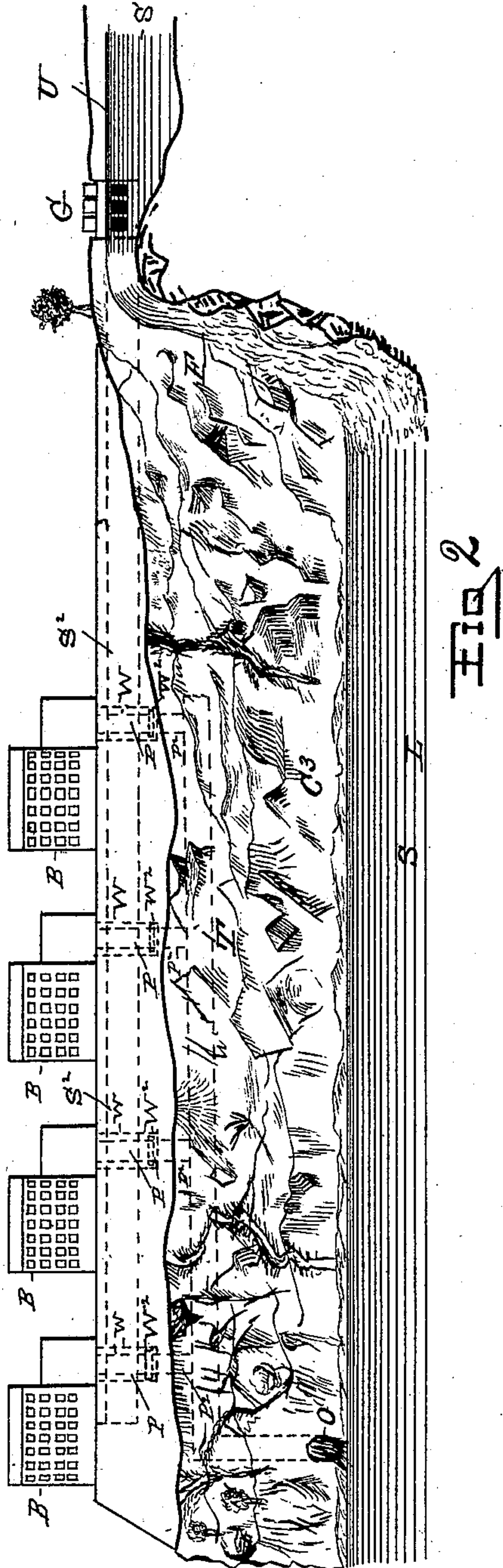
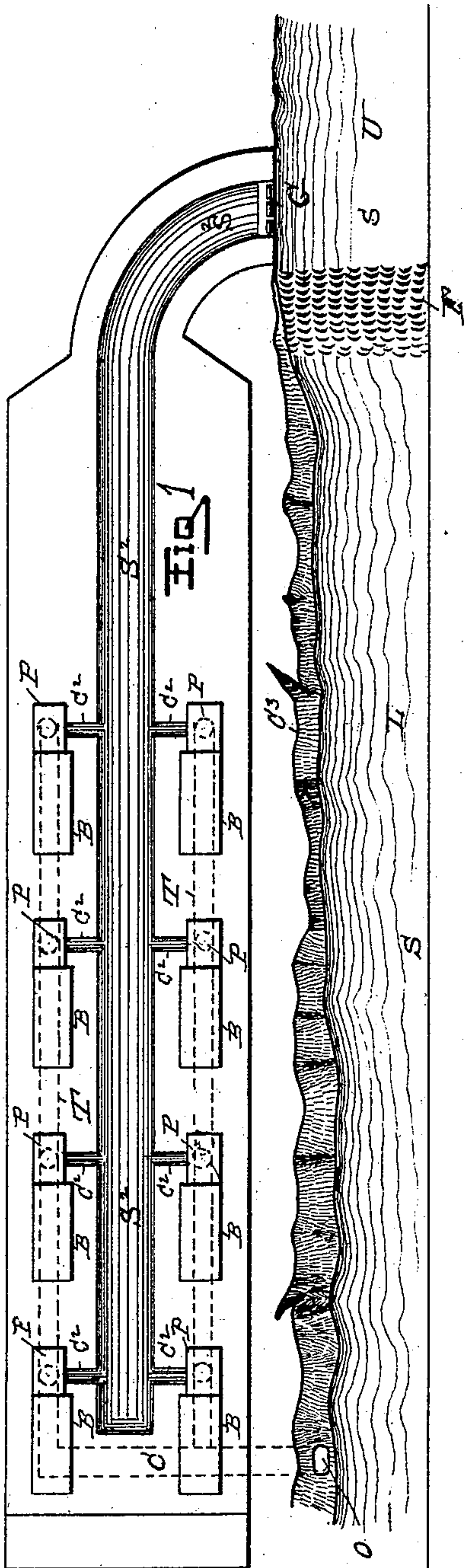


(No Model.)

W. ORR.
SYSTEM FOR UTILIZING WATER POWER.

No. 400,940.

Patented Apr. 9, 1889.



WITNESSES.

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WILLIAM ORR, OF TROY, NEW YORK.

SYSTEM FOR UTILILIZING WATER-POWER.

SPECIFICATION forming part of Letters Patent No. 400,940, dated April 9, 1889.

Application filed January 15, 1889. Serial No. 296,426. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ORR, of the city of Troy, county of Rensselaer, State of New York, have invented a new and useful
5 System for Utilizing Water-Power, of which the following is a specification.

My invention relates to a system for utilizing water-power; and the object and purpose of my invention are by a new method of
10 application to obtain the best capacities of an existing power, to avoid the waste of the latter and in application to make better available for use the site and area surrounding the latter, and to better facilitate the transmission
15 of the power on long lines of application.

As heretofore practiced, water has been taken from a level by means of a sluice, from which latter it was taken by one or more gateways to operate one or more wheels, from the
20 tail-races of which another level was established and use made of the water again by supplying it to other wheels, from the tail-races of which it passed into the stream below the dam or falls. This older method necessarily
25 must have an intermediate fall between the use of the upper and lower level that constituted a measure of waste or loss. Again, this manner of taking water necessitated the construction of a tail-race from each wheel, and
30 only made available for direct use that side of the sluice which was adjacent to the stream. As distinguished from this older method of using the water, as between two or more levels located one below the other in succession, by means of my improved system all the
35 head capacity of the fall is used and made available in each application by using turbine wheels where the head of water above the wheel, as well as the tubular or suction draft of the pipe-conduit leading from the
40 wheel is utilized, so that much less water is required to produce a given quantity of power. To thus utilize all the head of the fall upon one of several or many turbine
45 wheels, a tail-race is produced in the form of a tunnel that is located below the sluiceway, into which tunnel or tail-race the several tubular discharge-conduits of the turbine wheels discharge. With a sluiceway and tail-
50 race thus arranged both sides of the former are available for occupancy, and the building of factories or buildings for using the power

obtained and the sluiceway and tail-race may be continued as far as the water-supply and the topography of the country will permit. 55
The excavation of a wheel-pit and boring therefrom to the underground raceway is all the excavation required after the sluiceway and tail-race tunnel are completed.

Accompanying this specification, to form a part of it, there is a sheet of drawings containing two figures, illustrating my invention, with the same designation of parts by letter reference used in both of them. 60

Of the illustrations, Figure 1 is a plan view 65 of mill-site located upon the top of a cliff that fronts on a stream adjacently to a fall in the latter. This illustration shows also a sluiceway that is supplied with water from the upper level above the falls, and it illustrates a series of mills arranged upon each side of the sluiceway with a tunnel-form tail-race having a lower level than the sluiceway, indicated by a dotted line. Fig. 2 illustrates a side elevation of the cliff at and below the water-fall, 75 showing also the mills or buildings designed to use the power, and also the sluiceway intake-gates. This figure illustrates by means of a dotted line the sluiceway and the tunnel-form tail-race, into which the pipes leading 80 from the turbine wheels discharge.

The several parts thus illustrated are designated by letter reference, and the function of the parts, as arranged and constructed to carry out my system, is described as follows: 85

The letter S designates the stream; U, its upper level; L, its lower level, and F its water-fall.

The letter S² designates the sluiceway constructed and arranged to open out into the 90 upper level and to receive water therefrom, controlled by the gates G.

The letter T designates the tunnel-form tail-race, of which there is a branch below and at each side of the sluiceway, and these branches 95 are preferably arranged to connect, as at C, and have a common outlet, O.

The letters W designate the wheel-pits arranged above the tail-race; C², a conduit leading to each of the stand-pipes P, by which 100 water in column is caused to act on the turbine wheels W², and P² designates a suction or discharge pipe connecting the outlet from the wheel with the tail-race, whereby the dis-

charge column of water in said pipe P² in each instance creates a draft or suction upon the wheel to add to its power capacity.

5 The letters B indicate buildings arranged upon each side of the sluiceway to utilize the power developed by the wheels acted upon by the water.

The letter C³ designates the cliff.

10 As thus arranged, each wheel used receives the full capacity of the head, as it is divided up most conveniently between the column-pressure in the wheel stand-pipe and the draft or suction capacity of the discharge-pipe leading from the wheel to the tail-race.

15 While the water is thus used economically, the sluiceway and tail-race tunnels may be continued any distance that the supply of water will warrant or the topography of the country permit. As thus arranged, both sides
20 of the sluiceway are made available for use and occupancy, and to make a connection to utilize locally the power all that is required is to excavate for the wheel and its stand-pipe, and to bore from where the wheel is
25 placed to the tail-race for the insertion of the suction or discharge pipe.

30 The locating of the tail-race below the sluiceway and giving to it a tunnel form leaves the surface undisturbed, the only excavation required on the surface being that taken up by the sluiceway, and by having the tail-race be-

low the wheels all that advantage produced by the discharge-draft of the vertical pipe leading from the wheel to the tail-race is had, which could not be obtained did the water 35 run directly from the wheels to the tail-race on an incline or in an open cut.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is— 40

The system for utilizing water-power herein described, consisting of a sluiceway arranged to receive water from the elevated level of a stream or pond, a tunnel-form tail-race having a lower level than the sluiceway, 45 a series of wheel-pits containing turbine wheels having their stand-pipes connected with and so as to receive water from said sluiceway, and each provided with a vertical discharge or draft pipe connecting the discharge from the wheels with the tunnel-form raceway, substantially as and for the purposes set forth. 50

Signed at the city of Troy, New York, this 21st day of December, 1888, and in the presence of the two witnesses whose names are hereto written. 55

WILLIAM ORR.

Witnesses:

W. E. HOGAN,

CHARLES S. BRINTNALL.