

**The Grand Central Station.**

This great headquarters and metropolitan station of the New York Central and Hudson River system is now being enlarged and changed as to its exterior in a most radical way, although the interior arrangement of the ground floor is not to be changed at present. The original building, not counting the more recently added train-receiving house, was 240 feet on Forty-second Street by 692 feet on Vanderbilt Avenue, built of brick, stone and iron, and costing nearly \$2,250,000. On the streets named it was three stories high and was surmounted by several Louvre domes, and three more stories are now to be added, giving a uniform height of six stories, the towers also to be carried up proportionately, except the clock tower, which is to be obliterated. The entire building will be faced with stucco work, giving it the appearance of Indiana limestone, and the improvement will cost in the neighborhood of \$700,000. The added room thus provided has long been needed for the use of the executive officers and the 500 to 600 clerks employed. It may be added that at the same time that this very considerable work is being carried on, employing a large force of men, the neighboring streets are also being occupied by the workmen and materials necessary in constructing the new underground trolley, by which many of our leading street railways are to be operated by electricity.

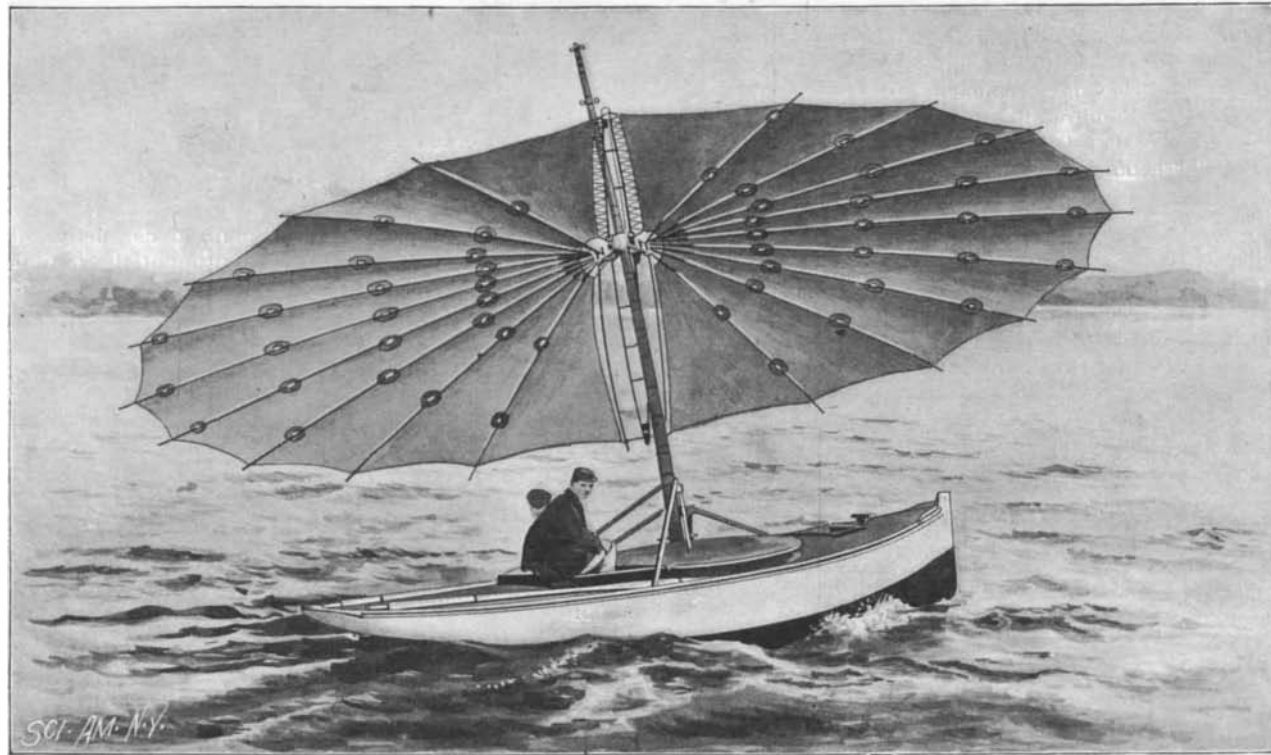
**THE UMBRELLA BOAT.**

The queer sailing vessel shown in our engraving is called the "umbrella boat," and is also known as the boat with the cyclone sail. This boat has been very conspicuous at Cowes and in the Solent. Our engraving was made from a photograph by West & Sons, Southsea, Eng. The chief feature of the cyclone sail is, it is said, that "the wind pressure does not tend to incline the boat. When the wind is making a large angle with the sail the center of pressure is almost at the center of the surface, but when the wind strikes the sail at an acute angle, as in all sails or kites, the center of pressure moves toward the weather edge; but, by suitably adjusting the sail, the desirable result of obliterating all heeling movement has been achieved.

"In practice this has been obtained by putting more sail to leeward than to windward of the mast and also by placing the sail not quite at right angles to the mast, but more raised on the lee side. The sail is made oval, with the major axis horizontal, so as to be able to carry more sail with a definite height of mast.

"The training in a horizontal direction is accomplished by means of a turntable, and the elevating and lowering by two tackles. There is a balance weight which helps in elevating the mast and which is just sufficient to balance the dead weight of sail in a calm not inclining the boat. The sail can be set and furled in a minute; it does not close like an umbrella, but each side shuts up like a fan. The object of the sail is to be able to sail without inclining the boat, so that the limit of driving force is not governed by the stability of the boat in any way, and also that the boat sailing on an even keel has less resistance than when sailing with a list."

In addition to the inventor's claim for his boat, the following particulars may be of interest: The sail in the illustration measures 30 feet horizontally and 16 feet up and down, while the total length of the boat is only 17 feet on the water line. With an ordinary rig 200 square feet of canvas was found too much for this boat, but with the umbrella sail she carries 360 feet of canvas and sails much faster. A light boat especially adapted for the sail is now being built by Messrs. Thornycroft, of Chiswick, England, the well-known manufacturers of torpedo boats.

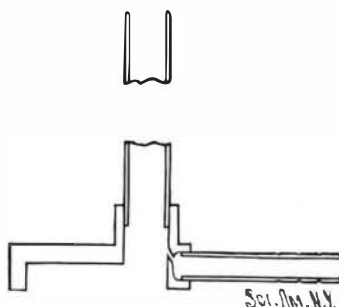


**THE UMBRELLA BOAT.**

**AN IMPROVED FORM OF BUNSEN BURNER.**

A great drawback with the ordinary form of Bunsen burner is the liability of the central jet to become choked up by anything falling down the tube, says Hugh Marshall, D.Sc., F.R.S.E., in the Journal of the Society of Chemical Industry. A single drop of water is often sufficient to extinguish the flame, and a fused borax bead is still more objectionable, owing to the difficulty of properly clearing the jet. This is troublesome enough in ordinary laboratory work, but is much worse with a large practical class. Various methods of getting over the difficulty have been tried more or less successfully. I think, however, I have now succeeded in evolving a form of burner which is a considerable improvement on preceding ones.

The improvement consists in replacing the central



jet by a suitably inclined lateral opening in the wall of the burner itself. The burner is left open right through, and the side air holes are done away with. An air regulator can be fitted on the base in the form of a pivoted diaphragm. A simple form of the burner is illustrated in the diagram. This represents a section through the gas supply tube and inlet (to the right of drawing) and one limb of the tripod base (to the left). The upper tube screws into the lower portion. This consists of a very shallow tripod with circular opening for the tube. At one side of the opening is a block into which the gas supply tube is fixed and through which the gas inlet is drilled. The inclination of the inlet and its diameter depend somewhat on the richness of the gas used.

The advantages of the burner are that the gas inlet does not become choked; anything dropping down the tube passes right through to the bench. Further, if the gas inlet is properly arranged, the flame can be turned down very low without its striking back or the air supply requiring regulation. Again, the air regulator fitted on the bottom cannot jam in the way the usual circular regulator does; in fact, it can be com-

months in the United States alone, and there was an excellent foreign trade, which indicates that Americans are not alone in appreciating improvements of the smaller kind.

**Pennock's Electric Power Transmission Plan.**

George B. Pennock, a New York electrical engineer, says he has invented a system of electrical distribution which will revolutionize the present methods of railway transportation. His claim is that he can so distribute electrical energy by means of a new kind of third-rail system that a hundred trains can be moved at a cost no greater than is now necessary to move one train, and that he has practically demonstrated the value of his discovery in electric lighting by supplying sixty standard candle power incandescent lamps with one horse power. The inventor was formerly a train dispatcher on the Pennsylvania Railroad, but for many years has given his entire time to electrical subjects. In an interview published in the New York Sun he says:

"In moving cars by electricity we generate at a central point a certain amount of horse power in the shape of electricity. That must be sent out over the route on which the cars run, and there must be as many times the power required to move one car as there are cars. To achieve the results which I claim will come from my system—that is, not to need a power increased in proportion to the number of cars used—I would build a central station midway between the terminals of the line, and in this I would put a 1,000 horse power engine and a 500 horse power dynamo. That is all that would be necessary to move any number of trains. Then I would put up my voltage distributor, which brings about the required result. This is a circular track cut up into 100 segments each 10 inches long. Mounted on it is an electric motor car of one-half horse power designed to run at a very high speed, to complete the circuit of the track 400 times in a minute. It is locked in by two tracks above, one of which carries the current to run the motor, and the other the current from the 500 horse power dynamo to the distributor.

"Between the rails of the railroad tracks, along their whole length, is placed a series of conducting segments, a brass rail one inch in diameter, each segment 500 feet long, the segments separated from each other by a space of three inches. Running side by side with these segments will be a similar but continuous conductor to complete the circuit. Each of the segments in the distributor is connected with wires to a 500 foot segment between the tracks. When all is ready the motor car on the distributor is set in motion, and, as it flies around the circle at the rate of 400 times a minute, it successively closes the circuit between the small segments in the distributor and the large segments between the tracks, and conveys to each segment sufficient electricity to start a train. This current is taken up from the large segment into another but smaller voltage distributor on the train, in charge of the motorman. This consists of ten segments, each attached to a motor on the train. The force of the current is 100 volts. The motorman has charge of this, and by turning his switch can use one motor with 100 volts or ten with a thousand. The current will be taken from the segments on the track to the voltage distributor on the trains by means of a connection underneath the car similar to a trolley pole. One of these

trolley wheels or shoes will rest continuously on the continuous rail, so that by generating 500 horse power at the dynamos, distributing it to the segments and putting just enough in each one to start the cars, I can do all the work of the road with 500 horse power. In other words, the same power is intermittently transmitted from one train to another several hundred times a minute. When the cars are started they move on to the next segment, where a new contact is made, thus giving fresh impetus. Finally, I have invented an automatic negative pole stepback to use in connection with the motors on the cars that will multiply the current ten times. [The Editor of the SCIENTIFIC AMERICAN assumes no responsibility whatever for this newspaper story.]

**Shrinkage of Castings of Metals.**

Pure aluminum (13-64 inch).....	0.2081 inch to the foot.
Nickel aluminum casting alloy (3-16 inch)...	0.1875 " "
Special casting alloy of the Pittsburg Reduction Company (11-64 inch).....	0.1718 " "
Thin brass castings.....	0.167 " "
Thick " ".....	0.150 " "
Zinc.....	0.3125 " "
Lead.....	0.3125 " "
Copper.....	0.1875 " "

—Aluminum World.

pletely removed by the aid of a screwdriver in a few seconds; it is unnecessary except when a luminous flame is desired.

The burner is now in use in Edinburgh and Aberdeen Universities, and works well.

ALTHOUGH there is always a fascination attaching to the invention of a device affecting what might be called the conspicuous and larger needs of mankind, it is probably the improvements on the common articles of daily use that have proved the most profitable to the inventor. As an instance, our attention has lately been drawn to a case of this character, where a device known as the Johnson anti-rattler for thill couplings realized a sale of 1,700 gross in the past six

## Recent Archaeological News.

Paul Dubois' equestrian statue of Joan of Arc has been set up provisionally in the quadrangle of the Louvre, to see what the effect will be.

Prof. Jakob Burkhardt, the historian and art critic, best known by his famous art guide to Italy, "Der Cicerone," died recently at Basel, his native town, at the age of 79 years.

In the Architectural Record for quarter ending September 30, there is an interesting article by Prof. W. H. Goodyear entitled, "A Discovery of the Entasis in Medieval Italian Architecture." It is accompanied by eighteen illustrations and plans, and, like the rest of the series, is of great interest.

Though the acoustic properties of the Roman theater at Orange have been highly praised, the recent performance by the Comédie Française, before President Faure, of "The Erinnyes" could hardly be heard, as the wind howled through the building. Two great persons, M. Francisque Sarcey and the Duchesse d'Uzès, complained that they had been treated rudely by the officials.

A tapestry map of Warwickshire, Shakespeare's county, 24 feet by 18, and made in 1598, is now on exhibition in London, where it has been sent to be repaired. It is one of five made by Flemish weavers imported into England, and is the largest and most minute topographical record of the time. It once belonged to Horace Walpole, but is now the property of the York Museum.

Dr. W. Flinders Petrie, the Egyptologist, has sent, according to the daily papers, to Dr. Breasod, of the University of Chicago, a valuable collection of relics excavated along the Nile. Among these are statues of Nen Khefa, a wealthy nobleman, and his wife, which are said to be nearly 5,000 years old. They are of limestone and are remarkably well preserved. They will go to the Haskell Oriental Museum of the university.

Prof. Nehring, in describing the domestic animals of the ancient Peruvians, states that the subject is scientifically important, because all the other peoples of ancient America were very poor in this kind of property as compared with the Peruvians and some of the Central American peoples. Nehring examined eighteen dog mummies from old Peruvian graves and ascertained that they belonged to three different races—a shepherd's dog, a dachshund and a bulldog. This discovery is interesting, as it shows the influence of domestication on the formation of races.

Public opinion in Holland is much moved by the sale of three important pictures from the famous Six Collection, the last survivors of those which were formed during the lifetime of the great painters of the seventeenth century. Every art-loving visitor to Amsterdam knows the house where hang Rembrandt's magnificent "Burgomaster Six," and perhaps a hundred other pictures of the highest class. Innumerable attempts have been made at various times to induce the family to sell, but till now without success. At last they have yielded so far as to cede, fortunately not the Rembrandts, but three others—Cuypp's "View on the Maas," the Terburg, and the Gerard Douw. These have lately been sold, after long negotiations, for a prodigious price. It is believed that they have gone to England.

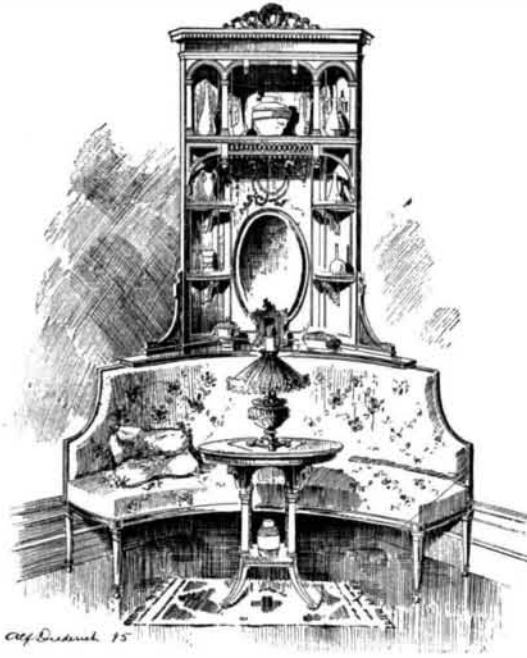
In the will of the late Lady Wallace, her pictures, porcelain, bronzes, artistic furniture, armor, miniatures, snuff boxes and works of art, on the ground and first floors and in the galleries of Hertford House, as well as the Louis XIV balustrade, are bequeathed to the British nation. The bequest does not include personal and modern jewelry, trinkets and effects, nor ordinary modern furniture and chattels, says The Builder. The government in return are to give a site in a central part of London, and build a special museum for the collection. It is also stipulated that Mr. John Murray Scott is to be one of the trustees of the collection. The other trustees appointed by the Treasury are the Earl of Rosebery, Sir Edward B. Malet, Sir John Stirling-Maxwell, Major-General Sir Arthur E. A. Ellis, Mr. A. B. Freeman Mitford and Mr. Alfred C. De Rothschild. Mr. Claude Phillips has been appointed keeper of the collection. The committee appointed to consider how the collection should be housed having recommended the purchase of the interests in Hertford House and its adaptation to a museum, a sum of £80,000 will be obtained for that purpose. No arrangement could be more satisfactory. The character of the Wallace collection would suffer if placed in a new building of a severe character like the National Portrait Gallery. The pictures were specially selected to adorn a private mansion, and it would be difficult to erect one better adapted for their display than the house in Manchester Square. Mr. Waterhouse acknowledged that at first he was not in favor of keeping the collection there, but, on considering the decoration of the rooms and their matchless chimney-pieces, he came to the conclusion that, if the bequest were taken away from its present surroundings, it could never be shown to such advantage. The value of the collection is set down officially, according to the New York Tribune, at the enormous sum of \$22,000,000.

## Excavations at Treves.

The excavations that have been going on for months past on a plot of ground belonging to Herr Schabb, a manufacturer at Treves, have resulted in the discovery of a Roman private house, which will excite the interest of antiquaries almost as much as the famous public buildings at Augusta Trevirorum. The front of the house lies parallel with the principal street of the old Roman city. A number of blocks which served as pedestals for the wooden or stone pillars of a portico still remain. The entrance is distinctly recognizable between two buttresses and an immense heap of stones. A long entrance hall running right through the house, from front to back, is intersected by another corridor, so that the gigantic building is divided into four parts. Side corridors lead into the rooms. Of these the marble tessellated bath rooms for hot and cold water and warm air lie side by side, and deserve special mention. The two latter were supplied with warm air through subterranean passages. The escape of the smoke was effected by means of hollow tiles laid on one another. The southwestern rooms have cellars under them. In a light court in the same part of the house there is a well-preserved window, the first ever found in a Roman building. The most interesting thing, however, is the magnificent and richly colored mosaic floor, a rarity of the first order. Experts assign the building to the first half of the fourth century, when Augusta Trevirorum attained the zenith of its splendor under Constantine and his sons.—Public Opinion.

## COMBINATION CORNER PIECE.

The accompanying engraving was loaned by the American Carpet and Upholstery Trade, and represents a very neat corner piece. For small drawing rooms,



COMBINATION CORNER PIECE FOR LADY'S APARTMENT.

such as are found in many apartment houses, it is a piece of furniture that might be found very desirable, as it is dainty in design, and occupies but very little space.

## Andree's Balloon Expedition.

A telegram from Stockholm, July 27, to the London Times, says that in a letter to the Aftonblad, Dr. Nils Ekholm, who accompanied Herr Andree to Spitzbergen last year with the intention of taking part in his aerial voyage, offers some remarks on the prospects of the expedition based on the full details now received of Herr Andree's ascent. Herr Ekholm declined to go this year because he considered that the impermeability of the balloon was unsatisfactory. In his letter he points out that from the day the balloon was fully inflated it lost 51 cubic meters of gas every 24 hours, representing a diminution in carrying capacity of 56 kilogrammes per day. This, he says, shows that the imperviousness of the balloon had not been essentially increased since last year. Besides this daily escape, various circumstances led to a certain loss of gas in the ascent itself, necessitating a corresponding sacrifice of ballast. After making allowance for these losses of gas, and taking into consideration the fact that in the ascent part of the dragropes were lost and that the balloon at once rose to a height of 15,000 feet to 25,000 feet—which was more than had been reckoned upon—Dr. Ekholm comes to the following conclusions: The longest time for which the balloon would remain in the air would be from 22 to 24 days, and less if mountains exceeding the height attained at the start had to be crossed. As the duration of the projected voyage may be estimated in ordinary conditions as regards wind at 24 days, remarkable good fortune would be necessary for success. Dr. Ekholm declares himself skeptical with regard to the supposed loss of the balloon in the White Sea, but he proposes, nevertheless, that a search expedition should be sent to the White Sea from Vardoe.

## Science Notes.

The Brooklyn Institute of Arts and Sciences announces that Dr. Nansen will lecture before that body during the coming season.

A sanitary Bible for the use of courtrooms has just been put on the market, says the Medical Record. It is bound with white celluloid instead of leather, and it can therefore be washed and disinfected from time to time.

The statue of Charles Darwin erected in his native town of Shrewsbury has been placed in front of the school which he attended for nine years. It was recently unveiled and was the gift of the Shropshire Horticultural Society and cost 1,000 guineas.

Andorra, the little republic on the border of France and Spain, is going to give up its picturesque isolation. It now has a telegraph line connecting it with the French system, and a carriage road is being constructed to take the place of the mule track over the Pyrenees, which for ages has been the only means of access to the town.

It is reported, says Science, that the Secretary of Agriculture will ask Congress, at its next session, to authorize the establishment of an agricultural experiment station in Alaska. Suitable scientific experiments would be of great value in showing what agricultural products and domestic animals could be introduced to advantage.

Holborn and Wien have invented a thermo-element composed of iron and "constantan" wire, says the Pharmaceutical Era. This latter is an alloy composed of copper containing 40 per cent of nickel and possesses the peculiarity that its electrical resistance is not influenced by temperature; also, next to the bismuth-antimony element, it is the most sensitive.

The London correspondent of the New York Evening Post cables that Mr. George Murray, keeper of botany in the British Museum, has proceeded to Panama at the instance of the government grant committee of the Royal Society for researches on little known pelagic algae. During the voyage these organisms will be obtained by pumping sea water through fine silk tow nets.

A committee of the Paris Academy of Sciences, appointed to report on the precautions to be observed in the installation of electric conductors in the neighborhood of powder magazines, concludes that no distinction can be drawn between telephone or telegraph wires and electric lighting mains; that a distance of 10 meters appears sufficient to avoid all risk in the case of underground wires; but for overhead lines a greater distance is advisable—20 meters at least.

Lieut. Keising has lately been lecturing before his comrades in Berlin upon the subject of the value of photography in field operations, says the Army and Navy Journal. He recalls how the Germans employed it in the war before Strasburg and Paris. He is of the opinion that every officer's patrol should have a small hand camera, which should hang at the belt or the saddle, the plates being developed when the patrol rejoins the troops. He advocates also the use of captive balloons for photography.

A Roentgen society has been formed, with Prof. S. P. Thompson as the president, says The Engineer. The intention of the founders is that the society shall occupy a position between those devoted purely to medicine, to physics, or to photography. Some of the members will study the sources of the Roentgen rays, others the applications; some the induction coils, others the tubes and the various forms and adaptations of the apparatus used in the production of the rays. Roentgen photography has been found serviceable in so many branches of scientific investigation that the society appeals to a large constituency for support. It should be the means of increasing the efficiency and applications of the rays, and should also be of assistance to surgeons and others who have entered the new field of work without previous training in physics.

The number of matriculated students attending German universities during the summer semester of 1897 is indicated by the first figures, the whole number of hearers by the second figures, and the number of women among the hearers by the third figures in the following list: Berlin, 4705, 344, 114; Bonn, 1889, 103, 13; Breslau, 1541, 83, 22; Erlangen, 1140, 13; Freiburg, 1449, 95; Giessen, 663, 29; Göttingen, 1123, 72, 34; Greifswald, 834, 19; Halle, 1534, 101, 6; Heidelberg, 1230, 92; Jena, 704, 50; Kiel, 727, 37; Königsberg, 695, 31, 11; Leipsic, 3064, 157; Marburg, 1042, 48, 7; Munich, 3871, 160, 2; Academy of Münster, 487, 10; Rostock, 499, 10; Strassburg, 1016, 31; Tübingen, 1289, 12; Würzburg, 1430, 13. The whole number of matriculated students was 30,982, and hearers 1519, of whom 207 were women; students of theology 4326, of law 8368, medicine 8232, and philosophy 10,006. There was a marked decrease of students of theology and medicine, and an increase of students in the philosophical department, especially in philology and natural science. There seem to have been no women hearing lectures at Leipsic, although there were several in attendance last winter.