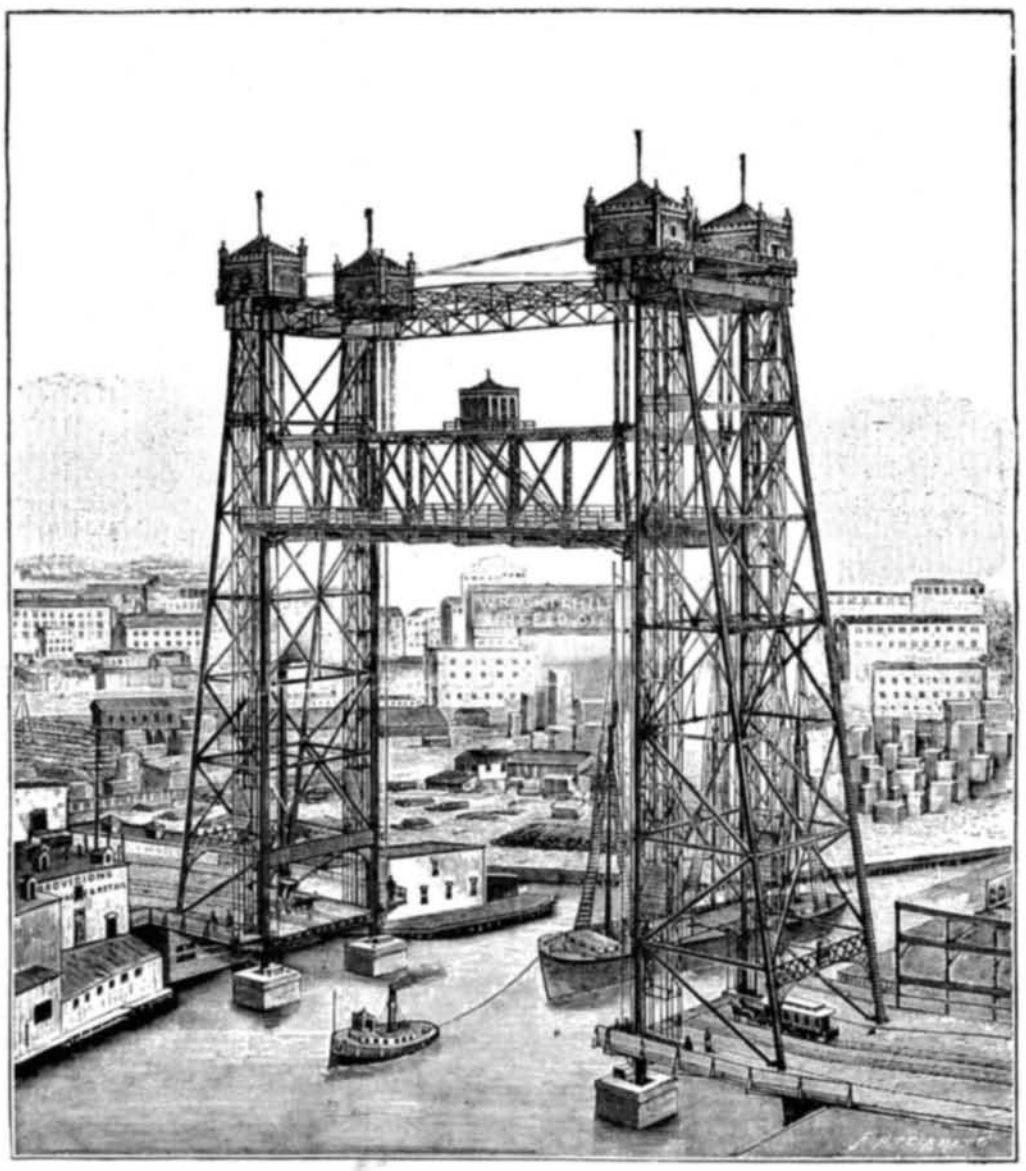
placed a little to the westward of Horselydown Stairs, and the approach on this side of the river is about 800 feet long, and runs in a straight line from this point, on a falling gradient of 1 in 40, until it meets Tooley Street. The north and south river piers are similar in all respects, and are, we believe, the largest of their kind in the world, the area of the two piers at the level of the foundations being about equal to the whole of the twelve circular piers carrying the Forth Bridge. The only other foundations of such dimensions are those of the Brooklyn Bridge, the two main piers of which support a roadway of 1,606 feet span. The total length of the bridge, including both approaches, is just half a mile. The total height of the towers on the piers, measured from the level of the foundations, is 293 feet. For the construction of this bridge some 235,000 cubic feet of granite and other stone, 20,000 tons of cement, 70,000 cubic yards of concrete, 31,000,000 bricks and 14,000 tons of iron and steel have been used.

The mode adopted for spanning the landward openings is the suspension system—that is, by stiffened chains anchored in the ground at each end of the bridge, and united by a horizontal tie across the central opening at the high level. This tie is carried by two narrow bridges ten feet in width, forming foot bridges, which come into use when the opening span is open for the passage of vessels. Above the landings from which the foot bridges start, and on which the foot passengers land from the lifts, come the roofs of the towers, the tops of which are 162 feet above the roadway level, or 264 feet from the bottom of the foundations.

The original design for a bridge on this plan is credited to the late Sir Horace Jones. But the modification and construction of the great work as it now stands is due to Mr. John Wolfe Barry, an engineer of great ability. The bridge has cost the enormous sum of $5,500,000.

Apropos of the way in which the Yankee sometimes deals with such jobs as the bridging a narrow stream like the Thames, we give a view of the new lift bridge over the Chicago River at Halsted Street.



THE NEW LIFT BRIDGE, HALSTED STREET, CHICAGO.

THE HALSTED STREET BRIDGE OVER THE CHICAGO RIVER.

We publish this week some further illustrations of the lift bridge, says *Engineering*, to which we are indebted for our cut and these particulars. (In some respects the problem to be solved was much the same as at the Tower Bridge, London. Some form of structure was required which, while giving when necessary a free way for high-masted ships, should obstruct the waterway and the river banks as little as possible. Hitherto the bascule type has been generally adopted under such conditions, and it was the favorite form of draw bridge during the middle ages, when such structures had a military rather than a commercial object. A moderate span was then all that was required, but when, at a more recent period, provision had to be made for the passage of large vessels, the swing bridge was invented, and up to the present it is still the favorite form where a large opening is required. In certain cases the swing has been as much as 450 feet long. A bascule bridge of similar span would be much more expensive, and, in fact, the Tower Bridge is, we believe, the only instance of a large bascule opening in existence. The increased expenditure in this latter case was considered justifiable on the ground that the bridges in a large city should be as picturesque as possible, and it would have been disgraceful for a wealthy community like that of London to have permitted the erection of a structure that would not harmonize with the old tower to which the new bridge is so close a neighbor. These latter considerations do not seem to have had much weight in the case of the Halsted Street Bridge, which, though a capital piece of engineering and a great credit to its designer, Mr. J. A. L. Waddell, can hardly be considered a success from the æsthetic point of view, though this defect is not inherent in the type, and we have no doubt Mr. Waddell will be able to embody his idea in a more graceful form whenever he finds a community ready to pay for the luxury. Apart from this, the lift type seems to have great advantages, and there is no reason why the system could not be applied to an opening of as much as 500 feet to 600 feet if desired, and the cost in such a case would certainly be considerably less than that of a swing bridge giving an equal opening, and if the foundations were difficult, it might cost less than a swing bridge giving two 250 feet openings.

In general plan the type of bridge under consideration consists of an ordinary truss span, resting on masonry abutment as usual, but so arranged that the truss can be raised from its seat and lifted high above the water level, so as to permit of masted vessels passing beneath. The truss is of the ordinary pin-connected type, 130 feet long by 23 feet high, connections being formed for the road way by prolonging the verticals below the bottom chord. This roadway is 34 feet wide between curbs, but the distance apart of the trusses, center to center, is 40 feet. The cross girders are of the plate type, and have the longitudinals, consisting of 15 inch I beams, riveted to their webs. The lower lateral bracing is fixed to the bottom flanges of these I beams. The pathways, 7 feet 8 inches wide, are carried on brackets, the pull of the top flange being carried round the vertical post. To guide the span while it is being lifted, two rollers are employed at each end of each top and bottom chord. One of the rollers is intended to take up side pressure, while the other checks any tendency to longitudinal swaying, but as provision must be made for expansion, this roller is fitted with powerful springs behind its bearings. The side pressure rollers are connected to the chords by a breaking piece, so that if the span is struck by a vessel the effect will be to shear this roller off, rather than to damage the span more seriously. A small hut for the bridge attendant is erected on the top of the lifting span.

The principal interest of the structure, however, centers on the lifting arrangements. As usual in the States, steam is employed for this purpose, an engine house being built on the river bank underneath one of the side spans of the bridge, and in this two 70 horse power engines have been erected, together with ample boiler power. These engines run at 240 revolutions per minute, and drive the pulleys for the lifting tackle by means of gearing. This tackle consists of 16 steel wire cables, ⅞ inch diameter, eight of which attach to the top of the span and the other eight to the counterweights, the lead of the cables being so arranged that as one set is wound on the winding drums the other set is wound off. The main sheaves on the top of the towers are 12 feet in diameter, and as the span and its counterweights each weigh about 250 tons, these four pulleys have each to carry about 75 tons each, and thus require a rather large shaft and long bearings. A 12 inch shaft has been adopted. To take the pull of the cables the two towers are connected together between the pulleys by a light truss. The abutment towers are very stiff, and consist each of two main vertical posts, which serve as guides for the lifting spans as well as taking most of the weight, while two raking posts support them against any end sway of the span when in its topmost position.

The bridge was designed by J. A. L. Waddell, C.E., of Kansas City, he having planned the same on a larger scale for Duluth Harbor. W. W. Curtis, engineer of the Pittsburg Bridge Company, made all of the working drawings of the structure, while the details of the lift gear were worked out by Superintendent T. W. Hermans, of the Crane Elevator Company.

The primary idea on which this type of bridge is based is the elimination of a center pier in cases where the bridge spans a navigable stream and a draw is necessary, thus securing the free use of the whole channel with very little obstruction of the docks in the immediate vicinity. This is accomplished by lifting the roadway to a sufficient height to allow passage of vessels with their spars and rigging, only for such time as is necessary, and immediately lowering to place, giving as little obstruction to street traffic as is possible. The bridge is so equipped as to be raised to full height in less than one minute, one engine being sufficient for the work, so that in this respect it is fully up to the ordinary center-pivot swing bridge, with the further advantage that in most cases it is only necessary to raise it part of the way, with the corresponding saving of time.)

An accident which caused not a little excitement occurred recently in the working of this bridge. When the bridge was raised on the morning of July 16, to allow a vessel to pass under it, a pinion in the hoisting apparatus broke as the bridge reached its uppermost position, and it was impossible to lower the structure until repairs were made, which it took thirty-six hours to accomplish. At the time of the accident, there were on the bridge eight passengers, of whom three, a policeman and two boys, were lowered in a chair tied to a rope, but five others, all men, were kept prisoners in their elevated position. A basket of provisions was sent up to them by a rope, and they passed the night as comfortably as they could in the signalman's little house.

Remarkable Fossils.

Prof. J. B. Hatcher and his party of students from Princeton College, who have just completed a tour through the Bad Lands of South Dakota, in search of fossils and petrifactions, have met with good success. The party has been in the Bad Lands between the Cheyenne and White Rivers since March 1. After completing their task, they started on an overland trip to Yellowstone Park. The collection of fossils has been shipped to Princeton. It weighs 9,000 pounds and consists of rare specimens of extinct animals.

The choicest and most valuable specimen was the elotherium, or extinct pig. The specimen was found protruding from a bank of one of the deep hollows in the Bad Lands. This is the only skeleton ever found of this character in that district, and was perfect, no bones being missing. This caress is much larger than the modern pig; in fact, it is larger than the living rhinoceros.

One specimen was the titanotherium, or extinct rhinoceros, which was twice as large as the modern rhinoceros. They also found several specimens of the rhinoceros family and the metamydor, a relative of the rhinoceros. Then there are skeletons of numerous small animals. They found a few fish skeletons, the only fish skeletons ever found in those beds. Last year's expedition from Princeton succeeded in obtaining the only crocodile ever found in the Bad Lands. On this trip a good specimen of the amphisbaenold lizard was unearthed, the only specimen of this reptile ever found in the world. This has no limbs at all, and was a very low order of the lizard.

GERMANY is now the best educated nation of the Continent, yet only one hundred years ago German teachers in many parts of the country were so poorly paid that they used to sing in front of houses in order to add to their income by odd pence.

Different Ways of Carrying Children.

La Province medicale for June 30 contains an abstract of an article on this subject by Dr. Felix Regnault, published in *La Medecine moderne*, in which the author writes as follows: Our customs with regard to the manner of carrying children are well known. They are carried on the left arm in order to leave the right hand free for use, but this practice evidently is not the best, for, aside from the fatigue entailed, one is obliged to pay the closest attention to the child, to watch all its movements while it is thus carried. Such a custom could not prevail among savages and half-civilized nations, where the necessities of existence do not permit of the same freedom from care, and where the women are obliged to work in the fields. The French peasants, says M. Regnault, leave their children in the cradle, and, if necessary, tie them in. This is the custom also in Armenia, in Morocco, and in Tartary. In Russia and among the Ostiaks the baby is put into a light willow basket, which is carried on the back and held firmly by means of straps. The custom among the Africans is still better. There the child is carried directly on the back and held firmly in place by means of a piece of cloth which is brought forward and fastened in front of the chest. In this manner the child is always carried by the mother, whether working in the fields or carrying water jugs on her head.

This custom has spread to other countries, and it has become a constant practice among the Japanese, who, it is well known, are the most careful people with regard to their children. M. Vidal, in the *Revue d'anthropologie* for 1874, gives many interesting details on this subject. From the time of the child's birth until it is three or four years old it is carried always, and everywhere, on the back. A garment called *kimono* is of such ample dimensions that when the folded sides are spread open it forms between the chest and the back a large funnel-shaped space into which the child is put, the head alone showing above the edge of the garment; the hands and arms are free, so that the child's movements are not restricted, and thus there is little danger of a fall or a blow. In this way, too, the baby is not exposed to cold, the mother's body giving sufficient warmth. Another advantage to be derived from this way of carrying babies is that the mother has her hands free to perform her daily work.

It is quite common, says the author, to see children of five or six years carrying their younger brothers and sisters in this manner on their backs. European children also are carried in this way by native nurses, and they do not seem to find it uncomfortable.

Among other nations the custom varies, and the hip, usually the left one, supports the child's feet. In this case a band holds the baby in place and leaves the left arm of the person who carries the child free. Among the Malays this band is a piece of cloth which is fastened on the right shoulder; among the Niams-Niams it is a large piece of hide which is crossed over the left shoulder and passes under the right one. When the women carry anything on their heads the back is chosen for the child, and when objects are carried on the back the child is placed on the hips, where it is fastened with bands. This custom prevails among many negro races. On the Congo coast objects are put on the head, and the child is carried on the back. In the interior, where there is more danger of accidents occurring, loads cannot be carried on the head, as they would be exposed to a fall; consequently they are put into a basket on the back, which is fastened with a large piece of goat skin on which the child is seated.

M. Lapicque, in his voyage to the Andaman Islands, has also seen the women of that country carrying children on the left hip and a basket on the back. In this way, says the author, have savage nations solved the question of being able to carry on their work and at the same time watch over and take care of their children.—*N. Y. Med. Jour.*

Royal Exhibits at the Chicago Exposition—Report on Women's Work, British Section.

The following report of the Ladies' Committee of the British Section has been transmitted to the Royal Commission:

In October, 1892, at the request of the Royal Commission, of which Sir Richard Webster, Q.C., M.P., was chairman, H. R. H. Princess Christian, of Schleswig Holstein, Princess Helena, of Great Britain and Ireland, accepted the presidency of a Committee of English women to represent, as far as possible, the work of women in England at the World's Fair in Chicago.

A large and representative Committee was formed, and the work of collecting and choosing the exhibits was undertaken by the different vice-presidents of each section of work, with the assistance of their separate sub-committees. Miss Fay Lankester was appointed secretary to the Committee by the Commission. A small Finance Committee, with Sir Douglas Galton as chairman, was appointed by Her Royal Highness.

The Committee was divided into eleven sections, the presidents of each section undertaking to form sub-committees and regulate the collection of exhibits—thus Scotland, Ireland, and Wales were represented. Education, handicrafts, lace, literature, needlework and embroidery, philanthropic work, and nursing, with the Countess of Aberdeen, Lady Aberdare, Mrs. Fawcett, Lady Roberts and Miss Webster, Duchess of Abercorn, Mrs. Gordon, Lady Henry Grosvenor and Lady Amherst, the Baroness Burdett-Coutts and Mrs. Bedford Fenwick, as presidents of the sections, each lady forming an active sub-committee to assist her in her work.

Mrs. Roberts-Austen kindly undertook the decoration of the vestibule, which was most beautiful, with panels on one side, by Mrs. Swynnerton, representing Nursing, in three groups, and on the other side by Mrs. Lee Merrett, representing Kindergarten; a group of women embroidering and women receiving degrees at the London University.

Miss Roper and Miss Halle furnished bass-reliefs, which were placed over the entrance.

Mrs. Roberts-Austen also sent out a few selected paintings by eminent women artists.

Miss Helen Blackburn kindly undertook to lend a collection of portraits of eminent women. They were arranged in periods—in Mediæval period, in Tudor period, Civil Wars, early half of 18th century, pioneers in Philanthropy and General Advancement of Women, pioneers in Education; Central Group, Science, History, etc.; General Literature, Poetry, Fiction, Drama and Music, Art; in all, nigh upon 200 portraits.

Mrs. Fawcett, besides being president of the Education Committee, was kind enough to write the report for the catalogue to the Women's Building, and this she did in the most able manner, explaining the objects and aims of the Women's Committee.

Some of the vice-presidents also wrote short prefaces on their own particular work in the catalogue: Mrs. Fawcett, for the Education Committee; Mrs. Bruce Clarke, for the Lace Committee.

Lady Priestley contributed a paper on "Hygiene in the Home" to the Congress, and Miss Blackburn undertook to provide one on "Patents taken by Women."

Thus about a hundred educated women were energetically interested in the active occupation of forming a suitable representative exhibition of the work of their fellow countrywomen. The expenses of the collections, show cases, freight, and insurance were heavy, but the Commissioners most generously undertook the expenses of freightage, insurance, and return of goods.

Her Royal Highness attended all the meetings personally, and was actively interested in the promotion of the work. The Committees have every reason to be congratulated on the speedy, economical, and business-like way with which their work was accomplished, the English Women's Section being the only one that was ready on May 1, when the Exhibition opened, mainly owing to the energy of Mrs. Cope, the lady sent out in charge of the exhibits. As the ladies did most of the work themselves, there was very little expense attached to the undertaking, except the most absolutely necessary expenditure. Mrs. Cope was sent from England in charge of a certain number of exhibits—royal exhibits, needlework, handicraft, lace, Welsh, and Indian work sub-sections.

Her Majesty the Queen and the Royal Family of England sent several paintings and work executed by themselves; also other exhibits:

1. Six original sketches from nature in one frame, by H. M. the Queen.

2. Copy in water colors from an oil painting, size of life, of H. M. the Queen's Munshi and Indian Secretary, Ab-dul-Karim, 1892, by H. M. the Queen.

3. Two pictures in oil by H. R. H. the Princess Christian of Schleswig Holstein.

4. Study from nature in water colors, by H. R. H. Princess Louise.

5. A picture by H. R. H. Princess Beatrice (Princess Henry of Battenburg).

Two napkins made from flax spun by H. M. the Queen.

A hat plaited by H. M. the Queen and given to her granddaughter Princess Victoria of Schleswig Holstein.

Corner chair of carved oak and cut and embossed cowhide, H. R. H. the Princess of Wales.

Embroidery on linen; knitted jersey—H. R. H. Princess Helena (Princess Christian of Schleswig Holstein).

Music stool of carved oak and cut and embossed cowhide, by H. R. H. Princess Victoria of Wales.

Stool of carved oak and cut and embossed cowhide, H. R. H. Princess Maude of Wales.

These Royal exhibits were received with especial interest in America.

The sales of work were not large, partly on account of the heavy duty to be paid on English goods and partly on account of the restriction that visitors could not take away purchases from the building until after the closing of the Exhibition.

The British Nursing Section received particular distinction in the way of medals and awards.

The collection of lace sent by the Duchess of Abercorn was particularly beautiful, as were the exhibits and specimens of lace sent by the Countess of Aberdeen.

The Scottish industries have profited by sending exhibits to the Exposition, as many sales took place in the way of Harris tweeds, Shetland shawls, hand-knitted stockings and gloves.

The cottage industries at the Welsh Section attracted considerable attention, more especially the hand-loom weaving, where 928 yards of flannel was woven during the Exhibition by a young Welsh woman in national costume, sent out for the purpose. The spinning wheels, both of North and South Wales, were very interesting, and "Welsh Section" was always popular among the visitors.

Two lady custodians, Mrs. Bond, an English lady residing in Chicago, and Mrs. Cope, sent out from England, were actively employed during the whole time of the Exhibition, and votes of thanks were sent to England by the Board of Lady Managers on account of the active services rendered by these ladies, and letters expressive of warm appreciation of British women's exhibits have been received from Chicago.

Three lady judges were appointed by the Committee at the request of the Board of Lady Managers, viz., Miss Kneely, Nursing, etc.; Mrs. McAllum, Philanthropic Work; Mrs. Crawford, Art and Handicraft.

Several members of the Ladies' Committee visited Chicago during the Exhibition. Mrs. Bedford Fenwick made two journeys to install the nursing exhibits, and obtained medals for the nursing appliances. Miss De Pledge also attended and read papers. Mrs. Roberts-Austen personally superintended the decoration of the vestibule with panels. Mr. Osborne also went on account of the Baroness Burdett-Coutts.

Notices of the numerous medals and awards which have been gained by British women have been sent to the president of each section; they are too numerous to mention in this report. An official list can be seen at the offices of the Women's Work, 53 Berners Street, W., or at the Society of Arts.

The thanks of the Ladies' Committee are due to Sir Frederick Abel in lending space at the Imperial Institute for the packing of exhibits and the reception on their return to England; and to Sir Somers Vine and the officers of the institute for their courtesy in assisting the Ladies' Committee in every possible way.

The exhibits not sold have been returned, with very little damage.

SCOTLAND.

President.—Countess of Aberdeen, in conjunction with the Scottish Home Industries Association. *Hon. Secretaries.*—Miss Munro Ferguson and Miss Meta Donald.

IRELAND.

President.—Countess of Aberdeen, in conjunction with the Irish Industries Association.

WALES.

President.—Lady Aberdare. *Hon. Secretary.*—Miss Adeane.

EDUCATION.

President.—Mrs. Fawcett. Miss Buss, Miss Julia Cock, M.D., Miss Davenport Hill, Miss Gurney, Miss Tod (Belfast), Miss Kingsley, Miss F. Stevenson (Edinburgh), and Miss L. Stevenson.

HANDICRAFTS.

Presidents.—Lady Roberts and Miss Webster. Mrs. Jack Johnson, Miss H. Blackburn, and Miss C. Holden (hon. sec.)

LACE.

President.—Duchess of Abercorn. Lady Clinton, Lady Ernestine Edgecumbe, Lady Susan Fortescue, Lady Iddesleigh, Lady Kenmare, Lady Kennaway, Lady Morley, Hon. Mrs. Marker, Hon. Mrs. Peek, Mrs. Bruce Clarke, Mrs. Alfred Morrison, Mrs. Reeve, and Miss Constance Hargrove (hon. sec.)

LITERATURE.

President.—Mrs. Gordon. Mrs. Humphrey Ward, Mrs. Clifford, Miss Gayford (hon. sec.), Mrs. Green, and Miss Kingsley.

NEEDLEWORK.

Presidents.—Lady Henry Grosvenor and Lady Amherst, of Hackney.

NURSING.

President.—Mrs. Bedford Fenwick. Lady Jeune, Lady Priestley, Miss Emily Shaw-Lefevre, Miss Isla Stewart, Matron St. Bartholomew's Hospital; Miss K. Hendie Close, Lady Superintendent for Sick Children, Great Ormond Street; Miss De Pledge, Matron Chelsea Infirmary; Mrs. Cheadle, late Inspector Queen's Nurses; Miss S. Cartwright, Gordon House Home Hospital; Mrs. Walter Lakin, Miss Edith Kirwas Ward, Miss Annesley Kenealy, and Mrs. Holmes Spicer (hon. sec.)

PHILANTHROPY.

President.—Baroness Burdett-Coutts. Countess of Harrowby, Mrs. Boyd Carpenter, Miss Mary Steer, Mrs. Holmes White, and Miss Ellen E. White.

(Signed)

HELENA,
Princess of Great Britain and Ireland,
Princess Christian of Schleswig Holstein.

FAY LANKESTER,
Secretary

The Newspaper Museum of Aix-la-Chapelle.

At Aix-la-Chapelle there is a museum which is probably unique of its kind, and which contains more than five hundred thousand journals in various languages. It was founded in 1886 by Mr. Oscar Forkenbeek, a distinguished amateur, who for forty years devoted his entire income to the acquisition of rare or curious specimens. A subscriber to several hundred journals coming from all parts of the globe, Mr. Forkenbeck received and read every morning a large number of papers published in thirty different languages. In founding his museum, he endowed it in the first place with ten thousand complete collections that he had got together, and then he sent a circular letter to the press of the entire world requesting it to second him in the colossal work that he had undertaken.

Most of the journals, especially those of Europe, are sent regularly to the museum, which now finds itself in the possession of complete series and some very rare specimens. Among the latter may be mentioned a number of the *Illuminated Quadruple Constellation*, published in New York in 1859. This very extraordinary journal is no less than eight and a half feet in length by six in width. It contains eight pages of thirteen columns each. The columns are forty-eight inches in length, and, if placed end to end, would therefore form a strip of printed paper about one hundred and twenty-five yards in length. It was printed with the greatest care upon a specially prepared and very strong paper that weighed about three quintals to the ream. Forty men worked night and day to set up and print the first number of this monster journal, which is to appear but once a century.—*La Nature.*

THE HARMONY AND MEASUREMENT OF PERFUMES.

The manufacture of perfumes is a thoroughly French industry, and it is no exaggeration to say that it affords a living to three-fourths of the rural population of the environs of Nice, Cannes, and Grasse. Yet this so prosperous branch of our horticultural industry has recently witnessed the birth of a rival one, that threatens to strangle it; we refer to the obtaining of perfumes through synthesis.

What is to be done in the face of such competition? Abandon the culture of flowers and leave the manufacture of perfumes to all the chemists of Europe? But, then, what use shall we make of our beautiful sunshine of Provence and the privileged climate that France enjoys in the south? No; it is preferable to react, not by endeavoring to obtain products as cheap as those furnished by chemistry, which would be simply chimerical, but by doing better—that is to say, by producing fine, delicate perfumes, capable, consequently, of competing with the always quite coarse products obtained by synthesis. In order to reach such a result, it is necessary to determine in an accurate manner the methods of formation and localization of

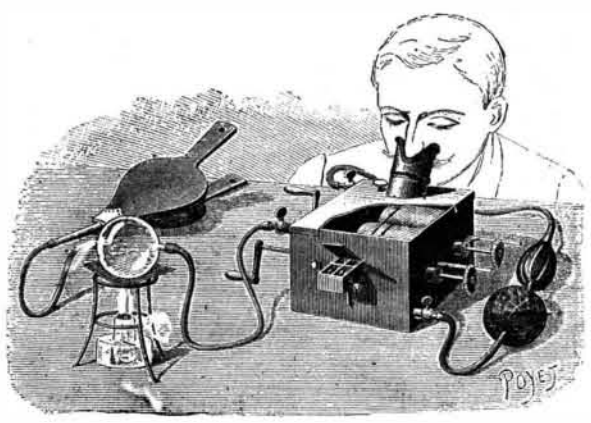


Fig. 2.—MEASUREMENT OF PERFUMES BY MEANS OF THREADS.

the perfumes in flowers, to observe their variations in the life of the same plant; to learn the conditions of culture that give maximum renderings, to devise rational methods of extraction, and to classify the perfumes. It is these various problems that Mr. E. Mesnard has attacked, and in part solved. We shall occupy ourselves here merely with his researches upon the measurement of the intensity of perfumes, and which are of a nature to interest the public at large.

It must not be thought, in fact, that, in order to excite our olfactory nerve agreeably, it suffices to mix, in any proportions whatever and in any manner whatever, odors which, isolated, are agreeable to smell, any more than it would suffice to drum upon a piano in order to play a harmonious air. There is, says Mr. Piesse, in his treatise upon perfumes, an octave of odors, just as there is an octave of notes; certain perfumes unite with each other like the sounds of an instrument. Thus, bitter almond, heliotrope, vanilla, and clematis blend very well, each of them producing nearly the same impression, in a different degree. On another hand, we have lemon, orange peel and verbena that form a higher octave of odors, and which associate with each other likewise. The analogy is completed by what we call semi-odors, such as rose with rose geranium for a half tone.

It is curious to note that upon mixing a small number of perfumes in definite proportions, we can obtain the majority of the odors of flowers, with the exception of that of jasmin, which is *sui generis.* With long practice, it is possible, if we may dare to so express ourselves, to educate our nose and become composers of perfumes, just as musicians become composers of music. Certain perfumers succeed in distinguishing more than four hundred odors and in blending them without difficulty in a proper manner. But these are exceptions; so Mr. Piesse, in order to aid the manufacture of perfumes, has conceived the ingenious idea of selecting the odors that are more especially employed in perfumery and of placing the name of each odor in a gamut in the position corresponding to its effect upon the olfactory sense (Fig. 3).

The odors that are not designated in the tables in question are easily interposed between those that are

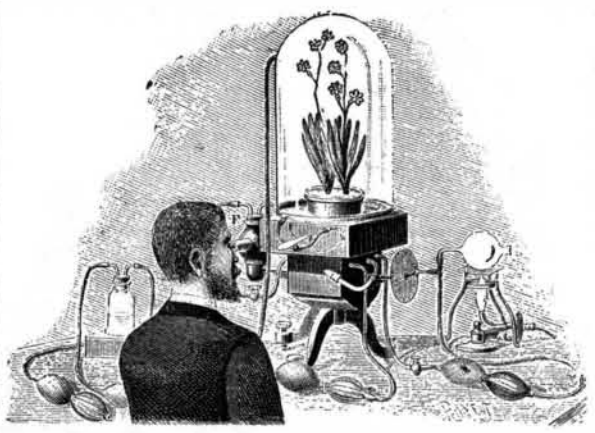


Fig. 1.—MEASUREMENT OF PERFUMES THROUGH THE EXTINCTION OF PHOSPHORUS.

here inscribed. Some of them admit neither sharps nor flats. Others, owing to their diverse varieties, might form a gamut by themselves alone. When a perfumer wishes to make a bouquet of primitive odors, he must select those that accord, and the perfume will then be harmonious. Upon glancing at the gamut, we shall see what harmony and discordance are as regards odors. Just as a painter blends his colors, just so a perfumer must blend aromas. When a bouquet of several perfumes is made, the latter must be so mixed that when brought together they shall form a contrast.

The following is an example that shows the method of compounding perfumes according to the laws of harmony:

BASS.

Sol	Pergularia	Bouquet, chord of *sol.*
Sol	Sweet pea	
Re	Violet	
Fa	Tuberose	
Sol	Orange flower	
Si	Southern wood	

This method of gamuts is ingenious and renders very great services, but it cannot be denied that it is very artificial, scientifically speaking, and this is what led Mr. Mesnard to the measuring of the intensity of perfumes in a more accurate manner. The matter is extremely delicate from all points of view, and it is interesting to see the roundabout method by which Mr. Mesnard has reached it. The method consists essentially in the introduction, into a given vessel, of air laden with a known perfume and of air that has passed over a special and easily procured volatile oil—essence of turpentine. Although the sense of smell is not capable, as may be supposed *a priori*, of estimating the intensity of an odor in absolute measure, it is capable of being a wonderful comparer. It is possible, therefore, to form a mixture in which the sense of smell shall succeed in perceiving only a neutral odor, that is to say, an odor such that it would suffice to cause a slight variation in the proportion of the essential oils in one direction or the other, in order to smell either the perfume or the essence of turpentine. At this moment, it may be admitted that the two odors are equivalent. It now only remains to determine the quantity of essence employed. As a basis for this is taken the curious property that essence of turpentine possesses of extinguishing the phosphorescence of phosphorus. The proportion of essence is easily calculated, by knowing that, in order to prevent the phosphorus from shining in a given space, it is necessary to introduce thereinto a volume of air so much the greater in proportion as it is charged with a less weight of vapors of turpentine essence. The intensity of the perfume will evidently be so much the stronger in proportion as it has been necessary to employ a larger quantity of essence in order to neutralize it.

In Fig. 1 we represent one of the apparatus used for such measurement. The observer watches in a ball of blackened glass, F, for the moment in which the phosphorus contained therein is extinguished. The numerous rubber bulbs observed are designed for stirring up the odorous vapors and for obtaining very homogeneous mixtures—this being a very important condition.

We show also (in Fig. 2) the last and not least curious model devised by Mr. Mesnard. The nose of the observer will be seen communicating with the cavity of the apparatus, into which is introduced the perfume and the essence by means of two threads that they impregnate. These threads may be seen through a hole that the engraver has represented in the cover for that purpose. We begin by introducing a determinate length of perfume thread, and then, in the same way, a certain length of essence thread, until the two odors neutralize each other. The intensity of the perfume can then be expressed in length of thread. To measure a perfume by the surveyor's chain is something that one would not have expected!—*L'Illustration.*

Mountain Sickness.

Mountain sickness is a complaint well known to most ascensionists to great heights. It is at the altitude of about 12,000 feet that they generally experience this peculiar trouble, which becomes more and more marked in measure as this height is exceeded in order to reach altitudes of 14,000, 15,000, and nearly 16,000 feet, as in the ascent of Mont Blanc.

Reaching such heights, the ascensionist is attacked with extreme lassitude and a desire to breathe more frequently. Scarcely has he made a few steps when he is obliged to stop in order to take breath, as if exhausted by the slight effort that he has just put forth. With this is joined, in certain persons, a feeling of nausea and a tendency to syncope. De Saussure, in one of his first ascensions, noted all these peculiarities, but was able to control the sensations caused by the trouble. Dr. Lortet, Dean of the Faculty of Lyons, who has made a thorough study of these physiological troubles, noted the same phenomena. More recently, Mr. Egli-Sinclair has made the ascent of Mont Blanc and has given a scientific account of it of the greatest interest. In company with Messrs. Infeld and Guglieminetti he started under the habitual conditions and reached the summit without tremors of the limbs and without shortness of breath. It was not until the ascensionists were installed in the hut erected upon the summit by Mr. Vallot that they felt the first attacks of the mountain sickness. Their respiration became difficult, their muscles were sensitive, and the sickness was completed by headache and a slight nausea. The party remained in the observatory four days, and the same symptoms persisted during almost the entire time. These symptoms, which are exactly the same as those experienced by other observers, will confirm the existence of a mountain sickness.

What is the nature of the complaint? It is due to anoxhæmia, that is to say, to an insufficient quantity

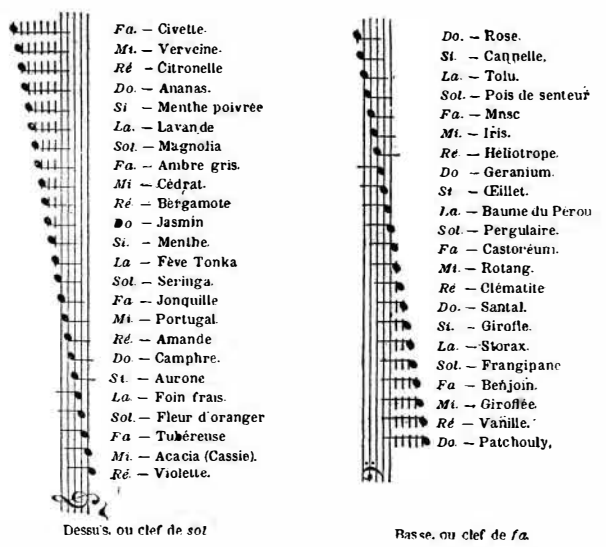


Fig. 3.—GAMUT OF PERFUMES.

of oxygen being absorbed by the blood. Messrs. Jourdanet and Bert have demonstrated that the rarefaction of the air prevents the organism from receiving the quantity of oxygen necessary for respiratory and organic combustion. Mr. Egli-Sinclair has shown the reality of this fact by careful analyses of the blood. In his companions and himself, the proportion of hemiglobine of the blood was reduced by a third, and even a half, and rose again, and that but slowly, only after their descent to the valley. The connection between mountain sickness and the amount of oxygen furnished the blood, therefore, appears evident. This, however, is not the sole cause, for another factor intervenes, and that is the fatigue, the exhaustion that is experienced, and which is variable according to the subject, his resistance, his training, and the conditions under which the ascent is made. In measure as one ascends a high mountain, then, the expenditure of oxygen is increased and the loss is not compensated for by an atmosphere that becomes more and more rarefied. The more the walk is forced, the more laborious becomes the effort, the more apparent becomes the decrease in oxygenation, and the more marked the disagreeable symptoms above mentioned.