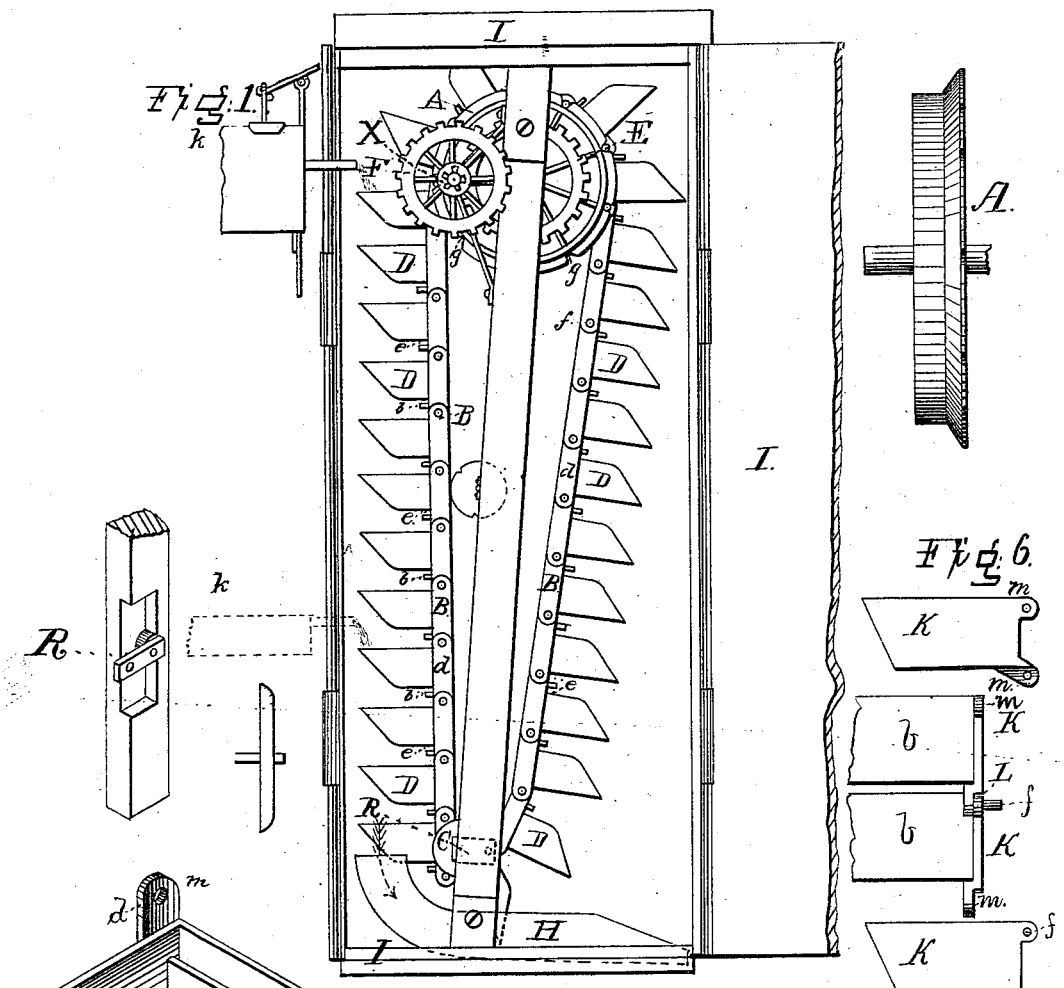
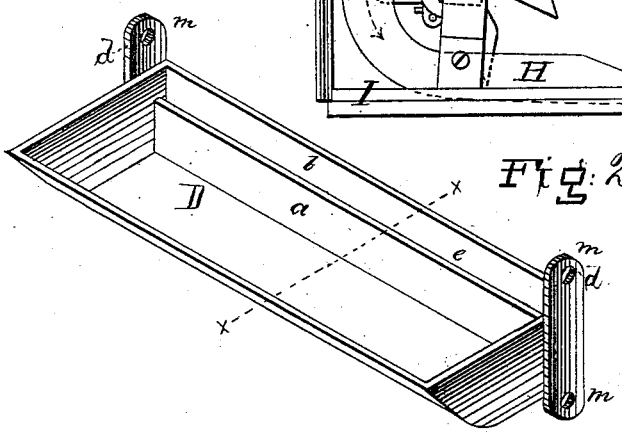
2 Sheets—Sheet 1.

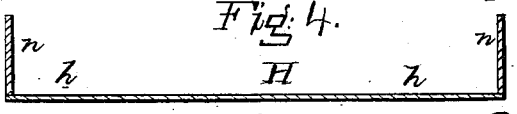
S. L. ROSE.

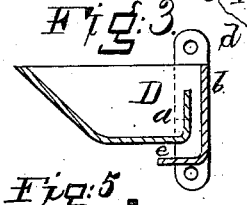
OVERSHOT WATER-WHEEL.

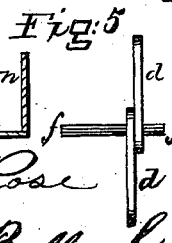
No. 192,286. Patented June 19, 1877.

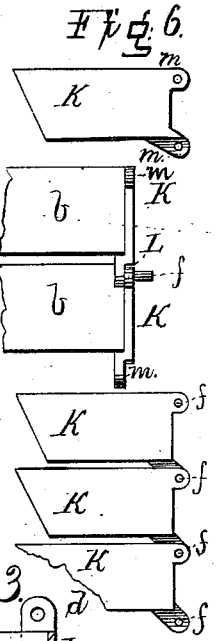












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2 Sheets—Sheet 2.

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OVERSHOT WATER-WHEEL.

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Fig. 7.

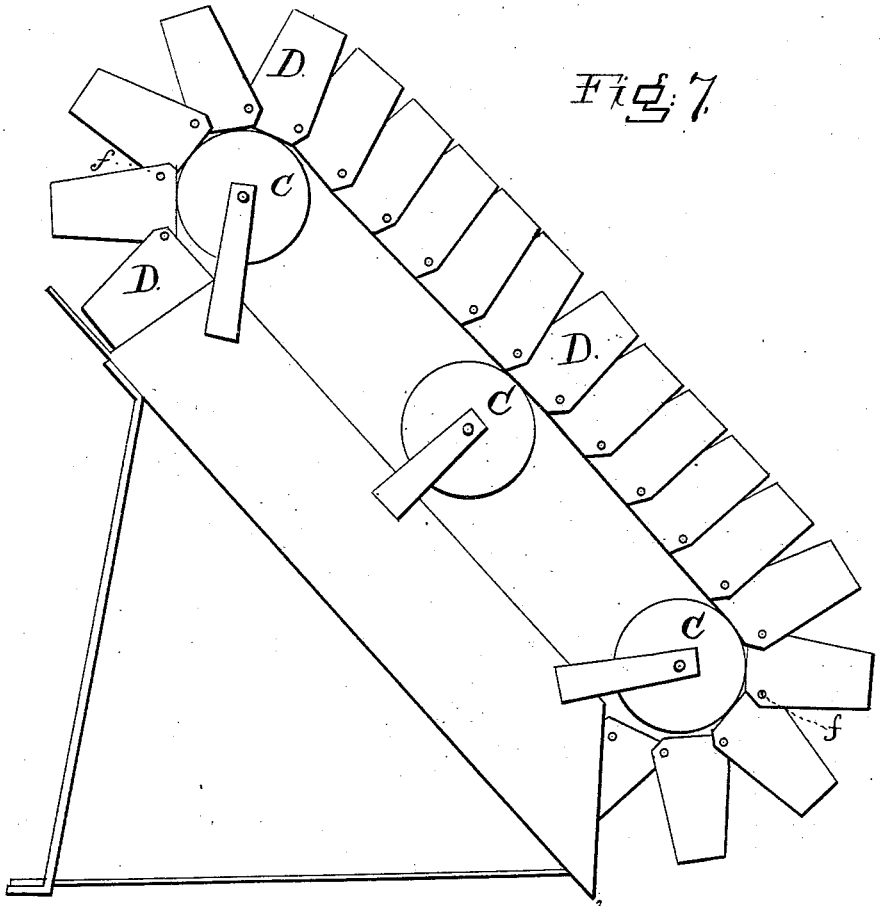
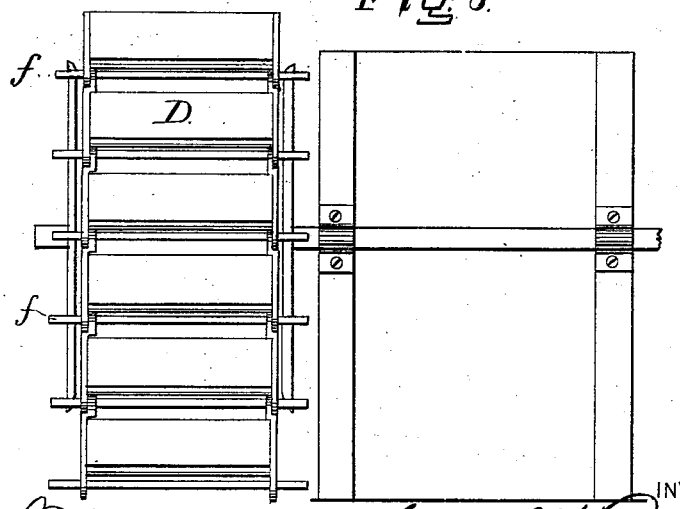


Fig. 8.



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UNITED STATES PATENT OFFICE.

SAMUEL L. ROSE, OF ROSE GROVE, IOWA.

IMPROVEMENT IN OVERSHOT WATER-WHEELS.

Specification forming part of Letters Patent No. **192,286**, dated June 19, 1877; application filed June 12, 1877.

To all whom it may concern:

Be it known that I, SAMUEL L. ROSE, of Rose Grove, in the county of Hamilton and State of Iowa, have invented certain new and useful Improvements in Water-Wheels, and in the use and application of power; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to water-wheels for driving machinery, such as mills, factories, &c., and using advantageously power upon such wheels, and taking off and applying such power to drive-wheels and gearing, and described more particularly hereinafter.

Figure 1 is a perspective view of the wheel in combination. B B is an endless chain of buckets. A is a pulley, over which B B works, propelling A and E. C is a small pulley, under which B B works. E is a drive-wheel on shaft of pulley A. X is a pinion on shaft of spur or gear wheel F. F is a spur or gear wheel propelled by E, acting on X. D D are buckets in B B. R is an articulating-arm, receiving journal of pulley C. H is the tail-race chute.

Fig. 2, D is a bucket detached from endless chain. *a* is its back. *b* is a false back. *e* is a passage between back and false back, for overflowing water; *d d*, links in endless chain; *m m m*, perforations to receive rod *f*.

Fig. 3 is a transverse section of bucket D. *a* is back of bucket. *b* is false back; *e*, passage for overflowing water.

Fig. 4 is a transverse section of tail-race chute. *h h* is the bottom. *n n* are the vertical sides.

Fig. 5 is the joint formed by links *d d* and rods *f f*.

Fig. 6, K is a bucket-head used as a link. L is a rear view of buckets and the joint formed by bucket-heads K K, used as links with rod *f*. K K K is a section of the endless chain of buckets where bucket-heads are used as links, with perforations *m m* for rod *f*.

This joint brings the buckets close together, saves loss of fall at the head, prevents buckets tipping forward, and carries down a more solid column of water, and effectually prevents all slopping or surging over of water.

The back *a*, false back *b*, and passage *e* are retained and used in this bucket, substantially as when link *d* is used.

I I I is a case surrounding the wheel, thrown open for view, and represents in suitable extension a case to inclose and protect wheel when in position within or outside a building.

The wheel consists of an endless chain of buckets, and power is received from water discharged into the buckets D D D in the descending column of buckets, which is communicated to pulley A by means of rods *f f*, passing the whole length of buckets D D D, and which are also used in connecting the buckets, thus forming the endless chain of buckets.

The rods *f f* may pass through the heads of the buckets, so made as to constitute not only bucket-heads, but also links in the endless chain of buckets, or by the other mode shown in the drawings, of independent metallic straps or bars *d d d* for links may be adopted, to which the buckets may be attached, and through which links *d d* the rods *f f* may pass. The rods are to be long enough to project to and fall into the notches *g g* in the flange of the periphery of pulley A, by which notches the rods and endless chain of buckets are prevented from sliding on the pulley. The links (or heads of buckets used as links) should run within and a little below the peripheries of pulleys A and C, which pulleys are chamfered on their inner peripheries to guide the endless chain to its proper position on those pulleys.

Power is given off to gear-wheels by means of drive-wheel E, working on the pinion X (on shaft of gear or spur wheel F) by means of cogs or teeth, as shown in drawings.

Drive-wheel E on pulley A is to be of so much less size in diameter than pulley A that the buckets in the descending column of buckets, when loaded, will nearly or quite equal in weight all the remainder of the chain of buckets and pulleys A and C and drive-wheel E, which are in rear of the point of bearing of said drive-wheel E upon pinion X on shaft of gear-wheel F, so that if said pinion were held stationary the loaded portion of the end-

less chain of buckets would balance, or nearly balance, all the remainder of the endless chain of buckets and pulleys A and C and wheel E.

By this location of said pinion X nearly all the weight of the loaded and empty portion of the endless chain of buckets (when loaded) and of pulleys A and C and wheel E are borne by said pinion X and its journal, and friction of the bearings of the journal of pulley A is reduced by the amount of relief from weight thus afforded, while no more weight is thrown upon pinion H and its journal than is required to propel it. By this means the weight of the whole wheel is thrown upon pinion X when so much force may be required to drive it.

For the full effect of this arrangement of location of the said pinion X and drive-wheel E and connecting-wheels, similar drive, pinion, and gear wheels should be used at both ends of pulley A, for the purpose of taking off power, as shown in front.

Drive-wheel F, as shown, is perhaps too large proportionally for the size of pulley A, and, if it is so found in practice, may be reduced; and said pinion may, if required, be increased in size. It is not claimed that the drawings in all cases show the exact proportions, but near enough to illustrate improvements.

Articulating-arms to receive the journals of pulley C are shown, and are used to allow the pulley C to accommodate itself to the somewhat irregular and constantly-varying vertical shortening and elongation of the chain, or its bearing at the rods upon the periphery of pulley C, as well as a more permanent contraction and expansion from changing temperature, as well as from possible or probable wear.

Instead of these articulating-arms a slot may be used, in which such journal may play upward and downward, its weight being borne by the chain.

The tail-race chute H consists of a trough, closely fitting to the buckets as to width and depth and in its bottom to their circular sweep, so that as the water is poured from the emptying and reversing buckets it will be held above and behind such emptying and reversing buckets, and thus, by its weight and current, propelling the buckets so long as they remain in and are passing through the tail-race chute, and until they rise from the water as a part of the column of ascending buckets. By this arrangement the entire fall is utilized.

The bucket D, as shown in Fig. 2, is of any desirable length, depth, and general capacity. The back *a* is lower than the ends and front, so that in starting water may flow over and between back *a* and false back *b*, which serves as a guide and conductor to the overflowing water through passage *e* into succeeding or lower buckets in the column, until enough are loaded to move the wheel, after which the buckets will severally be loaded from the spout *k*.

Pulley C should be as small as practicable in the diameter of its heads, so that they may receive upon their peripheries a proper bearing of rods *f f*, in order that the buckets in the endless chain of buckets may not begin to reverse until as low as practicable, and then reverse and empty suddenly.

The tail-race chute shown in Fig. 4 should be made to closely fit the buckets in the horizontal bottom and vertical sides, and also in its circular concavity closely conforming to the sweep of the buckets in the curve of the endless chain around pulley C, by means of which the emptying and reversing buckets pass in close proximity to the bottom and sides of the chute, driven by the descending and flowing water emptied from the buckets. The joint to connect buckets into endless chain is shown in the chain of buckets, and more in detail in Fig. 5. The form used where bucket-heads constitute links in the chain is shown in Fig. 6.

The endless chain of buckets may extend above high-water elevation, and power be taken off in the attic, or at any given elevation above or below the point where water may be received upon the wheel. Power may be taken off in the same manner as by pulley A and gearing, or in other usual modes of gearing.

Pulleys, drive-wheels, pinions, and other gear-wheels may be of any size found most desirable in practical use.

The spouts *k k*, as shown on drawing, are intended to illustrate the method of receiving water upon the wheel or chain of buckets at any practical or desired elevation.

I I I, as shown in the drawings, represents a case surrounding the wheel, thrown open to view.

A metallic or other water-tight case may surround the wheel in actual use, protecting it from frost, and preventing dampness in the building where used, and around or into which heated air or steam may be conveyed, if found necessary on account of ice.

This wheel or endless chain of buckets may be used in an inclined trough or flume-spout as an inclined plane, which trough shall closely fit the buckets, so as to restrain and be propelled by the descending water acting upon the buckets from the time received at the more elevated portion of the endless chain of buckets until discharged at the tail-race chute, the ascending and empty portion of the buckets returning parallel, or nearly so, to the descending column, and all supported, if necessary, by pulleys, beams, or travelers, within or upon the deck of the trough or spout, or independent rails with pulleys for guiding and taking off and giving off power, similar to those shown in drawings.

This endless chain of buckets may also be used as a current-wheel by being placed horizontally between floats or fixtures properly supported and borne, both as to lower and upper sections of the chain, and may have such practical extension as may be found practicable or desirable for power, and the same or similar or other pulleys and wheels, to guide, receive, and communicate power, may be used, as before described.

This endless chain of buckets may also be used upon pulley or pulleys, as shown, upon a shaft for the same, extending over or through a natural or artificial wall and in front of a natural or artificial fall of water, and receiving its power from such natural or artificial water-fall, properly regulated as to quantity by meters or gaged spouts, and giving off power so received from that portion of the shaft extending within the wall.

The inner surface of the peripheries of the heads of pulleys A and C are to be chamfered, as shown, so as to guide the endless chain of buckets to its proper position on the pulleys.

Rods *f f* are to be held in position by keys, burrs, or other convenient mode. These rods may be made of iron or any other metal found most economical and serviceable for that purpose.

The joint L in Fig. 6 is formed by the heads of buckets D and rod *f*.

K is the head of the bucket. *m m* are perforations, through which rods *f f* pass. K K are the bucket-heads, with the lower lug turned in and down, so as to form a smooth or plain joint on the outer surface when connected in the endless chain of buckets. This makes a strong connection without the intervention of independent links, or bolts, rivets, or other means to fasten the bucket to an endless chain formed of independent links. This necessitates strength in the bucket-head, which may be either cast or wrought, and thicker and stronger in the part requiring more strength, which may be provided for in the molding and casting if cast, or in pressing or rolling if wrought, or, if light plate is used, by folding to more than one thickness that part of the bucket-head requiring most strength, or otherwise, as practice may suggest.

By the form of a bucket being as flat as practicable buckets may be more shallow, brought nearer together, and receive their several supplies of water in close succession to each other, thereby saving head and fall, making a more solid column, and by slight vertical contact keeping upright until reversed.

Water may be received from the flume or source of supply by lowering instead of raising the gate, and the conducting-spout (if one is needed and intervenes) may or not, as preferred, be attached to and sink with it or independent of it; or lower gates or spouts, in succession, may be used, as the head of water may decline, by which the water may be used at all times from its highest head or source of supply to the wheel.

I claim as my invention—

1. The bucket D, having back *d* lower than ends and front, and false back *b*, by which water flowing over the back *a* will be guided and conducted by false back *b* into the bucket below, substantially as described and set forth.

2. The rods *f f* for connecting the links, or heads of buckets as links, in the endless chain of buckets, having projecting ends engaging with the notches upon pulley A for propelling said pulley, substantially as described, and for the purposes set forth.

3. The buckets having the eyes *m* projecting back from the top and bottom of the heads of the buckets, in combination with the rods *f f*, passing through said eyes to form the chain, substantially as described, and for the purposes set forth.

4. The tail-race chute H, curved and inclined, as shown, closely confining the water to the lower end of the chain of buckets during its passage around the lower pulley C, substantially as described, and for the purposes set forth.

5. Articulating-arms R, to accommodate the irregular and varied motions of pulley C, substantially as described, and for the purposes set forth.

6. The small pulley C, in combination with and secured to vibrating arms, by which the endless chain of buckets is held vertical and steady to and in the tail-race chute, and emptying-buckets suddenly reversed, as described, and for the purposes set forth.

7. The chamfered pulley C, in combination with chamfered pulley A, constructed as described, by means of which the endless chain of buckets is guided and inclined to its proper position upon those pulleys, as described, and for the purposes set forth.

8. In combination with the chain of buckets, the pulley A, wheels E and F, and pinion X, all so arranged by reason of the greater weight of the power side of the chain that the friction is principally transferred to pinion X, substantially as shown, and for the purposes set forth.

9. In combination with the chain of buckets, two or more power-transmitting pulleys, A, with their trains of gearing, as shown, whereby the power may be taken from different points of the height of the chain without the use of vertical shafting, substantially as described, and for the purposes set forth.

10. The combination, with the flume, the gate opening downwardly, and having the discharge-spout attached to its upper part, whereby the water is taken from its highest elevation, substantially as described, and for the purposes set forth.

11. The application and use of the endless chain of buckets as a current-wheel, as described, and for the purposes set forth.

12. The wheel composed of the chain of buckets, constructed as described, having but a single bearing upon the power transmitting shaft passing through the wall of the building, said shaft having an interior bearing within the building, as shown and described, and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

SAMUEL L. ROSE.

Witnesses:
GEO. W. BALLOCH.
GEO. S. BALLOCH.