THE CABLE CARS OF THE BROOKLYN BRIDGE.

On September 24 the passenger cars began their regular trips. In previous issues we described the endless wire cable to which the cars are attached, and also the machinery for driving it, located beneath the roadway of the Brooklyn approach. At the Brooklyn station the cars are shifted from the incoming to the outgoing track by small locomotives, but at the New York end the shifting is done by a small auxiliary rope. As the cable enters the New York station it passes over a grooved sheave, 10 feet in diameter, and then under a similar sheave, both sheaves being in the same plane and so near that their rims all but touch. By this means the sheaves are made to revolve in contrary directions. The journals in which the shafts of these wheels revolve are bolted to an iron frame supported in a inclined position, as shown in Fig. 4. After leaving the lower sheave the cable passes around a sheave whose plane is horizontal, and then goes across the station to a similar sheave, which is supported on a car running upon inclined rails, by which means the slack at this end of the route is taken up. On each shaft of the upright sheaves is a loose, grooved drum, and around these two drums are wound coils of a small wire rope which runs over pulleys guiding it to the second floor of the station on which the cars are. The slack is taken up by weights hung on the wire, as shown in the engraving. The plan of the two sheaves, the auxiliary rope, and the tracks is shown in Fig. 3, the dotted lines representing the rope.

The rope leads through the center of the main track to the switch, and thence through the center of the crossing to the other main track, up which it goes to the end of the building. To this rope is permanently attached a bar projecting from the bottom of a small car. By aid of a lever controlled by a switch, which is on a platform in the center of the station, so that an unobstructed view may be obtained by the operator, either of the driving drums can, by means of friction clutches, be made to revolve with the shaft it is on, while the other drum, being free, takes its motion from the rope. The drum which is in gear therefore controls the direction in which the small car moves. The passenger cars are brought to the station by the main cable, and after having discharged their passengers are coupled to the little switching car. The lever is shifted, the little rope moves, and the car is taken to the upper end of the station, but on the other track. The direction of the rope is now reversed, and the car is pushed down the other main track. The little car only starts the larger one, as the grade is sufficient to carry it to the platform. A second small rope, operated by similar drums on the other side of the sheaves, extends to the rear of the station along the incoming track, so that the cars may be taken to the upper end of that track and switched to the other by a second crossing.

On the platform above mentioned are five levers, by which the drums are thrown in and out of gear, and from which all the operations of switching the cars are controlled. Beside the switch tender is a telephone connected with the other station. Fig. 2 is a view of this platform and of the switching car, which is shown attached to one of the passenger cars.

The grip that takes hold of the cable is beneath the center of the car. It consists of four wheels, about 18 inches in diameter placed in the same plane, which makes a very sharp angle with the horizontal. These wheels are rimmed with wood, in which a shallow groove is cut. Oak was tried, but did not prove as satisfactory as maple. The grain of the wood runs toward the center of the wheel. The wheels face each other, two being on each side of the cable. They are attached to levers so that they can be moved near to or away from each other. The iron rim of the wheel projects so as to form a cylinder, against the inner surface of which presses the wooden shoe of a brake. These brakes are on the sides of the wheels nearest to each other. The cable is lifted and placed between the grooves, which hold it in position. The wheels now revolve at a rate corresponding to the speed of the cable. The brakes are brought into action and the cable is gradually pressed tighter and tighter between the grooves. The car starts very slowly, no jerk being felt, and the grooved wheels move slower and slower until they finally stop, the car having attained a speed equal to that of the cable. The wheels are expected to press the cable so tightly that the inertia of the car will be gradually overcome by the friction of the brakes upon the inside of the rim. The grasp thus obtained on the cable is continued until the car has neared the opposite station, when the grip is tripped by an arm coming in contact with a standard on the side of the track. All the operations of the grip are made from the brake on the platform of the car.

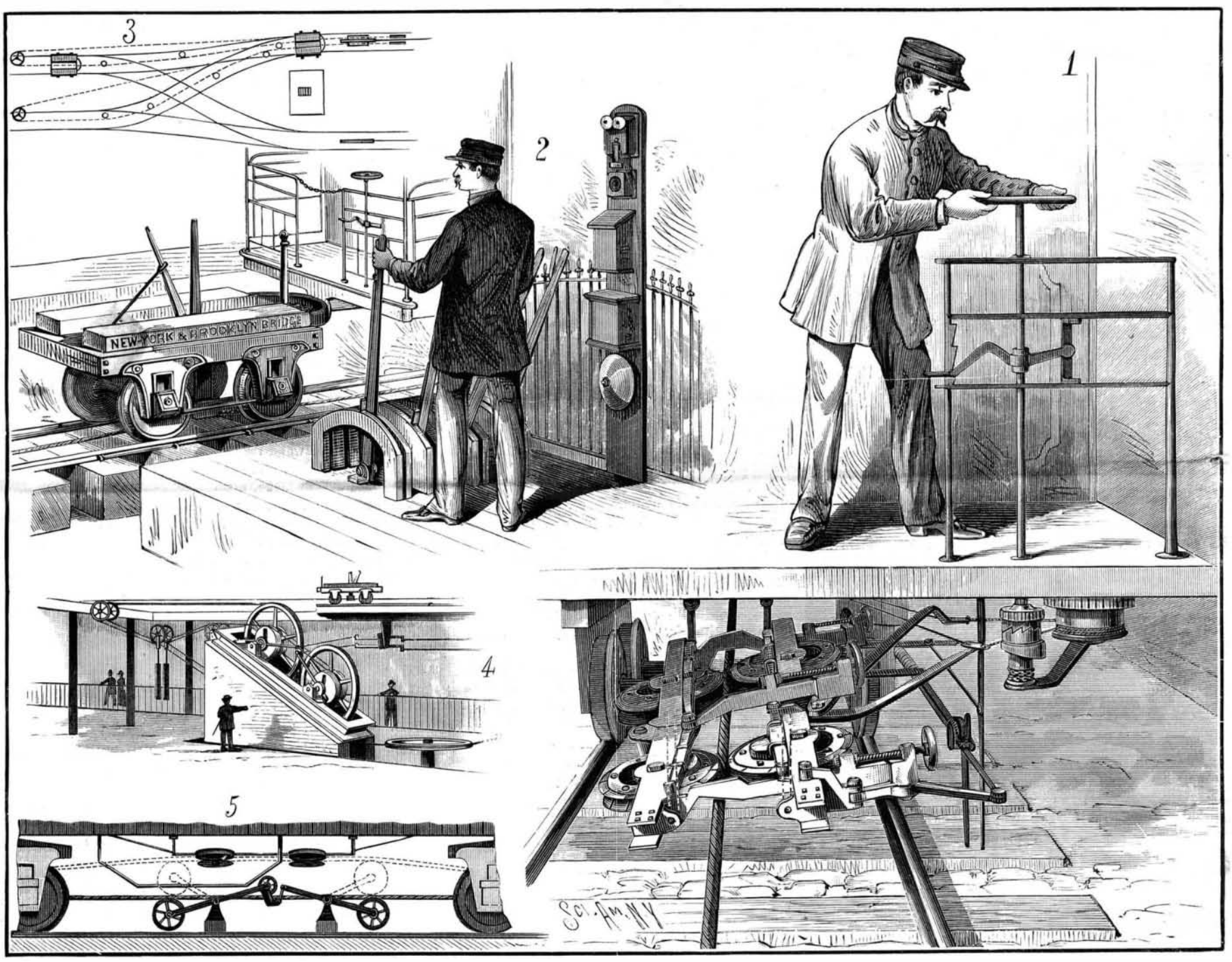
Fig. 1 is a view of the grip looking in a direction parallel with the track. When the hand brake is raised, a pinion on its lower end engages with a gear operating a drum about which is wound the wires attached to the ends of the levers that work the brakes upon the inner rims of the wheels of the grip. When the brake is lowered, as shown in the engraving, the brakes can be applied to the wheels of the car.

The cable is lifted to the grip by two pulleys in the center of the track. Each pulley is on the end of a rod, working on a fulcrum at its center, the adjoining ends of the rods being connected. It will be readily seen that if the joined ends of the rods are depressed, the pulleys will be raised until the cable is on a level with and is running between the grooved pulleys of the grip, the car having been stopped so that the grip is between the two pulleys.

Upon the adjoining ends of the two rods is a grooved pulley which is depressed by a bar projecting from the bottom of the car. The lower portion of this rod is horizontal, the ends which first come in contact with the pulley being inclined upward. The working of the lift will be readily understood from the drawing, Fig. 5.

When the engine was started, much trouble was occasioned by the journals heating. The shaft is of steel and the journals of brass. As the brass expanded more rapidly than the box, and as the excess of material so formed had no outlet, it bound the shaft. This was obviated by chipping away the inner edges of the brass. Then it was found that the oil would not pass to the under side of the shaft. A longitudinal channel was cut in the inner face of the under half of the journal and was branched at the ends. This accomplished the object.

The entire system of running the cars was designed by the assistant engineer of the bridge, Colonel Wm. H. Paine.



MECHANISM FOR OPERATING THE CARS OF THE BROOKLYN BRIDGE.

Comet Photographs.

Six photographs of the late comet, which were taken at the observatory of the Cape of Good Hope by D. Gill, were sent to the Paris Observatory and presented to the Academy by Admiral Monchez, who pronounced them the finest he had seen. The stars in the center of the image are reduced to a point of remarkable sharpness, in spite of the very long duration of the exposure, which amounted to 140 minutes for the sixth negative. More than fifty stars are seen through the tail of the comet. The slight increase of diameter which is observed in the stars remote from the center is due to the employment of an apparatus with too short a focus. The fine result is explained by the well known skill of the photographer and the purity of the South African sky. The success of the experiment encourages the hope that it will soon be possible to make excellent celestial charts by photography.—*Comptes Rendus.*