tons have yet been shipped to European ports. The bulk of this has, however, found a ready market at good prices, and it is quite certain that when speculation gives way to legitimate work, the constanly increasing demand will make of Florida the largest contributor to the world's supply.

DRAWING OF FINANCIAL BILLS BY THE CASANOVA APPARATUS.

The system of paying loans by obligations redeemable in a certain number of days through drawing lots has been greatly developed in our day, and is tending to increase to a still further degree. Some of these loans, those of the city of Paris, for example, are redeemable in a period of ninety-nine years; while others, such as the bonds issued on the occasion of the Universal Exposition of 1889, have fixed for such redemption a period of only seventy-five years. In certain cases, the obligation, issued generally at 500 francs, or at a slightly smaller figure, will be redeemable at 1,000 francs, and, in other cases, at its face value. Again, these annual drawings often include the distribution of prizes of more or less value, and which sometimes reach the respectable figure of 50,000, 100,000, and even 500,000 francs.

The simple *expose* that we have just given authorizes us now to claim that the operations that are to concur in the preparation and definitive establishment of the system of drawing such values, to which fate (sometimes ungrateful) may reserve a fortune under the form of a large prize, should be surrounded with the minutest and most mathematical precautions. Let a single one of the innumerable numbers (sometimes more than a million, as in the drawing of the prizes of the exposition bonds, which were 1,200,000 in number) be forgotten, and let the public by any means be apprised of the error, and we shall see our drawing exposed to just and very disquieting demands. Who knows whether or not the blind wheel of fortune stopped before the unfortunate forgotten number?

Were it a question of a simple lottery, there would be less trouble. A hidden sin is half pardoned; in this case it would be entirely so. In fact, the lottery differs from the drawing of redeemable bills in that, for the latter, the entire series of numbers, representing the corresponding subscribed obligations, must have made their exit from the wheel that contains them in a given period. If, for example, five hundred obligations are redeemed annually, the wheel will still have to contain, from the time of the last drawing, five hundred numbers, and not four hundred and ninety-nine, or even less. If the five hundred numbers are not presented to be called off, with entire accuracy, the putting of the numbers in the wheel has been imperfectly done in the beginning, or else former drawings have been incorrectly executed. In a word, there have been numbers forgotten or mislaid—forgotten at the moment of filling the wheel, or lost at the time of the annual drawings. There is no way out of this dilemma. On both hands, the operation will have been faulty, to the highest degree, and every bearer of a thrown-out obligation will have the right to render legally responsible for it the society, city or state that has assumed the reponsibility for it before its bond holders.

We frankly admit that we were never aware of the many inconveniences that we have just detailed until we had an opportunity of being present at a drawing—say at the putting of the tickets in the wheel, and at their extraction from their happy domicile. An opportunity of observing these curious operations was offered to us last year at the time of the fete that the Parisian press gave at the Continental Hotel for the benefit of a relief fund for widows and orphans. Aside from the fete itself, concert, ball, and exhibition we had got up a lottery of 15,000 tickets winning 587 different prizes. The drawing of these 587 prizes was done on March 15, in the presence of three delegates, Messrs. Victor and Henry Simond and Mr. Ranc. The putting of the numbers in the wheel had been effected on the previous evening by means of the Casanova apparatus, which we represent herewith. Everything proceeded wonderfully well, and Mr. Casanova had nothing to do but receive the best wishes of our *confreres*. As the press lottery was but a tombola, the 14,413 numbers remaining in the wheel were destroyed.

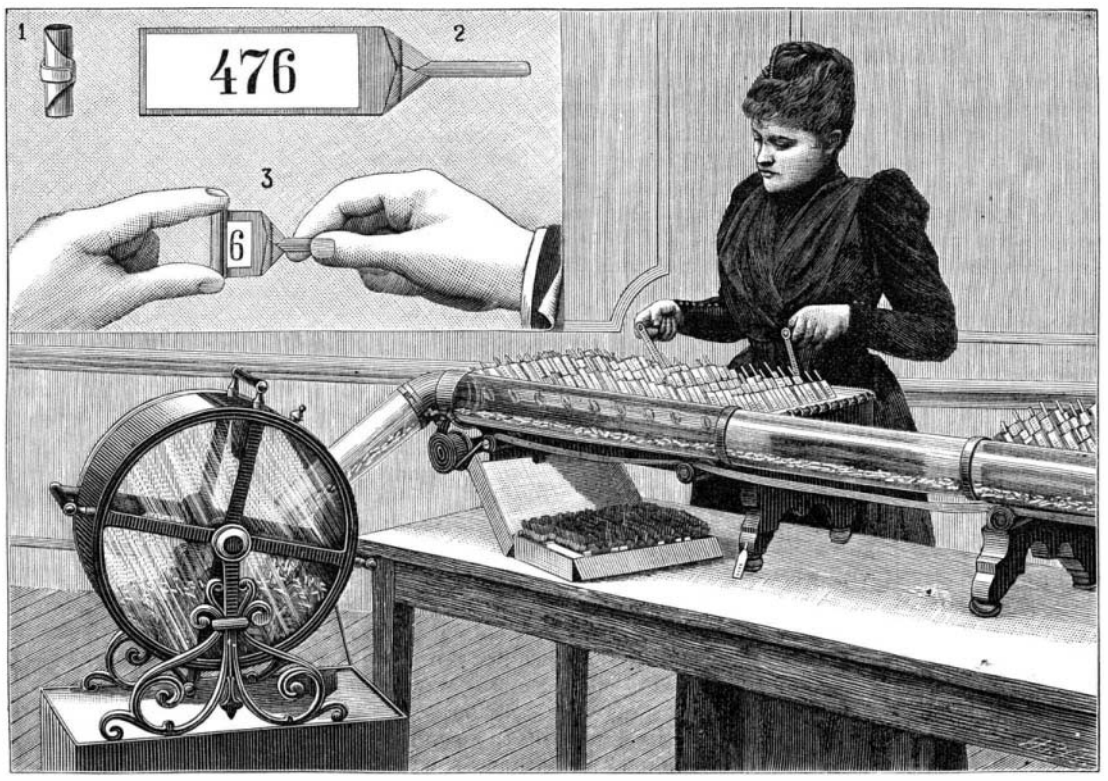


Fig. 1.—PUTTING THE NUMBERS OF A DRAWING INTO THE WHEEL, BY MEANS OF THE CASANOVA APPARATUS. 1. The number rolled up. 2. The number open. 3. The unrolling of the number.

Let us dwell in detail upon this wheel that we have just alluded to. It may be seen to the left of Fig. 1. It is about twenty-four inches in diameter. The two ends of it are of plate glass, that allow the numbers that it contains to be seen. The periphery of the wheel is of copper. Four handles permit of maneuvering it and of making it revolve in order to mix up the numbers, the dispersion of which is still further hastened by metal fans arranged within for this purpose.

The aperture that serves for the introduction of the numbers, and that will permit later on of taking them out at the epoch of the annual drawings, is, of course, carefully sealed after the numbers have been inserted and every time the effective numbers have been removed. The wheel is provided with two, or even three, locks, several keys to which are placed in the custody of those appointed to preside at the drawing.

Before everything else, then, it will be this wheel that it will be necessary to look after with the strictest attention. In the first place, not a number more, not a number less, between its glass ends. One more, that is difficult; one less, that has been seen. However this may be, absolute exactitude in the method of filling the wheel is necessary before all else. That is not all yet. Other misfortunes may happen. For example, at the time of a drawing, a delicate hand has been seen to enter the wheel, and draw two numbers therefrom. Two, be it understood, instead of one. The two unfortunate numbers, one of which might have been the winner, had got stuck together through their roughness, and were taken out as one. Which is to be put back into the wheel? Which shall be sacrificed when it has been so near the fortune? Solomon himself would have been perplexed—especially had he been the owner of several obligations, or even of but a single one! Along with exactitude in filling the wheel, it will be necessary to see also that the number itself be of intelligent and irreproachable make, and so established that it shall be irremissibly isolated from its neighbor, rolled artistically, with the figure perfectly legible and firmly glued. In a word, in the primitive operation, as well as in the annual operations, it is necessary to avoid every chance of irregularity and complaint.

We can now examine Mr. Casanova's system at our ease. In the first place, as to the number itself: This is admirably gotten up, and in such a way as not to be exposed to various inconveniences, and particularly to the inconvenience of bunching that we mentioned above. It is formed of a very light sheet of brass one and a half inches in length and a little over one-tenth of an inch in width, to which adheres a very light piece of linen carrying the figures, and which terminates in a small brass rod, which later on will be rolled around the sheet. The figures 1, 2, 3 in the corner of Fig. 1 show the number; unrolled completely at 2, and wholly rolled up at 1, as it is in the wheel.

At 3 the operator is unrolling the brass cylinder after its extraction from the wheel.

Now as to fitting the wheel. Let us refer for this to Fig. 1. Let us follow attentively the operations that are to carry the mechanically rolled numbers from the boxes in which they are primarily placed up to the wheel, in passing through the glass cylinder which we see in the foreground. The numbers, wholly open, are classified in advance by fifties, in boxes. As the apparatus consists of absolutely identical machines, each serving to put one hundred numbers in the wheel, we shall examine but one of them.

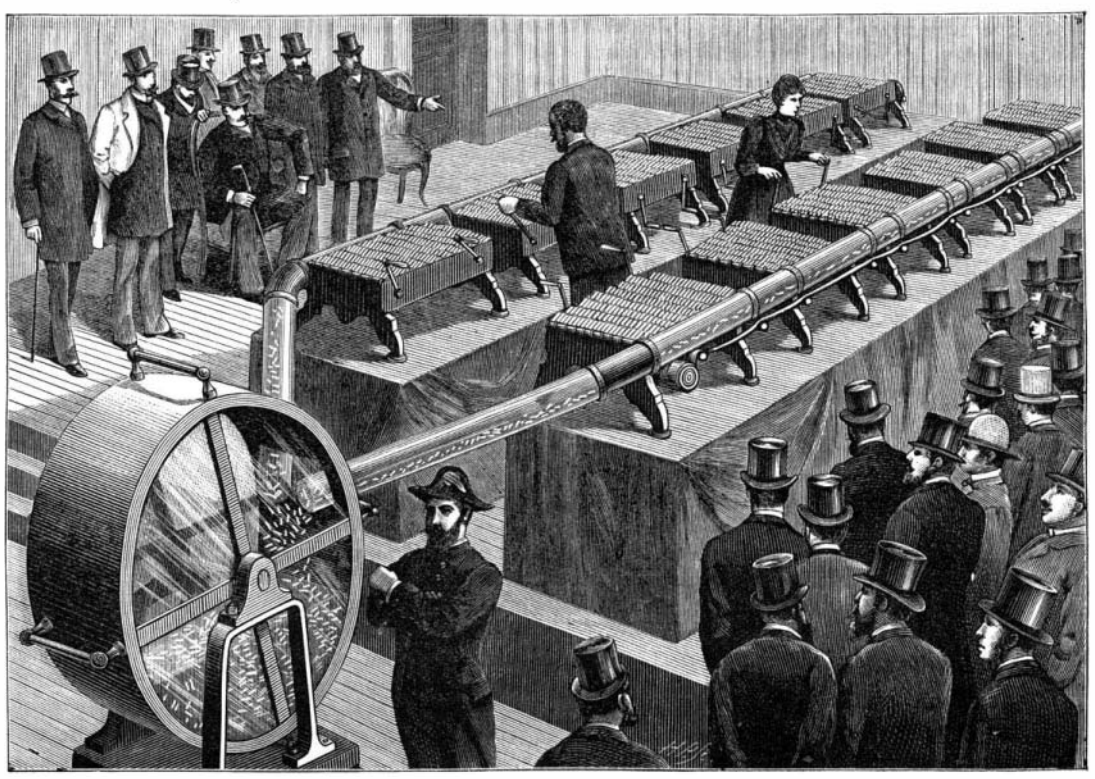


Fig. 2.—GENERAL VIEW OF THE PUTTING OF THE NUMBERS OF A DRAWING INTO THE WHEEL BY MEANS OF TWELVE CASANOVA APPARATUS OPERATING SIMULTANEOUSLY.

The operator, who has within reach the box of numbers to be put into the wheel, stands in front of a rectangular box, divided into ten equal parts by ten steel rods split lengthwise, and equidistant from each other.

In the longitudinal slit in the rods, the operator fixes the metallic numbers, ten to a rod—say a hundred numbers to ten rods. Fig. 1 represents the phase of the operation in which these hundred numbers are thus stuck in the slit in the rods, the brass tail of the number being upward.

So much for the placing of the tickets. At this moment, an examiner sees to it that these hundred tickets are complete in their place, that not a single one of them is missing, and that they belong to the same hundred series. He can read them, or ask the operator to point out to him or even to deliver to him any number of the hundred. Briefly, the minutest verification is at his disposal, and no chance exists of seeing a number doubled or absent or blank.

Second operation: the rolling of the numbers. As each of the ten rods that carry the numbers is movable around its axis, it is capable, through a winch within reach of the operator, of making as many re-

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 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.

The Right to Use Ground Wires.

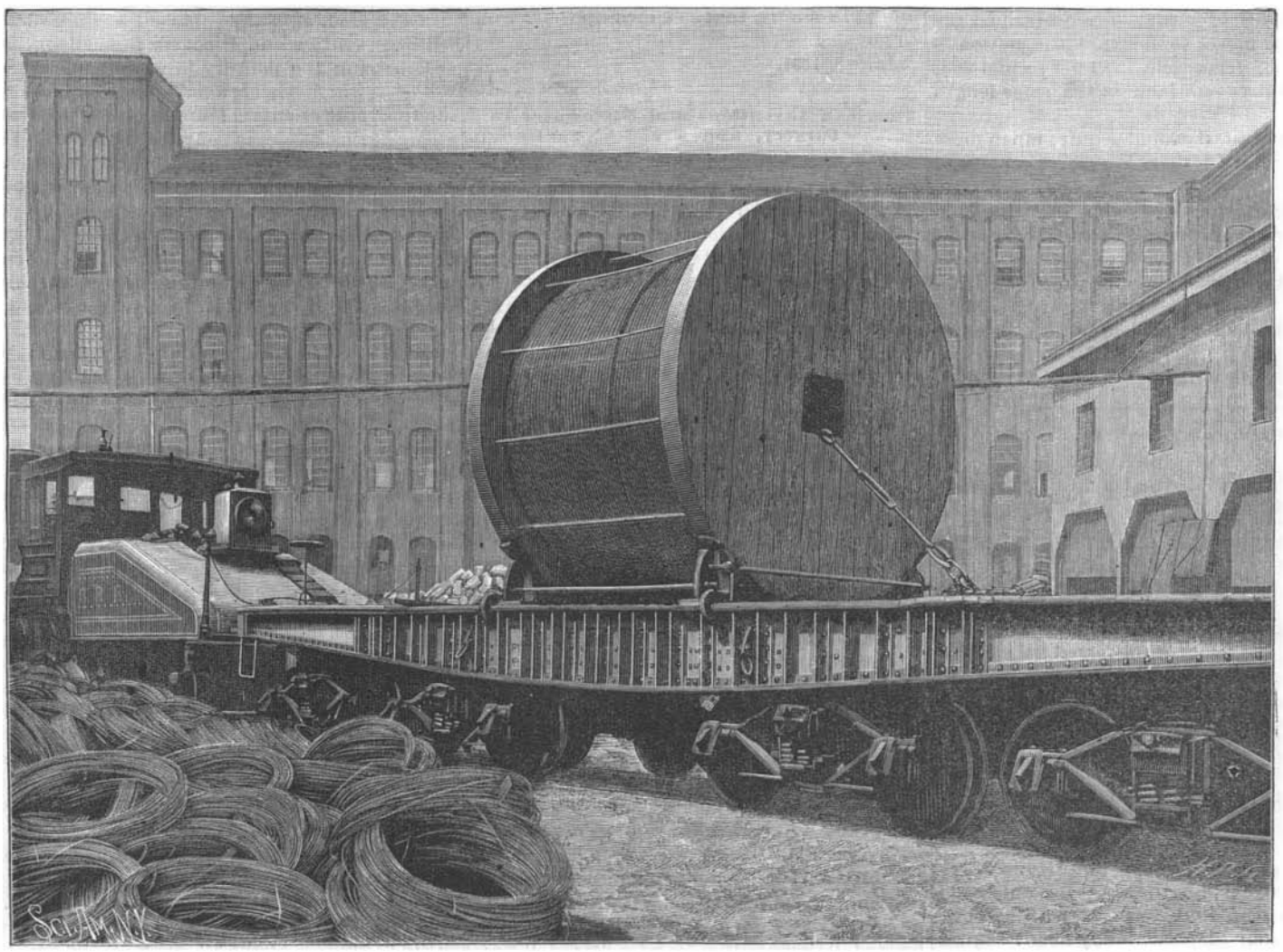
The Supreme Court of Ohio has rendered a decision reversing the decision of the lower court in the case of the Cincinnati Inclined Plane Railroad Co. against the City and Suburban Telegraph Co. Action was brought by the telegraph and telephone companies to enjoin the Inclined R.R. from operating its 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, 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.



SHIPMENT OF STREET RAILWAY CABLES.

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 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 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.