S. N. STEWART.
Water-Mill.

No. 209,143. Patented Oct. 22, 1878.

Fig. 1.

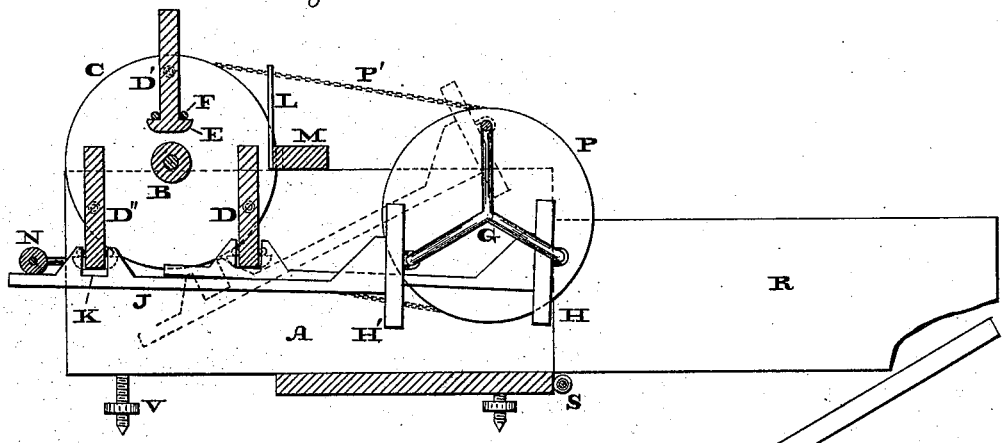
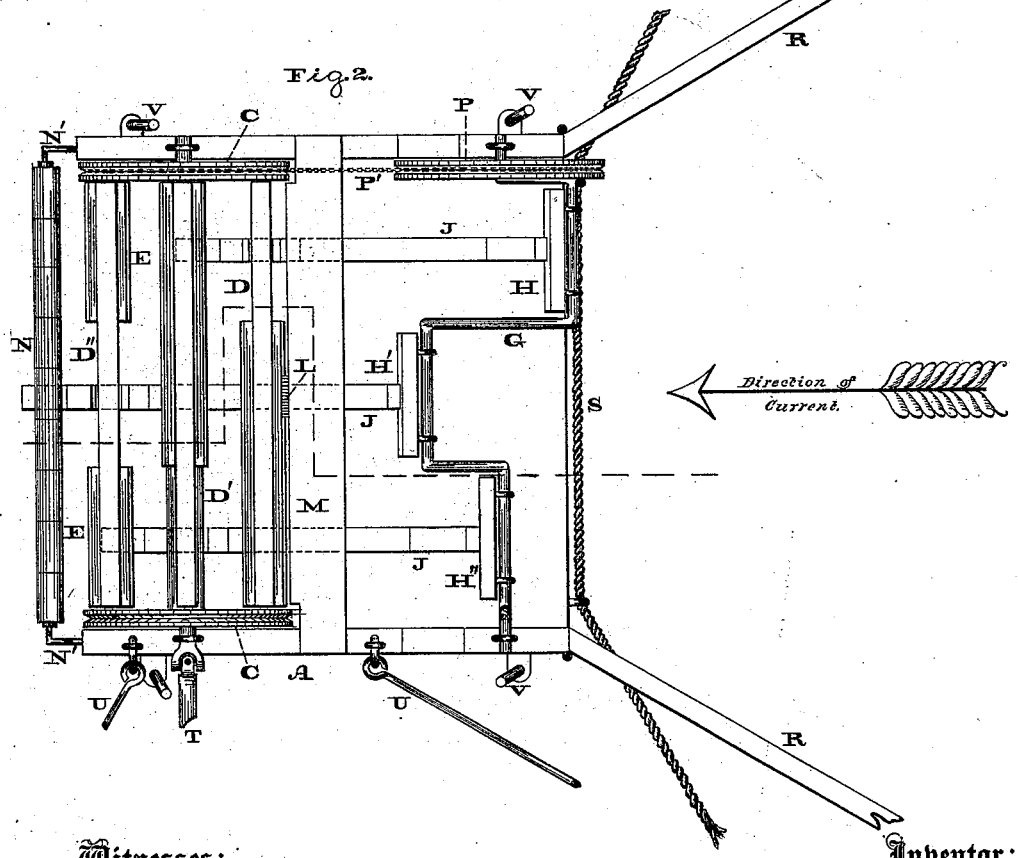


Fig. 2.



Witnesses:

A. P. Grant,

H. F. Kircher

Inventor:

S. N. Stewart,

by John A. Diederich

ATTORNEY.

UNITED STATES PATENT OFFICE.

SYLVESTER N. STEWART, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN WATER-MILLS.

Specification forming part of Letters Patent No. **209,143**, dated October 22, 1878; application filed September 12, 1878.

To all whom it may concern:

Be it known that I, SYLVESTER N. STEWART, of the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Water-Mills, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a side elevation, partly sectional, of the water-mill embodying my invention. Fig. 2 is a top or plan view thereof.

Similar letters of reference indicate corresponding parts in the two figures.

My invention relates to the class of water-mills which are used in running streams, and consists of a crank carrying a series of floats, which are held perpendicular to the action of the water by floating arms, which engage with a wheel from which the power is communicated to the shore or other place of service.

It also consists of float-boards on the power-wheel which are held vertical by the action of the floating arms.

It also consists in providing the float-boards with fenders, whereby they will only engage with the respective or proper floating arms.

It also consists in weighting the float-boards by means of metal rods or bars, which also brace said boards and prevent warping thereof.

It also consists in combining with the sluice-box means for anchoring and holding the same.

It finally consists of the combination of parts to form an improvement in water-mills.

Referring to the drawings, A represents a sluice or box on which is transversely mounted a horizontal shaft, B, carrying a wheel, to the heads C C of which are pivoted float-boards D D′ D″, which are equidistant from each other and from the center of the shaft B.

The bottoms of the float-boards are formed with fenders E, consisting of angularly-projecting strips or pieces of wood or other material, slightly rounded on their lower faces, and extending transversely on said boards. The bottoms of the boards are also weighted, metal rods F being employed therefor, and furthermore serving to brace the boards and prevent warping thereof.

G represents a triple-crank shaft which is mounted on the sides of the sluice or box A, and H H′ H″ represent floats which are journaled on the transverse portions of said crank, and equidistant from each other, the throw of the floats being equal to the throw of the float-boards D D′ D″. To each float H is firmly connected an arm, J, which extends longitudinally, or in the direction of the stream, and has near its free end a notch, K, which opens upward.

L represents a rod or bar, which is secured to and rises from a cross-piece, M, supported on the sluice or box, and so arranged that the float-boards D D′ D″, during the rotation of the heads C C, will strike thereagainst, and thus be guided vertically and prevented from overturning.

Rollers N are mounted on a rod, N′, whose ends are secured to the box or sluice A, and arranged at what may be termed the rear of said box in such position that the arms J are directed against them for causing the disengagement of said arm from the float-boards D D′ D″.

To the crank-shaft G there is keyed or otherwise fixed a pulley or wheel, P, around which passes a chain or belt, P′, which also passes around one of the heads C, and, if desired, a pulley or wheel, P, may be secured to both ends of the crank-shaft, and two chains or belts, P′, employed, one for each pulley and head.

To the sides of the forward end of the sluice or box A there are pivoted vertical floats or wings R, and at said end there is also connected a rope or chain, S, which passes freely through rings or staples secured to the sluice or box, one end of the rope or chain being attached to a windlass on shore and the other end connected to an anchor well out in the stream.

T represents a connecting-shaft, which is attached by a knuckle or universal joint to the shaft B or journals of the wheel or heads C C, and likewise, in the same manner, to a shaft on shore; and V represents rods, which extend from the sluice to the shore.

At two or all of the corners of the sluice or box A are fitted vertical screw-rods V, which are adapted to rest on the bed of the stream, and they are provided with heads or stops for limiting the extent of penetration in muddy

beds. Sufficient weight is permitted to rest upon the rods to assist in preventing the mill from surging or pitching from the motion of the current or waves, the mill being supported in a measure by the rods as well as by flotation.

The operation is as follows: The mill is placed in a running stream with the journals of the crank-shaft G at the water-line. One of the floats—say H—being partly immersed, receives the force of the current, and is held nearly vertical by the floating arm J, to which motion has been imparted, and the mill is started. The float-board D, having its edge in the notch of the arm J, is carried forward by said arm; and is also struck by the current, and during its passage through the water is held nearly vertical by said moving arm J. This arm is then stopped by coming in contact with the rollers N, or thrown off thereby from the board D, which, however, continues its motion.

The board D′ is, by means of the rod L, guided vertically into the water, and enters the notch of the arm of the float H′, and is moved through the water similar to the floats D H. The other float-boards, floats, and arms act in turn in the same manner, and thus a continuous motion is imparted to the wheel or heads C C and the shaft B by the impact of water upon the floats as they successively dip into it, the power being transmitted to the shore or place of service by means of the connecting rod or shaft T, or a band passing from a wheel or pulley placed at a right angle to and actuated by the wheel or heads C.

The fenders E are of such dimensions transversely, or so located on the float-boards, that each board can only engage with its respective arm J, as said fenders are wider than the notches, and thus prevented entering the notches, whereby each arm will properly engage with its own float-board. The rods or spars U are pivoted concentrically with the shaft T, so as to hold the mill at proper distances from the machinery on shore, so that the rise and fall of the stream will not affect nor interfere with the transmission of power from mill to shore.

The bearings of the floats, rollers, &c., may rest on metallic linings or bushings screw-threaded on their outer surfaces.

The wings R will be opened flaring, so as to increase the current of the stream, and they may be folded against the sluice or box A when not required for use. When opened or spread they will be held by rods, bars, &c., in any suitable manner.

The means of holding the mill in the stream will be adjusted relatively to the change of tide or rise or fall of the stream. The float-boards may be held in vertical positions by being pivoted a little above their centers. As the water rises and falls the sluice moves along the anchoring-rope S. The rods or spars U serve to draw or push out the sluice. Boats, casks, &c., may be attached to the sluice to increase the buoyancy.

In order to stop the mill the arms J are forced down, by any proper means sufficiently to clear the float-boards, and a brake is applied to one of the wheels or heads.

Proper boxes, collars, &c., will be applied to the various shafts, &c., and, if desired, a power or balance wheel may be secured to an end or ends of the shafts G or B.

The heads C C may be in the form of spokes or otherwise constructed, and the number of floats, float-boards, and arms may be increased or diminished; but two of each will be the minimum number in order to impart continuous motions to the shaft B.

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

1. The sluice or box A, in combination with the floats H H′, mounted on a crank-shaft and carrying floating arms J, substantially as and for the purpose set forth.

2. The wheel or heads C C, carrying float-boards D D′, in combination with the floating arms J, with notches K, and the throw-off N, substantially as and for the purpose set forth.

3. The float-boards D D′, provided with fenders E, in combination with the floating arms J, substantially as and for the purpose set forth.

4. The floats provided with weighting and bracing rods or bars F, substantially as and for the purpose set forth.

5. The sluice or box A, in combination with the rods V and the anchoring chain or cord S, substantially as and for the purpose set forth.

6. The sluice or box A, with wings R R, floats H H′, crank G, wheel P, arms J, float-boards D D′, shaft B, and hold-off rods or spars U, substantially as and for the purpose set forth.

SYLVESTER N. STEWART.

Witnesses:
ROBT. M. HOOPER,
DAVID T. S. FULLER.

Correction in Letters Patent No. 209,143.

It is hereby certified that in the original specification on file in the Patent Office the reference letter V, in column 2, line 45 of the printed specification herein contained, is U.

December 7, 1878.