THE LOCKS AT THE ENDS OF THE CANAL BETWEEN THE NORTH AND BALTIC SEAS.

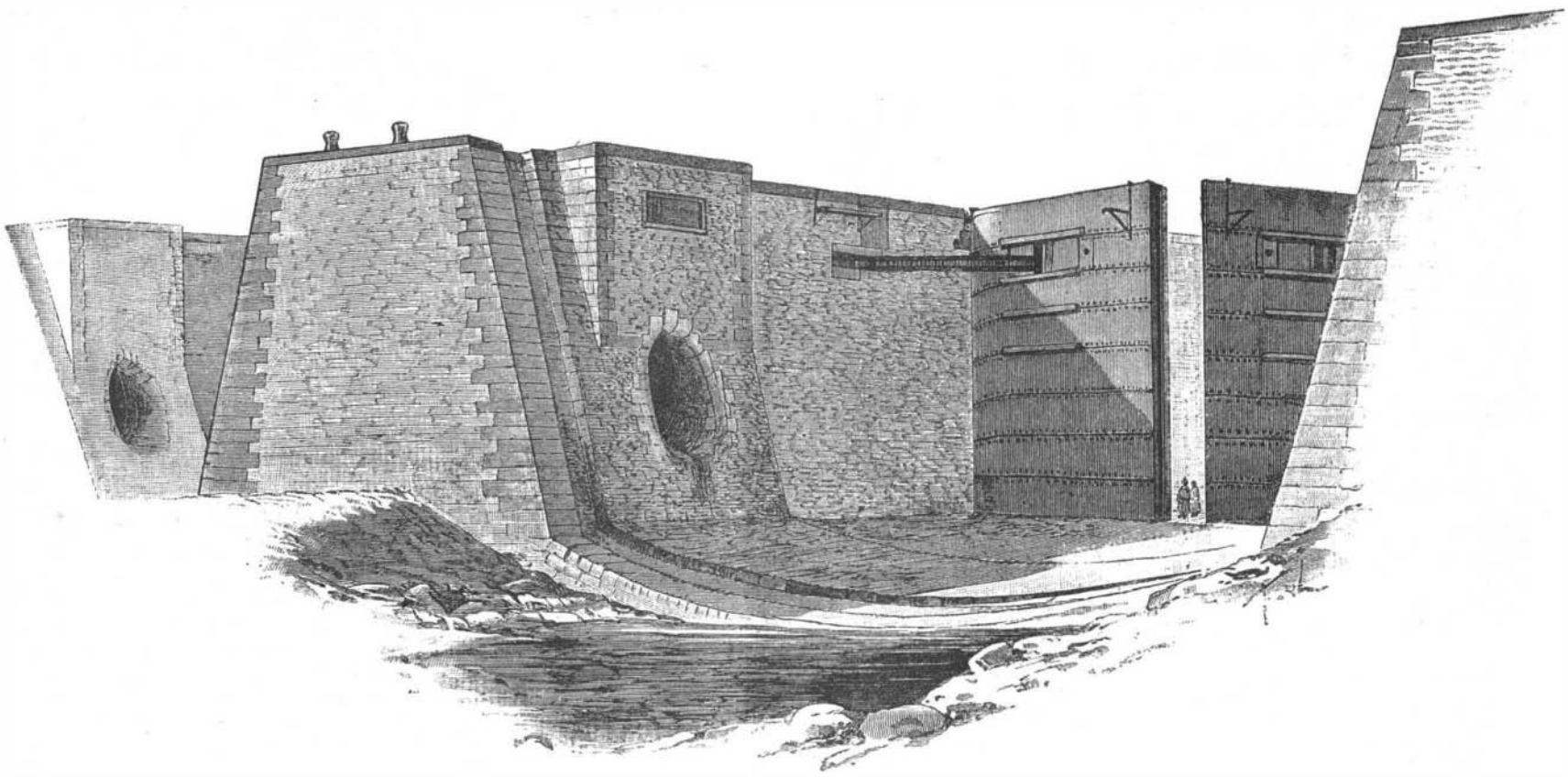
We are now separated only by months instead of years from the day on which this great canal—so important as a means of defense and also from a commercial point of view—will be opened to the world. We publish herewith some engravings which will give the reader an excellent idea of the present condition of the locks at the ends of the canal, and a little explanation in connection therewith will not be out of place.

Next June, or July at the latest, the canal will be ready for business. Just eight years will then have passed since the laying of the corner stone on June 3, 1887. On September 1, of this year, the chambers or basins of the lock on the Baltic Sea, near Kiel-Holtenau, were filled with water that was brought beforehand from the Eider Canal by means of culverts, and was dammed up to a depth of about 37 feet; so that one of the most interesting portions of the structure is now forever removed from sight; a smooth, mirror-like surface stretches over work that required years for its completion, only the massive tops of the masonry showing above the water.

The northern basin of the lock will be arranged for vessels entering from the Baltic and the southern one for vessels passing from the canal to the Baltic. The dimensions of the new lock are enormous; the available space between the gates is about 492 feet, the greatest breadth 82 feet, and the depth 32 feet. Vessels 492 feet long can pass through the lock, while our largest war vessels are not more than 367 feet long and 68 feet wide, having a draught of 27 feet 10 inches. The largest transatlantic steamers measure 557 feet 8 inches in length and 72 feet in breadth, with a draught of 26 feet.

Excepting the locks at Bremerhaven, there are no others as large in the world. In the Kiel-Holtenau lock, which is of about the same size as the lock at Brunsbuttel, several steamers or sailing vessels can pass through the two chambers at the same time.

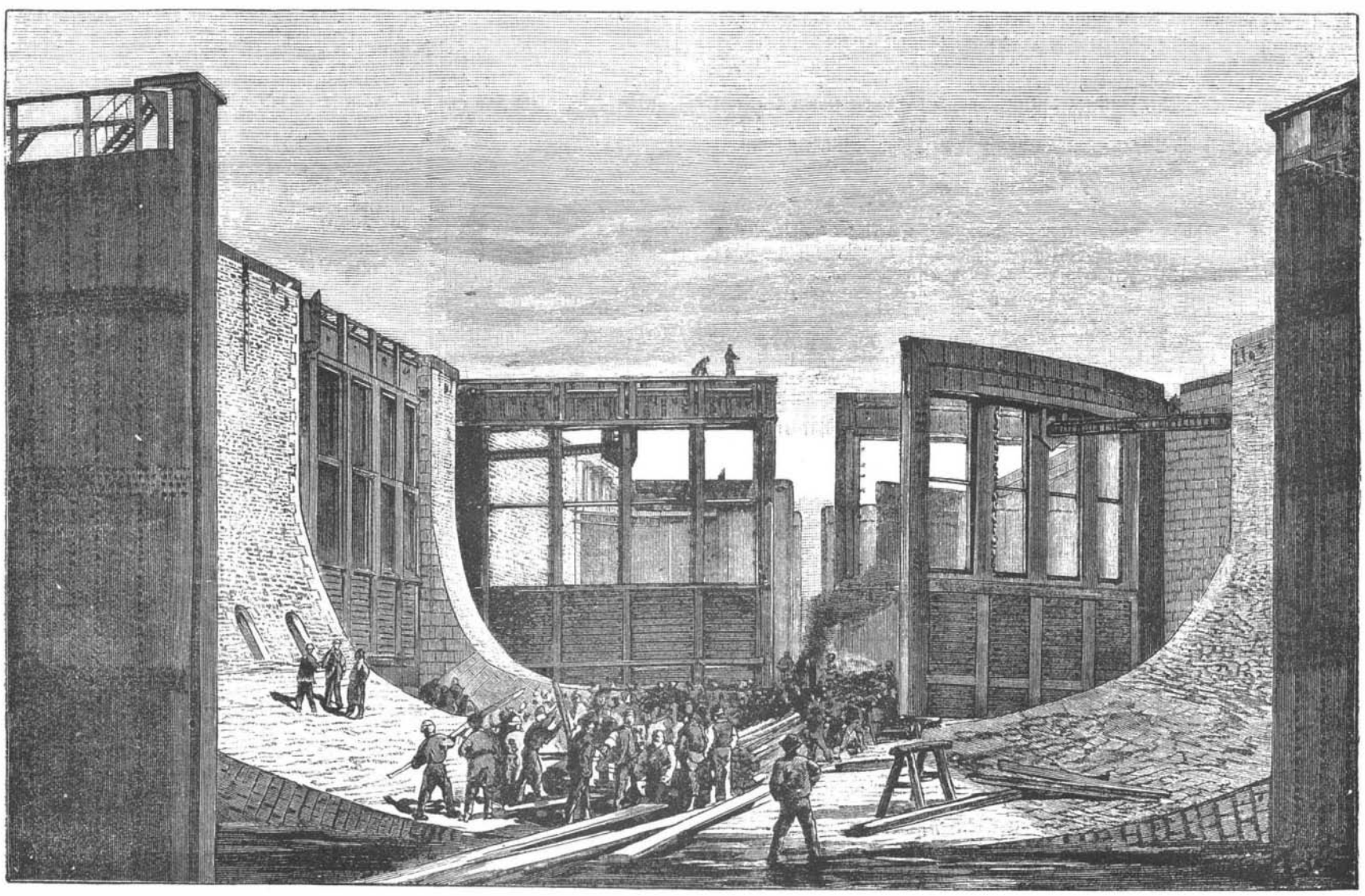
The locks are operated by hydraulic power. In the center of the basin there are light, inswinging gates, calculated to relieve the main gates of part of the pressure in case of high tide or other emergency. Eastward of the old Holtenau lock the canal widens to over 300 feet and forms an inner harbor that connects with the harbor on the north side where the government collects its revenues, and from here opens into the double lock. The locks will generally be open, for there is no flood tide in the Baltic Sea, and will need to be closed on special occasions that will not amount to more than twenty-five days in the year, while the lock on the North Sea can be kept open only three or four hours during each flood tide.



THE NORTH SEA—BALTIC CANAL—HOLTENAU LOCK.

With the completion of this lock we reach an important point in the construction of the canal, which is rapidly approaching its conclusion, and the celebration that will mark this important day.

Let us now turn our attention to the Elbe lock. From the Elbe one passes first to the outer harbor, which, at the quays on the western and eastern sides of the Elbe, measuring 1,509 feet and 918 feet respectively, offers accommodation for ships waiting to pass through the locks. This outer harbor is more than 300 feet wide and opens into the immense double lock.



INTERIOR OF BASIN IN HOLTENAU LOCK.

Beyond the Elbe lock stretches the inner harbor, which is about 1,557 feet long by 656 feet wide, at the widest place, and then narrows down to the regular width of the canal; that is, 229 feet.

But let us return to the lock. The two basins are contiguous and parallel, and each basin is provided with three sets of gates that are to be closed every four hours. The foundation of the Elbe lock was built mostly dry. The walls consist of brick and square blocks of stone, the latter showing in some parts, while other parts of the visible portions of the walls are covered with cement. The projecting corners, sills, recesses for the gates, and other trimmings are made of stone. In the Brunsbuttel lock there are altogether 103,332 square yards of masonry. The walls are provided with supply channels to be used in filling the locks, the water for this purpose being taken from the inner harbor. These channels can be closed watertight. Pontoons will be used for closing the basins watertight in case repairs are being made. In this lock, as in the lock at Holtenau, there are the necessary hydraulic motors and other machinery, all operated from a central machine station. The illustrations, for which we are indebted to the Illustrirte Zeitung, show the interiors of the locks.

About Engravings.

Not every one who reads the newspapers and looks at the engravings in print knows how they are made or what process is used in producing the different effects. The Newspaper Union undertakes to tell how the variety of kinds are produced:

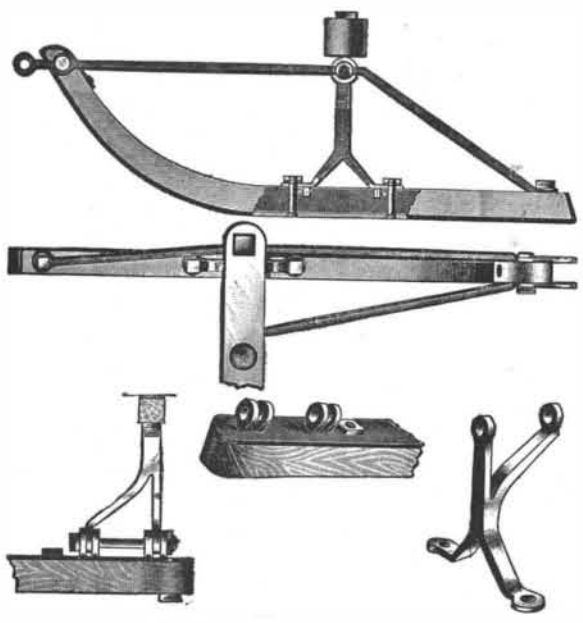
A half-tone is made direct from a photograph, and is the closest possible counterfeit of the original that can be produced. It is not suitable for newspaper work, but works well on any supersized and calendered stock. An electro from this necessitates a separate operation, and the price of an electro does not include the making of the half-tone.

A zinc etching is made only after the subject is first plainly shown in black ink upon white paper. Pen and ink drawings of original drawing subjects are indispensable, and may be made either from a photograph or other illustration. This drawing is photographed upon zinc, the superfluous metal eaten away by acids, and an electro is made from the skeleton which is left. Price of the drawing and zinc etching is not included in the price of electro. Zinc etchings are suitable for newspaper work, and are inexpensive.

Woodcuts are made only by drawing upon wood, and cutting out superfluous portions. They are necessary only for the finest work, not so good generally as half-tones, are slow to make, and expensive.

AN IMPROVED SLEIGH KNEE.

The illustration represents an improvement in sleigh construction for which a patent has recently been granted to Mr. L. L. Chaffin, of Monticello, Minn. The attachment of the knee to the runner is shown in one of the views, and the knee itself, shown separately, is forked at its upper end, spaced groups of bearings rigid with the beam receiving the upper forked arms of the knee between themselves, where they are held by a pivotal bolt. A continuous brace, having an eye through which the pivotal bolt is passed, is fastened



CHAFFIN'S SLEIGH KNEE.

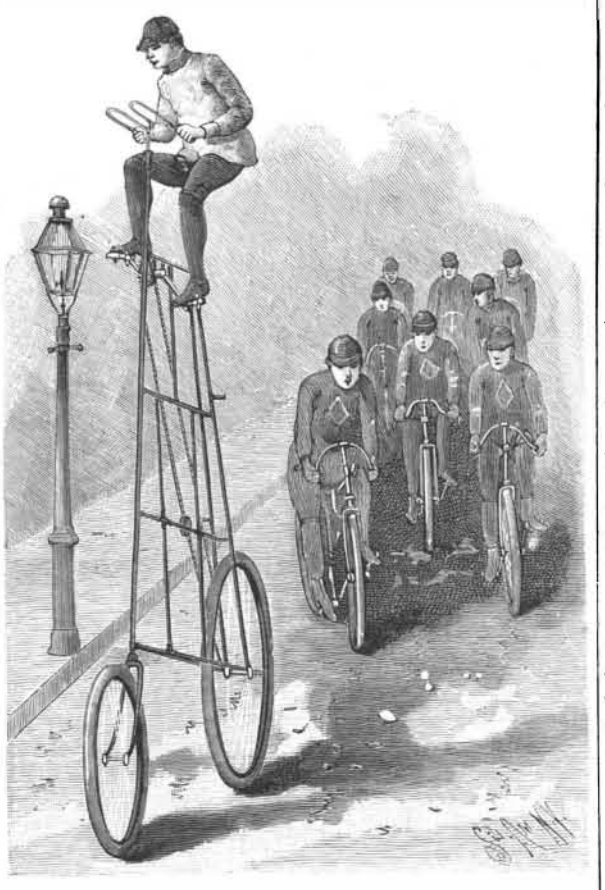
at its front and rear ends to the runner, and another brace extends diagonally from the front end of the runner to the inner end of the bolt.

The Shepherd's Telephone.

The use of the telephone on Australian sheep ranches is becoming common. Its employment is mentioned on the Clark ranch in Montana, where all the sheep and shepherds are watched and handled telephonically, by means of six stations all communicating with a central point, from which come weather signals, orders, etc.

A CURIOUS BICYCLE.

One of the most curious sights that has lately been seen in the streets of New York is what has felicitously been called the Eiffel Tower Bicycle. This machine is constructed on the same principle as an ordinary safety, but it has a frame superstructure which carries the rider at a distance of some ten feet from terra firma. This machine is frequently seen on the avenues of the city, and the rider easily overtops the ordinary lamp post along the route of travel. He seems to have



THE EIFFEL TOWER BICYCLE.

perfect control over the machine, which he can drive at quite a good rate of speed, taking sharp corners with perfect ease and apparent safety. This bicycle is mounted from behind in the usual way, but it has to be held by attendants while mounting. The owner sometimes places the machine against a wall and mounts from a standstill, but, of course, in the city this is not always practicable.

There is considerable difficulty in driving the bicycle up hill, owing partially to the weight, the length of the sprocket chain and the balance of the machine. The sprocket chain extends from the upper sprocket wheel to the rear wheel, and the lateral swing or play of the chain is prevented by a guide roller mounted just above the back wheel. The front wheel measures 28 inches, the rear wheel 36 inches, and the extreme height is said to be 13 feet. The machine was constructed in England, but the American Dunlop tire was applied after it arrived in this country. The adventurous spirit who has been seen riding this remarkable wheel is usually accompanied by a number of companions who serve as a sort of bodyguard and prevent vehicles and pedestrians from obstructing the way.

Natural Soda in California.

California is one of the few localities in the United States where natural soda is found. The geographical occurrence of this substance in the United States is principally confined to the arid regions of the Great Basin, especially to the soda lakes near Ragtown, Nev.; Mono Lake, Mono County, and Owens Lake, Inyo County, Cal.; and Albert Lake, Or., and to many dry deposits and incrustations in the same region. A full chemical discussion of the nature of natural sodas and their technology, together with numerous analyses of the waters of the soda lakes and dry deposits, are given by Dr. T. M. Chalard in Bulletin No. 60 of the United States Geological Survey. The lakes, as shown by Messrs. King, Hague (fortieth parallel, II.) and Russell (Eighth Annual Report and Monograph XI., United States Geological Survey) are, for the most part, the residues left by the evaporation of larger bodies of crates, the shore lines of which can be traced at considerable distances, sometimes several hundred feet above the present beaches, showing that the old lakes covered wide expanses of the present desert.

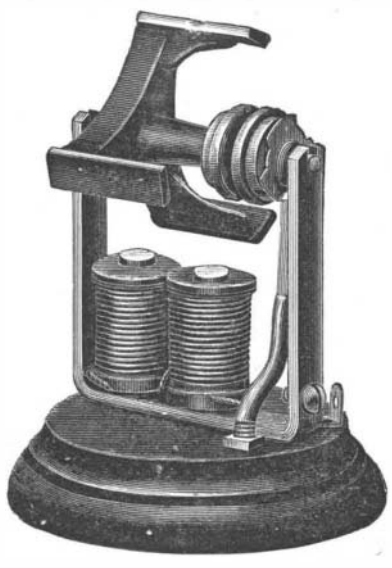
The concentration by evaporation of the waters of the former lakes has increased the proportion of their mineral salts, and sometimes this concentration reaches the crystallizing point, when the sodium carbonate appears as a white incrustation on the surface and shores of the lake. The origin of this salt is explained by the geology of the region where it occurs, which is given in the reports above referred to. Mono and Owens Lakes, in this State, are outside the great hydrographic basin of Lake Lahontain. Professor Russell describes the geography and geology of Mono Lake in the Eighth Annual Report of the United States Geological Survey. Its hydrographic basin has no outlet, but streams and springs feed the lake, and the only escape for the water is by evaporation. The ancient shore lines can be traced far up on the sides of the Sierra Nevada, which formed the western shore of the ancient lake. There are springs in the bottom of the lake and near its shores. They are especially abundant near the base of the mountains—the seat of former orographic movements—and a belt of hot springs extends along the range for hundreds of miles. Just south of the lake is a series of volcanic cones known as Mono craters, so that the locality is one of former volcanic activity. The high saline contents of this and other lakes is due to the gradual concentration of its own water supply.—Min. and Sci. Press.

Guard Rails.

The Roadmaster and Foreman says: "We were very much interested in the New England Roadmasters' Association's report on guard rails. The conclusions of the committee were about in accordance with the usual practice on the best roads of the country. The length of guard rail recommended is not less than 12 feet. But we rather like the length of 16 feet. The purpose of the guard rail being to so guide the wheels that they will not take the wrong side of the frog, or pass over it with unnecessary jar, it is plain the guard rail need only be long enough to produce this result. Any additional length is mere waste. For all practical purposes 16 feet is sufficient. With this length we could have a curved portion of four feet at each end and a straight portion of eight feet in the middle. A curvature of two inches at the end is sufficient. No greater mistake can be made than in having the curve at ends of guard rails too stiff. When the curve is short and stiff, the approaching wheel strikes the guard rail at such an angle as to impede its progress, and cause a very decided jerk. As evidence of this note a guard rail that has a very stiff curve. Not only does it cause a jerk when the wheel strikes the guard rail, but the wheel is veered out of its proper position, and before it rights itself a succession of jerks follow that are injurious to the track and rolling stock. It is therefore very important that the curve be as slight and gradual as possible, so that the sides of the wheel flange will strike the guard rail and glide along without any jerk, or without being retarded until it reaches the straight portion of the rail and passes over the frog without any jerk or jar. Everything should be so arranged that the wheels will pass over the frog squarely, and the only way this can be accomplished is to have nothing impede the progress of one of the wheels. The more gradual the curve, the more nearly this can be secured, as there is no facing surface for the edge of the flange to strike. Careful attention to these little details in the arrangement of the guard rail will save time, trouble and expense."

SIMPLE ELECTRIC MOTOR.

The electric motor shown in the annexed illustration is capable of use for driving mechanical signs, toys, and other devices requiring a very small amount of



SIMPLE ELECTRIC MOTOR.

power; but it finds its principal use as an instructive toy.

It is provided with a bichromate battery capable of developing sufficient current for running the motor at a high rate of speed. The armature can readily be detached so as to permit of using the field magnetfor experimental purposes.

The entire apparatus, including battery and a few charges of bichromate of potash, is furnished for $1, a common tumbler being used for the battery cell. This motor is manufactured by the Wood Novelty Concern, of 46 Cortlandt Street, New York.