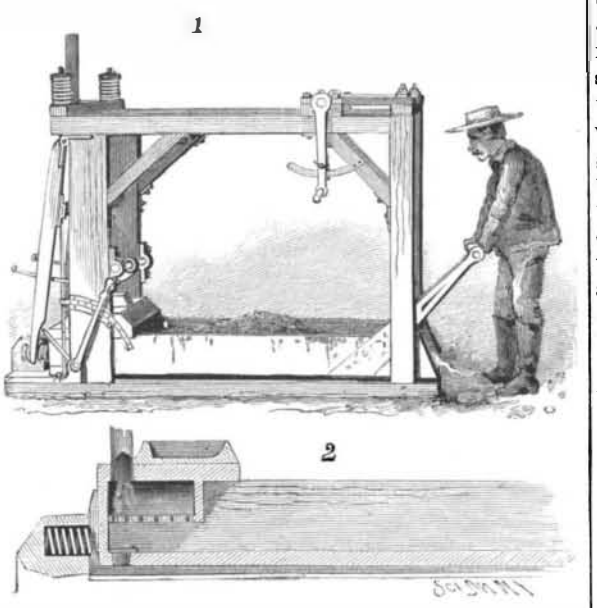
AN IMPROVED ORE WASHER.

A machine designed to facilitate the cleansing and separation of ores is shown in the accompanying illustration, and has been patented by Mr. Frederick C. Miller, of No. 136 East Tenth Street, Leadville, Col. A box-like washing table is suspended in a suitable frame, by two pairs of perpendicular rods, one pair at each end of the frame. The table is normally held very nearly level, its upper end, where the water box is located, being only about two inches above the other end, while the height of the lower or tail end, at which are the handles for working the machine by hand, as shown in Fig. 1, may be adjusted as desired. This is effected by attaching the suspension rods at this end to the outwardly extending arms of a crank on a rock-shaft journaled in the top of the frame, a rack being provided to hold the lever in adjusted position. The suspension rods at the head end of the table have coiled springs around their upper extremities, to impart to the table as it is operated a quivering motion. The base of the frame, at this end, has a buffer block, in a recess in which is a coiled spring. The water box, connected with a water supply tube, has a perforated bottom, as shown in Fig. 2, and beneath the water box, at the upper end of the table, is a series of valved openings, to be closed by plugs or otherwise. When the ore has been sufficiently washed, it is permitted to pass through these openings beneath a spray of water. Upon a cover plate of the table, over the water box, is a rectangular recess or coping, one side of which is adapted to be engaged by a curved arm, or cam shaft, integral with a drive shaft, when the machine is operated by power. The other side of this recess is engaged by the lower end of a spring arm, engaged by levers, actuated by crank arms integral with a shaft journaled in the base of the frame. An upwardly extending arm from one end of the shaft engages a rack at one side of the frame, whereby the tension of the spring arm may be increased or diminished. As the table is oscillated, either by hand or power, the motion and the reaction of the spring at the upper end tend to throw the heavy particles of ore in that direction, while the light or waste particles are carried out by the water at the lower end.



MILLER'S ORE WASHER.

BREAST WHEEL FOR LIFTING WATER INTO THE MORRIS CANAL.

The accompanying illustrations show the machinery used for supplying one of the summit levels of Morris Canal with water. The canal, coming from the coal region of Pennsylvania, passes through the city of Newark, N. J., across the salt meadows known as the Jersey flats, and into the Hackensack River at the point where the Passaic River joins it and opens out into Newark Bay. One portion of the canal terminates at this point. The boats going on to Jersey City are hauled directly across the river. The mules, generally used for towing on the canal, walk across the regular bridge, drawing the boat after them across the river. When there is an incoming tide the boats would be swept up against the bridge. To prevent this an iron cable is carried across the river, and to this, when necessary, the boats are attached by a traveling pulley, so that the cable keeps them away from the bridge. When the tide is running out, the cable is not used.

After crossing the river, there intervenes between the eastern shore of Newark Bay and Jersey City the Bayonne and Bergen Point peninsula, which is two or three miles wide at this point. By pursuing a somewhat devious route, the canal crosses this peninsula with one level, of eight miles in length, the water of which is about four feet above high water in the New York or Newark Bays. At the east and west ends of this level there are two locks, a single one at each extremity, which lock the boats up from, or down to, tide water, as the case may require. The machinery we show is designed to supply this level with water.

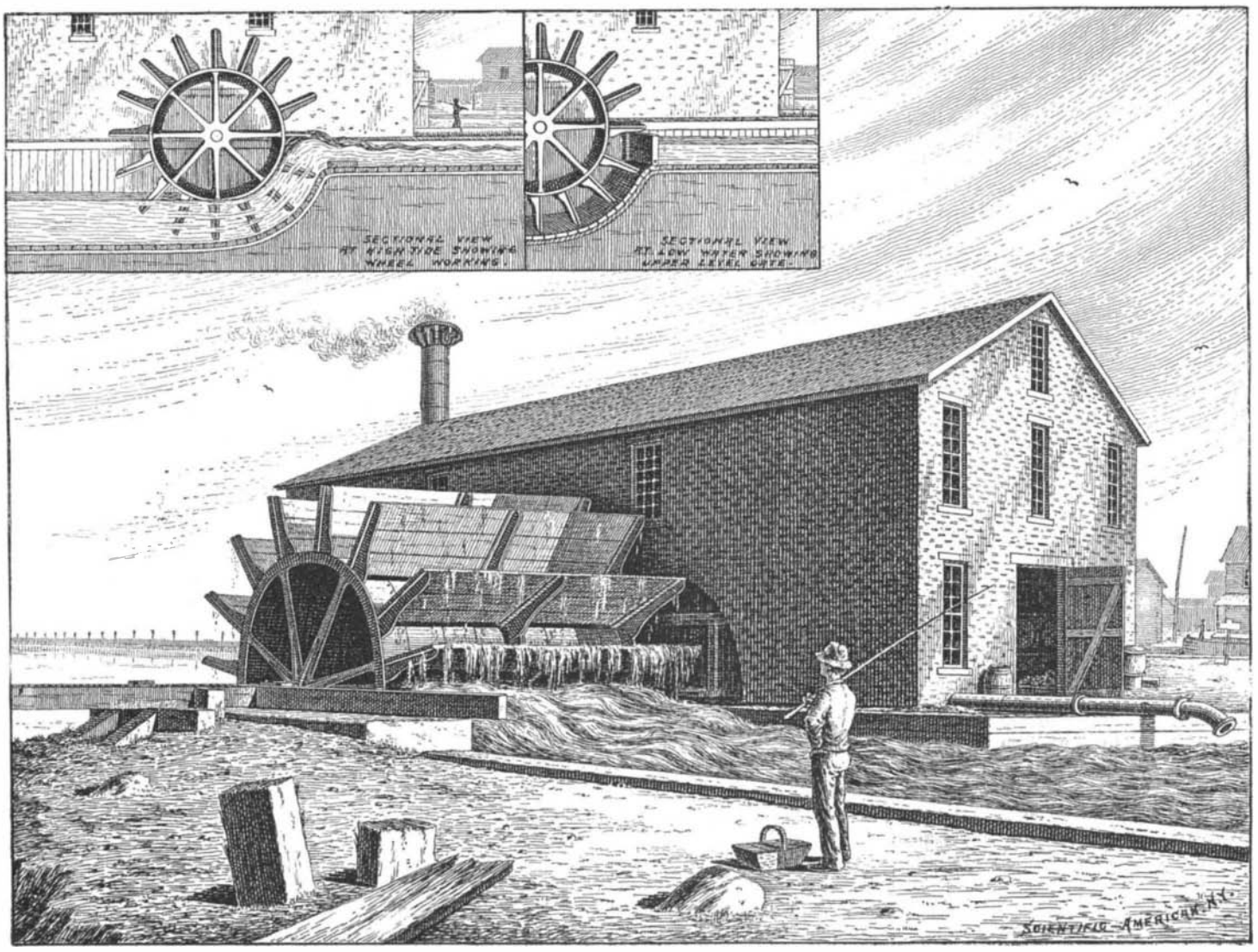
The water-raising mechanism consists essentially of a breast wheel, working in a masonry flume or breast, an inch or two of space only intervening between the floats and stonework. The wheel is 12 feet long, and carries a 10 foot sheet iron drum. The whole works upon a 10 inch iron shaft. From the periphery of the drum the buckets project. These are 3 feet 6 inches in width and 12 feet long, corresponding with the drum. The shaft carries a large cog wheel on its inner end; a spur wheel gears into this, the ratio of the diameters being such that the breast wheel makes one revolution for four revolutions of the spur wheel. It is obvious that if the wheel is rotated, it will raise water and deliver it into the canal, provided the rotation is in the proper direction, which is, of course, the reverse of that it would receive were it a motor wheel.

Directly in front of it is a gate pivoted at the bottom, which acts as a valve. As long as the wheel is in action throwing water into the canal, this gate lies flat upon the floor of the flume. When the wheel is stopped the gate rises as the water tends to flow backward, and closes the flume, thereby impounding the water in the canal. The wheel is so situated as regards level that it can work from the time when the tide is half flood until it is full flood, and until it falls to half ebb; thus in practice it is worked seven hours each day, when the tide is rising and falling, catching the last of the flood and the first of the ebb. It is situated on the banks of Newark Bay, and takes water directly therefrom. It is driven by a low pressure beam engine, with a 36 inch cylinder and 6 foot stroke.

The engine shaft, to which the spur wheel already referred to is attached, carries also a 15 foot fly wheel. The coal consumed amounts to 1½ tons per day.

In seven hours' pumping it raises the water in the eight mile level sufficient to compensate for the loss during the rest of the day. It can raise the level one inch an hour. As the canal is from 35 to 40 feet wide, this gives an approximate basis on which to estimate the delivery of water.

The apparatus was erected in 1859, and is to a certain extent an interesting example of old engineering practice. An effort was made to substitute for this wheel a rotary pump with 12 inch connections, but it did not prove successful. The pump and connections are still there to act as a reserve in case the wheel should break down. The drum of the wheel is quite essential to its strength; on one occasion when this broke down it was found that the wheel could not be used, as the floats were twisted out of place by the strain. By allowing the steam pressure to run down, the wheel can be made to operate like a breast wheel, so as to drive the engine backward. The only communication between the summit level and the tide water as far as regards the intake of water is by means of this wheel, yet it is found that it not only supplies the canal with water, but the crabs and fish are introduced with the water. During the crabbing season, the crustaceans are found in considerable quantities in the canal, being thrown into it by the water wheel.



BREAST WHEEL FOR LIFTING WATER INTO THE MORRIS CANAL.

THE class of buildings struck most frequently by lightning are, first, dwellings; second, barns and granaries. Oil-tanks and oil-works come next.