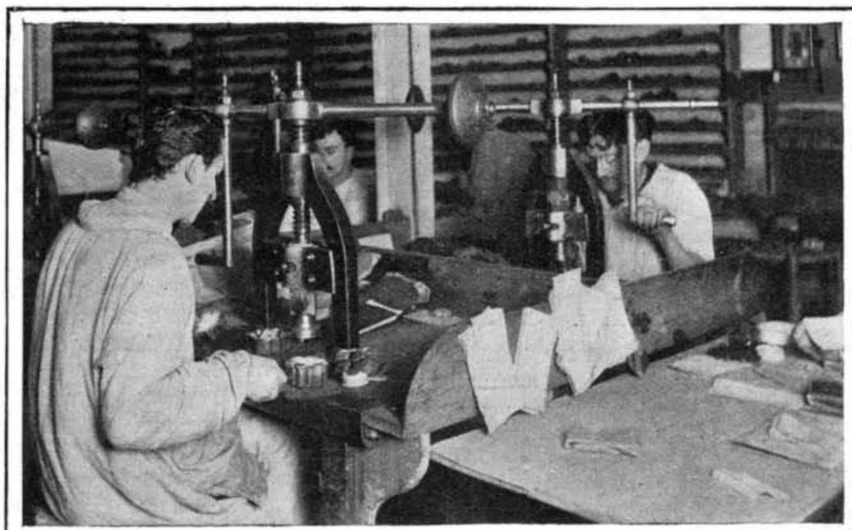
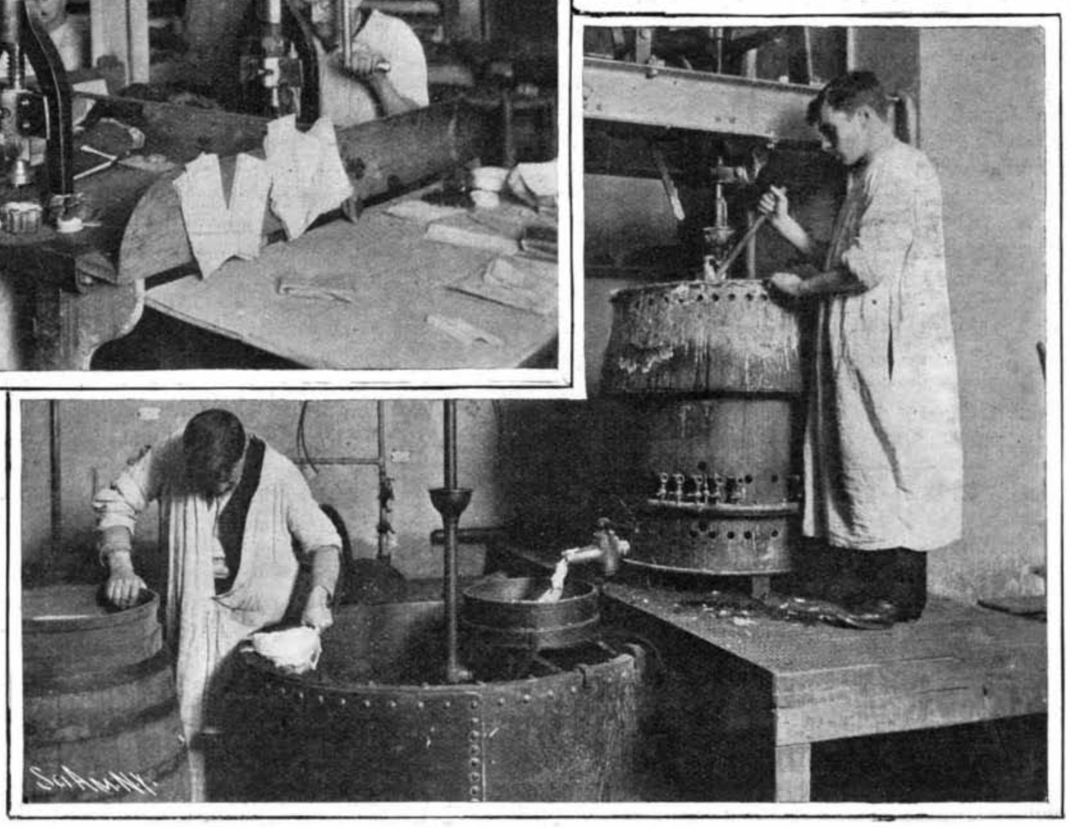
MAKING ARTIFICIAL FLOWERS.

BY JACQUES BOYER.

Artificial flowers and leaves are made of silk and cotton fabrics stiffened with starch paste which is prepared in the apparatus shown in one of the illustrations. From the upper tank, heated by gas, where the starch and water are mixed together the paste passes through a sieve to the lower tank where it is kept in continual agitation by a rotary stirrer and cooled by cold water circulating through pipes. From this tank the paste is dipped and poured through a second sieve into a cask. The fabric is plunged into the paste, wrung out, and stretched on wooden frames, the bars of which can be moved by screws to regulate the tension of the fabric, and the layer of paste is made uniform by parallel strokes in one direction with a broad, fan shaped brush. Here the fabric is allowed to dry and if it is to be used in making leaves or petals of uniform color, the proper pigment is applied with a brush. It then goes to the cutting room. The cutting is done, by hand or machine, with punches of a variety of forms, shown, arranged on trays, in one of the illustrations. The cutter sits on a stool before a great wooden cutting block covered by a cushion supporting a thick sheet of lead, on which from two to four thicknesses of the prepared fabric are laid. The punch is guided with the left hand and struck with a heavy mallet held in the right. The operation of cutting by machine is similar, except that the mallet is replaced by a vertical steel beam moved up and down by an eccentric. Girls then fasten to the cut-out leaves pieces of fine cotton-covered brass wire which give them stiffness and represent the leaf stalks. The veins and folds of the leaves are imitated by pressing the pieces forcibly, in a hand press worked by a vertical screw, between a copper plate engraved with a design in intaglio and an iron plate which bears the same design in relief, the two plates being hinged together to insure exact correspondence of the designs.



Stamping and Veining Machine.



Making Starch Paste.

On leaving this apparatus the artificial leaf is a pretty good imitation of its natural model but, like an oil painting, it needs a final operation—varnishing.

For this purpose the leaves are immersed in melted wax in basins heated by gas. A mere dip suffices for a small leaf, but a large one is rotated by rolling the stalk between the hands to assure contact of the wax with every part. The soft, velvety appearance which is characteristic of the leaves of some plants is obtained by dusting the waxed and re-heated leaf with fine starch, equalizing the coating with a soft brush and removing the excess of starch with a coarser brush.

Striped leaves are imitated by means of stencils, the colors being applied with a brush. Irregular markings are imitated by free-hand painting. The large leaves of *Sedum* and other *Crassulaceæ* receive one or more coats of colored starch paste before being varnished. The edges of the leaves of rosemary, etc., are curled with hot pincers. Finally, the leaf stalk is usually covered with silk paper.

Stems composed of fabric are made by a machine in which three ribbons cut bias are unrolled from bobbins and pass through spiral metal tubes heated by gas which cause them to curl like shavings, and form little tubes which preserve their shape even when reeled. Stems are also made of India-rubber tubes. These are painted green and after drying are tinted brown on one side by a spray of color from a vaporizer, which gives them a very lifelike appearance. Even the thorns of roses, and acacias are sometimes imitated in sheet rubber cut out with a punch. In copying an entire shrub, such as the lilac herewith illustrated, the skeleton of the trunk and branches is wrapped with strips of suitable fabric which are then colored by hand before the leaves and flowers are attached. For the imitation of heather a machine has been invented which cuts a ribbon into very narrow strips which remain attached to each other at their bases. When these ribbons are wrapped around brass wires the irregular fringe thus formed imitates natural heather to perfection.

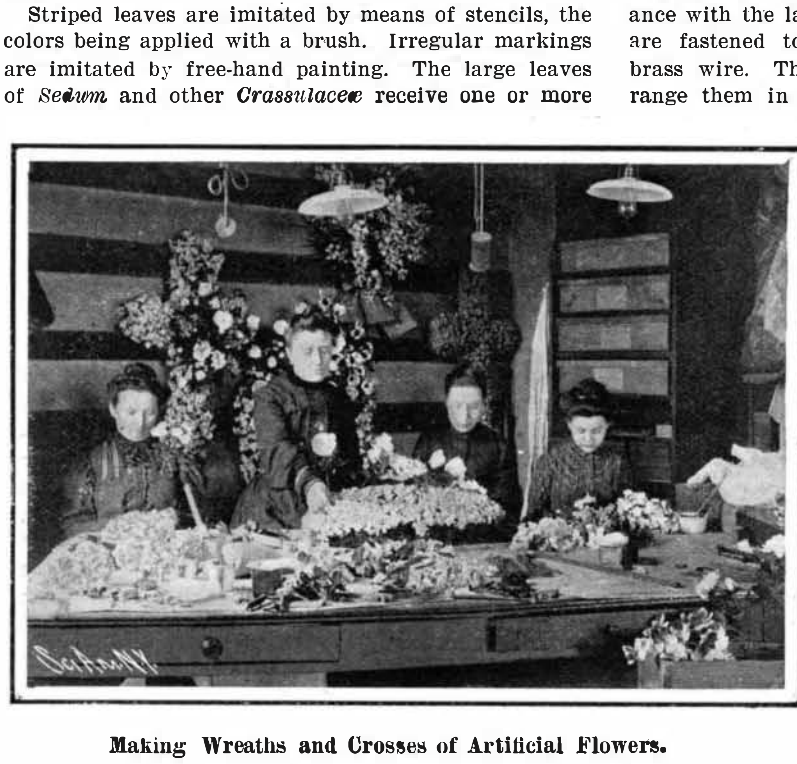
The manufacture of petals differs from that of leaves. Petals are colored by hand and are shaped, curled, and fluted by means of pincers and little balls of metal manipulated by skillful workwomen, who quickly impress the variety of nature on a mass of previously identical petals. Other women, equally adroit, sit at tables strewn with petals, calyxes, pistils, and stamens, which they rapidly assemble in accordance with the laws of botany. The parts of the flower are fastened together by wrapping them with fine brass wire. The flowers then go to women who arrange them in bouquets, baskets, wreaths, and more elaborate pieces. The artificial flowers made in Paris are celebrated throughout the world despite the competition of the flower makers of England, Germany, Belgium, Italy, the United States, and Brazil.

Drainage of the Florida Everglades.

The land known as the Florida Everglades has been of historical interest since the seven year Seminole Indian war, which ended in 1842, during which time a meager knowledge of that peculiar area was obtained and later published in various brief reports. Its reclamation for farming purposes has generally been regarded as impossible, or at least so visionary as to merit no attention until recently. The preliminary work for its drainage, inaugurated by the State in 1906, is sharply criticised in many quarters and bitterly opposed in others. There is no question but that this area occupies a most unique position among the various drainage projects now receiving attention in various parts of the country. It is a swamp plain extending from the south shore of Lake Okeechobee to the south boundary of the State, 5,000 square miles in extent and covered with saw grass of extraordinary height, relieved by scattered hillocks which are covered with pine, palmetto, and various subtropical bushes. This plain is covered with water to various depths during the entire year.

Whenever the question of the agricultural possibilities of the Everglades is raised, several problems present themselves for solution. One is the removal of the excess of water, which makes this the largest swamp area of the country. Not only is there an annual rainfall of 60 inches to be considered, but water is also contributed by the overflow of Lake Okeechobee, which receives the drainage of not less than 5,000 square miles from the northern portion of the State, and has only one small relief channel, the Caloosahatchee River, which discharges westerly into the Gulf. This being inadequate, the lake spills over on the glade lands lying at the south.

The depth and structural character of the soil has not been determined nor studied closely. The Disston sugar plantation, established several years ago north of Lake Okeechobee but now abandoned, demonstrated that the muck soil in that locality when drained produced sugar cane of superior quality and quantity. The stability of artificial drainage channels in this territory, the control of the water level in soils of a muck or peat character, and the amount of shrinkage likely to take place where drainage is accomplished, are yet subjects of speculation. Those glade lands whose producing properties have been tested are confined to the little glade openings at the border of the great swamp, which are not muck lands, and in this



Making Wreaths and Crosses of Artificial Flowers.

Varnishing Leaves.

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respect are wholly dissimilar to those in the interior, as far as examinations have disclosed their character.

While the State Drainage Board of Florida has begun to dredge the channel from the head of New River at Fort Lauderdale, on the east coast, northeasterly to the southern border of Lake Okeechobee—the first move made toward the drainage of any considerable portion of the Everglades—these and other undetermined matters essential to the ultimate success of this vast reclamation project still confront the State and other owners of land to be affected. The State Board, appreciating this state of affairs, has through the governor asked that the U. S. Department of Agriculture, through irrigation and drainage investigations of the Office of Experiment Stations, make the matter a subject of special investigation and report.

A preliminary examination of the Everglades was made by Mr. J. O. Wright, drainage engineer of the Office of Experiment Stations, followed by a conference with the governor and a number of members of Congress of Florida, which resulted in the Office of Experiment Stations undertaking an investigation, which includes the running of a line of levels from the west to the east side of the Glades, something never heretofore attempted. This survey was begun at Fort Myers in January last. It is in charge of Mr. John T. Stewart, assisted by Lawrence Brett, drainage engineers of the Office of Experiment Stations. These engineers have a corps of assistants equipped for making all the necessary engineering and physical examinations. The line of levels, which starts at tide water at Fort Myers, will be carried across the State, connecting the surface of Lake Okeechobee and the upper part of the Everglades with tide water at the east coast. Examinations will be made of the physical structure and depths of muck or other material overlying the rocks which is said to constitute the substrata of the entire area.

This preliminary examination relating to the agricultural possibilities of the historical Everglades includes not only instrumental engineering, but problems in drainage construction and consideration of the subsequent behavior and value of the soil for productive uses. The examinations will be made with a view to determining the most feasible and practicable plan for draining the whole or a part of the Everglades, in which will also be taken into account their probable agricultural value when drained. If the land can be successfully reclaimed, its value will be measured largely by the staple subtropical crops that may be produced and exported. It is expected that the investigations already begun will be continued until some definite conclusions have been reached upon all of the doubtful and undetermined factors pertaining to the drainage of the Florida Everglades.

Building a Tree.

Cutting Out Leaves and Petals with Hand Punches.

Preparation of a Moth-Exterminating Powder.

The following recipe for preparing a moth-exterminating powder called "Antimothine" is given by the Pharmazeutische Zeitung of Berlin: 500 parts by weight of finely-sifted sawdust are thoroughly mixed with 5 parts of powdered ammonium carbonate, prepared with oil of lavender. To this 10 parts of glacial acetic acid, mixed with 10 parts of water, are added and mixed until the effervescence, caused by the acetic acid, has ceased. By this treatment, the sawdust is made ready for the admixture of further ingredients. A second mixture is then prepared as follows: 500 parts by weight of finely-sifted sawdust are mixed with 20 parts of glacial acetic acid, diluted with 20 parts of water, 15 parts of spirits of wine, in which 5 parts of camphor have been dissolved, and 10 parts of American turpentine oil. This second mixture is then added to the first, and 40 parts by weight of ammonium carbonate prepared with oil of lavender added to the whole. The mass is left to dry in a well-closed receiver.

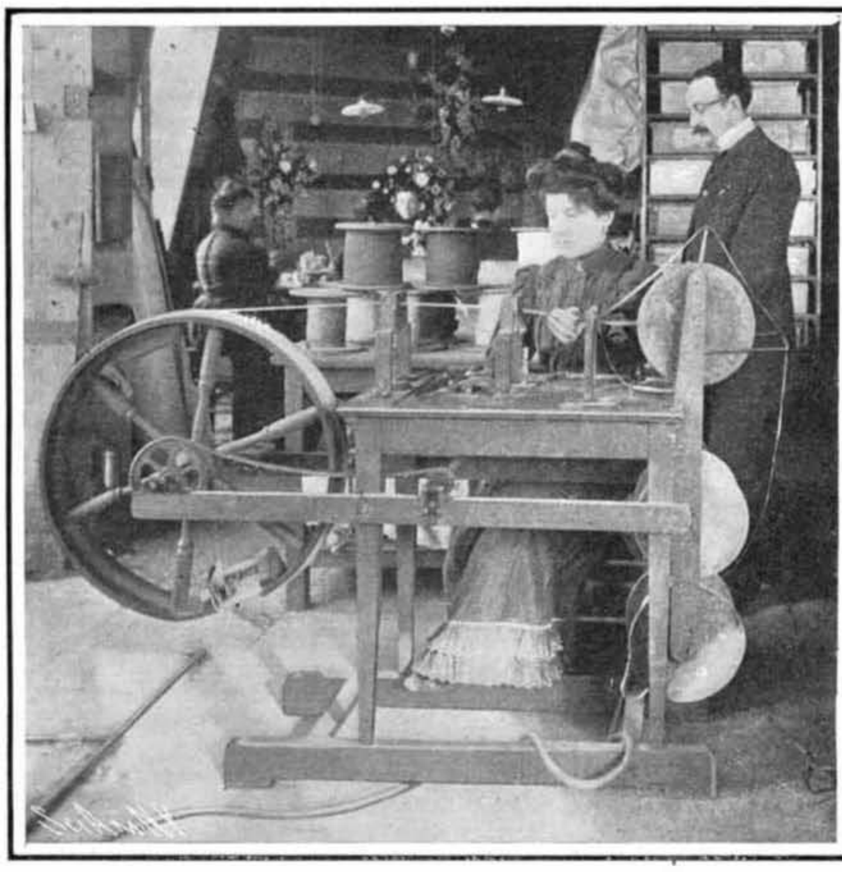
When required for use, the powder is scattered in rooms or receptacles containing the articles which are to be protected from moths, the articles being either suspended over it or laid in it. The powder may, however, be strewn over the objects in the usual manner, without the latter suffering any injury. Owing to the fact that the active constituents are contained in the vehicle (cellulose) in a finely-divided state, their action is certain and lasting; moreover, an agreeable smell, injurious to moths, is developed by the ammonium carbonate prepared with the oil of lavender.

Other suitable substances capable of absorbing the active constituents, such as infusorial earth, sponge, etc., may be used instead of sawdust, as they are more or less substitutes for cellulose.—Neueste Erfindungen und Erfahrungen.

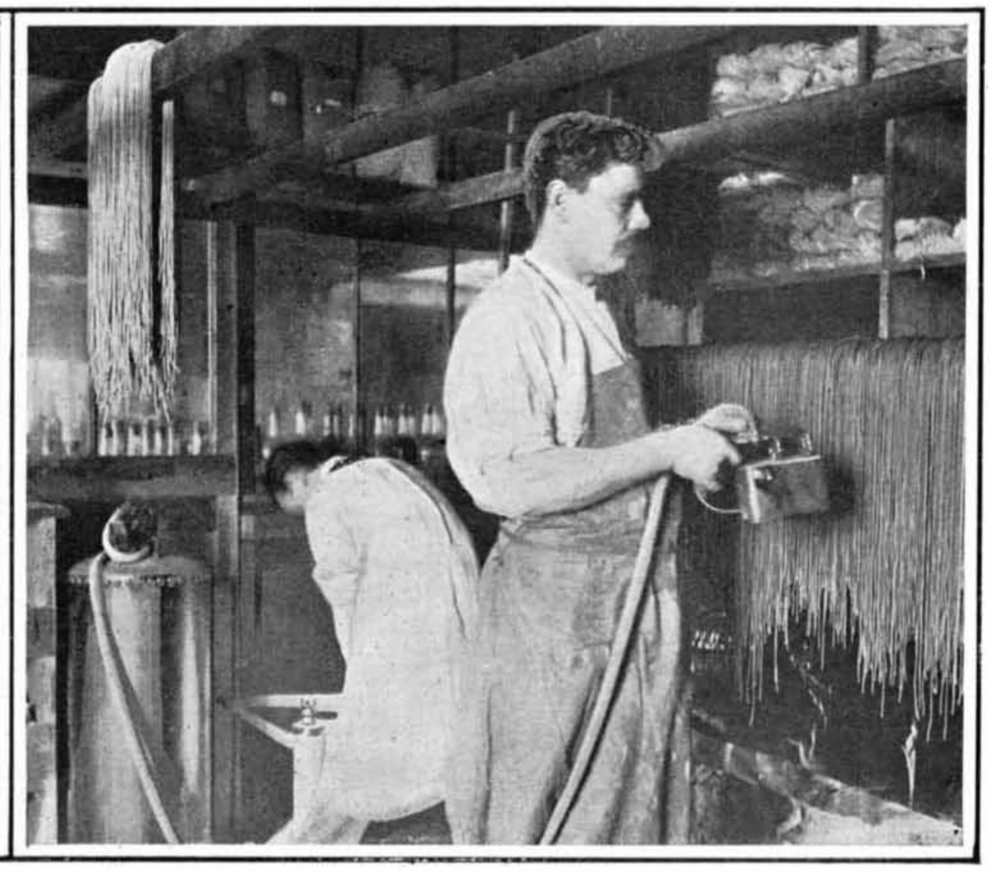
The Size of the Atom.

John A. Brashear, in an address delivered at Lehigh University a short while ago, gave what seems to be a new illustration of the minuteness of the atom. Quoting Lord Kelvin's saying that: "If we raise a drop of water to the size of the earth and raise the atom in the same proportion, then it will be some place between the size of a marble and a cricket ball," Mr. Brashear then said:

If you fill a tiny vessel one centimeter cube with hydrogen corpuscles, you can place therein, in round numbers, five hundred and twenty-five octillions (525,000,000,000,000,000,000,000,000,000) of them. If these corpuscles are allowed to run out of the vessel at the



Making Stems of Cloth.



Spraying India Rubber Stems with Brown Pigment.

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rate of one thousand per second it will require seventeen quintillions (17,000,000,000,000,000,000) of years to empty it. Such a computation seems almost like trifling with science, indeed apparently trifling with the human intellect; but it is with these subtle theories that our physicists are wrestling, delving into the innermost chamber of the infinitely minute, to build for us, upon the most stable foundation, the macrocosm of a universe.

Immigration Increasing.

During the fiscal year ended June 30, 1906, a record was established in the matter of immigrants who entered the ports, eclipsing all former years. During that period no less than 1,166,353 aliens were admitted, of whom 1,100,735 were immigrants. The increase over 1905 was 106,598. During the year 1905 11,480 aliens were rejected, and in 1906, 12,432. Of the immigrants, 764,463 were males and 336,272 females.

Most noticeable is the increase in the percentage of immigrants from the countries of southern Europe, and the decrease from those countries from which the United States in former years received most of her future citizens. During 1906 those countries of northern Europe whose people and ideas are very similar to our own furnished but few immigrants. Of these, there were from Ireland, 17,950; England, 15,218; Sweden, 3,281; Germany, 3,010; Denmark, 1,229, and Scotland 1,111 less than in 1905. On the other hand, from Italy came 5,165; Russia, 30,768; Greece, 8,974, and Turkey 5,165 more than in the previous year.

The immigration from Austria-Hungary amounted to 265,138; Italy, including Sicily and Sardinia, 273,120; Russia and Finland, 215,665; China, 1,544; Japan, 13,835; the West Indies, 13,656.

The large amount of emigration from southern Europe is due to the very general unrest existing among the laboring classes of those countries, and a very reprehensible activity on the part of agents of transportation companies, who, in order to secure passengers for their respective lines, are often guilty of gross misrepresentations of conditions and advantages in the United States, represented as a land of boundless plenty for all. The mental and physical grade of the immigrants now entering the United States is said by the Commissioner-General of Immigration to be much lower than in former years.

Of the immigration of 1906, the North Atlantic and North Central States received 90 per cent of the total, and the South 4 per cent. The bulk of the immigrants avowed their intention of locating permanently in the larger centers of population, 374,708 declaring New York State to be their destination, 198,681 asserting that they were going to Pennsylvania, 86,539 to Illinois, and 73,863 to Massachusetts.

Number of Motor Cars in France.

The number of motor cars in France which paid the tax in 1905 was 21,523, with an aggregate of 179,361 horse-power. Of the total, 45,346 horse-power belonged to the Department of the Seine, the number of cars being 4,627, or an average of nearly 10 horse-power per vehicle. In the remaining departments the number of motor cars was 16,896, with a total of 134,015 horse-power, or an average of about 8 horse-power.

The Porquerolles wireless telegraph station regularly receives messages sent from Land's End; and now space telegraphy has been accomplished over a far greater distance. Quite lately a communication transmitted from the Eiffel Tower was recorded at the Biserte station, which is not laid out for long distances; and the circumstance was considered sufficiently interesting to be telegraphed to the ministers.

HOW TO STUDY A STAR MAP.

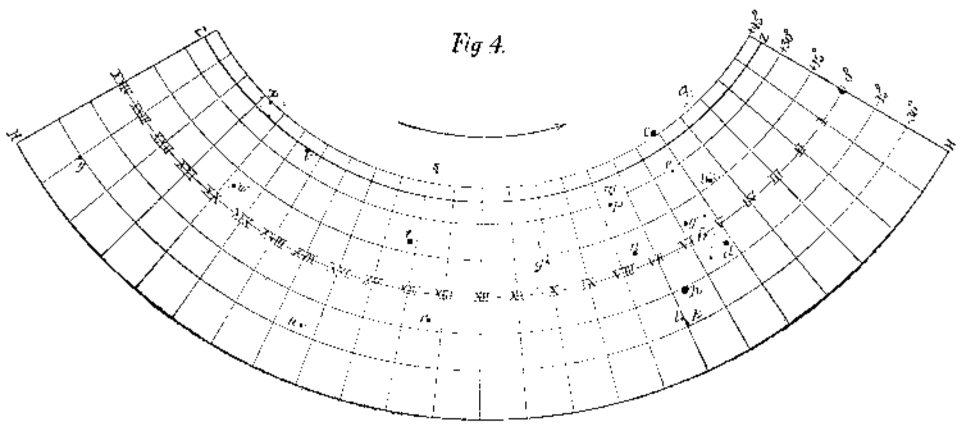
BY FREDERIC R. HONEY, TRINITY COLLEGE, HARTFORD.

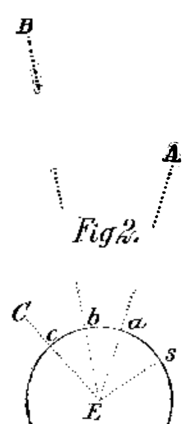
The following plan of a study of the heavens is offered for the assistance of the non-professional student, who finds his chief difficulty in the constantly changing positions of the stars from day to day; an apparent but not real change, due to the revolution of the earth round the sun.

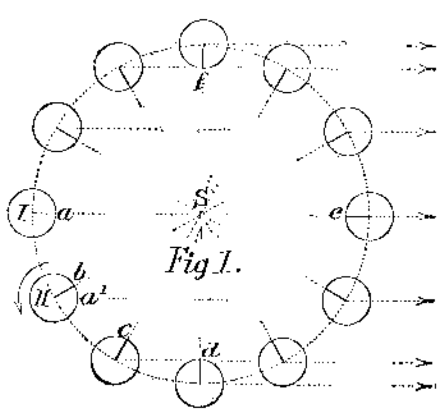
Omitting a very small fraction, the length of the year is 365¼ days. During this period the earth rotates on its axis 366¼ times; i. e., the year is composed of this number of sidereal days, or the same star comes to the meridian this number of times, while the sun crosses it only 365¼ times.

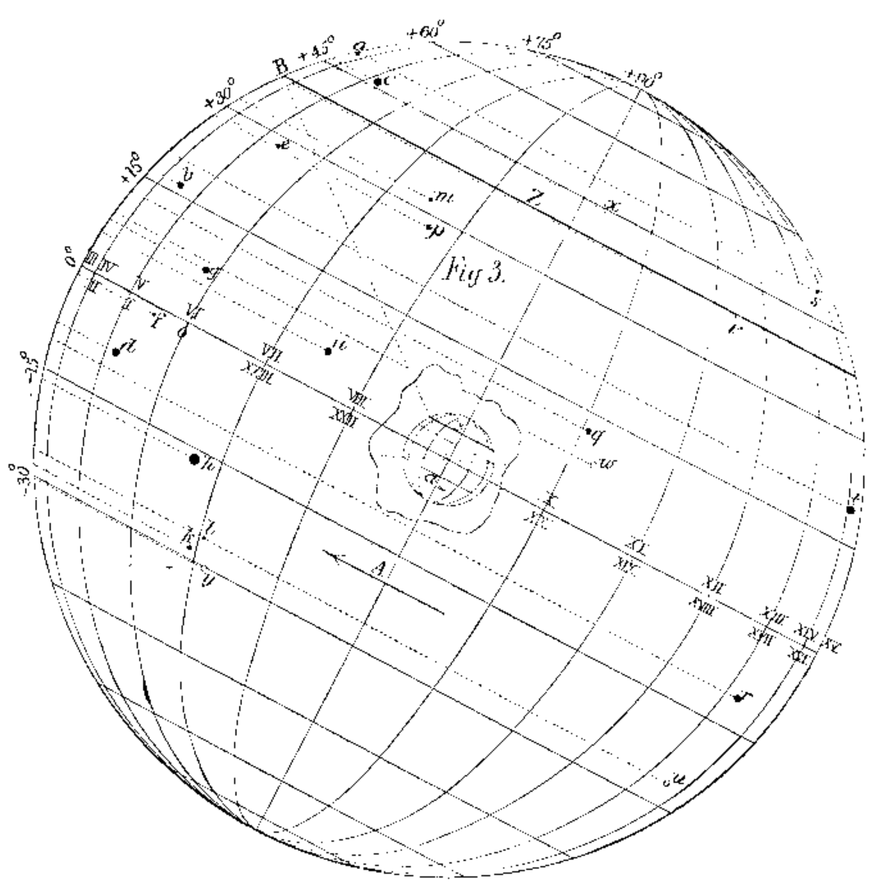
This will be made clear by the following illustration: If the earth's orbit were a circle, its axis perpendicular to the plane of the ecliptic; and if it revolved at a uniform rate, Fig. 1 would represent it in twelve positions, with the understanding that the earth's diameter is enormously exaggerated to make the illustration clear.

Assuming the length of the year to be 360 days, each month having 30 days, the earth in the figure is represented at intervals of one month. While it is moving from position *I* to *II*, i. e., through 30 deg. of its orbit, it must rotate on its axis this number of degrees (from *a'* to *b*) in addition to the thirty rotations it performs during the month to bring the sun *S* on the meridian.









HOW TO STUDY A STAR MAP.

The earth each day rotates on its axis 361 deg.; therefore in 360 days it rotates 360 × 361 deg., and 360 × 361 deg. ÷ 360 deg. = 361 rotations during the year.

A star is always seen in directions indicated by the arrows, i. e., along lines which are practically parallel. If the reader will follow the earth in its consecutive positions, he will see that a star comes to the meridian at intervals of exactly one rotation of the earth, while the sun reaches it 1/360 of a rotation later.

During one complete revolution of the earth round the sun, i. e., after 360 solar days, the earth will have made relative to the stars (360 × 1/360) = 1 rotation more than the number of days indicates. The fact that the solar year is composed of 366¼ sidereal days does not complicate the discussion.

If this were all, it is evident that each solar day the earth would rotate a little less than 361 deg. But the earth's orbit is an ellipse of small eccentricity, and while its axis moves parallel to itself it is inclined at an angle of about 23½ deg. to the vertical—a consideration of which would involve the subject of the "equation of time," a discussion which is outside the scope of this article.

The other point to which attention is called is illustrated in Fig. 2. The differences between the distances of the stars need not distract the attention of the observer of the heavens. For the purposes of observation they may be regarded as situated upon the internal surface of a sphere whose diameter compared with that of the earth is so great that the latter may be represented by the point *E*.

Let *s* represent the nearest fixed star. A circle described with *Es* as a radius represents the "celestial sphere," upon whose surface all the stars may be considered to be located.

Thus a star, *A*, is represented at *a*; *B* at *b*; and *C* at *c*.

The positions of a few of the bright stars are indicated in Fig. 3, which shows the celestial sphere with meridians or "hour circles" traced upon its surface, and "parallels of declination" at intervals of 15 deg. The earth is shown within it very much enlarged. In the drawing it would shrink to a mere point if it were drawn to the same scale as the celestial sphere. The parallel represented by the heavy line *z* is that of Washington. The radial line produced to intersect the celestial sphere determines the position of the zenith of Washington; and the parallel of declination represented by the heavy line *Z* may be called the zenith-parallel of Washington; i. e., as the earth rotates on its axis, each point of this parallel becomes in succession the zenith.

The earth rotates in the direction of the arrow *a*, while the celestial sphere remains stationary. It is convenient, however, to regard the earth as stationary, and to consider that the celestial sphere revolves in the opposite direction, viz., that of the arrow *A*.

If the reader will consider that when his body is erect it forms a continuation of the earth's radius, he will realize that the point *B* is directly overhead, or his zenith. If he will turn his back to the Pole star and look directly south, he will be in a position to observe the majority of the stars which are labeled and indicated in the figure, and whose names—which may be found in the Nautical Almanac—are given in the table below.

The celestial equator, whose plane coincides with that of the earth, is divided into twenty-four equal parts numbered from 0 to XXIV. The numbering 0 begins on the far side or invisible surface of the celestial sphere, and the numbers I and II. are also invisible in the drawing.

The visible divisions are from III to XV; they are then continued on the invisible surface until XXIV or the 0 point is again reached. This arrangement of the drawing has been made to bring as large a number of bright stars as possible on the surface of the visible portion of the celestial sphere. They are represented by small black circles.

Those which are on the far or invisible side are represented by small open circles. By this arrangement seventeen of twenty-two bright stars are black, and the remaining five are open circles.

The "right ascension" of a star is the hour angle indicated by the Roman numerals on the celestial equator, and the "declination" the number of degrees measured on the hour circle which passes through its right ascension point; i. e., right ascension may be regarded as celestial longitude, and declination as celestial latitude.

For example, the declination of every point of the heavy line *Z*—the zenith-parallel of Washington—is 38 deg. 55 min. 14 sec., and the heavy line *z* is the parallel of Washington whose latitude is also 38 deg.