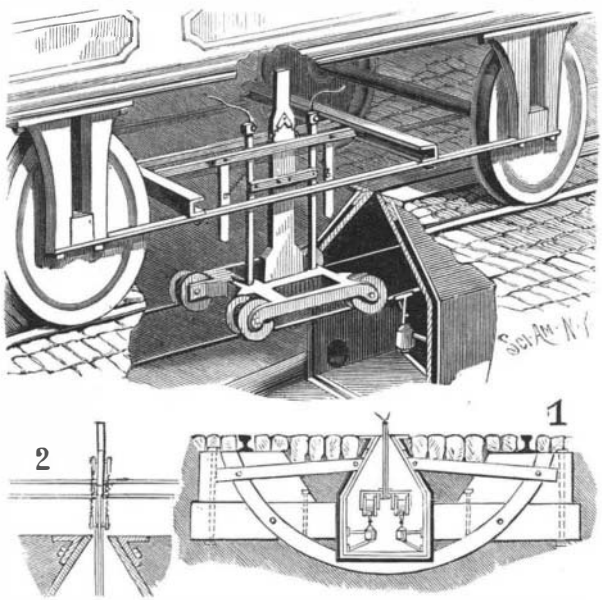


IMPROVED ELECTRIC RAILWAY CONSTRUCTION.

The illustration represents a conduit system railway with continuous metallic line conductors, but which may be operated with a single trolley wire with return through the rails, the conduit being always well drained and easily reached to make repairs. The improvement has been patented by Mr. George F. Moffett, No. 195 North Seventeenth Street, Portland, Oregon. In addition to the perspective view, with parts broken away, to show the improvement in use, Fig. 1 represents a cross section of the conduit, and Fig. 2 a section of the trolley support. The conduit walls are arranged to be taken apart in sections, being suspended by arch-shaped yokes and re-enforced by angle

**MOFFETT'S CONDUIT ELECTRIC RAILWAY.**

plates at opposite sides of the slot. The sleepers on opposite sides are connected by a nearly semicircular tie bar, and the conduit is strengthened by cross-braces, while drain pipes lead from its lower portion to the sewer. The conducting wires are held at intervals between clamping pieces on the upper ends of forked posts whose lower ends are held in a bed of insulating material in a cup or socket supported by brackets from the side walls. The double trolley employed with a continuous metallic circuit is composed of two similarly connected frames, insulated from each other, secured to a central vertical stem extending up through the slot, and so arranged that the trolley may be conveniently raised and the circuit broken when necessary. The trolley conductors extend through insulating sleeves at the front and rear of the stem, provision being made for a continuous circuit with the motor and the return of the current to one of the conduit conductors. The construction is such as to permit the car to pass easily around a curve without straining the trolley, and in front and rear of the conductors are vertical guide bars sliding in the slot to keep it open and remove obstructions. When a single conductor is used the trolley has but one frame, and the wires at the ends of the trolley conductors are connected together and also connected to one pole of the motor, from which the current is returned to the rails in the same way as in the overhead system.

Submarine Blasting.

The most extensive submarine blasting operation ever undertaken for the improvement of a harbor was that for the removal of the rocks known as Hell Gate, which obstructed the passage between New York Harbor and Long Island Sound. The works for the final operation in removing the middle reef consisted of the excavation of 21,669 feet of galleries through the rock, of an average section of 10 feet square, and involving the removal of 80,232 yards of rock by blasting. The total quantity of roof and pillars remaining to be shattered by the final explosion to a depth of 30 feet amounted to 270,717 cubic yards. The number of cartridges placed in the holes was 42,500, containing 240,399 pounds of an explosive consisting of potassium chlorate and nitrobenzol and 42,331 pounds of dynamite. The cost of the final explosion was \$110,950, the total expenditure in breaking the reef being \$1,094,000, exclusive of removing the shattered rock. The cost per cubic yard averaged \$2.75. The total estimated cost of the Hell Gate improvement works amounted to \$5,353,250. The work for breaking up the middle

reef rock extended from June, 1875, to October, 1885, when the final explosion took place.

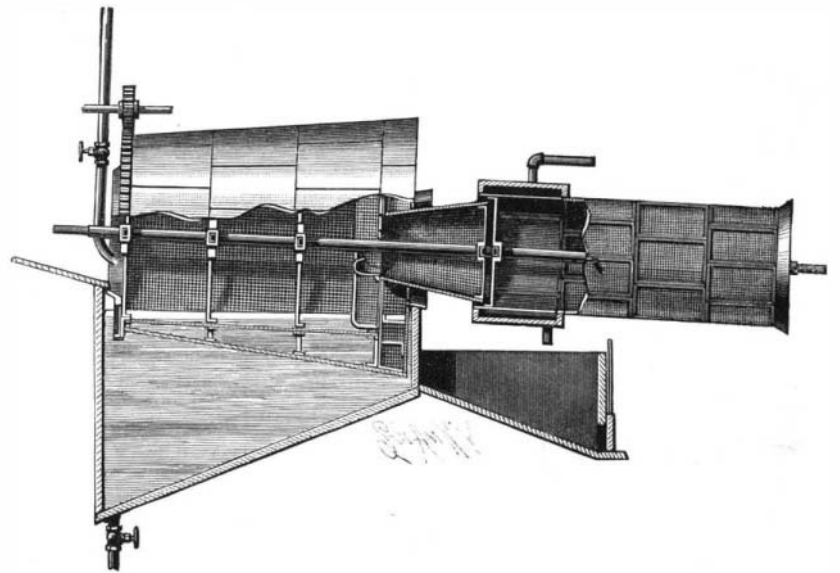
A MACHINE FOR WASHING, DRYING AND SEPARATING COAL, ORE, ETC.

This machine, patented by Mr. George H. Tench, of Pottsville, Pa., is comparatively inexpensive to build and is designed to do its work rapidly and automatically, being also adapted to do the screening under water to avoid creating a dust. It has an open-ended tapering drum, carried in nearly horizontal position by a shaft rotated by a gear from the driving shaft. A chute extending into the smaller end of the drum feeds the material to be screened, and the lower portion of the drum turns in water held in an inclined tank, supplied by a pipe delivering into the small end of the drum, the dirty water being let off through a pipe at the lower end of the tank. Arranged longitudinally in the drum is a cylindrical slightly inclined screen, whose lower portion is adapted to be submerged in water, and near the lower end of the screen is a circular transverse partition, having a central opening connecting with a supplemental tapering screen, there being on the inner face of the partition radial scoops delivering through the opening. The smaller end of the tapering screen is secured to the partition and its larger end is supported by spokes carried by the shaft. The end wall of the larger

end of the drum is of screening material, and between the end of the drum and the partition is a second series of scoops made of perforated material adapted to raise dirt or other fine material passed through the longitudinal screen and deliver through an outwardly inclined ring, beneath which is a dirt pocket, the pocket having an inclined bottom and a door at its lower end to facilitate the removal of the dirt. The coal or other material discharged through the supplemental tapering screen is received in a cylindrical drier and separator also mounted on the shaft, and inclosed at its front end by a steam jacket connected with steam supply and exhaust pipes. The connection of the drier and separator with the washing and screening mechanism enables the entire operation of washing, screening, drying and separating to be carried on continuously and rapidly. The machine is especially adapted to wash, screen, dry and separate coal, culm, pebble phosphates, ore and similar material.

**TWIN ELM TREES, IOWA COUNTY, IOWA.****Pleasure Barge for an Indian Prince.**

There has just been completed by Messrs. Messum, the well known boat builders of Richmond, to the order of the Nizam of Hyderabad, a pleasure boat peculiar in shape and, for its size, exceedingly costly in construction. Two boats of the size of a large skiff have been joined side by side by a deck, upon the extremities of which rise a number of finely carved pillars supporting a pagoda-shaped roof. The whole of the woodwork is of teak, a wood which is not warped by heat. As an instance of the great expenditure of labor upon the boat, which is only 28 ft. long by 14 ft. wide, it may be stated that the tiles of the roof are composed of some 3,000 small pieces of teak,

**TENCH'S WASHER, DRIER AND SEPARATOR.**

most of which have had to be specially cut. There are no windows, but all four sides of the barge will be hung with pure silk of the richest quality, while the deck will be cushioned in the same costly way to a height of some feet. The barge will be propelled by two feathered paddles, placed between the bows and sterns of the two supporting boats and turned by handles after the manner of a small canoe. The barge is intended for use on a lake near to which the Nizam has a summer palace.

THE TWIN ELMS.

To the Editor of the *Scientific American*:

I take great pleasure in sending you photograph of the "Twin Elm Trees." They are located in Honey Creek Township, Iowa County, Iowa, one and a half miles northeast of the town of Kasza, in the Iowa River bottom timber. They stand seven feet apart. It is thirty feet from the ground to where they unite.

From the point of union it is three feet in diameter for at least ten feet.

Each body is two feet and six inches in diameter, and from the ground to the topmost twig it is fully ninety feet. The widest diameter of the tree top is about seventy-five feet.

I discovered the curiosity September 30, 1864. It was photographed May 14, 1893, by Mr. A. R. Brinkley.

WAYNE A. SULLENBARGER.

Belle Plaine, Iowa.

A Curious Method to Take Foul Air Out of a Well.

I saw, says a writer in the *Globe-Democrat*, a curious method used, the other day in Illinois, to take the foul air out of a well. The well was to be cleaned, but the man that took the job was afraid to go down until he had ascertained the quality of the air at the bottom. He let down a lighted candle, and when it descended to about six feet of the bottom it went out as suddenly as though extinguished by a whiff of air. That was all he wanted to know. He was then sure that the well had poisonous gas in it, and took a small umbrella, tied a string to the handle and lowered it open into the well. Having let it go nearly to the bottom, he drew it up, carried it a few feet from the well and upset it. He repeated this operation twenty or thirty times, with all the bystanders laughing at him, then again lowered the light, which burned clear and bright even at the bottom. He then condescended to explain that the gas in the well was carbonic acid gas, which is heavier than air, and therefore could be brought in an umbrella just as though it were so much water. It was a simple trick, yet perfectly effective.