

Durability of Rails.

The tests of the durability of steel rails on the Great Northern Line of England, show that the hardest rails do not wear the best. In one instance a hard rail was worn away one-sixteenth of an inch by a traffic amounting to 5,251,000 tons. A softer rail near by was worn the same amount by 8,402,000 tons. In another instance the total was 15,531,000 tons for a hard rail, and 31,061,000 for a soft rail, the wear and tear being the same—one-sixteenth of an inch. Analysis showed this last rail to consist of 99.475 per cent of iron and minute quantities of carbon, phosphorus, silicon, manganese, sulphur, and copper.

BRUSH HOLDER.

The engraving shows a brush holder for sustaining and keeping the brushes used by an artist while painting separate from each other, particularly when the brushes are charged with paint.

Usually the brushes are held in the hand of the artist, and often with more or less difficulty; but with this device the handles are inserted through the grid and into the bag, the grid serving to keep the heads of the brushes apart from each other.

This invention was recently patented by Edith A. Pope, of Boston, Mass.

The Safety of Steamboat Travel.

The annual report of the Supervising Inspector General of Steam Vessels corrects the prevailing impression that last summer was uncommonly prolific in steamboat disasters. There is charged against the year but twenty-six accidents involving loss of life, against thirty-two for the year before.

During the year the total number of vessels inspected was 4,536; total number of officers licensed, 16,661. The total number of lives lost by accidents from various causes was as follows: Explosions, 22; fire, 52; collisions, 66; snags, wrecks, and sinking, 14; accidental drowning, 25; miscellaneous casualties, 6; total lives lost, 185. The report concludes as follows: "I respectfully invite attention to the small percentage of lives lost as compared with former years, when the number of passengers carried was much less. Out of perhaps 220,000,000 passengers transported on steam vessels during the last twelve months—a daily average of over 600,000—but 185 lives have been lost through causes incidental to steamboat travel, 103 of which number were passengers; and I feel warranted in asserting that the fact that only one person was lost out of every 1,100,000 persons carried argues a degree of intelligence and skill on the part of the licensed officers of steam vessels and the officers of this service unsurpassed and scarcely equaled in any other service."

APPARATUS FOR DEMONSTRATING MECHANICAL PRINCIPLES.

An ingenious apparatus for demonstrating certain mechanical principles is shown in the accompanying engraving from *La Nature*. It is the invention of Mr. Jean Mocenigo. The curved track is about five feet long. The car carries two shallow cups designed to catch and discharge small balls of lead or other material dropped from the cylindrical reservoirs at the ends of the track.

When set free at one end of the track the car by itself descends to the bottom of the curve and is carried by its momentum part way up the opposite slope; then it returns, and continues the to-and-fro motion until brought to rest at the bottom by the combined resistance of friction and the air. The amount of this resistance is measured by means of the balls employed to keep up the oscillation of the car.

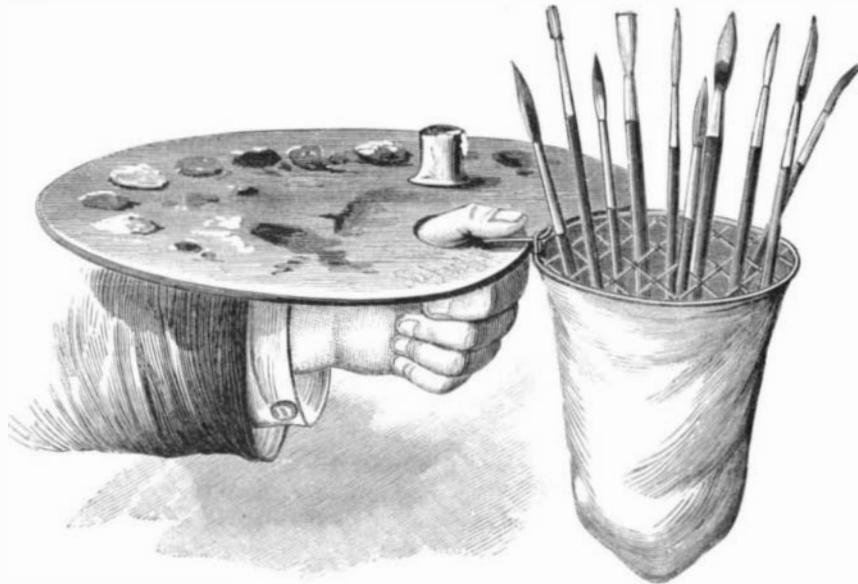
The discharge of the balls is effected by the impact of the car upon the light springs underneath the spouts at the ends of the track, one and only one ball being let go at a time. The car thus loaded runs to the bottom of the curve, where the ball is dropped, the increased momentum from the added weight just sufficing to carry the empty car to the summit of the other slope and set free another ball, by which its gravity is re-enforced for another excursion. In this way the to-and-fro movement of the car may be maintained for any length of time.

It is obvious that in one complete excursion of the car the force applied is equal to the combined weight of car and

ball falling through a distance equal to the height of the end of the track above the middle; the work done is equal to the lifting of the car alone through the same distance, the ends of the track being on the same level. The difference between the power and the effect is the measure of the power consumed in overcoming friction, the resistance of the air, and the force of the spring by which the ball is discharged.

Atlantic Cables.

The lengths of the several cables between the United States and Europe and their locations are given as follows: The three Anglo-American cables now in use run from Ireland to Newfoundland, 1,850 miles, and from Newfoundland to Sydney, over 300 miles—a total distance of about 2,150 miles each; the Anglo-French cable from Brest to Duxbury, by way of St. Pierre, is about 3,329 miles long;

**NOVEL BRUSH HOLDER.**

the Direct United States cable from Ireland to Torbay, and from Torbay to Rye Beach, 2,360 miles; and the new French cable from Brest to Louisburg, 2,430 miles, from St. Pierre to Cape Cod, 880 miles, and from Brest to Penzance, 151 miles—a total length of about 3,461 miles.

Preparations are being made for laying two new cables to be operated in connection with the land lines of the American Union Telegraph Company. They will connect with the land lines at Cape Breton, and be about 2,400 miles long.

Of the cables laid by the Anglo-American Company, the one put down in 1865 was broken March 11, 1873, and finally abandoned February 1, 1878; that laid in 1866 was broken January 13, 1877, and abandoned July 27, 1878. The latter cable, except the shore ends, was renewed last summer at a cost of £222,300; it is now called the cable of 1880. The cable laid in 1873 was broken April 2, 1879, and was repaired in the same month; it is now in operation. No break has yet occurred in the cable laid in 1874. Of the three cables

last month. It is said that the cable is so rotten that no attempt to repair it will again be made.

The cable of the Direct United States Company was laid in 1874, and has been broken twice: the first time, January 4, 1879, on the ocean side near Torbay, and in February, 1879, in the Rye Beach and Torbay section. Both breaks were repaired, and the cable is said to be now in good condition. The cable of the new French Company has been down about a year. It was broken May 2, 1880, near the Island of St. Pierre, and repaired the same month; the section between Cape Cod and St. Pierre was broken November 21, 1880, and is now repairing.

ENGINEERING INVENTIONS.

An improved car coupling has been patented by Mr. William I. Ely, of Freehold, N. J. The invention consists of an open-mouthed and open top draw bar, having pivoted within it a spring-actuated hook-headed jointed coupling bar, and of the combination therewith of a stirrup fitted within the draw bar, embracing or set about the coupling bar.

Mr. John W. Carley, of Cotton Gin, Tex., has patented an improved machine for boring wells, prospecting, and mining shafts, post holes, and various other purposes where earth is to be loosened and removed. It is so constructed as to operate continuously, except while sections are being added to the shaft and belt, the earth being removed as fast as it is loosened.

Mr. John G. Herold, of Moberly, Mo., has patented an improved nut lock for railroad rail joints, by which the nuts are prevented from becoming loose and dropping by the jar of the engines and cars passing over the rails; and the invention consists of a flanged locking strip or piece with beveled underside that is fitted into the angle of the fish bar. The flange extends up between the fish bar and inner face of the nuts into the space formed by the interposed washers of the nuts,

while the top of the locking strip in front of the flange is notched below the nuts for retaining the corners.

An improvement in surveying instruments has been patented by Mr. Thomas M. Jackson, of Clarksburg, West Va. The invention consists in attaching a level detachably to the body of the telescope of a plain transit instrument by means of two armed or hinged clamps whose upper or free ends are secured together by thumb and binding screws, the telescope being also provided with laterally projecting pins that indicate the proper position of the clamps and prevent it from shifting.

An improvement in baling presses has been patented by Mr. William Duke, of Longtown, Miss. The invention consists in constructing a rotating baling press with plates and rollers interposed between its friction surfaces to diminish the friction when the press is operated.

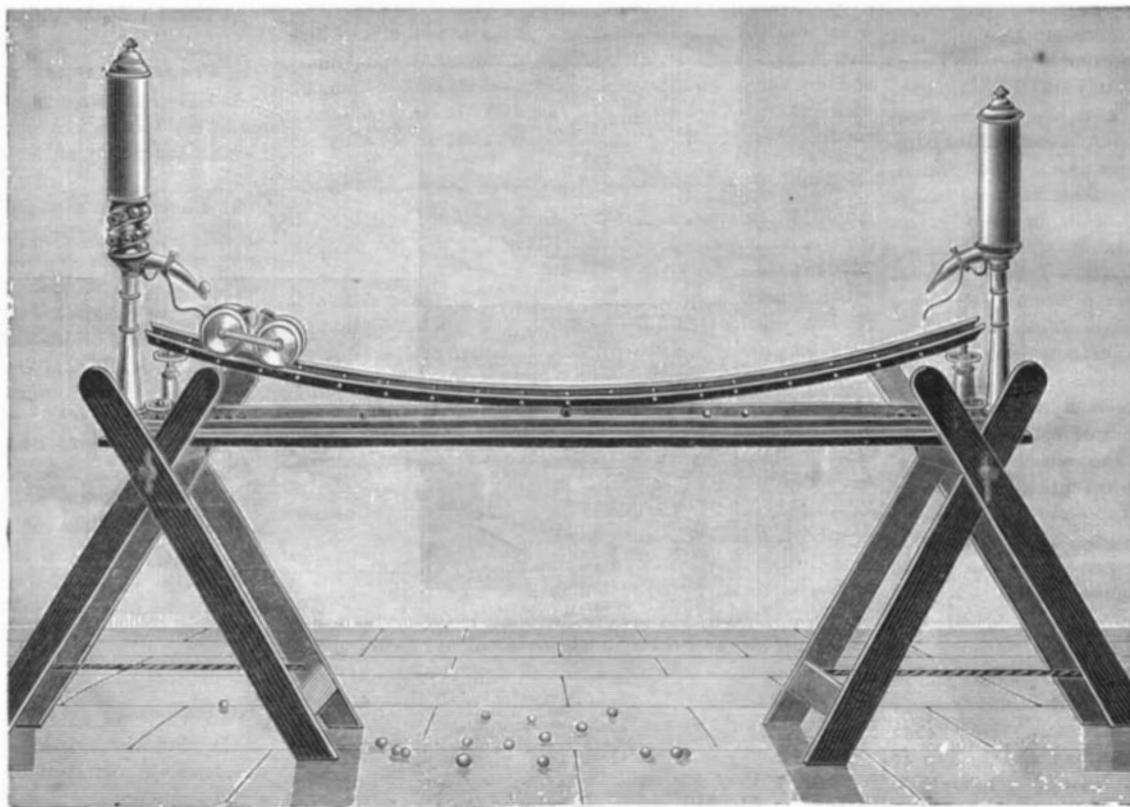
An improvement in that class of railway car trucks in which the brakes are not applied to the flanged running wheels, but to small wheels which are mounted on the axle between the truck or running wheels, has been patented by Mr. George Bressler, of Altoona, Pa.

An improved vehicle wheel has been patented by Mr. John Ladner, of Charlestown, Mass. The invention consists in constructing a vehicle wheel with friction rollers placed in a counter-sink in the hub, a ring oil chamber having holes in its inner wall, the plates that close the outer end of the hub, and the guard plate attached to the inner end of the hub, whereby the friction is lessened, the bearing kept lubricated, and the escape of oil and the entrance of dust are prevented.

An improved drilling machine for artesian and other wells has been patented by Mr. Patrick Sweeney, of Leadville, Colorado. The invention consists of a drum for the drill rope loosely mounted on a shaft and provided with a rising curved flange on each end and with two studs on one end, the studs engaging with a cross bar on the shaft, and the rising

flanges sliding on adjustable projections of the frame, thus causing the drum to move forward and backward on the shaft, whereby it is alternately engaged with and disengaged from the cross bar, thus raising the drill and then permitting it to drop.

An improved drilling machine for artesian oil wells has been patented by Mr. Frank Knowlan, of New York city.

**MOCENIGO'S APPARATUS.**

now working, which were laid by the company, one has been down over six years and another over seven years. The Erlanger cable, under the management of the Anglo-American Company, was laid in 1869; it was broken in the following May, and several times since the same accident has occurred. It was last repaired in August, 1879, having been broken February 22 in that year, but it was again broken