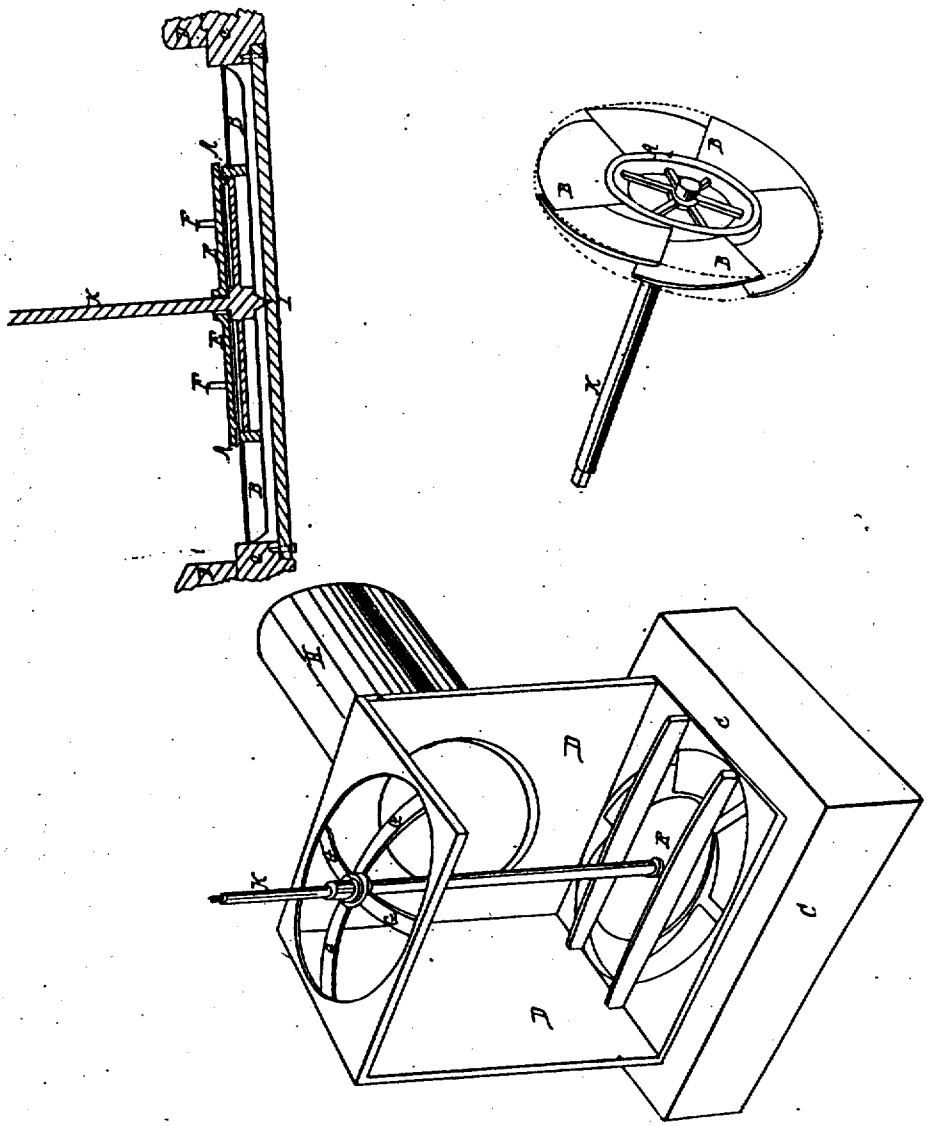
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A. & B. Darling,

Water Wheel.

Patented Apr 3, 1835.



April 8 1835

Morin Darling and Barlow Darling

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Letters Patent.

The Schedule referred to in these Letters Patent and making part of the same, containing a description in the words of the said Morin Darling and Barlow Darling themselves of their improvement in Tide Wheels for moving Mill works, Machinery &c.

To all to whom these these presents shall come, be it known that we Morin Darling and Barlow Darling both of Bellingham in the County of Norfolk and State of Massachusetts have invented a new and useful improvement in Water wheels for moving Mill works, Machinery and other things by water power, and that the following is a full and exact description of the construction and operation of the said Water wheel as invented or improved by us. We call our improved wheel, the upright perpendicular pressure wheel with spiral floats. It is constructed and used in the manner hereinafter described.

First, there is an upright shaft which may be either cast or wrought iron, though we prefer to have the shaft of wrought iron, the shaft should be of a length adapted to the place where it is to be used, and of strength proportioned to the weight which is to be put upon the wheel. The lower end of the shaft must be fixed to revolve upon a step or bearing. There is to be a cast iron rim connected with the lower end of the shaft by arms of cast iron. This rim and the arms may be all cast together, and if the lower end of the shaft where the arms are to be fastened were square, and a square orifice like a Mortice just fitted to that part of the shaft were made in the casting of the centre where the arms rest, the rim and shaft would be easily connected. The rim and arms may also be cast in parts which together, and bolted to the shaft to suit the convenience of the

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rim makes. The length and number of the arms and their size and the thickness and depth of the rim must be adapted to the strength required on the wheel, and the depth of the rim will also vary as will be seen hereafter vary to suit the speed required of the wheel, the quantity of water proposed to be used by it, and the head from which the water is to be taken. Upon the outside of the rim are to be bolted cast iron floats. These floats when connected with the rim represent precisely the thread of a screw, that is the float should be so shaped that each one when connected with & bolted to the rim would represent a portion of the thread of a large screw of which the rim would represent the body. This gives the floats themselves what we call their spiral shape. The upper end of each float should be in the same plane with the upper edge of the rim, and the lower end of each float in the same plane with the lower edge of the rim. The floats should lap over each other somewhat. The upper end of each float should lap over or past by the lower end of the float next to it. The distance which they pass each other on the rim may equal about twice the distance between them. The length of the floats must be governed by the number. If only one were used it must be long enough to go round the rim and lap a little at the two ends. The distance between the floats too depends upon the number to be applied to any given rim. This number and their width must be proportioned to the quantity of water to be used, the head from which it is to be drawn and the speed required of the wheel. We find the following proportions answer very well in practice viz. with an eight feet head to have a wheel three feet in diameter including the floats, to have the depth of the rim two and an half inches, to have the number of floats six, the width of the floats eight inches, this wheel will revolve one hundred and fifty times per minute and with force sufficient to carry a corn mill, if greater speed are required it may be obtained by increasing the depth of the rim or by increasing either the

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cracked so as to conform to the rim in which the floats re-
ceive. The rim attached in the model to the platform re-
presents the proportional thickness of the platform and
rim the cap piece might have been straight. This was con-
structed so that the model might be as light as possible.
Another and very important appendage to the wheel is the
Watermarg cap which keeps the water from pressing upon
any part of it except the floats. This cap should be cast
iron a circular plate of sufficient thickness to be strong,
equal in diameter to the exterior diameter of the rim of the
wheel to which the floats are bolted, and as it lies over the
wheel should not project at all over the floats. On the lower
side of this cap piece should be a circular flange to correspond
as near as possible with the inside of the rim of the wheel.
The flange and cap should set as close as possible to the
rim of the wheel without friction to prevent the escape of
water. This cap must be supported by iron or wood bars fastened to
the upper side of it which bars may be iron or wood, but I think
them better to be made of iron. and may rest and be supported on
the upper side of the platform if that is thick enough; if the plat-
form is not thick enough so that the cap would clear the rim
of the wheel, if the bars were so placed these bars may rest on
blocks secured upon the platform. The pressure of the water on
the cap will keep it in its place when the wheel is in motion.
Over the platform must be placed and framed a square flume
of sufficient diameter to enclose the wheel and its appendages.
This flume may be of the same height with the head of water,
and the shaft of the wheel may at the top pass through and turn
in and be confined by a cross bar or breast tree resting the top
of the flume. On the top of the shaft may be fastened a coupling
block, a gear or trundle to communicate the motion to work to
which the wheel is to be applied. The shaft passes through the cap
and must be air tight in the cap as it can be without preventing

turning

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number or the width of the floats. Either of these changes would
occasion the use of more water under the same head. The first
is the depth of the sins, and the greater is in the number of the floa
and the greater is the width of the floats. The greater is the diam
of the wheel which of the same diameter and the greater is the
quantity of water used under the same head; under a great
head the same power can be obtained with narrower sins and
narrower floats. We believe for practical purposes numbers
not more than ten or twelve feet in diameter including the
floats, but the same principles will apply to larger or smaller
wheels. We think the width of the floats should equal about one
fifth of the diameter of the whole wheel, and the depth of the sins
should equal about one tenth of the same diameter. With these pro-
portions the number of the floats may be adapted to the head
water and the speed required. We think too that where a large
power is wanted it is better to have two small wheels con-
structed according to our plan than one very large one and
should call a very large one one which is more than forty feet in diam-
eter. The wheel should be set into a wooden platform a very
little thicker than the depth of the sins, so that the floats may re
ceive of the water which supports the wheel below and the bars
which support the axis which will be described hereinafter) abov
This platform must be solid and unyielding, large enough to
support the frame, and the space in it where the wheel revolves
must be just large enough to admit it to revolve freely and at
the same time prevent the escape of the least possible quantity
of water. On this horizontal platform the wheel revolves supported
upon a cross bar or beam let framed or bolted to the bottom of the
platform. The end of this cross bar or bearing fastened to this
cross bar. In the model sent herewith the plate intended to
represent the bottom of the flume or the platform is not equal
in thickness to the depth or width of the sins of the wheel; and
the cross bar supporting the wheel is represented by a bar

marked

decreasing friction. The flume may if thought necessary must be caped over and the water introduced into it through it is designed that the flume should be caped to prevent the wheel is in motion and that the wheel should be started by allowing the water to run into the flume. We think it would suit best to be working that the flume may be always just full with water. our wheel if inverted would, if enclosed in a hollow cylinder, well answer the purpose of a very powerful forcing pump.

Witnesses — Jathaniel Bellingham County of Norfolk & State of Massachusetts, Sept 1st 1836. — Moses Darling, Barton Darling, Moses Darling

Drawing

To all persons to whom these presents shall come. Barton Darling and Moses Darling aforesaid would respectfully represent. that they have contemplated the application of the cap used in their wheels before described to keep the pressure of the water from the arms of their said wheel to other upright wheels for the same purpose, that is for keeping the water from pressing upon the arms of such wheels and impeding their motion. And they have invented such a cap as an improvement in such upright wheels and particularly in the cast iron wheel invented and patented by Russel &c.... And the application to the said Russel wheel they make in the following manner. The cap is a plate of cast iron circular and just large enough to be admitted into the inside of the said Russel wheel with a hole in the center of the cap large enough to admit the shaft of the wheel to pass through the said cap. The cap should be fitted as closely to the bottom of the wheel as it can be and allow the wheel to revolve without friction, and it must be supported in its place by bolts from cross bars passing across the flume above the wheel. Another application of their said cap. The said Darling have

invented

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invented which is this. Let the arms of the said Russel wheel be at the top of the same rather than at the bottom, & the shaft be connected with the arms as it would be if they were at the bottom. Then place a cap of cast iron fitted over the top and as close to the upper edge as possible so as to keep out water from the wheel as entirely as possible & allow the wheel to revolve without friction against the cap, & the shaft of wheel passing through the cap. The cap must then be supported by such brace of wooden iron passing across the flume. The wheel so erected must then be let into the bottom of the flume in such a manner as to run. A circular hole is made in the bottom of the flume just large enough to admit the wheel, and the lower edge of the wheel must then be admitted into this hole just enough to prevent the escape of water through this hole except that which comes through the wheel & the orifice should fit the lower edge of the wheel as tightly as possible without friction. The wheel may then run upon a step or bearing resting on a breech tree bolted to the bottom of the flume. The wheel being so placed the water when let into the flume will pass into the wheel and cause it to revolve and then escape through the bottom.

The said Darlings therefore claim as their invention the same as applied to this said wheel and to other applications as specified in the foregoing.

Bellingham aforesaid Sept 23d 1834.

Barton Darling
Aaron Darling

Witnesses
Ellis B. Darling.
Benjamin M. Darling.

2379 words

(Patented April 3. 1835)

(Drawing)