

surmounted by walls that reach a level of five feet above the respective keystones. The walls are carried beyond the columns into solid walls beyond. Just above each of the four great arches that connect the columns (and embedded in the solid masonry) there run straps of iron 3 inches broad and 1½ inches thick. Four of these straps are laid side by side, thus forming tie rods, which are anchored in the solid wall beyond. Thus each of the four columns is crossed at right angles by tie rods some distance above its capital. This will be shown more clearly by the accompanying section of the two east and west walls. The dotted lines at *d* show the hidden granite arch that receives the thrust from the main arch and keeps the four great columns from being pushed outward. As the tie rods expand in the summer, the arches drop a trifle. When they contract with colder weather, the arches will not rise, but spalls will chip off. This process has been going on for years, and it has been a source of great danger. These spalls which fall to the floor almost invariably appear when there is a considerable change in the temperature outside—in October and November. The staging that is in place now enables the visitor to examine closely the under surface of the ceiling. The dropping of the central keystone has pulled the ashlar away from the west walls, and has left great gaps, which were filled four or five years ago. At the same time many defective places caused by the dropping of spalls were pointed, so as not to appear from the floor. A closer examination shows that the ridges along the main vault are so thoroughly crushed that it is a wonder the broken stone did not fall long ago. The diagonal ribs of the great vault show many cracks, which prove they were made of too light material. The fact is, they should not only have been made of better material, but they should also have been three or four times as large.

The Capitol Commissioner, Mr. Perry, saw at once that these diagonal ribs must be supported. In this he did not agree with some who had thought that the ribs connecting the four great columns should be strengthened. Mr. Perry's first movement was to cut through the floor in four places near the center of the room, so that he might strike two columns in the floor below; and, for his other two foundations, go to the solid bases one story lower. Thus he had a parallelogram 18 feet one way and 12 feet the other. He placed on the corners sticks of Georgia pine 12 inches square as the uprights for the trestle. These sticks were reinforced by sticks of the same size placed edge for edge toward the interior of the parallelogram—the two being bolted by straps of iron. The trestle was continued all the way to the keystone. Excavations were made about the bases of the four great columns and heavy foundations of wood were laid, on which two uprights (each 12×12) were placed, with the inclination toward the great trestle in the center. When these uprights had passed above the capitals of the columns, they were met at right angles by great tie beams, which braced them into the central trestle. Having thus prepared a strong framework, it was a comparatively easy matter to construct four trusses running from the top of each column upright to the nearest corner of the central trestle. In the placing of the trusses, a chord was first run in a straight line. Then a rib, in very small sections, was built along in the curve about 6 in. for the stone rib of the ceiling above. The last of the work was to connect the ribs and the chords by the struts, or cross pieces.

The whole work has been an undertaking of great difficulty. It supports the ceiling so that there is no possible danger, and, at the same time, the support is so permanent that it can be used when the ceiling is finally removed. The chances are that it will be succeeded by one of wood or of iron. In either case it is probable that the pointed Gothic arches will not be repeated; but that Romanesque arches will be used, in harmony with the windows and doors, thus lowering the height of the room from 12 to 15 ft., and much improving its acoustic properties.

A New Treatment for Boils and Carbuncles.

In a communication to the French Academy of Medicine, at a recent meeting, M. Verneuil says: The topical applications (prominent among which stand the carbolated and borated solutions) employed in a certain way, and particularly in the form of powder used repeatedly and for a long time, are of remarkable efficacy, and at the same time are absolutely harmless and easy of application.

These applications of powder quickly abort, with very few exceptions, boils and carbuncles. They arrest the progress of the disease in the gravest cases, ordinarily cause the pains to quickly cease, reduce the fever, disinfect the purulent and gangrenous centers, hasten resolution, and promote the formation of healthy granulations.

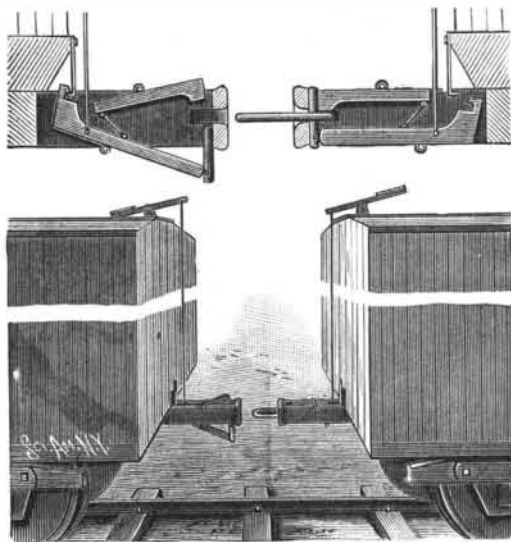
This treatment is suitable for all regions, and for all forms and periods of the disease. It is never harmful, and leads to a cure in a large number of cases. It assists surgical interference when that is necessary.

Finally, it tends to prevent auto-inoculation and general infection.

AN IMPROVED CAR COUPLING.

A car coupling in which a lever operated by a foot lever on top of the cars carries the coupling pin, a guide lever being connected with this lever, and a spring catch for holding it in place, is illustrated herewith, and has been patented by Mr. William H. Dawson, of Harlan, Iowa.

The manner in which the lever is fulcrumed to hold the coupling pin is plainly shown in the sectional view, the inner end of the lever being formed with a catch to engage a spring by which it is held in a locked outward position, and there being secured to the lever, in front of its fulcrum, a link connected with the rear end of a guide lever fulcrumed on the drawhead, and also moving in the vertical slot in which the coup-



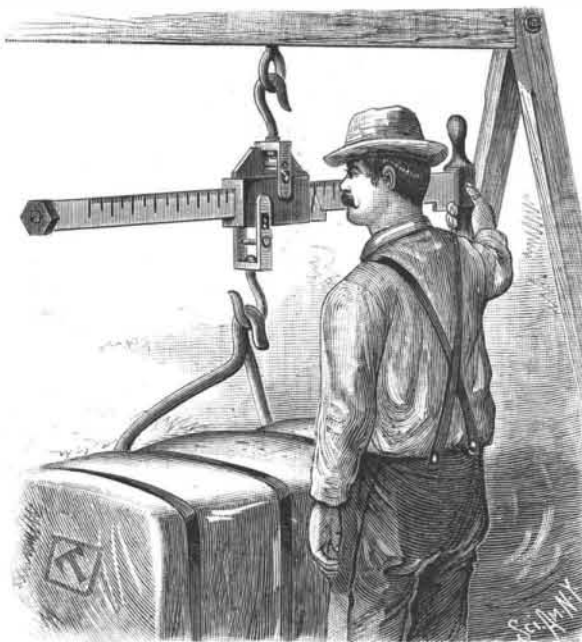
DAWSON'S CAR COUPLING.

ling pin slides. The front end of this guide lever has a shoulder adapted to engage the inner end of the coupling link, to guide it to place when entering the other drawhead. When the fronts of the two drawheads come together, the catch is disengaged from the lever holding the coupling pin in the open drawhead, and as the cars are coupled the shoulder of the guide lever engages the top of the coupling link, locking it in place. To uncouple the cars, it is only necessary to press with the foot on the inner end of the foot lever on top of the car.

AN IMPROVED WEIGHING SCALE.

A device to facilitate the convenient weighing of a wide variety of articles, and which has but few parts and can be economically constructed, is shown in the accompanying illustration, and has been patented by Mr. Waddy C. Thomson, of Lancaster, S. C.

The scale beam is arranged to slide in a suspended piece or box, so that at every sliding or shifting one end of the beam will project more and the other end less from the point of suspension. The weight is a constant, permanently fastened to the sliding beam, there being



THOMSON'S WEIGHING SCALE.

a larger weight attached to one end and a smaller one at the other end, both weights and beam adding to the capacity of the scale. Removable weights are not required, with their liability to being mislaid or dropped on one's feet. The top buffer, with the hanger, limits the swing of the beam, showing down or up weight. A fixed stop or buffer on the under side of the beam limits the sliding of the beam to the left, and protects the fingers from being mashed when the stop comes against a projection from the bottom of the box, the scale then being in equilibrium when no object is being weighed. To this projection is attached a pointer, indicating the weight on the graduated beam as it is moved in or out,

the scale balancing with the weights. The weights cannot be tampered with without the scale indicating it. This invention is applicable to a variety of scales.

The Care of the Eyes.

At the sanitary convention held at Ann Arbor, Mich., not long ago, Dr. C. J. Lundy, of Detroit, read a paper on "Hygiene in Relation to the Eye," which should have the widest circulation, especially among teachers and school officers. A fruitful source of eye troubles is shown to be the excessive strain upon the muscles and nerves of the eyes due to faulty educational methods, the ill planned and insufficient lighting of school rooms, poor ink and fine print in school books, and other causes which education might correct.

In conclusion, Dr. Lundy lays down the following rules for the better care of the eyes:

1. Avoid reading and study by poor light.
2. Light should come from the side, and not from the back or from the front.
3. Do not read or study while suffering great bodily fatigue or during recovery from illness.
4. Do not read while lying down.
5. Do not use the eyes too long at a time for near work, but give them occasional periods of rest.
6. Reading and study should be done systematically.
7. During study avoid the stooping position, or whatever tends to produce congestion of the head and face.
8. Select well printed books.
9. Correct errors of refraction with proper glasses.
10. Avoid bad hygienic conditions and the use of alcohol and tobacco.
11. Take sufficient exercise in the open air.
12. Let the physical keep pace with the mental culture, for asthenopia is most usually observed in those who are lacking in physical development.

A Mammoth Aphenescope.

The *English Mechanic* describes what it calls a mammoth aphenescope which has just been devised and constructed by Mr. W. C. Hughes, of Mortimer Road, Kingsland, for Princeton College, New Jersey. The object of the apparatus is to show diagrams, solid objects, such as machinery, the human face, and anatomical and other subjects occupying a large space, on a larger scale than has ever yet been attempted. The idea of an opaque lantern is, of course, not new, but hitherto the loss of light reflected has been an insuperable difficulty, which Mr. Hughes has overcome by constructing condensing lenses of larger diameter and special curvature, the object lens being of a very special character, being 8 inches diameter, and therefore very costly. In days gone by, the size of the largest object that could be shown was that of a carte-de-visite or watch face, but with this new instrument an object occupying 24 to 30 inches square can be shown on a disk of from 12 to 18 feet. To obtain these results the expenditure of no inconsiderable amount of money and numberless experiments have been necessary, extending over a period of more than eighteen months. After all this labor it is gratifying to find that the invention is a complete success, many scientists having expressed their approbation and approval, among others Mr. William L. Carpenter, B.A., who was commissioned to test the capabilities of the instrument, and whose verdict is that he has never seen so fine a result from reflected light.

Waxing Hard Wood Floors.

Take a pound of the best beeswax, cut it up into very small pieces, and let it thoroughly dissolve in three pints of turpentine, stirring occasionally if necessary. The mixture should be only a trifle thicker than the clear turpentine. Apply it with a rag to the surface of the floor, which should be smooth and perfectly clean. This is the difficult part of the work, for if you put on either too much or too little, a good polish will be impossible. The right amount varies, less being required for hard, close grained wood, and more if the wood is soft and open grained. Even professional "waxers" are sometimes obliged to experiment, and novices should always try a square foot or two first.

Put on what you think will be enough, and leave the place untouched and unstepped on for twenty-four hours, or longer if needful. When it is thoroughly dry, rub it with a hard brush until it shines. If it polishes well, repeat the process over the entire floor. If it does not, remove the wax with fine sandpaper and try again, using more or less than before, as may be necessary, and continue your experimenting until you secure the desired result. If the mixture is slow in drying, add a little of the common "driers" sold by paint dealers, japan, for instance, in the proportion of one part of the drier to six parts of turpentine. When the floor is a large one, you may vary the tedious work of polishing by strapping a brush to each foot and skating over it.

WE are glad to know that our correspondent Wm. R. Brooks, of Red House Observatory, Phelps, N. Y., has just been elected a Fellow of the Royal Astronomical Society of England, in recognition of his astronomical discoveries.

Trade Mark Difficulties.

The new English trade mark law makes it incumbent on the customs authorities to stop the import and also the export of any goods which they think bear wrongful trade marks. The officials have been carrying out their duties with such a high hand as to occasion loss and inconvenience to merchants. A large public meeting was lately held in London with a view to measures for the amendment of the act. All sorts of well known names, it appears, are registered in England as trade marks, and consequently almost any species of goods made by outsiders is liable to be seized by the customs for infringement.

Several amusing instances were cited of goods being stopped by the customs, including a consignment of bacon from America, because the boxes, though bearing the name of the town whence they came, were branded "mild cured;" a package of albums, because the word "album" (it was said) was English; and a case of thermometers, because they were marked "Fahrenheit." The following amendment was proposed by Mr. Platnauer and seconded by Mr. Moenich:

"That steps be taken by the Chamber of Commerce to influence the treasury to permanently remove the petty restriction placed by the custom house officials in the way of the equitable operation of the act, without in any way interfering with the trade marks or the resemblance to those marks such as would lead the public to suppose that they were articles of English manufacture."

A FAMILY at Versailles, France, consisting of the parents and two children, were poisoned with conium, which had been used instead of parsley in a dish of vegetables. The patients, being dangerously sick, were taken to the hospital for treatment, and recovered. A variety of conium much resembling parsley grows in all the back yards and gardens in Versailles.

THE FRENCH EXHIBITION OF 1889.

The greatest activity now prevails in Paris in respect to the preparation of the buildings for the International Exhibition of 1889, which promises to be by far the most wonderful and interesting industrial assemblage ever brought together. We give, on page 152, a condensed map of the locality, which we find, with some particulars, in *Engineering*; also additional views illustrative

of the great one thousand foot tower, from *Le Monde* and other journals.

M. Georges Berger, the Director-General of the Paris Exhibition of 1889, has issued an official block plan of the buildings and grounds, together with some general information intended especially for the use of foreign exhibitors. Annexed is a copy of the plan referred to, from which it will be seen that the exhibition is contained within one continuous inclosure, comprising:

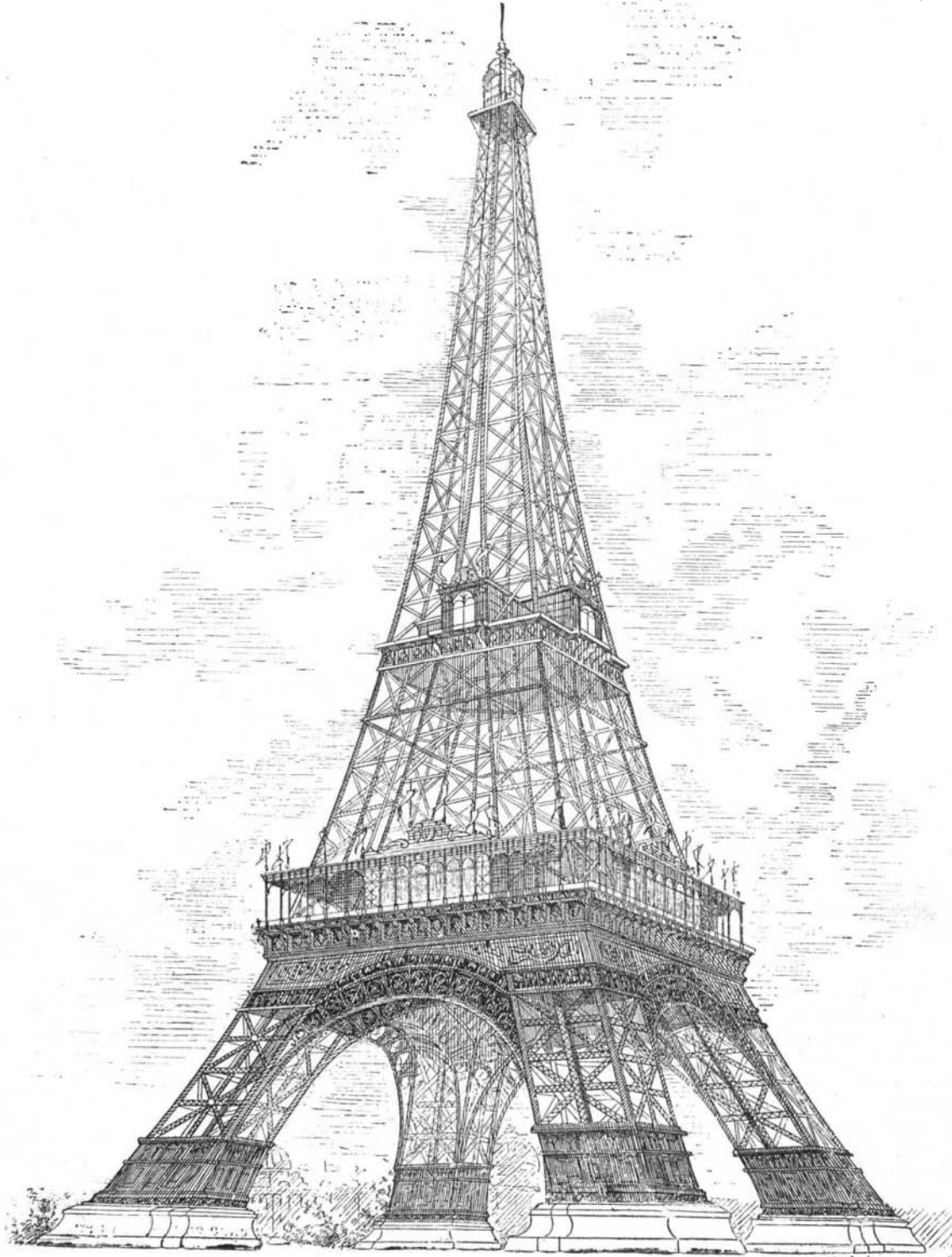
1. On the left side of the Seine: The Champ de Mars and the river quays and banks; the Esplanade of the Invalides and that part of the Quai d'Orsay between the Esplanade and the Champ de Mars.

2. On the right bank of the Seine: The park and certain available portions of the Trocadero Palace. The Pont de Jena, connecting the Trocadero and the Champ de Mars is also included. The exhibition will be divided into four principal parts and nine groups, as follows:

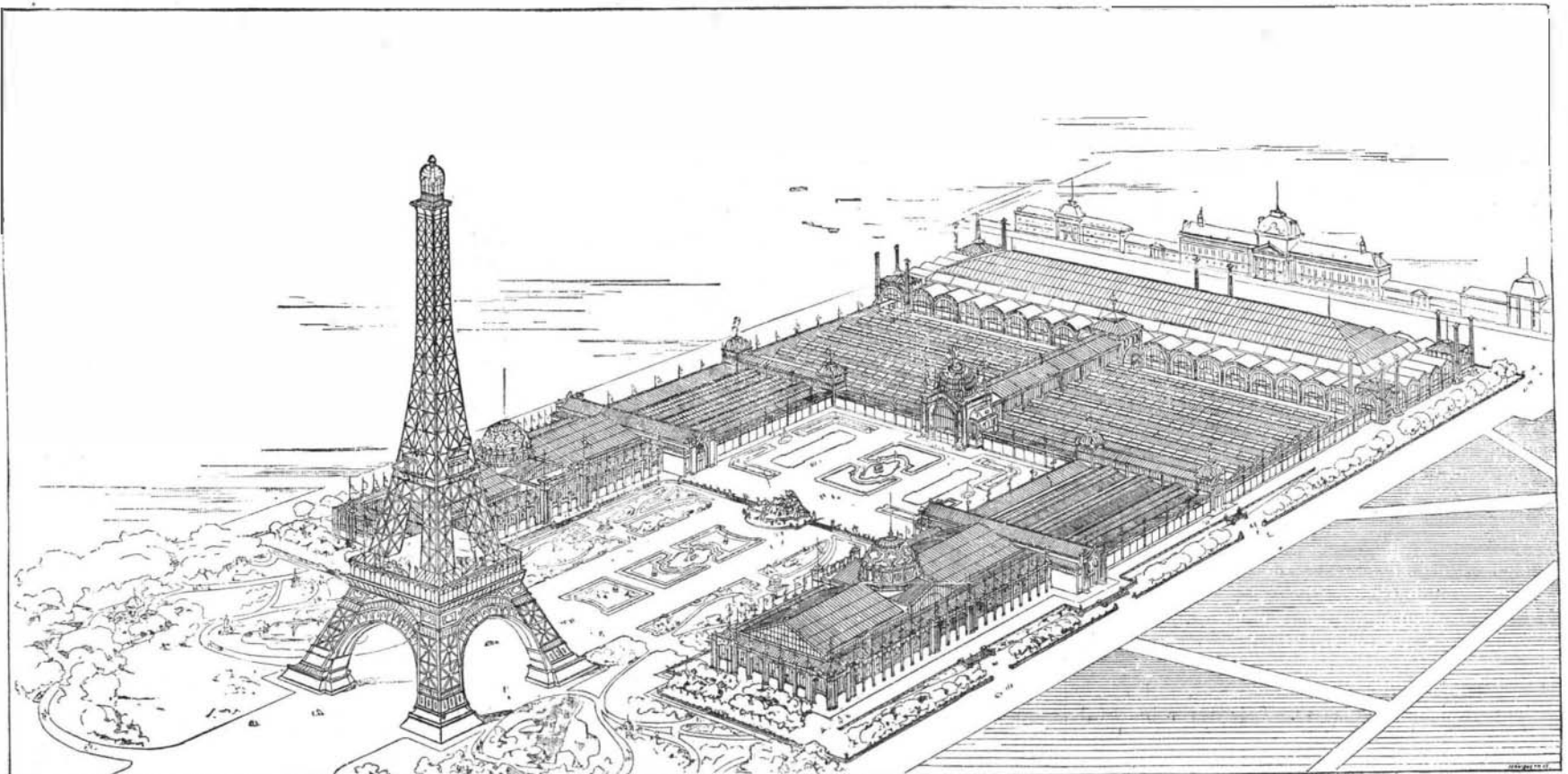
Part I.—The Champ de Mars. (A.) Section I. The Fine Art Buildings: Group 1. Sculpture, paintings, etc. This building will be divided into galleries and groups of galleries, corresponding to the various national exhibits.

Section II. (B.) Liberal Arts: Group 2. Education; materials and processes connected with the liberal arts. This building will comprise a great central nave and galleries, and the space will be divided into two parts, distributed by classes, one for French, the other for foreign exhibits.

Section III. (C.) Gallery of miscellaneous industrial products, comprising: Group 3. Furniture and accessories. Group 4. Fabrics, clothing, and accessories. Group 5. Extractive industries; raw and manufactured products. The area of this gallery—about 100,000 square yards—will be divided into three parts, one being allotted to each group. Each part will be subdivided into two, of which one, reserved for French exhibits, will be divided into



M. HANIN'S PERSPECTIVE OF THE GREAT TOWER.



THE FRENCH EXHIBITION OF 1889—DIAGRAM OF GREAT TOWER AND BUILDINGS.