"The Potsdam Red Sandstone Company's Water Wheel"

In *Scientific American*, Vol. LXVIII, No. 3, pp. 37-38
January 21, 1893

(Note: Starting on the next page, you will find images of the article; and on the following pages, you will find a transcription of the article.)

This article, which begins on the next page,
is presented on the Stone Quarries and Beyond web site.
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October 2012

SCIENTIFIC AMERICAN

(Entered at the Post Office of New York, N. Y., as Second Class matter. Copyrighted, 1898, by Munn & Co.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXVIII.—No. 3. ESTABLISHED 1845. NEW YORK. JANUARY 21, 1893. $3.00 A YEAR. WEEKLY.

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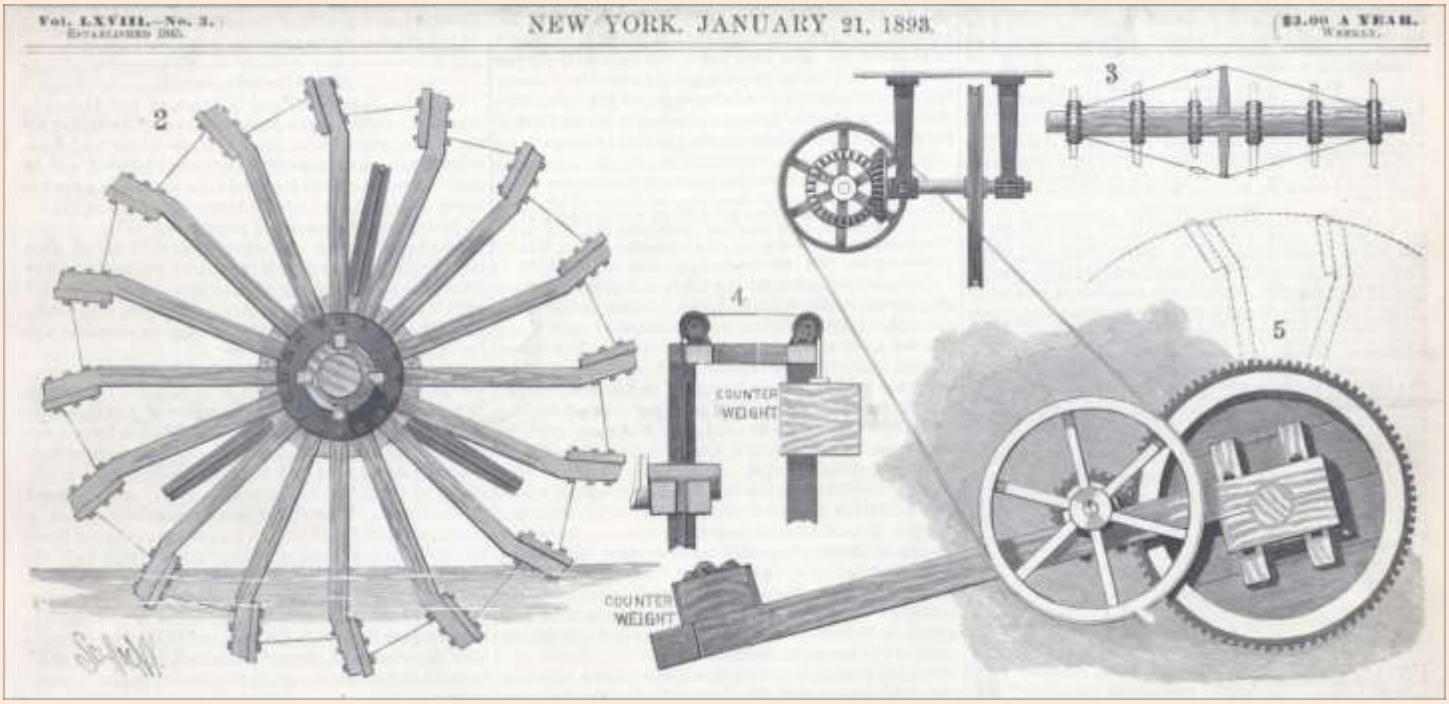

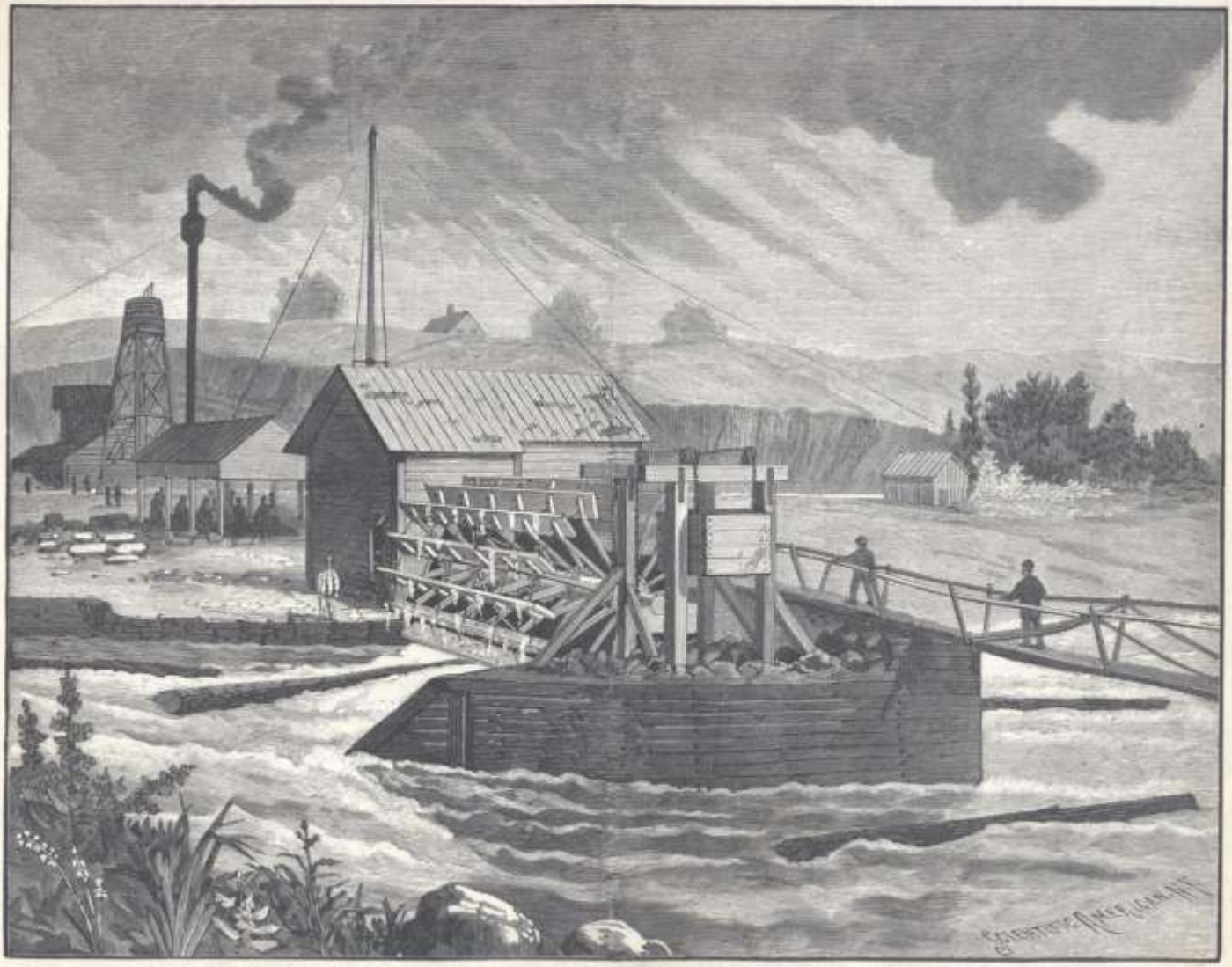

1. General view of wheel and outer counterpoising. 2. Side and view of wheel. 3. Bracing of wheel shaft. 4. Counterpoising. 5. Adjustment for varying water level.

ADJUSTABLE UNDERSHOT WATER WHEEL FOR VARYING WATER LEVEL, OF THE POTSDAM RED SANDSTONE CO.—[See page 38.]

THE POTSDAM RED SANDSTONE COMPANY'S WATER WHEEL.

In a recent issue of this paper we illustrated the Potsdam stone quarries of this State. In one of the cuts a water wheel was shown, to which we alluded as employed for developing power for running the machinery of the works. This wheel was designed by a member of the firm of the Potsdam Red Sandstone Company. Its simplicity and efficiency entitle it to consideration, independent of the fact that the position in which it is placed involves special difficulties in operation. The river on which it is located is subject to freshets and varies at times greatly in the level, in the spring sometimes rising 6 feet. The stream is also used for logging, 200,000 logs passing down it in a season. These sometimes jam, and quantities of the logs strike the wheel and pass under it, the wheel rising to let them pass. The wheel has been in operation for several years, yet in all this time it has never broken a paddle.

The wheel proper is an undershot wheel of the simplest possible construction. The hubs or flanges for carrying the arms are keyed to the shaft, as shown in the cut, Fig. 2. To further stiffen the shaft, three struts are placed equidistant around its center, over which tension rods with turn buckles are carried, as shown in this view and also in Fig. 3. The wheel is destitute of framing to take up twist. In place of such framing a wire rope is carried spirally half way around the wheel, just inside the paddles, to which it is fastened. This compels the end of the wheel next the gear to keep up with the other end. The rope is found to answer the purpose perfectly.

The shaft of the wheel is made of rock elm, and is 24 inches in diameter. At the ends it is trimmed down for journals, and over the portion thus reduced in thickness pieces of 15 inch iron pipe are driven. The outer portion thus treated forms a journal two feet long; the inner portion is 6½ feet long. The wheel is 18 feet in diameter and 41 feet long. The paddles are 20 inches wide and of the full length of the wheel, each being in one piece. The arms are of 4x7 inch water elm.

The wheel axle is carried on trunnion blocks made of timber 20 inches square. The trunnion blocks are suspended by ropes, which, passing over pulleys in a stationary frame rising above the top of the wheel, terminate in counterweights, thus supporting the weight of the wheel. Everything now is in condition to keep the wheel at the same level as regards the water, whether it rises or falls. In the large engraving the trunnion block and counterweighting arrangement for the outer end of the wheel shaft is shown. A similar mechanism is contained within the house for the other end of the shaft. In Fig. 4 of the sectional drawing the arrangement of counterweighting is shown more in detail.

The end of the shaft is carried into the house and on it a gear wheel 10 feet in diameter, with teeth of 2½ inches pitch, is placed. It is obvious that as the wheel rises and falls this gear wheel will, of course, do the same. The arrangement shown in Fig. 5 is for the purpose of enabling it, in spite of the changing of position, to operate a fixed countershaft. A wooden frame of heavy timber has one end journaled upon the shaft, so as to inclose within itself the 10 foot gear wheel. On the same frame a 10 inch gear wheel engaging with the larger one is journaled. This gear wheel turns a 5 foot band wheel attached to its own shaft. From the band wheel a belt goes to a fixed band wheel near the ceiling, which, by miter gearing, turns a grooved rope pulley for the power-transmission cable. On the further end of the frame a box is placed to receive material for proper counterweighting. This counterweight keeps the belt stretched. An examination of Fig. 5 of the cut will explain the entire arrangement. As the water wheel rises and falls, the counterweight executes the reverse movements. The 12 inch gear wheel and 5 foot band wheel change in position a little as these movements take place, but the counterweight keeps the belt always stretched, and the two gear wheels are always at a fixed distance from each other, as they are both attached to a rigid frame. The grooved sheave for the transmission rope is 10 feet in diameter, and normally runs at 200 revolutions per minute. The gear wheel on the end of the shaft is of wood with iron segments bolted on, and is of 8 inch face, as is also the 10 inch pinion with which it engages.

The fastest speed of the wheel is thirteen revolutions per minute, its lowest speed is six revolutions. It has developed as much as 200 horse power. The total expense, including pulleys, belting, shafting, and wire rope for transmission, was $2,500. The gear and all the parts have worked perfectly without noise or wear. It was built by regular employes of the Potsdam Red Sandstone Company.

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