Admission of Air to Rooms.

Air should be introduced and removed at those parts of the room where it would not cause a sensible draught. Air flowing against the body at, or even somewhat above, the temperature of the air of a room will cause an inconvenient draught, from the fact that, as it removes the moisture of the body, it causes evaporation or a sensation of cold. Air should never, as a rule, be introduced at or close to the floor level. The openings would be liable to be fouled with sweepings and dirt. The air, unless very much above the temperature of the air of the room, would produce a sensation of cold to the feet. It may be regarded as an axiom in ventilating and warming that the feet should be kept warm and the head be kept cool.

The orifices at which air is admitted should be above the level of the heads of persons occupying the room. The current of inflowing air should be directed toward the ceiling, and should either be as much subdivided as possible by means of numerous orifices, or be admitted through conical openings, with the smaller openings toward the outer air and the larger openings toward the room, by which means the air of the entering current is very rapidly dispersed. Air admitted near the ceiling very soon ceases to exist as a distinct current, and will be found at a very short distance from the inlet to have mingled with the general mass of the air, and to have attained the temperature of the room, partly owing to the larger mass of air in the room with which the inflowing current mingles, partly to the action of gravity in cases where the inflowing air is colder than the air in the room.—*D. Galton, in the Architect, London.*

Foreign Trade Marks—a Dilemma.

The Californian Fig Sirup Company, of Reno, Nevada, U. S., having registered the trade mark "Sirup of Figs" in the United States in 1885, demanded in January of this year to have the same mark registered in this country. In the Act of 1883 (Section 103) it is provided that, if her Majesty should be pleased to make any arrangement with the government of any foreign State for mutual protection of inventions, designs, and trade marks, then any person who has applied for protection for any invention, design, or trade mark, in any such State, should be entitled to a patent for his invention, or to registration of his design or trade mark (as the case may be), under this Act, in priority to other applicants; but in the case of a design or a trade mark, he must make his application within four months of his application in the foreign State. The same section, further on, provides that any trade mark the registration of which has been duly applied for in the country of origin may be registered under this Act. In March, 1884, her Majesty did please to accede to a convention to which France, Italy, Spain, and Belgium had previously agreed. The United States acceded in 1887. Article VI. of the convention thus acceded to provides that "every trade mark duly registered in the country of origin shall be admitted for registration, and protected in the form originally registered in all the other countries of the union." Under that article the California company claimed the registration of their trade mark "Sirup of Figs" in this country. The comptroller demurred, and argued that he was only bound by the Act of Parliament, and in that the limit of four months was clearly named, and had not been complied with by the applicants. They replied that in the convention such a limit was not mentioned, and they appealed to the board of trade, who referred the case to the court. The point at issue was evidently whether the convention should override the statute, or whether the statute ruled the convention. If the former, then we are bound to register every foreigner's trade mark here if he has got it on the register of one of the countries in the union. If the latter, we are in a degree breaking faith with the co-signers of the convention. Mr. Justice Stirling has ruled against the applicants, but he evidently perceived the dilemma, and said that her Majesty's government would no doubt consider what steps ought to be taken in the way of harmonizing the conflicting claims.—*The Chemist and Druggist (London).*

THE ELECTRIC BLOWPIPE.

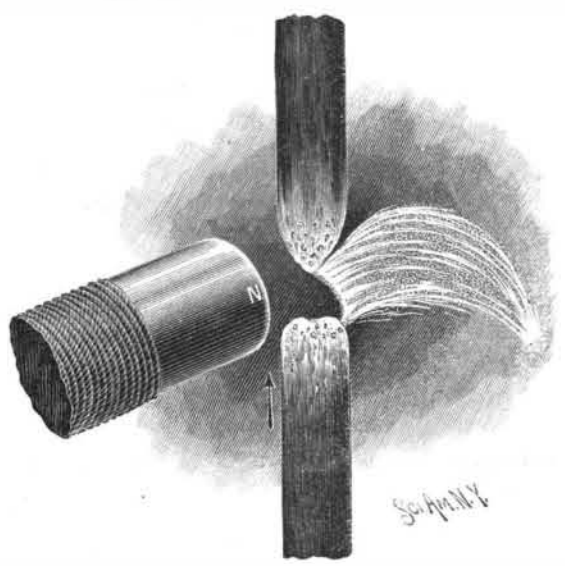
BY SAMUEL SHELDON, PH.D., PROF. HARVARD UNIVERSITY.

The application of dynamo-electric currents for the welding of large pieces of metal, in the mechanic arts, has been practically demonstrated as a success. But its employment has been, of necessity, limited to large workshops, where the amount of work of this character would warrant the purchase of a dynamo. Furthermore, the danger attending the use of powerful currents has deterred many from making use of them, because they have had in their employ mechanics of only ordinary attainments, with no especial knowledge of electricity.

Besides the Thomson-Houston system, which employs a current of very great strength but small electro-motive force, and where the pieces to be welded are brought into contact, two general methods employing the electric arc have been used. The first consists in making an electrode of each of the pieces to be welded, a small space being left where the welding is to take place. If a strong current be sent through, it forms an arc of great heat at this space and the metals are melted, and, running together, form a compact whole. The second consists in connecting both of the parts to be welded to one end of the circuit, while the other end is connected to a movable point, which is brought into close proximity to the joint, and, the arc being formed, gives the same result as before.

For many pieces of work these methods are not practicable. For instance, oftentimes when two pieces are brought into their proper relative positions, if a current be sent through after the first method, arcs will be formed at several places, and junctures will be made in places not desired. Again, in the employment of the second method, the use of two hands is often essential in the manipulation of the work, in which case a second person is necessary to apply the second contact. It is well known that two persons cannot co-ordinate their movements in the efficient manner in which one can those of his two hands, and the result is often an inferior grade of workmanship.

Now, the peculiar behavior of the electric arc, when placed in a strong magnetic field, affords at once a simple and efficient means for welding. A dynamic attraction or repulsion occurs between the rectilinear current of the arc and the amperean currents of the field, and this results in the drawing or driving out of the arc into a point, which is very similar to the point of flame projected from a blowpipe. The form may be seen from the following sketch:



THE ELECTRIC BLOWPIPE.

The heat at the point of the arc is intense, and suffices to melt any of the metals. A piece of No. 14 copper wire held at the apex melts instantly.

This extreme heat in such a convenient form can be the means of bringing electro welding within the reach of all shops where arc lamps are employed for illumination. By a mere nominal alteration the lamp may be made to perform the double function of illumination and welding. To attain this end, a straight electro-magnet wound with coarse wire is only necessary. This is placed with one end toward the arc, and may be fixed in one position (to be determined by experiment, and depending upon the direction of the desired point of the arc), or made movable in a horizontal plane on a level with the arc. The two terminals of the magnet coil are inserted anywhere in the main circuit, or, if found necessary, may be shunted from the same. The connections, once made, can remain undisturbed, and, without influencing the main line, the lamp performs its two functions.

In the employment of the arc for electro welding, the operator must, of course, wear colored glasses for the protection of the eyes. Care must be used in the selection of these, for some of the coloring matter used (especially in blue and red glasses) absorbs the light given out at the apex of the arc, and this would be detrimental to fine work.

The electric arc, when in a strong magnetic field, exhibits another peculiarity. It is known that if a circuit, traversed by a strong current, be broken under ordinary circumstances, a moderate spark will ensue, accompanied by a snap similar to that given by a toy cap when exploded. If, however, the break be made in a strong magnetic field, an extremely large spark follows, accompanied by a peculiarly sibilant report, as intense as that of a pistol. The effect is very startling when unexpectedly made.

If a strong field be brought to bear upon the interrupter of the primary circuit of a Ruhmkorff coil, the spark emitted by the simple secondary coil equals in magnitude and length that which would be produced under ordinary circumstances were the secondary in communication with a large condenser. This simple means may often be employed to advantage in work with a Ruhmkorff, when a long spark is desirable and, at the same time, any electrostatic residue, owing to the condensers, is to be avoided.

THE PARIS EXHIBITION.

In June, 1883, a few French members of Parliament, among whom were MM. Herve-Mangon, Liouville, and Million, urged M. Herisson, minister of commerce, to consider the desirability of holding a national exhibition in Paris in 1885. Public discussions in the press and elsewhere followed, with the result that it was considered best to hold a "universal" exhibition in Paris in 1889, the centenary of the French revolution in 1779. M. Jules Ferry, who was then president of the council, considered that such an exhibition would be not alone good in itself, but tend to keep peace in Europe. On November 8, 1884, M. Jules Grevy, president of the republic, signed, upon the recommendation of M. Rouvier, minister of commerce, a decree that a universal exhibition should be opened in Paris on May 5, 1889, and should be closed on the 31st of October, in the same year. A deliberative commission was at the same time appointed to consider the best method of carrying out the project, and it recommended that other nations should be invited to take part in the exhibition, on the economical ground that it celebrated the French centennial of industrial freedom. Later on, under the Freycinet ministry, M. Lockroy, minister of commerce and industry, asked credits from the chambers for the purpose. The government resolved to leave the matter to private initiation, and that the whole cost of the enterprise should not fall upon the state, as in 1878. It pronounced, therefore, in favor of a system of organization by the state in alliance with a guarantee society, as in 1867, which had been found to work well. This society guaranteed the state eighteen million francs receipts, and gave certain guarantees in the event of the expenses exceeding the amount calculated. The society acted by means of a board of control and finances, composed of eight municipal councilors, seventeen senators, deputies, and agents of the state, and eighteen subscribers to the guarantee fund, each commissioner representing one million francs. This commission enjoys, with the state and municipal council, the right of being consulted by the minister of commerce on all questions relating to the financial aspects of the exhibition. In short, the state has control of the exhibition, the city of Paris has a voice in the control, and the guarantee society does not lose sight of its capital. The state will be reimbursed to a large extent by the great circulation of money and extra surplus from its indirect imposts. The city of Paris will be largely reimbursed by increased receipts in octroi duties, and the guarantee society is safeguarded by the receipts of the exhibition. A law, dated July 6, 1886, sanctioned this combination, and a few days afterward, on the 28th of July, a decree regulated the organization of the services. M. Edward Lockroy, minister of commerce and industry, received the title of commissioner-general of the exhibition; M. Alphand, that of director-general of the works; M. Georges Berger, that of director-general of the exploitation; and M. Grison, director-general of the finances. M. Bartet was appointed engineer-in-chief, MM. Contamin, J. Charton, and Perron have control of the metallic constructions, MM. Bouvard, Duturt, and Formige are the architects of the exhibition, and MM. Laforcade and Lion have charge of the gardens and plantations. A ministerial order, dated August 26, 1886, appointed a consultative committee of three hundred persons, under the title of the grand council of the universal exhibition of 1889, and this was subdivided into twenty-two consulting committees to watch over various departments of the works. Foreign committees, established at the request of the French government, were each invited to be represented by a delegate charged to deal with questions interesting to the nation he represented. The minister and the commissioner-general do not correspond directly with foreign exhibitors.

The ground plan of the whole exhibition, published herewith, will make clear the general arrangement. The portions devoted to exhibits from Great Britain are represented by the darkest areas. The exhibition is divided into three great parts. One part, bounded on the north by the Trocadero, is on the north bank of the Seine, and devoted chiefly to exhibits relating to horticulture and arboriculture. It is connected with the chief part of the exhibition in the Champ de Mars by the Pont de Jena, and the main thoroughfare passes under the center of the Eiffel Tower—the positions of the four feet of which are represented in the map.

In that part of the exhibition which covers the Esplanade des Invalides are many scattered buildings. One of them is for miscellaneous exhibits, and some of the others for exhibits by the French naval and military authorities. Others are for exhibits from the French colonies. Places are being built in the Seine for floating exhibits of boats and ships. Some English steam-launches are expected to be there.

At one time the plan was under consideration of connecting the Champ de Mars and the Esplanade des Invalides with a railway denoted by the dotted line, R R. Unfortunately for the public, this idea has been abandoned, and they will have to go an immense way round by the route marked W Y. This length, however, will be traversed by a railway, which will carry passengers for a small fee.

Plan II. represents part of the palace of the Champ de Mars, which plan we copy from the *Bulletin Officiel* of the exhibition. The shaded upper part represents a portion of the great machine gallery. The galleries numbered 41 will be devoted to exhibits connected with the working of mines; 47, to leather and skins; 45, chemical products; 43, hunting and fishing appliances; 42, forestry appliances; 44, agricultural products, not alimentary; 46, bleaching and coloring; 31, linen; 39, encampment appliances; 38, arms, portable; 35, hosiery and dress accessories; 33, silks; 34, lace and lace making; 36, dresses for the two sexes; 40, toys; 37, jewelry. Returning to the upper portion of plan II., gallery 27 is devoted to heating appliances; 25, bronzes and artistic castings; 26, clocks and other time-keeping instruments; 29, ornamental leather work; 28, perfumery; 22, wall papers; 18, decoration and upholstery; 21, upholstery and tapestry; 17, these three galleries are devoted to furniture; 20, two galleries will contain specimens of ceramic art; 19, crystal and glass work; 24, goldsmiths' work; 23, cutlery; 20, mosaics. The pavilions of various Oriental nations will border this hall of miscellaneous exhibits, on that side of it nearest the Avenue de Suffren. The central portion of the lower part of the plan represents the area allotted to groups III., IV., and V., and to class 60, group VI.

By a ministerial order of August 2, 1887, an international congress of photographers will be held in Paris in connection with the exhibition; and by a resolution dated July 16, 1888, of the minister of commerce and industry, director-general of the exhibition a committee of organization was nominated to make the necessary arrangements. That committee includes the names of some men of great celebrity, including that of M. Edmond Becquerel, the chief pioneer and discoverer in relation to photography in natural colors. No great progress has been made in this research since his experiments of half a generation back. To this day such pictures cannot be fixed, and are slowly destroyed by light. MM. Paul and Prosper Henry, of Paris, who have done such good work in stellar photography, are among the members of the committee, and its president is Dr. Janssen, director of the Astronomical Observatory at Meudon, who discovered in India how to photograph the red flames of the sun without an eclipse. M. Davanne, vice-president of the French Photographic Society, is one of the most active members of the committee. The congress is expected to be held at some period between July 15 and August 15, 1889. We are indebted to the *Engineer* for the foregoing and for the plans herewith given.

U. S. GUNBOAT YORKTOWN.

The gunboat Yorktown is the first of a group of three, all similar in design. She is somewhat smaller than the Swatara class of vessels, but in offensive and defensive power and speed is immeasurably their superior.

She is a twin-screw, coal-protected cruiser, with poop and forecastle decks, with an open gun deck between.

Forward and aft, throughout the length of the vessel, is a three-eighths inch steel watertight deck, under which are placed the machinery, magazines, and steering gear. The principal dimensions of the ship are as follows:

Length between perpendiculars, 226 ft.; depth of hold, 18 ft. 9 in.; draught forward, 13 ft.; draught aft, 15 ft.; mean draught, 14 ft.; displacement in tons to L. W. L. (loaded water line), 1,703 tons; area, L. W. L., 5,765 sq. ft.; sail area, 6,352 sq. ft.; indicated horse power, natural draught, 2,200; forced draught, 3,300 H. P. Her maximum speed is calculated to be 16 knots, but it is believed she will show even better figures than these. Her crew will consist of 160 men all told.

The Plating (outside).—Garboards, 15 pounds, or about ⅜ inch; from thence to main deck, except double strakes amidships, 14 pounds; above main deck, 10 pounds. The plating up to the watertight deck is lap jointed and single riveted at the edges. Above the watertight deck, amidships, the plating is flush jointed and single riveted at the edges. All plates are double riveted at the butts. In the wake of the torpedo ports and the machine guns the plating is 40 pounds, or 1 inch thick, as a protection from the fire of an enemy's machine guns.

A conning tower, oval in shape, is built on the forecastle deck, athwartship, 7½ × 4 ft. fore and aft, 5 ft. 4½ in. above the deck, with a cover with a vertical travel of 3 inches. The tower is fitted with complete steering apparatus, speaking tubes, and telegraphs to the engine room. A handsome wood pilot house is fitted forward of the conning tower, with plate glass windows, steam steering wheel, telegraphs, etc. This pilot house is to be used in time of peace when cruising; but in an action, all manipulation of the ship will be from within the conning tower.

Her rig is that of a three-masted, fore and aft schooner. In coal endurance, the normal supply is 200 tons, but the bunker capacity is for 400 tons. This coal is disposed in the wake of the machinery and boiler, so as to give additional protection to these most invaluable adjuncts of the ship.

ENDURANCE OF THE YORKTOWN.

Speed.	Indicated horse power.	Coal. Per hour.	Coal. Per day.	Distance per day.	Coal supply of 393 tons. Distance can steam	Coal supply of 393 tons. Days.	Coal per H. P. per hour.
Knots.		Tons.	Tons.	Knots.	Knots.		lb.
16	3,300	2·60	61·7	384	2,419	6·3	1·75
15	2,620	1·75	42	360	3,366	9·35	1·50
14	2,000	1·33	31·92	336	4,136	12·31	1·50
13	1,600	1·07	25·68	312	4,773	15·03	1·50
12	1,230	0·82	19·7	288	5,750	20	1·50
10	650	0·46	11·04	240	8,542	35·5	1·60
8	375	0·26	6·24	192	12,092	62·9	1·80
6	200	0·17	4·08	144	13,870	96·3	2

The motive power is furnished by two triple-expansion engines, placed in separate watertight compartments, and develop with natural draught to 2,200 H.P., and forced draught to 3,300 H. P. The cylinders are 22, 31, and 50 in. in diameter, with 30 in. stroke. The pumps of all kinds will be driven by auxiliary engines. The two propellers are each three-bladed, and are 10½ feet each in diameter. There are four boilers, and are of the cylindrical horizontal pattern; each 9 ft. 6 in. diameter and 17 ft. 6 in. long; with a grate surface of 220 square feet.

There are two sets of dynamos to furnish a system of incandescent electric lighting throughout the ship. The search lights are of 25,000 candle power.

Armament.—The main battery is composed of six 6 in. breech-loading rifles, two on the forecastle and two on the poop, with the line of fire about 18 feet above the water. One is mounted on each side in the waist of a sponson, at a height of 10 feet from the water. The forward guns concentrate at 300 feet forward the stem, and the after two at 300 feet abaft the vessel, while three guns on one side can be concentrated at a point 100 feet from the side of the vessel. The secondary battery consists of eight rapid-fire guns and revolving cannon on the rail and tripod mounts. The Yorktown has eight torpedo guns or launching tubes, fixed ones, in the stem and stern, and three training tubes on each side. Automobile torpedoes will be fired from these tubes, and there is a complete outfit of boat, spar torpedo, gear, and charges.

The quarters for the officers are under the poop deck at the stern of the vessel, and are admirably lighted and ventilated. The crew's quarters are situated on the forward part of the berth deck, and are divided athwartship by steel watertight bulkheads, fitted with the necessary watertight communicating door. The dispensary and mess lockers are also located here. Great space and accommodation are also provided for the crew under the forecastle deck. The water closets for both officers and men are here located, as are the crew's wash rooms and galley inclosure.

Two 47 mm. Hotchkiss guns are located here, in the bow, and a large space left for the manipulation of torpedoes on each side.

The Yorktown was built at the yards of the Wm. Cramp & Sons' ship and engine building works, Philadelphia, Pa., and is now waiting for the government to give her the official trial before she can be accepted. This trial will probably be made within a few days, and it is anticipated that she will come up to the required standard, and will be put in commission at an early date. With the threatened complications in the Samoa affair, this addition to the new navy will be gladly welcomed.

Improved Polariscope.

Some improved polarizing apparatus for microscopes were exhibited and described by Dr. S. P. Thompson, at a recent meeting of the Physical Society, London. For polarizer, he uses a special prism, and for analyzer a flat-ended one of his own design. The former prism is formed from a rectangular block of spar, two faces of which are perpendicular to the optic axis; two cuts parallel to the axis are made from the middle of one side to the ends of the opposite, and the cut faces are polished and cemented by Canada balsam. A short prism with wide angle is thus obtained which can be readily fitted to the substage of the microscope. The analyzer, which consists of two wedges of spar, is mounted in a tube which fits on the eyepiece, and by recognizing that the upper end need not be larger than the pupil of the eye, the author has been able to considerably reduce the length of the prism, and still keep the bottom end large enough to collect all the rays passing through the eyepiece.

Several ingenious methods of cutting spar so as to produce prisms with minimum waste were described and illustrated by models, and a "Nicol" made by the inventor at the age of seventy-nine was exhibited.

Mr. Lant Carpenter asked the author why he condemned analyzers placed directly behind the objective; for in his experience this arrangement gave the most satisfactory results.

In reply, Dr. Thompson said his experience was decidedly different from that of Mr. Lant Carpenter, and mentioned that Zeiss had abandoned the common arrangement and now introduced his analyzers between the two lenses of his Huyghenian eyepieces.

Correspondence.

Query 22 of December 15, 1888.

To the Editor of the Scientific American:

Is there not *another* error in answer 22 of your issue of December 15, 1888?

T. B. A., in your issue of January 12, points out an error, which you state is typographical. This is evident by the solution of the equation $(500 - x) + 0{\cdot}08\,x = 200$; but I contend that the value of x, $326.09, *in this equation*, and not $340, as you state, is the *answer*.

As I understand the problem, the amount due—$500—was to be a cash payment at the time this transaction took place between A and B, but A being unable to meet his obligation, B agrees to extend the time for the payment of *a balance*, provided A will pay him *part* of the *principal*, and *the interest in advance* on the *unpaid* part.

Now, by these terms, I cannot understand how interest can be charged on the *cash payment*—$500 − x—and therefore the amount due B at the end of twelve months is simply *the unpaid balance*, $326.09.

"WALDO."

Roxbury, Pa.

[There is much probability in your statement. The only value attaching to the problem is as a question of algebra. Its wording is such that it is not easy to definitely solve it.—ED.]

Whence the Corona?

To the Editor of the Scientific American:

The solar eclipse of New Year's day has again brought up the question of the nature of the corona. Of the attempted explanations of this phenomenon, the one ascribing it to a diffraction of the sun's light on the edge of the moon seems to have found most favor, though it is not very clear how light thus diffracted can become visible as a halo without falling upon gaseous matter around the moon.

When the igneous mass out of which our satellite evolved was cast off from that of the earth to seek its own orbit, it is hardly to be supposed that it went without its due portion of those elements which, so far as they remained in a gaseous state, would eventually form an atmosphere. But astronomers say there is no evidence of a lunar atmosphere.

Many years ago the German philosopher Schopenhauer argued, from primary premises, that the moon once contained water like the earth and, since it lost its own heat, became covered with a crust of ice, which he thought accounted for the brilliancy of its reflected light. Recent speculations on the moon's constitution have led to the same rational view, so that our satellite may be said to be getting credited at least with the possession of crystallized water.

Now, the congealment of the moon's water implies the disappearance of aqueous vapors, and an atmosphere deprived of such vapors might be expected to escape detection by telescopic search, because the remaining gases, nitrogen and oxygen, would be invisible. But it may be reasonably presumed that these gases would sufficiently reflect the sun's light to be rendered luminous under the favorable conditions of an occultation, and hence likely the corona—revealing a lunar atmosphere.

A. PARTZ.

West Philadelphia, January 16, 1889.

A Providential Escape.

A miraculous escape is recorded as having taken place at the Wright Steam Engine Works, at Newburg, N. Y., a few days ago. A pulley weighing nearly eleven tons was being adjusted in a lathe, when suddenly the chain by which it was suspended parted, allowing the wheel to fall into the pit below, a distance of eight feet, where it was broken into eight pieces. At the time the chain parted, one of the turners was standing on the hub of the wheel and was precipitated into the pit below. Those who witnessed the accident rushed to the spot, expecting to find him crushed beneath this enormous mass of iron, but he was discovered alive and sound, although the pit was only five feet wide. Of course the shock was severe, but he was entirely uninjured, save for a few scratches received from flying fragments. With a little help he was able to climb out of the pit, when he was warmly received and congratulated by his friends and co-workers.

The Book Camera.

Kruegener's book camera is a veritable detective. One might be meekly walking along the road, or mixing with the devout going to or coming from church (on a week day, of course), with this innocent-looking, yet really formidable, apparatus in his hand or under his arm, and no one would suspect its nature, for to a casual observer it is a book and nothing more. Yet does it really contain, stored away in its interior, no fewer than two dozen small plates, 1⅝ inches square, each of which can be brought in rotation to the focusing plane, exposed, deposed into a separate receptacle, and another plate made to take its place, and all this by the simple act of pulling out a small handle, pushing it in again, and pulling a string.—*Br. Jour. Photo.*

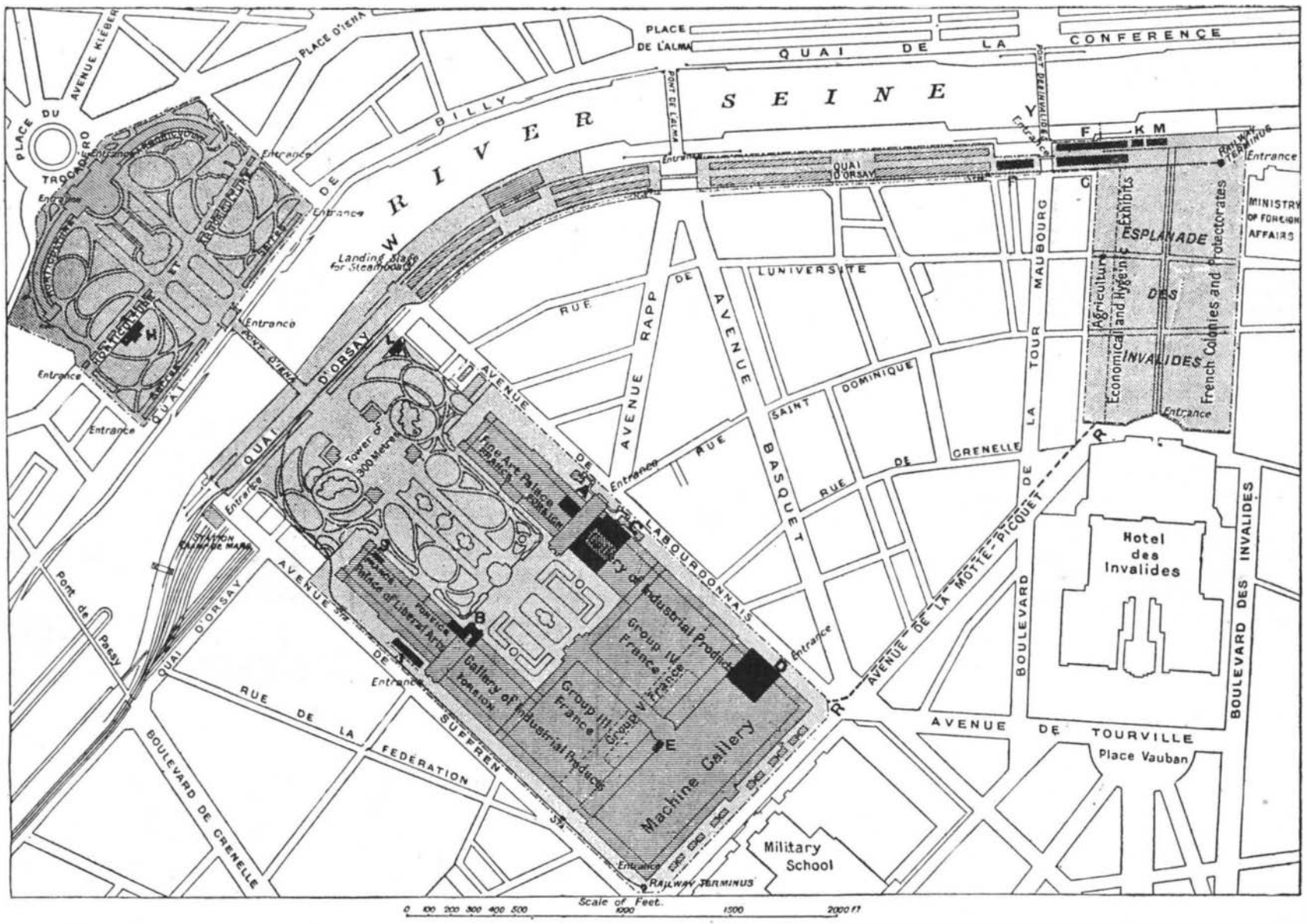


Fig. 1 — PLAN OF THE PARIS EXHIBITION.

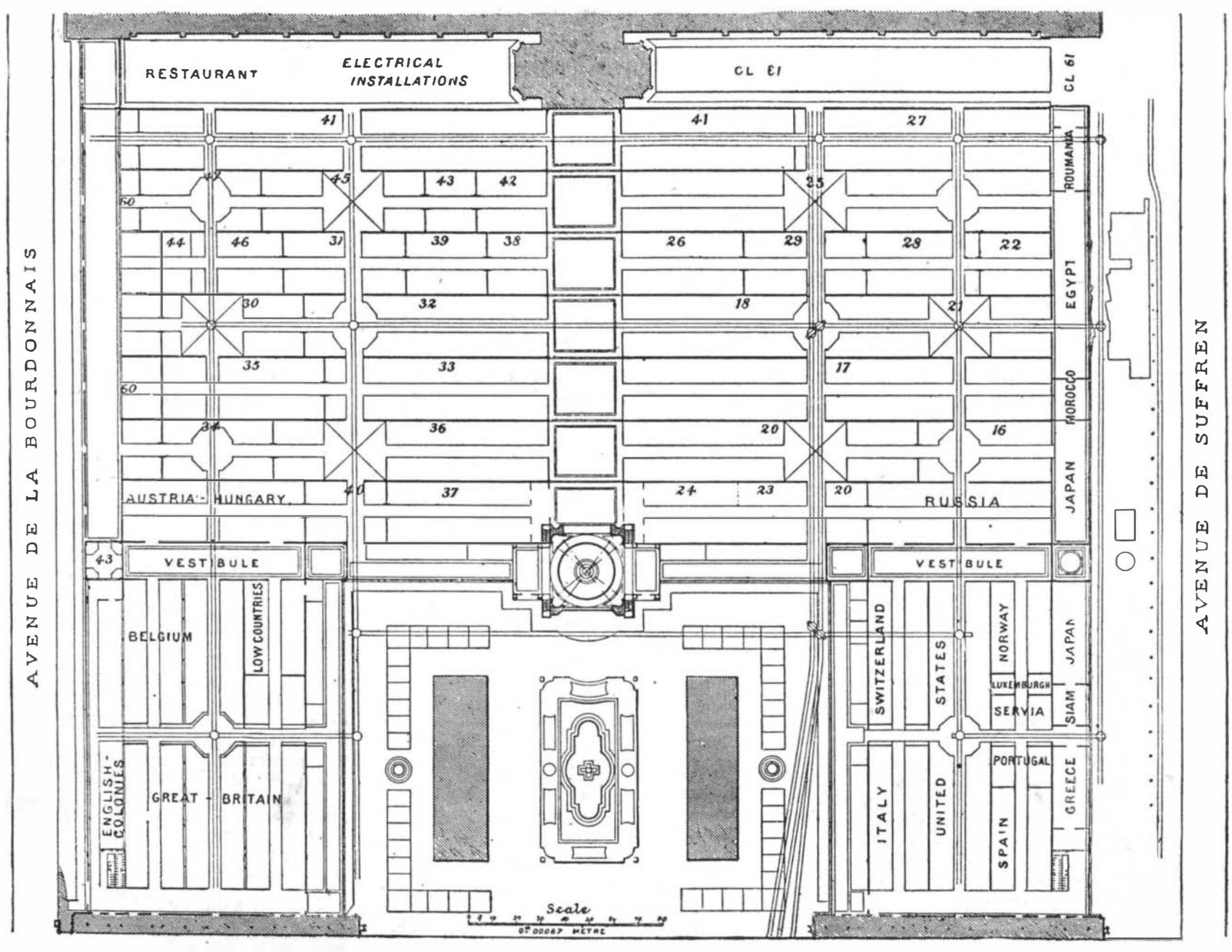


Fig. 2 — PLAN OF THE CHAMP DE MARS PALACE.

THE PARIS EXHIBITION 1889.

[For description see page 68.]