

UNITED STATES PATENT OFFICE.

PIERRE FRANÇOIS MILLOT, OF PARIS, FRANCE.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 57,831, dated September 4, 1866.

To all whom it may concern:

Be it known that I, PIERRE F. MILLOT, hydraulic engineer, of Paris, in the Empire of France, have invented certain Improvements in Water-Wheels, of which the following is a specification.

This invention relates to that class of water-power wheels usually known among mechanics as "overshot" and "breast" wheels; and has for its principal object the easy introduction into and the economical retention of the water on the buckets, and at the same time the securing of such a construction of the wheel as, while fully securing these advantages, to also insure the requisite strength and stability of the parts.

Figure 1 of the accompanying drawings is a side view of the wheel and its accompanying parts, partly in section. Fig. 2 is a vertical section on a plane passing through the center of the axis of the wheel. Fig. 3 is a horizontal section on a plane which passes through the center of the axis of the wheel. In both Figs. 2 and 3 some of the parts through which the planes of section pass are represented entire for the convenience of illustration. Fig. 4 is a detail view in vertical section transverse to the axis of the wheel, showing certain modifications in the form of buckets or floats, and also some peculiarities in the construction of the sluices by which the water is led onto the wheel. Fig. 5 is a detail view, partially in section, on a plane passing through or near the axis of the wheel, and designed to show more clearly the mode of attaching the arms to the buckets, which form, in part, the rim or crown of the wheel, and it also shows in dotted lines a proposed modification in the construction of the rims or annular rings which are attached to the ends of the buckets. Fig. 6 is also a detail section transverse to the plane of Fig. 5, and on a plane passing through the center of the latter-named figure. Figs. 7 to 13 represent different modifications in the forms of the buckets.

In constructing this wheel a shaft, *b*, of any ordinary and suitable construction is first provided, and upon this shaft two hubs or flanges, *H H*, are firmly secured, said hubs or flanges having inclined sockets to receive the inner ends of the arms *B B*, the construction of the

hubs or flanges *H H* and the arms *B B* being such that the said arms will meet, or nearly so, at the middle of the inner edges of the buckets or floats. I prefer to unite the arms *B* to the arch of the wheel by means of cast-iron sustaining-buckets *F'*, made much stronger than the intermediate buckets *F*, and provided with sockets or flanges *f*, to receive the outer ends of the arms *B*, though other modes of uniting the arms to the crown may be adopted.

The buckets *F'* and *F* are secured between two annular rings, *A*, in any suitable manner known to millwrights, and an inner sheathing, *b*, covering only a small portion of the inner edges of the buckets at the middle, is attached to the buckets between the arms. The object of this sheathing or lining is chiefly to retain the water in the bucket at the moment of admission, though it unquestionably also strengthens the wheel. With the exception of this lining the buckets open freely into the atmosphere, both at the inner and outer edges, the design being to introduce the water from inside of the crown and discharge it at the outside. This is accomplished by introducing two spouts, *E E*, from the fore-bay or flume into the interior of the wheel, in the manner shown in Figs. 1 and 3, or the same thing may be accomplished, and perhaps quite as well, by placing the fore-bay or flume on the other side of the wheel and bringing the spouts in over the shaft, in which case the course of the water from the fore-bay to the buckets can be made in more direct line. When, however, the fore-bay is located on the side of the wheel on which the water is received, the introduction of the water may be somewhat facilitated by flaring the inner edges of the rims *A*, as indicated by dotted lines in Fig. 5.

The construction of the frame-work of the wheel not only supports the buckets in the center and gives the utmost facility for introducing the water into the interior of the crown of buckets, but it has the further advantage that it strongly braces itself at the same time, though in very small wheels this last feature is not indispensable, and such wheels may be constructed with a single set of radial arms connecting to the buckets at the middle of the latter.

Fig. 4 shows more clearly the manner in which the water is laid onto the wheel, and it

also shows certain modifications in the form of the buckets for the purpose of utilizing whatever shock there may be in the entrance of the water to the bucket, and retaining the water at a more uniform level. In this figure each sluice is represented as having two gates, G and G', with a dividing-plate, E'', between them, the gate G discharging the water from the surface like a weir, and the gate G' discharging water under pressure. This allows two buckets to be receiving water at the same time, and consequently the bucket can be more gradually filled and the water delivered in thinner sheets.

An apron, *a*, is placed between the wheel and the spouts from which the water is received, at the lower side of the lower spout, leaving just sufficient room between the apron and the wheel to allow the latter to turn freely. This apron *a* extends down below the center of the shaft of the wheel, its object being to retain the water upon the wheel. The rims A are also made to project inward beyond the bucket, as shown at *c*, to prevent the lateral escape of the water by overlapping the end of the spout.

The gates may be operated simultaneously by gearing, as indicated in Figs. 1, 2, and 3, and instead of the double gates G G' single ones, *c c*, (indicated in Figs. 1 and 3,) may be used in some cases.

In Fig. 4 the buckets are formed with ridges or undulations which gently break the shock of the water on its entrance into the wheel, and prevent its dashing so deadly against the outer and more perpendicular section of the bucket. They also, by their inclined form, utilize the effect of the shock.

Figs. 7 to 13, inclusive, represent different forms of buckets adapted to different circumstances and occasions, and to be either of them employed, according to the judgment of the millwright in each particular case. In Fig. 12 these buckets are represented as being formed by combining simple inclined boards with the outer sheathing, openings being made through the latter at *g g* for the discharge of the water.

The construction of the other forms will be entirely obvious from the drawings.

The water may be laid onto the wheel at various proportionate heights, according to the case, but should generally be above the center. In cases where a longer face of buckets is required than would be economical in a single wheel, on account of the difficulty of properly regulating the supply of water to all parts of the bucket, two or more wheels may be hung upon the same shaft.

I claim as my invention—

1. The combination of a series of buckets, open internally and externally, to receive the water internally, in the manner described, upon each side of the arms and discharge it externally, and a series of arms attached at or near the middle of said buckets, to allow the water to be introduced on both sides of them, and connecting said buckets to the shaft, as set forth.

2. The combination of a series of buckets, open as aforesaid, to receive water internally and discharge it externally, with the shaft of the wheel and the arms B B, the said arms B B being set at an angle to each other, converging from points separated and distant from each other at the inner end to the middle of the bucket, as set forth.

3. The arrangement, in combination with a wheel adapted thereto, of two separate spouts in such a manner as to discharge water into the interior openings between the buckets on each side of the arms of the wheel, substantially as described.

4. The combination, with the internally and externally open buckets, to receive the water internally and discharge it externally, as described, of the projecting flange *e* to retain the water on its entrance into the buckets, as set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

PIERRE FRANÇOIS MILLOT.

Witnesses:

L. RICHARDS,
E. SHERMAN GOULD.