

volutions as may be desired. One revolution of the winch, then, or rather several revolutions (the operator is here represented as about beginning the rolling), and the numbers, but just now flat and vertical, are rapidly wound around rods. Of course, a single winch causes the simultaneous revolution of the ten rods. At this instant again the examiner can come to find whether each rod carries its ten rolled numbers properly, whether the hundred is therefore complete, and to see that none of the numbers of this series (it will be the same with all the others) is missing from the wheel.

Third operation: The guidance of the rolled numbers into the wheel. A few revolutions of a second winch actuate a flat rod placed in the rectangular box, and the forward motion of which pushes the hundred numbers, which thus fall through apertures in front of each of the rods that support them, into the glass tube that runs along the various machines. The bottom of this glass tube is provided with a belt upon which rest the numbers thrust forward by the rods. This belt is endless, and passes and repasses, through a pulley shown to the left of the figure, in the interior of the cylinder, and thus carries the rolled numbers to the oblique glass tube, which empties them into the wheel.

The description of the filling of the wheel just given is sufficiently detailed to allow the reader to get an

The Right to Use Ground Wires.

The Supreme Court of Ohio has rendered a decision reversing the decision of the lower court in the case of the Cincinnati Inclined Plane Railroad Co. against the City and Suburban Telegraph Co. Action was brought by the telegraph and telephone companies to enjoin the Inclined R.R. from operating its line by the Sprague system (single trolley method), on the ground that by its use the telephone system was rendered practically useless. The telephone people claimed a prior right to the use of the earth as a means of securing a return circuit. The court upholds the theory that the street is primarily intended for the use of the public for traveling and transporting goods, and practically that if the motive power employed for this primary use interferes with a secondary use, the law cannot help it. It has been said that this decision makes free property of the earth as a conductor—that is, that the company using the most powerful current may crowd out smaller concerns by sheer superior power; but it is more accurately described as above indicated—as holding a railroad more important than a telegraph or telephone.

GREAT SPOOLS OF WIRE.

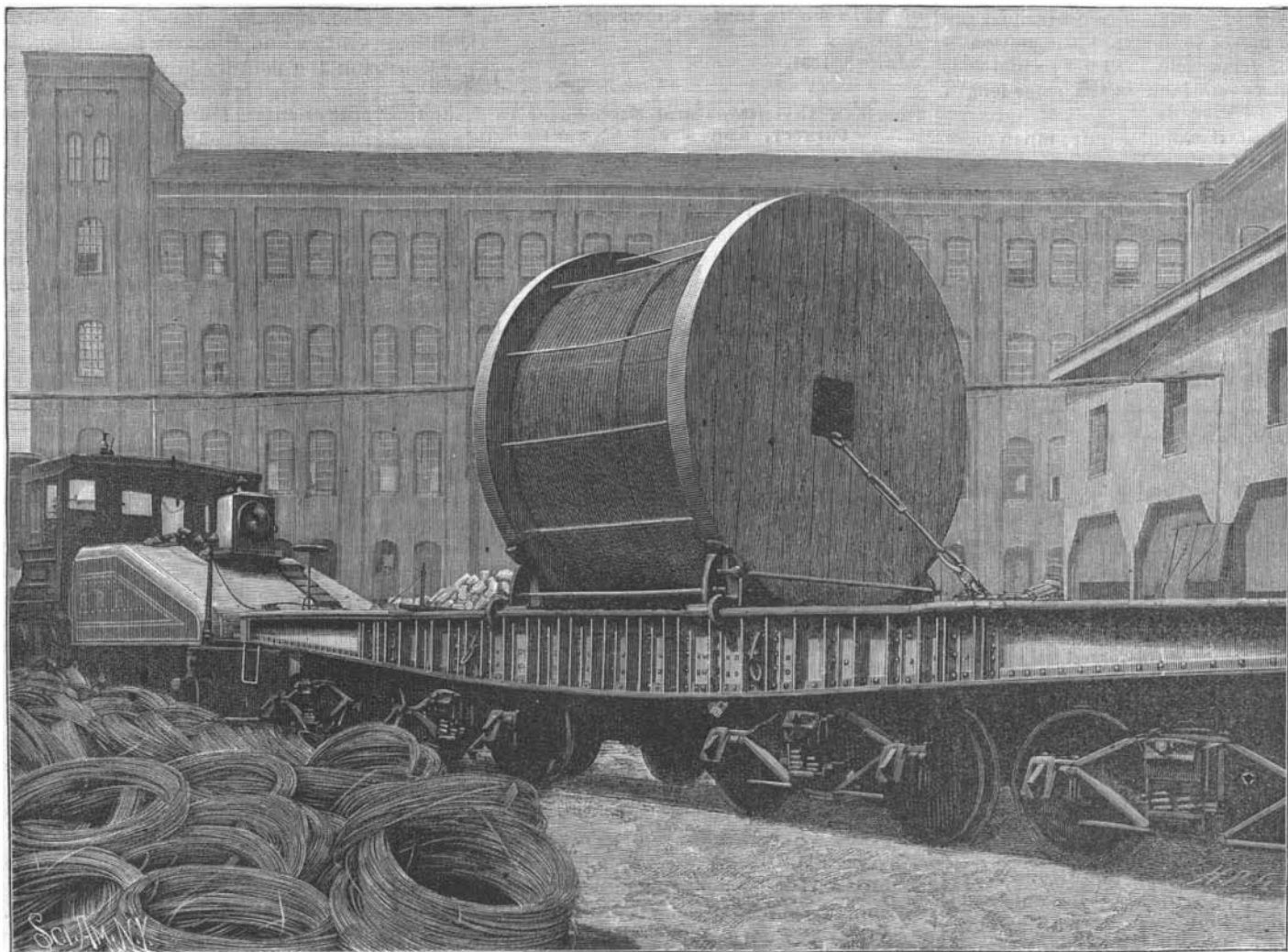
The extensive use of street cable railways has necessitated the manufacture of wire ropes of great continuous length, and the problem of transporting such ropes,

which raw material may be turned into a finished article, going through numerous processes. If the *Record* averaged 50 cords of poplar daily, it would amount to 18,250 cords annually. It must then be considered that this is only one paper in one city, and that about every newspaper is printed from material consisting largely, and often almost wholly, of wood pulp, which is also used in the production of nearly all common and medium grades of paper for almost all uses. It is thus seen that the consumption of wood in pulp making is of great magnitude.

With the enormous consumption of wood for railway ties and building and the added requirements of the printing press, it is not strange that our forests are rapidly disappearing. Every State should pass laws for the encouragement of tree planting. If steps are not soon taken to restore our woods, there will ere long be a tree famine.

Twelve-Inch Gun No. 1.

The first 12-inch steel gun made in the United States has been completed at the Watervliet Arsenal, West Troy, N. Y., and shipped to the Sandy Hook proving ground for testing. This is the largest steel gun ever built in this country, and is the first of 16 of its type ordered by the government. It has been building since 1888, and great things are expected of it. It is designed



SHIPMENT OF STREET RAILWAY CABLES.

idea of the exactitude and of the minuteness of the operations which secure indisputable regularity in a future drawing. The drawing of the press lottery mentioned above was, however, but an elementary operation alongside of the putting in the wheel of the 1,200,000 numbers of the exposition bonds that Mr. Casanova executed in 1889 for the account of the Credit Foncier. For this colossal operation it was necessary to use a wheel 4¼ feet in diameter, in which, in ten days, were placed the million and more brass cylinders, by means of the twelve machines represented in Fig. 2.—*La Nature*.

Electric Light Fishing.

The sloop *Lou* left San Diego, June 4, on a novel fishing expedition, to last from one to three months, so says the *Pacific Lumberman*. An electric plant has been put on board, and the fishing is to be done by the aid of incandescent lights and a net. Experiments in the bay proved that everything alive under the water is attracted by the glare of the light, and thousands of fish of every description can be taken in a short time and with very little trouble.

Four men were on board, and the boat has steered for the banks near San Clemente Island. The practical result of the first voyage will be watched with much interest, and if it is as successful in deep water as the experiments in the bay have been, the projectors of the enterprise are confident they will have solved the problem of supplying all Southern California with cheap fish. W. G. Riffenberg, a citizen of San Diego, is the inventor of the apparatus.

without injury, from the manufactory to the place of use, was a serious one.

This was successfully solved by Messrs. John A. Roebling & Co., of Trenton, N. J., whose cable railway ropes have become everywhere famous for excellence.

A single Roebling cable sometimes is required to have a length of 6½ miles. Such a rope 1¼ in. in diameter will weigh 42 tons. It is reeled upon a single spool, over 10 ft. high, as shown in our engraving, which is from a photograph. A special car of superior strength receives the great package. The particular rope here shown was made for the Western Company's cable railway, St. Louis.

Wood for the Printing Press.

The wool pulp business is generally regarded as in its infancy in this country, and yet the product is enormous. The Philadelphia, Pa., *Record*, which makes its own paper, has furnished a piece of special information, which gives an inkling of the magnitude of the general consumption of wood pulp. It states that a single edition of the *Record*—150,000 copies of a 12 page paper—required 17 tons of blank paper, to produce which 67 cords of poplar was used. In 22 hours from the time of felling the tree it had been turned into printed papers. The process is thus divided with respect to a test case: Chopping 1½ cords of wood, 3 hours; in manufacturing into pulp, 12 hours; transporting to the *Record* office, 1 hour and 20 minutes; wetting paper preparatory to printing, 30 minutes; printing 10,000 copies, 10 minutes. This shows the rapidity with

for seacoast defense, with the 12-inch steel mortars that are also now being built. The gun weighs 52 tons. It is 36.66 feet long and the length of the bore is 34 feet. Its charge is 440 pounds of powder, and its projectile weighs 1,000 pounds. The powder pressure that will be exerted on its interior when the gun is fired is 16.5 tons to the square inch. The initial velocity of the projectile will be 1,940 feet per second, the muzzle energy 26,000 foot tons. At the muzzle this projectile will penetrate 32 inches of iron, and at a distance of two miles 20 inches.

The tube and jacket forgings for this gun were purchased at Le Creusot, France, and the remaining forgings were obtained from the Midvale (Penn.) Steel Works. Although it was necessary to go abroad to purchase the largest forgings, owing to the fact that substantial progress in the manufacture of steel forgings in this country had not then been made, it will not be necessary to do so in the future, American manufacturers having in the meantime acquired an experience that enables them to produce the largest forgings. The completion of this gun marks a creditable step in the progress that the government is making in its army gun factory at the Watervliet arsenal.

In the early days of steamships on the Atlantic the steam pressure carried was five pounds only above the atmosphere, and the engines made from 10 to 12 revolutions per minute; the vessels made 8 knots per hour on an average. Now we carry exactly 36 times the pressure, make 7 times the revolutions, but go only 2½ times faster.