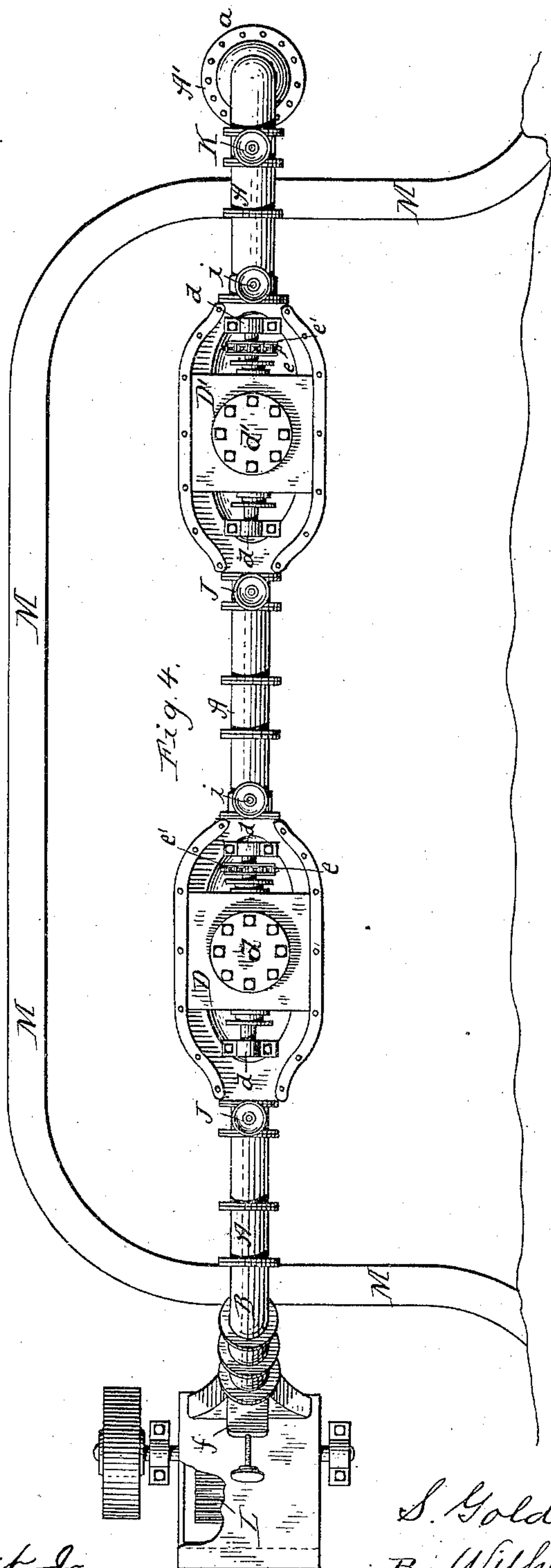
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By Wilhelm Bonner
Attorneys.

UNITED STATES PATENT OFFICE.

SAMUEL GOLDEN, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-FOURTH TO CHRISTOPHER CULLEN, OF SAME PLACE.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 445,551, dated February 3, 1891.

Application filed February 28, 1888. Serial No. 265,621. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL GOLDEN, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful
5 Improvements in Water-Motors, of which the following is a specification.

This invention relates to a water-motor which is more particularly designed for use in the vicinity of water-falls of considerable
10 height.

The object of my invention is to construct a water-motor in which a current is utilized, which is created in a flume, which is but slightly depressed below the level of the wa-
15 ter in the river or other water-course from which the water is supplied, so that the water-motor can be located upon the bank or land at the top of the falls in close proximity to the machinery which is driven by the mo-
20 tor, instead of at the foot of the falls, where it would be more or less remote from the driven machinery.

To this end my invention involves the use of an air-tight flume, through which the wa-
25 ter is forced by the pressure of the atmosphere, thereby creating a current through the flume, which drives the water-wheels arranged in the same.

My invention consists of the improvements
30 which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, consisting of two sheets, Figure 1 is a longitudinal sectional elevation of my improved flume. Figs.
35 2 and 3 are cross-sections thereof in lines xx and yy , Fig. 1, respectively, on an enlarged scale. Fig. 4 is a top plan view of the flume.

Like letters of reference refer to like parts in the several figures.

40 A represents the upper or main portion of the flume, which consists of a cylindrical iron pipe or conduit arranged horizontally, or nearly so, so as to follow as nearly as possible the natural surface of the ground, and
45 preferably placed under ground immediately below the frost-line.

A' is the depending mouth or head of the flume, which may be located in the river at any desired distance above the waterfall or
50 precipice, and is submerged below the water-

level to a sufficient depth to prevent eddies from forming around the mouth and drawing air into the flume. A cage or guard a is arranged at the mouth A' for excluding ice and other solid objects from the flume. 55

B is an inclined or perpendicular leg forming a continuation or tail-piece of the flume A, and extending over the precipice to the bottom thereof; or, if preferred, the leg B may pass through a tunnel terminating at the
60 bottom of the precipice. The flume A and its leg B are made as nearly air-tight as practicable. The leg B or descending tail portion of the flume extends below the point at which the atmospheric pressure will sustain the col-
65 umn of water in the same, so that the downward flow of the water through the descending tail portion tends to create a vacuum in the same, whereby the head-water is forcibly drawn into the flume and through the same. 70

C C' represent the water-wheels arranged with their lower portions in the flume A and inclosed by casings D D', secured to the upper side of the flume and communicating with the latter. Any desired number of water-
75 wheels may be arranged in the flume at suitable intervals. The horizontal shaft of each water-wheel is mounted in suitable bearings d , secured to the upper side of the flume, and the casing of the wheel is provided in its
80 sides with stuffing-boxes through which the shaft passes, whereby the entrance of air into the casing is prevented. The casings D D' are provided in their tops with doors d' , which afford access to the interior of the casings for
85 making repairs, &c. Power is taken from the shafts of the water-wheels by sprocket-wheels e and chains e' , or by any other suitable means. The column of water descending through the inclined leg B produces a vacuum
90 in the air-tight flume, and the atmospheric pressure on the water at the submerged head or mouth A' of the flume causes the water to flow through the latter, thereby creating a
95 current through the same which drives the water-wheels arranged in the flume. The flow of water through the flume is started by closing a gate or valve f , located in the leg B near the lower end thereof, then filling the
100 flume, wheel-casings, and inclined leg with

water and opening the gate *f*. In filling the flume one of the doors *d'* of the casings *D D'* is opened to allow the air to escape, or, if desired, the flume may be provided with a separate air-valve for this purpose. At the points where each water-wheel is located in the flume the latter is provided with an auxiliary passage *G*, arranged below the main passage of the flume, and through which auxiliary passages the water passes when the main passage is cut off for repairing the water-wheel.

H represents sliding gates or valves arranged at the head of the auxiliary passages *G* of the flume for cutting off the water from the main passage of the flume and admitting it to the auxiliary passages *G*, and vice versa. The gates *H* slide in suitable ways arranged on the inner sides of the flume and are operated by vertical screws *i*, working in screw-nuts arranged in suitable supporting-frames secured to the upper side of the flume, as represented in Fig. 1. Upon lowering the gates *H* the water is allowed to flow through the upper main passage of the flume and actuate the water-wheels, while by raising said gates the water is shut off from the main passage and caused to pass through the auxiliary passage *G*. In the position of the gates illustrated in Fig. 1 the water is excluded from water-wheel *C* adjacent to the precipice and admitted to the other wheel *C'*. By this means the water can be independently shut off from any of the wheels without interfering with the operation of the other wheels.

A gate or valve *J* is arranged in the main passage of the flume opposite the tail of each auxiliary passage for closing the main passage at this point and preventing the water from flowing from the tail of the auxiliary passages *G* back into the main passage. The gates *J* also prevent the air from passing from the portions of the main passage immediately connected with the chambers *D D'* into the remaining portion of the flume when the doors *d'* of said casings are opened.

K is a gate or valve arranged near the mouth *A'* of the flume, and whereby the water can be wholly shut off from the flume, if desired.

The water-wheels *C C'* are preferably provided with spiral or oblique floats, as shown, and the wheels are arranged with their axes in line with the flume, so that the floats or wings trend lengthwise of the flume. In case any of the water-wheels are stopped by their resistance being greater than the power of the current passing through the flume the latter will not be obstructed, but the water will be permitted to pass onward between the floats of the arrested wheel to the next water-wheel. The water-wheels are preferably made about twice the diameter of the

main portion of the flume, and the top of the latter is depressed where the casings *D D'* are located to afford room for the sprocket or driving wheels *e*. A water-wheel *L* may also be arranged at the lower end of the inclined leg *B*, if desired, as shown in Fig. 1.

The main portion of the flume is preferably protected by a stone or brick wall *M*.

The flume will operate in a level or horizontal position, and can therefore be employed with advantage in streams whose bed have but little grade so long as a precipice or fall is available for the leg or tail portion of the flume.

I claim as my invention—

1. The combination, with the tight flume composed of a main portion which is arranged horizontally, or nearly so, and a descending tail portion, of a raised casing arranged in the horizontal main portion of the flume, a water-wheel arranged in said casing with its lower portion in the flume, an auxiliary water-passage arranged below said casing and the main portion of the flume, a sliding gate or valve arranged at the head of said auxiliary water-passage, whereby the water can be shut off from the wheel-casing and directed through the auxiliary passage, and a sliding gate or valve arranged in the main portion of the flume opposite the tail of said auxiliary passage, whereby the water flowing through the auxiliary passage is prevented from entering the wheel-casing, substantially as set forth.

2. The combination, with the tight flume composed of a main portion arranged horizontally, or nearly so, and a descending tail portion, of two or more tight casings raised above the main portion of the flume and opening into the flume, a water-wheel arranged in each of said casings with its axis lengthwise of the flume and having oblique blades trending lengthwise of the flume, an auxiliary water-passage arranged below each casing and communicating at opposite ends with the main portion of the flume, sliding gates or valves arranged at the head of each auxiliary passage, whereby the flow of water can be shut off from the wheel-casings and admitted through the auxiliary passages, and sliding gates or valves arranged in the main portion of the flume in rear of the casings and opposite the tail portions of the auxiliary passages, whereby the water flowing through the auxiliary passages is shut off from the wheel-casings above said auxiliary passages, substantially as set forth.

Witness my hand this 15th day of February, 1888.

SAMUEL GOLDEN.

Witnesses:

FRED. C. GEYER,
CHESTER D. HOWE.