pillars of brass. The upper room has a greater roof, and the middle tower of the front is unfinished. Herod's fortress, Antonia, has taken the place of the old strong place on the northwest. This temple was destroyed by the Romans.

Equally interesting is the model of the great Christian Church of St. Mary, built in the reign of the Emperor Justinian and known as Justinian's Church. A detailed description of the model is unnecessary here. Dr. Schick was of the opinion that it was erected on the foundations of the temple of Jupiter, built in the second century by Hadrian. The fourth model, Haram Es-Cherif, shows Mount Moriah, the site on which the preceding temples have been built, as it is to-day. It will be seen that a beautiful mosque has taken the place of Justinian's church. The first building within the inclosure is the Aksa mosque, and close to it the mosque for the women, once the armory of the Knights Templars. The great mosque shows traces in its architecture of all the phases of ownership it has seen—Byzantine, Crusader, and Saracen.

As could only be expected, the models have caused a great deal of discussion in archæological circles. It is impossible to know in certain instances the exact architecture of the buildings, but all are agreed that Dr. Schick's models represent with marvelous ingenuity and faithfulness the great and ancient worshiping places that have stood upon the famous temple site at Jerusalem. They undoubtedly show great intelligence, patient industry, and profound scholarship. Dr. Schoenecke, the present owner of the models, is always pleased to show them to visitors to Jerusalem, and many Americans have expressed interest in them.

London, S. W.

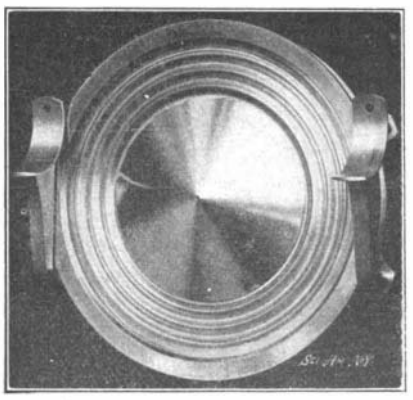
## A "SCIENTIFIC" VIOLIN.

BY H. C. FYFE.

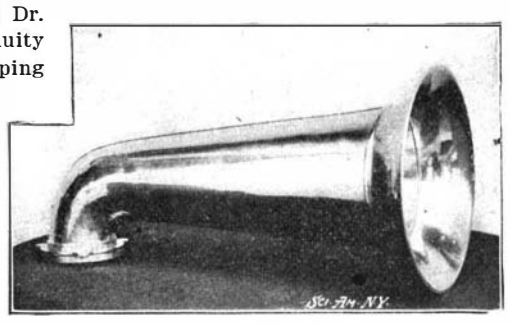
Mr. Augustus Stroh, a well-known London man of science and inventor, has lately brought out an entirely new kind of violin, of which some photographs are given on this page. On looking at the instrument, the first thing that strikes one is the fact that there is no sounding box, and that instead of this feature of the violin, hitherto considered indispensable, there is a metal trumpet or resonator and a diaphragm also composed of a metal substance. Mr. Stroh's object was to turn out a violin which should equal in quality of tone the fine old instruments of the classic makers and should be in every respect as beautiful an instrument, so far as sound was concerned, as the fiddles of Amati or Stradivarius.

The ordinary, common form of violin consists, as everybody knows, of the strings, the bridge and the sounding box or body. It was thought that all string instruments must have a sounding box, which would be set in sympathetic vibration with the strings of resonance if any considerable effect was to be attained, and the maker of violins showed his skill by the manner in which he made his sounding box. The body required special wood, special varnish, etc., and in the construction of violins the great Cremona makers have for long held first place.

The violinist had to pay a high price for one of their instruments, but he knew that it could not be equaled by any other modern maker. Mr. Stroh having given much attention to musical instruments, decided to abolish the "body" or sounding box of the violin and to substitute for it a trumpet or resonator made of aluminium. The following description, together with the photographs here reproduced, will give a good idea of the construction of the Stroh violin. The vibrations of the strings are conducted by means of an ordinary violin bridge, which rests upon a rocking lever, to a diaphragm and resonator. The lever supporting the bridge oscillates laterally upon the body of the instrument, each being attached to a diaphragm of aluminium by a small connecting link. The diaphragm is held in position between two india rubber cushions by means of a specially designed holder fixed upon the body of the violin by two brackets.

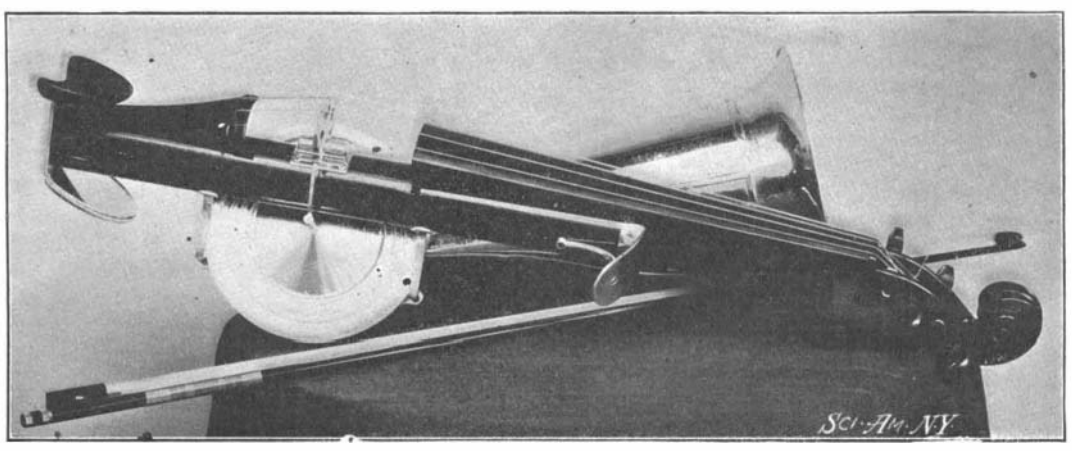


The Vibrating Diaphragm in Holder.



The Resonator or Trumpet.

Lever and Rocking Bridge.



THE STROH VIOLIN.

Attached to this holder is the trumpet or resonator. The body or main support of the instrument is in no way employed for sound purposes; it simply holds the various parts of the violin together and sustains the enormous tension of the strings when tuned. The disk or diaphragm which represents the belly of an ordinary violin, is perfectly free to vibrate, the result being that when the strings are set in motion by the bow, the bridge and rocking lever vibrate accordingly, and thus every vibration is transmitted to the diaphragm.

The diaphragm sets in motion the air contained in the resonator, the resonator augmenting and distributing the sound to the surrounding atmosphere.

London, England.

### A Japanese Opinion of American Patents.

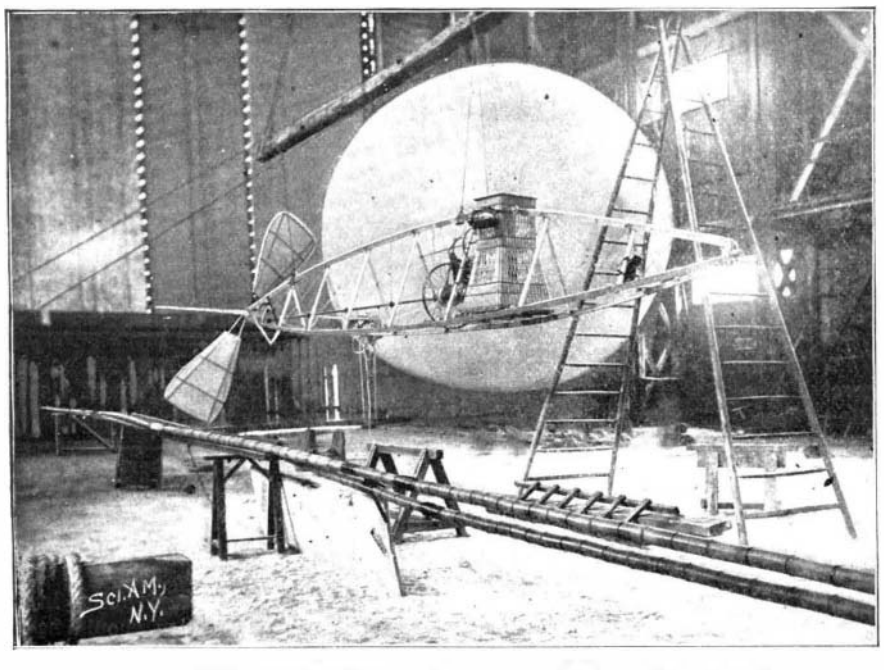
Some three years ago the Japanese government sent to this country a certain Mr. Takahashi to study our patent system. Mr. Takahashi pays a glowing and picturesque tribute to the American system. "We saw the United States not much more than one hundred years old," he said, "and we asked, 'What is it that makes the United States such a great nation?' We investigated, and found it was patents, and so we will have patents."

## THE "SANTOS-DUMONT NO. 9."

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

The new airship which Santos-Dumont is constructing at Paris will be the smallest that has yet been made. It is being built at the Lachambre aerostatic park, and is nearly finished, as will be noticed in the different views of the car and balloon. The latter has somewhat the form of an egg, with the large end placed foremost. Its length is about three times the diameter. The aeronaut is experimenting with this form of balloon, which differs considerably from its predecessors. The ovoid form will no doubt prove more stable than the cigar-shaped, and will give less pitching, although of course as high a speed cannot be attained with it. Only the light weight of the aeronaut, 110 pounds, permits of constructing such a small airship. The balloon is constructed of Japan silk and has a capacity of only 280 cubic yards. An upper valve is not made use of, but a tearing cord is employed instead, while below, in the rear, is a valve opened by a cord from the car. The balloon is provided with an interior air bag of 58 cubic yards capacity; this will be kept filled out by a ventilating fan. The total length of the balloon is but 45 feet, and its diameter, in the largest part, 18 feet. The balloon is to advance with the large end foremost, like the balloon "La France" with which the Renard brothers made their celebrated experiments in 1884. The photographs were taken while the balloon was being inflated with illuminating gas in order to fill it out in shape and allow the wires to be attached. On each side of the balloon a piece of fabric is firmly fastened to the canvas. To the eyelets of these strips will be attached, by connecting pieces, a series of steel piano wires which support the car. There will be 40 of these wires, and they have been carefully tested. Each wire, with a diameter of .032 inch, can support a weight of 190 pounds.

The framework or car is constructed on somewhat the same lines as before, and is suspended 7 feet below the balloon. It is quite small, and measures but 29 feet long and 3 feet high in the center. The framework, of pine, is made up of three main pieces of triangular section, bent into an arc of a circle, and braced



THE "SANTOS DUMONT NO. 9" IN COURSE OF CONSTRUCTION.

THE CAR OF THE "SANTOS-DUMONT NO. 9."

in seven places by three light strips forming a triangle. In the rear is the propeller, which is made of steel tubes, flattened out at the extremities, and covered with varnished silk to form the blades. The propeller is 10 feet in total diameter and weighs 24 pounds. Each blade is 4.5 feet long and its greatest width is 15 inches. The photograph shows the position of the aeronaut's car, which is suspended toward the front. In the rear of the car is mounted the motor, which is a light-weight gasoline one made by the Clement Company. It is extremely small and light, weighing but 26.4 pounds, yet developing 3 horse power. The weight per horse power is thus only 8.8 pounds. The motor is of the double cylinder, air-cooled type, the cylinders being set at an angle on to a light crank-case box of aluminium. The flywheel, which will be noticed next the motor, is made of a simple bicycle wheel, and weighs but 1.8 pounds. The motor is thrown in or out of gear with the main propeller shaft by an aluminium friction clutch, mounted in front of the flywheel. The clutch is held in normally by a spring, and is thrown out by a lever within easy reach of the aeronaut. The car, of basket work, has the well-known form adopted by Santos-Dumont, and is just large enough to allow the aeronaut's body to pass, although it widens somewhat at the lower part. It is but 16 inches square and 36 high, and weighs 12 pounds. It is braced at the top by a metal tube, which passes around it and joins the main beam. At the side of the car will be noticed the gasoline tank, which is pointed at the ends and contains 2.5 gallons. From the motor the shaft passes back to the propeller, and revolves in four light bearings, which are supported from the frame by piano-wires. Near the propeller the frame carries a cross-bar, which receives the ends of the supporting wires, to prevent their becoming entangled in the screw. The total weight of the framework, including the motor, shaft, propeller, and basket car, is 132 pounds, and the balloon weighs 30 pounds, thus giving the complete airship less than 200 pounds total weight. The car will be provided with a hemp trail-rope 100 feet long. The propeller turns at 200 revolutions per minute. The speed of the airship will probably not reach over 16 feet a second. The aeronaut has been making a series of tests of the motor and propeller. The propulsive effort of the latter was measured by a dynamometer, and was found to be as high as 65 pounds. The motor runs easily, and the mechanism appears to be quite satisfactory. Santos-Dumont is pleased with the results, and is confident that the airship will be easily handled. After the balloon, which is now inflated with illuminating gas, is attached to the car, it will be refilled with pure hydrogen from the generator located on the grounds; and within a short time it will be ready for the trial ascensions. Santos-Dumont intends to make the trip from the aerostatic park across Paris, and to land at the window of his second story apartment on the Champs Elysées. For this purpose he will construct a special balcony outside the window, composed of light copper tubes.

After making the trials of the small balloon ("No. 9"), he will be ready to commence "No. 10," which is to be eight times the size of the present one and capable of carrying ten persons. Before building such a large airship, he thought it more prudent to make a series of experiments with a balloon of the same type but of much smaller size; and it is for this purpose that he constructed the small one we illustrate. The "Santos-Dumont No. 9," and the large airship "No. 10," will differ considerably from the former types. Up to the present, he has used the cigar shape; but now he wishes to find out whether the ovoid form has not some advantages, at least where high speed is not the main factor.

### The Nobel Prizes.

The report published in the SCIENTIFIC AMERICAN concerning the award of the Nobel prizes now receives official confirmation. The honors in physics were divided by Dr. H. A. Lorentz and Dr. P. Zeeman, both of Holland. The chemical prize was taken by Dr. Emil Fischer, of Berlin. The medical prize was received by Major Ronald Ross, principal of the Liverpool School of Tropical Medicine. The venerable historian Theodor Mommsen received the literary prize.

To American readers some of these men may not be well known. Zeeman is the man who discovered that if a beam of light were passed through a magnetic field before being analyzed by a spectroscope, the lines in the spectrum would be doubled. Lorentz worked on kindred subjects—the theory of radiation and the relations of the ether to matter. It is singular that both of these men are Dutchmen, countrymen of the famous Van t'Hoff, who received the prize in chemistry last year.

Fischer is a most versatile scientist. His early work was in the field of coal tar. More recently he has studied the amino and diamino acids, which are products of the decomposition of proteids.

To Major Ross is principally due the theory that the mosquito is an active agent in the dissemination of malaria. Laveran has discovered the parasite in the blood of its human victims. Major Ross proved that the mosquito had much to do with conveying the germ from one person to another.

### THE EGYPTIAN PAINT PALETTES

BY WALTER L. BEASLEY.

Among the noteworthy and curious finds which have recently been brought to light from Egyptian excavations are the series of carved slate palettes found at Hierakonpolis, by Prof. Petrie, in the great tomb of the first pre-dynastic kings, who reigned 5,000 to 6,000 B. C. These long-buried fragments vividly portray the art practice of this remote period. The palettes are considered to be among the most important of early monuments and of great interest zoologically, as showing several animals now extinct in Egypt. The palettes were employed by the royal ladies for grinding the face-paint, and the cup-hollow or ring-space on each was for holding the paint. The sculptures on the slates are supposed to refer to battles and victories before or at the establishment of the united monarchy under King Menes, and the conquered were the different natives—negroes, Libyans inhabiting that country before the coming of the first dynastic Egyptians. That the race who made these monuments had high artistic tastes and a knowledge of technique that argues a long practice of art is apparent from the objects themselves, which are eminently superior to any later Egyptian work.

THE NARMAR PALETTE

Two typical examples of the slate palettes are here pictured. One has been identified from inscriptions as belonging to King Narmar, whose reign is now fixed by his tomb as being just before Mena. At the top are two heads, supposed to be the goddess Hathor. In the next division the first figure is a personage bearing a pair of sandals, having in his right hand a vase. He has short hair, covered by a close-fitting cap. Before him is seen the King, wearing the crown of Lower Egypt, dressed in a tunic arranged over the shoulders so as to leave the right arm and shoulder bare. He carries in his right hand a mace, and is preceded by his queen, with curled locks, clad in a tight-fitting garment. In front of her are borne by attendants four standards having the emblems of Horus. The bearers are depicted with short hair and close-fitting caps, wearing greaves. The right space is taken up apparently with a sacrificial scene. The corpses of ten bodies are seen in two rows, their arms bound, and heads cut off lying between their feet. All of the victims are bearded and wear caps with a double peak. The center division shows two composite monsters, having the bodies and heads of lions or panthers, with long intertwined necks. They are tied with cords around the neck, held by two men. The hollow space made by the curl of the two necks is used for the deposit of paint. The lower division represents the King in the shape of a bull, trampling upon a flying enemy, probably the Libyans.

EGYPTIAN SLATE PALETTE.

The broken slate pictures a race of bearded warriors, evidently engaged in hunting. The majority are armed with bows and arrows having flint heads and feathered on both sides of the shaft. Some carry long spears, javelins, double-headed axes, and a weapon on the style of a boomerang. Two have lassoos. At the extreme left is a lion pierced by six arrows, and at the right another with two. Close to the edge of the right foreground is drawn a building with a cupola, near which is a strange monster, consisting of the forepart of two bulls joined together about the middle of the body. In the middle the animals are depicted as running, being pursued by a greyhound. The animals represented are hartbeests, one of which has been lassooed, an ostrich, stag, two jackals and a gazelle. A peculiar feature observed on the originals was that the eyes of all the animals had been bored out, evidently with a drill, and inlaid with some substance like glass. Prof. Petrie states that at this early period ordinary daily objects were developed into ceremonial show-pieces and made the vehicle for historical records.

### Government Aid for the Russian Merchant Marine.

A spirited effort was made by the Russian government last year to encourage the construction of merchant vessels and to stimulate Russian navigation by the formation of a special commission under the presidency of the Grand Duke Alexander Mikhailovitch to investigate the subject. This commission elaborated a scheme providing as follows: The grant to shipowners of loans, without interest, amounting to half the cost of construction of ships owned and built of Russian material in Russia; repayment is to be spread over twenty years in equal installments, the vessels to be mortgaged for the amount due during that period. Insurance premiums on ships to two-thirds of their value to be paid by the government, the shipowner paying two per cent per annum on the amount, while the remaining third of the value may be insured by the owner when he pleases. To encourage the export of Russian goods in vessels of Russian construction the government will repay half of the cost of the fuel consumed in working the engines, provided such fuel is of Russian origin; the vessel claiming this privilege must load cargo at a Russian port for abroad to the extent of three-fourths of its carrying capacity. All these privileges will be granted exclusively to shipowners of Russian nationality and to associations of which all the members are Russians, and they are to come into force from January 1, 1903.

### Experiences in a Submarine.

Lieut. Lawrence Spear, formerly naval constructor, who recently read a paper in New York on submarine war vessels before the Society of Naval Architects and Marine Engineers, gave to a representative of the Tribune an interesting description of his experience while under water during a three hours' trial of the "Adder" in Peconic Bay.

Fifteen miles were traveled under water without coming to the surface once. After the first hour the trip became monotonous. There were eleven men in the boat, nearly 18 feet below the surface of the water. No noise could be heard except that of an electric motor driving the boat through the water at 7 knots. The captain stood with his head in the conning tower, steering by the little compass and timing the boat by his watch, so that he might know when to turn her around and begin the return trip of the three-mile course. Water could be seen rushing by, but nothing else could be distinguished except the small brass whistle which stands close to the rear of the tower; the rest was just a wall of green water through which the "Adder" was rushing. Objects ten feet away could not be seen. As for the air, it was as pure as any could be in a room of the same area, and much purer than that of many a card-room in which men sit, not for three hours, but for ten and twelve hours with closed doors, and with the air vitiated by tobacco smoke.

### To Our Subscribers.

With the next issue many subscriptions to the SCIENTIFIC AMERICAN will expire. It may not, therefore, be amiss to call attention to the fact that unless subscriptions be renewed, the paper will be discontinued. In order to avoid any interruption in the sending of the paper, the subscription should be remitted before the new year.

During the past year the SCIENTIFIC AMERICAN has more than ever maintained its standard of excellence. The Special Numbers which have been issued have attracted the widest possible attention. The Transportation Number, for example, issued last week, has been most flatteringly commented upon by many subscribers, as well as by the daily press.