lighted visitors, seated in boats or little cars. The two longitudinal runways are parallel, as are also the transverse, stationary runways, from one of which the passengers embark, while they coast down the other to the second longitudinal runway. The motion exactly simulates that of the waves of the sea, and all enjoy it, good and bad sailors alike. The wave motion is imparted to the flexible steel sheet flooring by the mechanism which we illustrate on our front page. In passing, it should be stated that the forward travel of the conveyance is caused by the constant rise of the strip or sheet in the rear of the same. In other words, the passenger is always on a down grade.

At one end of each longitudinal runway is a motor which serves to drive the mechanism which produces the progressive rising and falling movement of the wave sheet. Geared cranks serve to actuate long pitmans, which serve to pull the great connecting rods to and fro in a horizontal plane. The horizontal motion is changed into a rising and falling motion by bell cranks, which actuate lifting bars which move in a vertical plane. These lifting bars actuate two levers, which are beams secured at the outer end by pins. It is the progressive movement of these beams which gives the flexible sheets their progressive rising and falling motion. There are 16 bell-cranks to every wave, which is 16 feet long. While one pair of beam levers is being raised, the next follows and so on until the full cycle of motion is accomplished. The mechanism is so well equalized, that only enough power is used to overcome inertia and friction.

This is an illusion which has to be seen to be appreciated, and it is a clever adaptation of some of the fundamental principles of mechanics to produce an apparently complex result.

The "Scrambler" is an amusement device based on centrifugal force. In an inclosure a circular floor section is mounted to revolve. The upper surface of the platform is slightly dished from the center to a point near its periphery. The circular table or floor is rotated by a motor at a rapid rate of speed. The cars are of elliptical or oval conformation. There is a bumper made of resilient material placed around the circumference of each car. In the operation of this amusement device, the cars are placed in the central portion of the platform, which is then revolved as rapidly as may be desired. The cars, by reason of centrifugal force, will be propelled in the direction of the periphery of the platform, and at the same time will be given a rotary motion. A rocking motion is also obtained by the use of caster wheels. The cars strike several buffers and rebound. The circular side wall is interrupted, and is composed of a large number of spring buffers, which give when struck by the car. The "Scrambler" is the invention of Mr. H. A. Bradwell, of New York, N. Y.

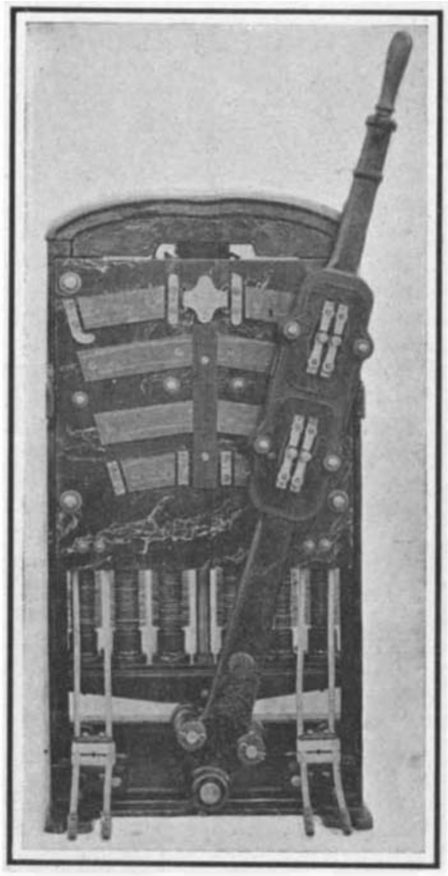
The "Human Toboggan Slide" never fails to draw immense crowds. In the one which we illustrate, which is in Luna Park, an escalator serves to take the would-be sliders to the top of a rattan slideway, which follows a sinuous course. Once on the rattan there is little standing or rather sitting on the order of going, and after an instant whirl, one is precipitated on to a mattress, to the huge delight of the watching crowd. This is the invention of Mr. Frederic W. Thompson, founder of Luna Park.

Steeplechase Park also has a number of very curious amusements, in one of which the principle of the "Human Toboggan Slide" is utilized. This is called "Hitting the Pipe." The pipe consists of an immense affair shaped like a tobacco pipe. Entrance is obtained through the mouthpiece, and exit is summarily thrust upon the would-be slider at the top of the bowl. Great care is taken to make these various slides safe, as otherwise a loose piece of rattan would be likely to do serious injury. One of the curious amusement devices in Steeplechase Park is called the "Arkansaw Traveler." It consists of a track having two openings like the underground trolley slots. A plow comes up at various intervals, and foot pieces are attached thereto. On being admitted to the "Traveler," a foot is placed on a foot piece of the two tracks. Mechanism is provided for varying the speed of the travel of the foot pieces, and the result is that the passengers are contorted into curious attitudes. The device, while simple, has been well carried out.

An interesting phenomenon that may be of use in the ignition of explosives is creating some interest in Germany. According to a consular report, it has been discovered that an alloy of iron and cerium, lanthanium, or any other of the rare substances which are used in the manufacture of incandescent gas mantles will create luminous sparks on being struck with a metal tool, such as a knife edge, file, or the like. The sparks given off at the point of impact are sufficient to ignite not only gas, but even a cotton wick saturated with alcohol, and it is possible that these alloys may be utilized for igniting all kinds of explosives. The behavior of these alloys has been found to vary according to their percentage of iron, the sparking reaching a maximum when the iron content is 30 per cent.

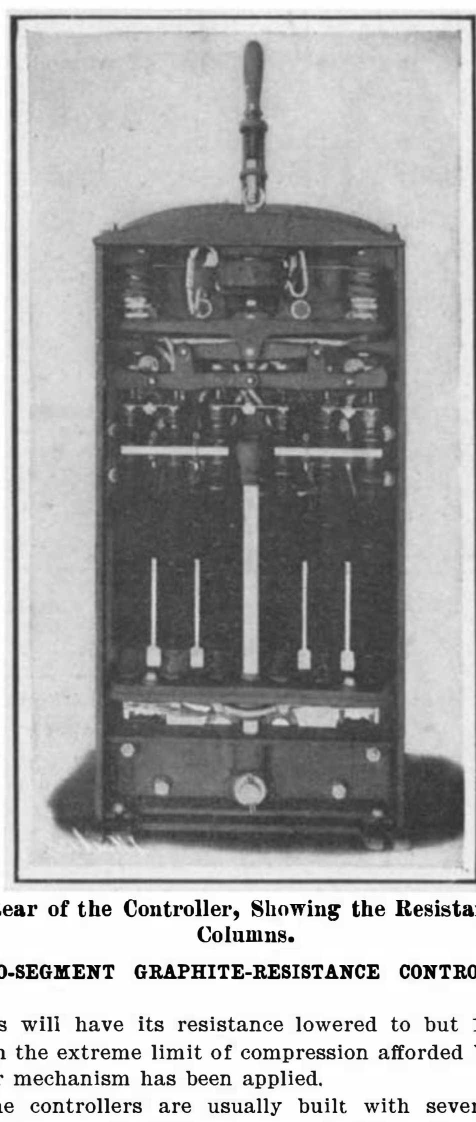
A NO-SEGMENT GRAPHITE-RESISTANCE CONTROLLER.

The principle of the carbon microphone has been utilized to produce a controller in which there are no abrupt steps from one degree of resistance to another. In the usual telephone transmitter the diaphragm bears against a small quantity of granulated carbon, through which the line current passes. As the diaphragm is vibrated by the voice, it varies the pressure at the contact points of the hundreds of carbon granules, thus correspondingly varying the resistance of the circuit. In the same way the no-segment controller varies the resistance of the circuit by pressure at a series of contact points. In place of carbon granules, columns of graphite disks are used, and a powerful lever mechanism is employed to compress the columns.



Front of the Controller, Showing the Compressing Lever.

The disks are about an inch in diameter and ⅛ of an inch thick, and the imperfect contacts between them when under no pressure but their own weight, offer a high degree of resistance to a current following through the column. Such a column offering 110 ohms will have its resistance lowered to but 1 ohm when the extreme limit of compression afforded by the lever mechanism has been applied.



Rear of the Controller, Showing the Resistance Columns.

A NO-SEGMENT GRAPHITE-RESISTANCE CONTROLLER.

The controllers are usually built with several resistance columns, each comprising an insulated tube in which the disks are piled, one above the other. These tubes are provided with radiator fins or rings, to dissipate the heat that is generated in the resistance columns. The tubes are carried on a yoke or cross-head at the bottom of the controller. The lower side of the cross-head is formed with inclined cam faces adapted to engage one or the other of a pair of rollers mounted on the operating lever. When the lever is moved out of its normal, vertical position, one of the rollers engages and lifts the crosshead, thus jamming the columns of disks upward against the top of the controller. Here a series of levers are arranged to equalize the pressure, and provide a uniform compression of each column of disks. The degree of compression is governed by the extent to which the lever is moved from the vertical. When the lever is in vertical position, the circuit is broken; but when moved out of this position, a set of brushes on the lever engages a series of contact plates, and closes the circuit through the controller. The resistance columns are subjected to the maximum degree of pressure, permitting practically a full flow of current, before the lever is moved to the extreme position, and the last move of the lever cuts out the graphite columns entirely, and allows of an unobstructed flow of current. To reverse the current, the lever is moved in the opposite direction, bringing the brushes into contact with another set of contact plates.

These no-segment controllers are built especially for use with crane motors. There is probably no other condition in which the controller is subjected to a more severe strain than in connection with an electric crane. The current must constantly be thrown on and off. No time can be spared for a gradual variation of resistance. The crane motor must be started, stopped, or reversed on the instant, regardless of the destructive effects produced. In the ordinary controllers with fixed resistance units of wire, ribbon, etc., the units are cut out of or into the circuit successively, or step by step, and there is a considerable flashing and sparking at the contact points. The contact plates and brushes are constantly in need of repairs, and the resistance units frequently burn out. In contrast with these conditions the no-segment controller admits the current steadily instead of by jerks, and there is no arcing or injurious flashing. The slightest motion of the lever means a different speed of the motor. No injury is done by keeping the current on the resistance. Any desired horse-power is secured by multiplying the number of resistance columns.

Originally, carbon disks were used in this controller, but they were not able to withstand the heat generated in the controller, and in service they disintegrated, and clogged the tubes with carbon powder. The use of graphite instead of carbon was suggested by a traveling salesman, Mr. Henry T. Jones, who had heard of the heat-resisting qualities of this material. The chief objection to graphite was its superior conductivity, and in the first experiment only a few of the graphite disks were placed in the upper part of the carbon disk columns, in order to obtain the desired control. Eight months of constant and severe service failed to produce any injurious effects on the graphite disks, while it was necessary frequently to remove the carbon disks. Mr. Jones then learned that the graphite used for railway signaling purposes, after being subjected to a heat of 7,500 deg. Fah., is an excellent conductor; but the constant arcing and alternate heating and cooling in service has the effect of hardening the material and impairing its conductivity. Accordingly, he subjected the graphite disks to a similar treatment. The disks, after having been exposed to a heat of 7,500 deg. in the electric furnace, were repeatedly heated to a temperature of 1,200 deg. Fah., while exposed to the air, until the desired degree of hardness and resistance was obtained. The graphite disks thus treated have entirely supplanted the use of carbon. In service it is impossible to produce a temperature high enough to further affect the resistance of the graphite.

The heat-resisting qualities of graphite are astonishing. In a recent experiment some of the treated graphite disks were repeatedly subjected to a current of 75 amperes at 1,900 volts. This powerful current was applied at least thirty times to one of the disks, but it failed to affect the graphite in the least. A set of resistance tubes was also subjected to a severe test. The current was allowed to run continuously for ten hours through the resistance. For six hours of that period the steel tubes were red hot, and they were partly melted by the heat generated, but the graphite disks in the tubes remained uninjured, and are still in use in a 50-horse-power controller.

The second largest masonry arch in the world has, according to Engineering News, recently been built on a new railway in Austria. This arch is the largest span of a bridge over the Isonzo River, and is 278.9 feet, having a rise of 78 feet. The arch is of cut stone founded on reinforced concrete footings, backing into solid rock. It is 6.6 feet thick at the crown. The largest masonry arch in the world is at Plauen, Germany, having a span of 295 feet, and the hitherto second largest, at Luxembourg, with 277.6 feet span.