PROTECTOR FOR BUILDINGS.

A novel device for protecting buildings against destruction by storms has been patented by Messrs. Ezra Crowell and Elisha C. Dawson, of Dawson, Neb. This apparatus is designed as a temporary or permanent attachment to a building for preventing it from being blown over during wind storms, and to protect it from lightning. As will be seen by reference to the engraving, the building is secured by wire ropes of suitable strength passing over the house and connected with threaded rods extending into the earth, and secured to suitable anchorages. The tension of the ropes is adjustable by means of the nuts on the rods, which permit of putting on or taking strain off from the ropes, or of removing them altogether, as occasion may require.

The building is provided with brackets at the side, and with a saddle at the top, over which the wire cable passes. These bearings for the cable are placed in the vicinity of the corners of the building, or otherwise located over the end

APPARATUS FOR PROTECTING BUILDINGS.

framing and studding of the structure, where the strain is greatest.

A lightning rod point attached to the saddle permits of utilizing the cables and anchorages as a protection against lightning.

This invention is especially adapted to the portions of the country periodically visited by wind storms, and its adoption will preserve many buildings from destruction, and prevent loss of life and bodily injury during such storms.

BOYS' POWER METER.

We annex engravings of a new form of engine power meter which has been recently designed by Professor C. Vernon Boys. The object of the engine power meter is to find automatically the amount of work done by steam or other fluid under pressure, such as gas, water, etc., upon the piston of an engine, whether single or double acting, and to record the result on a dial during any period of time, so that the total amount of work done in one or any number of strokes may be found by inspection and without calculation.

As in an ordinary indicator, there is in the apparatus illustrated a piston controlled by a spring, the displacement of which is a measure of the steam pressure in the cylinder of the engine at every moment. When used with a double acting engine, if the total work is required, each end of the indicating cylinder is connected with one end of the cylinder of the engine, so that the displacement is a measure of the difference of pressure or the effective pressure. To find the work done, this varying pressure must be integrated with respect to the motion of the piston of the engine. In the ordinary indicator the process of integration is represented by a "diagram," the area of which is a measure of the work. In order to make the diagram on a sufficient scale, the motion of the piston is multiplied. Now the inertia of the piston alone, which cannot be obviated, tends to slightly modify the diagram, but that of the parallel motion and pencil, light though they be, has a greater effect than is often supposed, owing to the fact that the energy of motion varies as the square of the velocity.

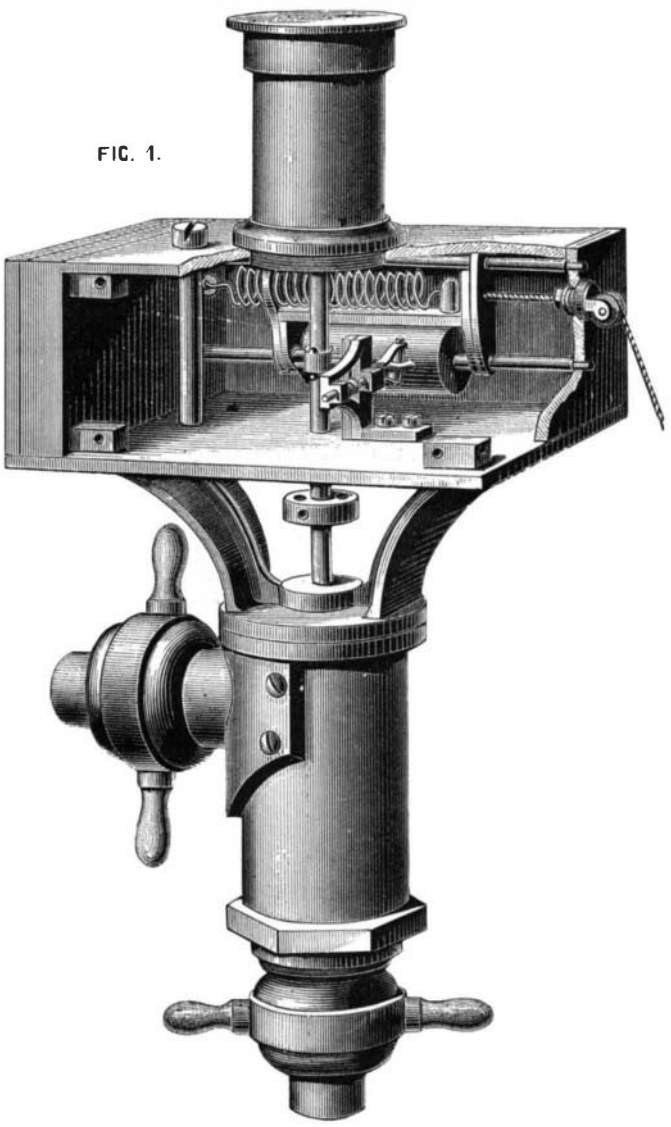
In the engine power meter there is no multiplication of motion, and all errors due to this cause are removed. Instead of having to move a pencil at a higher speed than itself in contact with paper, all the work that the spring piston has to perform is to turn an excessively light and delicately mounted disk on a swivel axis more or less in accordance with the movement of the piston, a motion in which sliding friction is absent. This disk rests against a cylinder, which is capable of moving longitudinally on its axis, but which, if turned, causes the axis to revolve also. The cylinder is moved longitudinally on its axis in time and in proportion to the motion of the piston of the engine. The plane of the disk is parallel to the axis of the cylinder when the spring piston is in its normal position, in which case longitudinal movement of the cylinder is unaccompanied by rotation, for the little disk rolls straight along it; if, however, in consequence of steam pressure, the disk is inclined, it will tend to run in a spiral line round the cylinder, thus causing the cylinder to rotate to a proportionate amount. Now the rate of rotation of the cylinder is directly proportional to the rate of its longitudinal motion multiplied by the tangent of the inclination of the disk; or, as the longitudinal motion of the cylinder is directly proportional to the piston of the engine, and the tangent of the inclination of the disk to the effective pressure, and the product of these two is the rate of doing work, the rate of rotation of the cylinder is at every moment directly proportional to the rate at which work is being done in the cylinder of the engine, and the number of turns recorded on the dial is a measure of the total work done.

In theory the instrument depends nowhere on approximations. It is mathematically perfect in every respect. In practice it is exceeding simple. The one adjustment that might be expected to be important and troublesome, viz., making the plane of the disk parallel with the axis of the cylinder when there is no steam pressure, is of no consequence whatever, for if it is not parallel, any error that may be made during a forward stroke is absolutely removed during the return stroke, because the tangent of the angle is as much too great in one as it is too little in the other, and therefore no accumulating error can result.

As constructed, the calculating mechanism is inclosed in a box separated from the indicating cylinder by an air space, and is so protected from injury by dirt and heat. One spring can be removed, and replaced by another instantly.

Our illustration is a perspective view of the instrument, showing the dial plate on the left, the spring cover at the top, and the integrating mechanism within, part of the casing being shown broken away. The axis of the cylinder carries the first index on the dial plate.—*Engineering.*

FIG. 1.



BOYS' POWER METER.

One of General Washington's Patents.

We were recently favored with an inspection of an original patent, which ranks among the earliest documents of the kind that were issued by the United States. We allude to the letters patent granted on May 4, 1796, to Peter Zacharie, of Maryland, for a new and useful mode of making nails and brads from cold iron. A good description of the machine is given in the patent, and the inventor says he can make with the machine eight millions of nails a day. Pretty good for 1796. The patent is written upon parchment in a large clear hand. The front page bears, in large type, an official certificate of the fact of the granting of the patent, the wording being almost identical with the official form that is to-day used by the Patent Office. At the bottom of the certificate is the well-known bold signature of George Washington, President; it is attested by the signature of Timothy Pickering, Secretary of State; and is countersigned and certified by Charles Lee, Attorney-General. It is dated at Philadelphia, which was then the seat of government.

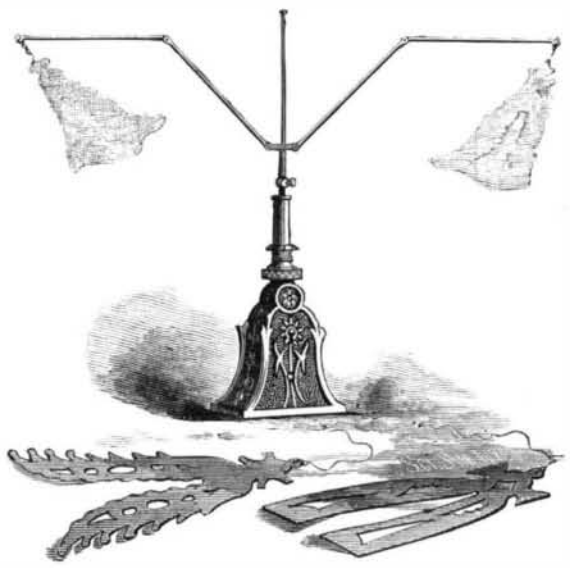
Taken altogether, it is a most interesting old document. It was shown to us recently by Mr. R. S. Chilton, formerly (from 1849 to 1851) librarian of the Patent Office. He now resides at St. Catharines, Ontario, but was appointed from New Jersey.

AUTOMATIC FLY FAN.

The engraving shows a novel spring-actuated fly fan for driving flies from the table or from a sleeping person or invalid. The spring mechanism in the base of the apparatus revolves the vertical spindle, which carries two jointed arms, each having at its outer extremity a swivel for receiving a paper flier like those in the foreground of the engraving.

These fliers may be cut from ordinary plain or fancy paper by any one according to taste, and may be renewed from time to time, so that the wings of the fan are always fresh and clean.

The arms may be extended more or less, and as they are revolved by the spring gearing, the fliers are revolved on the swivels, giving the apparatus a very curious appearance.



COFER'S AUTOMATIC FLY FAN.

The fan is compact, ornamental, and inexpensive, and avoids the objection of having dirty, unsightly wings.

This invention has been patented by Mr. Thomas W. Cofer, of Portsmouth, Va.

Curious Facts about Precious Stones.

In his lecture on precious stones, Professor Egleston, of the Columbia School of Mines, says there is in Paris a diamond so hard that the usual process for cutting and polishing made no impression upon it. The black diamond is mostly used for tools. In Russia it is broken into flakes, polished, and worn as court mourning. The historic diamonds have no more luster than a piece of glass. The sham diamond was more beautiful than the genuine stone, but it has a tendency to decomposition and does not retain luster.

The diamond mines of Brazil were first opened in 1727. It is estimated that since that time they have produced at least two tons of diamonds. In England, a stone weighing one carat and of the purest water is worth, when cut and polished, about $60. The dealers in rough stones acquire the habit of distinguishing the water of a rough stone by simply breathing upon it. Among the historic diamonds, the Rajah weighed 367 carats, and the Great Mogul 280. Before it was cut the latter weighed 900 carats. From the composition of the diamond we see what costly things Nature makes from common material. All the diamond fields of the world are not worth the anthracite fields of Pennsylvania.

A ruby of five carats is double the value of a diamond of that size, and one of ten carats is worth three times as much as a diamond of corresponding size. A perfect ruby is the rarest of all stones. Rubies are often imitated with real stones, the most common being spinel. But it is not difficult to distinguish the imitation, as the ruby is the only stone having a pigeon blood color. Another precious stone is the sapphire, which is like the ruby, with the exception of the color. He had seen a small stone which was ruby on one side and sapphire on the other. The emerald is a deep green, the deeper the better. It loses no brilliancy in an artificial light, but its color may be expelled by a gentle heat.

Most of our emeralds come from New Granada, and will always have flaws. In imitations it is not the hardness nor the color that is sought, so much as the flaw. The first eye-glasses were made in England of emeralds.

Bands from Sheep's Entrails.

The mode of manufacturing bands from sheep-guts is described as follows in the *Shoe and Leather Reporter:* The entrails, which are about 15 yards long, are well cleaned, and laid for a few days in salt water. They are then not thicker than ordinary cotton yarn, but will bear a strain of nearly 12 pounds, and are wound upon spools like yarn. If it is required to make round bands, the procedure is the same as in the making of ordinary rope; if, however, broad flat bands are required, this must be done in a loom, and in 5 strands, as in the making of ribbon. Flat bands can be made of any size; round ones have various diameters. The round ones have either the form of a smooth cord or that of a cord of from 3 to 5 strands.

Kidd's Cave.

BY H. C. HOVEY.

During the dog days last summer, I amused myself by hunting up some of the localities linked by tradition with the name of the famous pirate, Captain Kidd. It is certain that, when hard pressed by Lord Bellomont, who finally caused him to be hanged, the pirate concealed in some safe place a vast amount of treasure! We have nothing now to do with the whimsical stories told about exciting adventures in digging for these coveted chests glittering with costly jewels, ancient coins, and solid wedges of gold. The matter of fact is that, within the memory of persons now living, excavations for Kidd's treasures have actually been made in the bank of the stream that used to run near Silver Street, in New Haven, Conn.; and the probability is that Kidd used occasionally to sail into the bay for repairs at Greenough's ship yard.

Pits are also visible on Money Island, one of the group known as the Thimble Islands, off Branford, where treasure hunters have been at work within the present century. Nearly everything, indeed, about these picturesque islands is flavored with reminiscences of piratical adventure. Kidd's Harbor lies between two of the highest rocky points, and Kidd's Punch Bowl is exhibited as a great curiosity. The latter is a natural hollow in the granite ledge on Pot Island, and is about three feet long by a foot or more in width, and the same in depth. There is no proof that it was ever used for convivial or even culinary purposes.

Kidd's Cave, however, deserves more particular description. It is one of several small grottoes in the granite ledges near Short Beach, about six miles from New Haven. Leaving the cluster of cottages by the shore, we made our way through thickets of laurel and bay to what was once the natural sea wall. Following this for three hundred yards, we came to a rift in the rocks, around which a mass of fragments lay scattered for twenty feet. Measuring the height of this wall, I found it to be about thirty feet above the sea level, and twenty-four feet above the adjacent meadow.

Some former explorer has taken the pains to paint the name of "Kidd's Cave" on the wall near the entrance, which is an opening eighteen inches wide and five feet high. The adit slopes for ten feet at an angle of forty-five degrees to a small chamber, the floor of which is encumbered with fragments. The main passage runs from east to west for twelve feet, and then turns abruptly north for sixteen feet. This measurement does not include rifts and seams that reach much farther in several directions. The height of the chamber varies from three to eight feet, and there is an opening at one place up to the surface, through which smoke might ascend as by a chimney. Remnants of fire show that the spot has been used at some time as a hiding place; though it would not be easy to tell if the refugees were pirates, Indians, or modern tramps. At one point the floor was examined for relics, and search was rewarded by the discovery of a few arrowheads and two stone axes.

The fauna of Kidd's Cave includes spiders, flies, frogs, slugs, snails, and mice. Three of the latter were caught, and were found to be specimens of the common field mouse.

The temperature in the shade near the mouth of the cave, at 4 P.M. on the day of our visit, was 74° Fahr. But, within the grotto, the mercury fell, after an interval of ten minutes, to 55° Fahr., which is only one degree above the mean temperature of Mammoth Cave, as determined by the same instrument. I regard this fact as remarkable, considering the limited dimensions of the excavation; and it confirms the opinion to which other temperature observations have led me, that the mean temperature of the earth's crust in this latitude is about 54° Fahr., both winter and summer.

The origin of Kidd's Cave was undoubtedly marine; and the probability is that it was formed at a time when the coast was considerably higher than it now is, and that the upper portion of the cave is all that is now visible. I judge thus from the fact that large masses of rock have evidently fallen from the roof into some lower cavity, where they have disappeared.

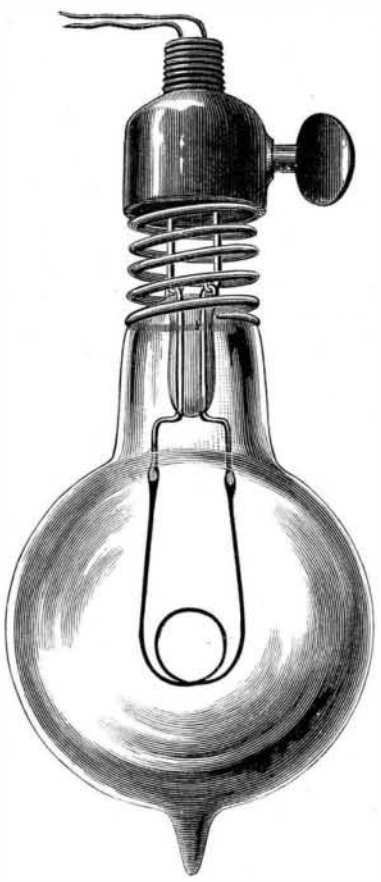
Subsidy to Pasteur.

The French Minister of Agriculture has lately placed at the disposal of M. Pasteur a new sum of 50,000 fr. ($10,000), in order to continue his admirable investigations upon the contagious diseases of animals. The government had already granted to the illustrious savant, for the same object, 50,000 fr. in 1880 and 40,000 in 1881. The minister consulted a special committee, who, in view of the brilliant success obtained by Pasteur in his previous investigations, unanimously recommended a renewal of the grant.—*Les Mondes.*

IN the eastern part of Massachusetts, and with headquarters in Boston, are seven nail mills, operating 300 machines, and turning out an average of 10,000 kegs per week, mostly for the home trade, but furnishing shipments for Cuba and South America.

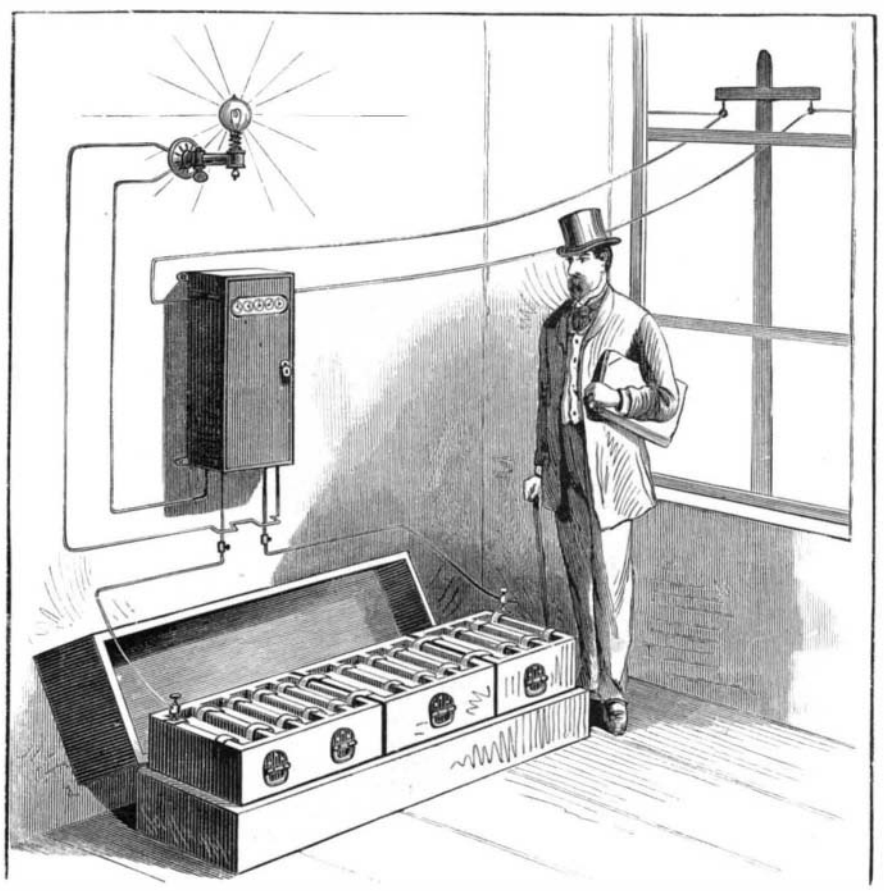
THE BRUSH-SWAN ELECTRIC LIGHT.

A private exhibition of the Brush-Swan incandescent electric light was recently given at the offices of the Brush Electric Light Company in this city, and Mr. Charles F. Brush, the inventor of the system, and Mr. G. W. Stockley, the vice-president and manager of the Brush Electric Company, of Cleveland, O., gave to members of the press and electricians a general explanation of the Brush-Swan apparatus for electric lighting. The salient features of the system are



THE SWAN LAMP.

the Brush storage battery, the Brush "current manipulator," and the Swan incandescent lamp. These devices—located on the premises of every consumer—in connection with the distributing wires of the street system and generating dynamos of the district, form the complete Brush-Swan apparatus for electric lighting by incandescence. The current may be (and in the present case was) taken from the arc lamp circuit during the evening, while the arc lights are in operation, or in the daytime while the lamps are cut out of the circuit, or they may be placed in a special circuit and



THE BRUSH STORAGE BATTERY.

charged by machines set apart for this use alone; but the important features of the system are: first, to provide an unfailing supply of electrical energy, which is secured by the use of the storage batteries; and second, to utilize the arc light plant at times when it would otherwise be idle, thus virtually diminishing the interest on the investment.

The employment of storage batteries not only produces a perfectly steady light, but the uniformity of the current insures great durability in the carbon filament of the lamp.

The storage battery used on the evening referred to was charged by the current from a No. 8 Brush dynamo at the Elizabeth Street station, which at the same time furnished thirty-four arc lamps on a circuit a little over ten miles in length, the conductor being a No. 6 copper wire. The battery consisted of twenty-four elements, and furnished a current to twenty-seven sixteen-candle power Swan lamps. The carbon filament was maintained in a high state of incandescence, emitting a very steady white light.

The general appearance of the storage battery is shown in our engraving. It consists of lead plates treated by a process not explained by Mr. Brush. The plates are arranged by pairs in cells and connected up in series. Each battery of twenty-four cells is connected with the "current manipulator" fixed to the wall, and the charging current entering the manipulator is switched from one battery to another automatically by the manipulator, and when all of the batteries are fully charged they are cut out of the dynamo circuit by the same means. When either of the batteries is partially exhausted, it is switched into the charging circuit by the manipulator, and even while receiving its charge the battery may be supplying its current to the lamps, the needs of the battery being provided for by the manipulator, which also records the amount of current used.

The sizes and capacity of the cells are given below.

Size of cells.	Capacity in Swan lamps.	Size plates in inches.	Number cells required for Swan lamps.
No. 1.	5 to 8.	8 x 8.	20.
" 2.	10 " 15.	8 x 16.	20.
" 3.	20 " 30.	8 x 16 dbl.	20.
" 4.	40 " 60.	16 x 16.	20.

These batteries, we are assured, will furnish 9 to 10 lights of the size or power of an ordinary 5-foot gas burner (usually 16-candle power), for each horse power absorbed by the dynamo electric machine used in charging them.

This is an economy which we believe has not been claimed for any other system, and which is partly due to the greater efficiency of the battery, and partly to the use of a distributing and charging current of comparatively high electromotive force. This kind of electric current permits of the use of small conductors and long circuits, and is effective in charging the secondary batteries, while the batteries yield a current of low potential adapted to incandescent lighting.

As to the durability of the Swan lamp, we are informed that in the Savoy Theater, London, which is illuminated by them (the current being supplied by a dynamo), the lamps have lasted 3,000 hours. This is due, in a great measure, to the homogeneity and density of the carbon filament, and the perfect uniformity in its size and shape from end to end. This lamp, as will be noticed by reference to the smaller engraving, is similar to others of its class; the mounting, however, is different. The wires which hold the ends of the carbon, and are fused into the glass, are bent into hooks for engagement with other hooks forming the terminals of the circuit wires, the lamp being pressed downward, so as to bring the hooks into engagement by the spiral spring into which its neck is inserted.

All danger from short circuiting the lamp or wires is avoided by means of an exceedingly simply and inexpensive device consisting of a strip of tinfoil secured to the face of a piece of vulcanized fiber, the tinfoil forming a part of the circuit. When the lamp is short circuited, the tinfoil melts and is thrown off from the strip of fiber thus interrupting the circuit. The vulcanized fiber with its attached tinfoil is readily replaced.

The Brush Electric Company assert that this system of lighting is now entirely beyond the experimental stage, and that it is commercially practicable and ready for the public.

In addition to the extensive works already in operation in Cleveland, the Brush Electric Company is erecting a large building to be supplied with steam power to the extent of 1,000 horse power, for the purpose of manufacturing the new storage battery.

Headache.

Dr. Haley says (*Australian Medical Journal,* of August 15, 1881) that, as a rule, a dull, heavy headache, situated over the brows and accompanied by languor, chilliness, and a feeling of general discomfort, with distaste for food, which sometimes approaches to nausea, can be completely removed, in about ten minutes, by a two-grain dose of iodide of potassium dissolved in half a wineglassful of water, this being sipped so that the whole quantity may be consumed in about ten minutes.—*Glasgow Med. Journ.*

IT is announced that a contract has been closed between the Canada Southern Railroad Company and the Phœnix Bridge Company, for the building of a new suspension bridge across the Niagara River, a quarter of a mile south of the old suspension bridge. The new bridge is to be ready for traffic by September, 1883.