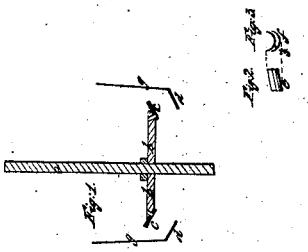
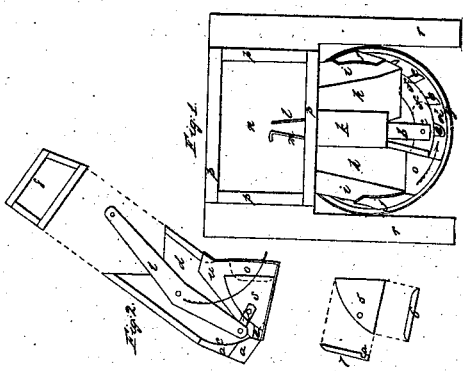
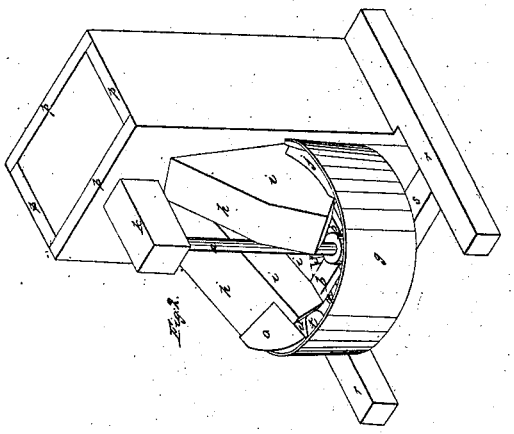
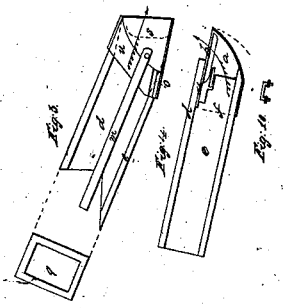
W Lamb
Water Wheel,

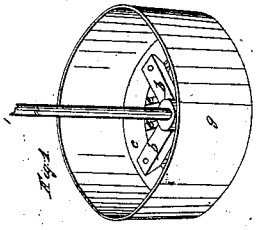
No 5,230. Patented Aug. 7, 1847.











Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM LAMB, OF ROME, NEW YORK.

WATER-WHEEL.

Specification of Letters Patent No. 5,230, dated August 7, 1847.

To all whom it may concern:

Be it known that I, WILLIAM LAMB, of Rome, in the county of Oneida and State of New York, have invented a new and useful Horizontal Water-Wheel with a New Method of Introducing Water Thereto to Propel the Same; and I do hereby declare that the following is a full and accurate description thereof, viz:

It consists in forming the wheel with two bevel rims the planes of which are to stand 20 degrees more or less from the plane of the horizon, the upper one smaller in diameter and narrower than the lower rim and parallel or nearly so to each other. Between the rims curved floats or buckets are firmly attached thereto by their opposite ends. The floats incline from a perpendicular position inward to correspond with the rims and incline forward so that the water may strike them with its greatest force, the lower ends of the floats standing inward half an inch, more or less, from the curb hereafter mentioned. The rims and buckets may be cast whole and entire of metal, or in separate parts, if too large to be cast whole, and then fastened together, or may be formed of other materials, and attached to arms from the shaft, by bolts, screws or otherwise. To the outward periphery of the larger rim a circular curb is firmly and closely attached forming part of the wheel and guiding the water with a spiral descending motion against the floats. This curb may be perpendicular and of equal diameter from top to bottom or the upper part may be larger or smaller than the bottom and two inches, more or less, higher than the water gates, and made of wood or metal or both. The water is conducted over the top and within the curb by one, two or more trunks descending near it and within two inches, more or less, from the upper rim, so as to be guided to and strike the floats with its greatest force. By the shape of the floats the water is discharged between them under the wheel, with a motion inward and partly opposite to the centrifugal force of the wheel. The lower end of each trunk has (what I call) a spout-nose formed of iron or other substance cast whole or made in pieces and fastened together; that part of which nose, next the curb, forming the segment of a circle smaller than the inside of the curb and parallel therewith and a little distance therefrom. The nose is contracted, at the outlet, so as to pass a column of water, of the desired thickness, within the rims, against the floats. Each water-gate may be placed outside or within the nose of each trunk, to open at its lower end and discharge against the floats and side of the curb a column of water of a thickness equal, at least, to the distance between the curb and upper rim. The gates may be made to admit a larger quantity of water within the wheel to propel it, when under back-water, and to open so as to admit a smaller quantity of water when less power is required.

The principle involved in constructing this wheel with a curb rising above the water-gates (and guiding the water so that all of it operates upon the wheel) and also the curved trunk-noses opening by gates very near the floats (guiding the water spirally parallel to and around the side of the curb) I contemplate applying to other wheels, to which it may be applicable.

To enable mill-wrights and others skilled in the art, to make and use my wheel, with its combinations, I annex three plates of drawings numbered 1, 2 and 3 and will proceed further to describe their construction and operation.

Plate 1 comprises two figures. Figure 1 is a perspective view of the wheel with its curb *g*, shaft *a*, arms *b*, floats *e*. Fig. 2 is a perspective view of the same with its appendages, *p* top of pentstock, *r* foundation of same and wheel, *b* cross timber on which the shaft stands, *k* fixture to hold upper end of shaft, *h*, *h*, upper surface of trunks, *i*, *i* side of trunks, *j* side of nose to short trunk, *o* top of nose of long trunk, *b*, *b*, arms to the wheel, *c* upper rim, *e* floats, *d* lower rim, *g* curb, *t* gate, *u* plate inside of which gate slides.

Plate 2 comprises three figures. Fig. 1 represents a thin section through the center of the wheel and curb with two arms of it fastened to the smaller rim by a screw, bolt or otherwise, *a*, the shaft, *b*, *b* arms and hub, *c*, *c*, cross sections of the smallest rim, *d*, *d*, cross sections of the large rim, *g*, *g* the curb between which and the upper rim *c* the water passes and strikes the floats attached to each rim. This figure shows the relative proportions and positions of the parts represented as I have constructed them for use. They may be varied as the mill-

wright may judge most useful, Fig. 2 being a view of a curved float detached from the wheel as the eye sees it, looking across its two edges, and Fig. 3 shows the curvature of each end of a float, and the distance of inclination of one end from the other is represented by the space *s*, between the two curves. The inside curve of each float (against which the water strikes) to form in every part from end to end, the segment of a circle. This segment may be more or less than a semi-circle, but I prefer a semi-circle. It is not important that the float conform to the segment of a circle, as it may be curved more or less on either edge, and may also be somewhat concave or dishing.

Plate 3 has ten figures. Fig. 1, is a perspective view of the wheel and its appendages seen from a point directly above it, *g* the top and inside of the curb, *c* the upper rim, *d* the lower rim, *e* the floats, *f* dotted lines, shows the upper end of two floats, beneath the upper rim and their relative position, *b* arms attached to upper rim, *h*, *h* upper surface of trunks, *i*, *i*, side of trunks, *k* fixture to hold upper end of shaft, *j*, *j*, side of nose to trunks, *o* top of nose of long trunk, *l*, lever to open and shut gate in short trunk, *m* rod to move gate in long trunk, *n* bottom of flume, *p* top of flume, *r* foundation of flume and wheel. Fig. 2, inner view of side of short spout next the shaft, *l*, side view of lever moving on a pivot in the center connected by pivot to bar *t*, by pivot to gate *s*, to move it, *u* plate over which the gate slides on same side of trunk at the nose with way *o* on the plate entering a groove on the flat side of the gate to keep it in place when moving and the dotted lines shows the size of the opening in plate *u*, for the passage of water, *v* space for the passage of water when the gate is open, *c*, curvature of inside of trunk next the nose, *a*, *a*, timbers forming the curvature. Fig. 8 shows the shape and size of the opening in the short trunk for the passage of water. Fig. 3, inner view of side of long trunk next the shaft, *m*, rod to move the closed gate *s* and connected to it by pivot, *u* plate with way *o*, on which the gate slides, the dotted line shows the opening for water. Fig. 9, shows the shape and size of long trunk for the passage of water. Fig. 4, inner view of bottom of long trunk, a bottom plate of trunk nose extending to dotted line *f*, under the plank *e* of the trunk, *b*, lower edge of gate which slides on the plate *a*, in a place cut out of bottom plank *e*, *c* iron staple (represented by Fig. 10) inside of gate passing through and fastened with nuts or otherwise under plate *a*, of trunk nose. Fig. 5 gate, *b* thickness and shape of its bottom edge and 7 thickness and shape of section of gate from bottom to top, with a groove *a*, to run on way *o* in plates 2 and 3, *d* in Figs. 2 and 3 the flat side, *d* in Fig. 4 the edge of plank on the inside of which the plates *u*, in those figures is fastened.

The passages for water through the trunks should be three or four times as large as the openings for gates at their noses. The shape and size of the trunk nose and its opening may differ somewhat from the above, but should be so made and placed in such a position as to pass an unbroken column of water smoothly in a direction parallel to the curb and descending to the wheel 3 inches, more or less, to the foot run.

Experience convinces me that, under a high head of water, the diameter of the wheel should be larger, the rims narrower, the space between the curb and upper rim less, and the floats narrower and the opening at the nose smaller than when placed under a low head, and that the top of the curb should be smaller in proportion to the bottom than under a low head—and further that under a 10 foot head the wheel should be 6½ feet diameter, the curb 33 inches in height, 3 inches larger at top than bottom, the upper rim 9 inches wide, the lower rim 10 inches wide, with 28 floats, each 9 inches wide and 9 inches long, 2 gates, each to let out a column of water 20 inches in height and 6 inches thick, but these sizes, proportions and numbers may be varied according to the judgment and experience of the mill wright. Such a head and wheel are believed sufficient to drive two mill stones of 4½ feet diameter for each to grind at least 12 bushels wheat per hour.

When there are 2 or more gates they should be equi-distant from each other and made so to open as to regulate the quantity of water to the power required at different times.

When the penstock or flume is formed to take the water from two or more sides of the wheel, the trunks and noses are formed alike; but the drawings represent it as taken from one side only, by two trunks, the one shorter than the other, the nose of the long trunk projecting forward of the end and the nose of the short trunk forming the curve at the end of and under the trunk to conduct the water to the wheel in the same direction as the other, with regard to motion. The noses are alike except that their upper ends are made to fit the trunks.

The advantages of this invention consist in cheapness of construction combined with economy in the use of water, whether much or little is used. The wheel is put in operation by opening the gates by any convenient method, as by pressing down the lever *l* in the short trunk, or drawing the rod *m*, in the long trunk, plate 3, Fig. 1, and thereby discharging the water within the curb against the floats and giving mo-

tion to the wheel to drive any machinery connected with the shaft.

What I claim as my invention, and desire to secure by Letters Patent is—

The above described horizontal water-wheel in combination with the method of introducing water thereto, viz: by a curb connected with and forming part of a wheel to- save- and- give direction- to the water, and the form, and position of trunk noses, as hereinbefore fully described.

WILLIAM LAMB.

Witnesses:
WHEELER BARNES,
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