

WORLD'S FAIR NOTES.

(Continued from page 115.)

The landscape gardening in the Exposition grounds is very grand. The park stretches along the southern shore of Lake Michigan and for about a mile there is a graceful curve with a low sloping beach upon which the waves splash, usually with the gentleness of a land-locked arm of the sea, but during a storm with a vigor that approaches that of the ocean itself. A broad promenade follows along the edge of the beach, giving a beautiful view of the lake and the many buildings that face it. Two canals extend from the lake into the center of the Exposition grounds, giving outlets to the waterways called the lagoons and the Basin with their connecting canal. These waterways, especially the lagoons, are superb. I am told these are not natural, but that they were dredged out and the earth taken from them used to raise the foundations of the Exposition buildings above the line of the swamp of which this park consisted before the Exposition was located here. The banks of the lagoons are lined with foliage, all aquatic shrubs indigenous to northern Illinois being transplanted.

In the center of the lagoons is what is called the Wooded Island. This is the garden spot of the grounds. It comprises about ten acres and is laid out with winding paths. Nearly all of its area is given over to the exhibits of flowers and flowering shrubs and foliage plants. The Basin is a body of water of considerable size walled in on all sides by walls of staff resembling marble, and surrounded by the noblest of the Exposition buildings. In fact, the region about this Basin is called the Court of Honor; here the illuminating in the evening is done, and in this vicinity are located the grandest works of sculpture and architecture.

The collection of old watches in the Swiss section of the Manufactures building is very curious, as it shows the gradual advancement of the science and art of horology from the clumsy affairs of former centuries to the life matchless timepieces of to-day. The oldest watch on exhibition bears the date 1074 of the Hegira, the watch being of Arabian workmanship. The watch has a hammered bronze case, which covers works of oriental simplicity. The hand marked the hours on a dial inscribed with Arabian numerals. A "Nuremberg egg," dated 1550, is shown, as well as a watch which dates from the time of the French revolution. The dial divides the day into ten hours and each hour into 100 minutes, according to a decree of the National Convention, which ordered that the decimal system be used for all measures. Some watches are shown which were made by the great-grandfather of Jean Jacques Rousseau. A wooden watch made by a Siberian convict attracts many visitors. The workmanship was so marvelous that such a workman could not be lost to art, and he was pardoned. Some of the modern watches are wonderful. Watches for rings, bracelets, etc., are shown mounted and unmounted. A spring in the back of a small beetle opens, displaying a tiny watch.

The lighting of the Ferris Wheel is effected by means of 1,400 electrical lamps.

A model of St. Peter's, at Rome, is exhibited near the Ferris Wheel, in the Midway Plaisance, by L. De B. Spindor. The model is 30 feet long, 15 feet wide, and about 15 feet high. Two men in front of the building, dressed in the orthodox uniforms of the Swiss guards of the Vatican, bid for custom with trombones. The model is made of wood, and is covered with a kind of varnish or stucco, which imitates stone. Various other models are included in the exhibit, as the Milan Cathedral, St. Agnes' Church, at Rome, the Piombino Palace, etc.

A gigantic flagstone is exhibited from Colorado. The stone is 25 feet long, 8 feet wide, and 10 inches thick.

A writer in the *Century Magazine* gives the following advice to visitors: Take a day first to satisfy your curiosity, to gratify your sense of wonderment and your love of beauty, to get your bearings and discover how much exertion you can support. Go all over the Fair grounds, and to the top of at least one of the big domes or towers. See the Fair, as a Fair, from its various centers and from different parts of its circumference, especially from the lake. I think you can do this in one or two days, if you start early and end late, if you are strong, and if you have yourself conveyed by all the available means of conveyance—encircling railways, boats, and rolling chairs—and if you do not step inside a single building except for the ascent in search of your bird's eye view. Then go home, stay in bed the following day, if you are wise, and the next day spread the wings and stiffen the spine of your conscience, and go in search of the things you have come to study—steam boilers or roses, fishes or stuffed birds, needle work or statistics of idiot asylums, methods of slaughtering men or cattle, or of preserving human life or edible fruits. Stay at this task until you have finished it, or until it has exhausted your powers of application. Then release and relax yourself. Go to see something else—palms if you have been studying plows, pictures if you have been studying electric motors.

THE WORLD'S COLUMBIAN EXPOSITION—A VIEW IN COLUMBIAN AVENUE, PALACE OF MANUFACTURES AND LIBERAL ARTS.

The Manufactures building is at once the wonder and the glory of the Fair. This huge structure, which is rectangular in form, measuring 1,687 by 787 feet, was designed by Mr. Geo. B. Post, of New York, and the great fabric abundantly testifies to Mr. Post's ability as an engineer as well as an architect. The Manufactures building is said to be the largest roofed building ever constructed, and some idea of its magnitude may be obtained when it is stated that the total floor space of both the main floor and gallery is forty-four acres. The Palace of Mechanic Arts at the Paris Exposition of 1889 could be placed inside the Manufactures building without touching any portion of the walls or roof, even with the Eiffel Tower laid flat on top. Seventeen million feet of lumber entered into the construction of the building, as well as 12,000,000 pounds of steel and five car loads of nails. The amount of staff used on the exterior could not be easily calculated. The total cost was \$1,700,000, and this cost would be entirely paid up if the building could be filled with an audience at \$5.65 a head, for the building would seat 300,000 people or three and three quarter times the seating capacity of the coliseum at Rome.

The exterior of the building is plain, which adds to its effect of grandeur. Decoration is entirely subservient to construction, and decoration is shown chiefly in the eight entrances, over each of which is a small dome, decorated by a celebrated American artist. All effects of color are obtained by flags and pennants on the roof. Crossing the bridge by the Electricity building, the main entrance is reached. There is really no difference in the entrances, but the one through which the greatest number of people enter the building, is called the main entrance. Passing under the beautifully decorated dome, the visitor enters the great building and in a moment stands in Columbian Avenue, the main thoroughfare through the building. Standing at the south entrance and looking north the effect is grand. On each side rise the exhibits of foreign nations, which in many cases come from thousands and even tens of thousands of miles. In the distance the clock tower breaks the seemingly endless vista. Overhead the huge trusses show the skeleton which forms the backbone of the building. Suspended from the roof are great coronas of arc lights, which alternate with huge flags.

At the left of our illustration will be seen the pavilion of a sister republic—Switzerland. The collection of watches in the Swiss section is very wonderful, and some of the tiny examples of the horologists' art seem almost too small to keep time. Directly beyond the Swiss pavilion rises the lofty tower of the Danish section. The exhibit of Denmark, and in fact all of the northern countries, is very creditable. A narrow aisle separates Denmark from Canada and Great Britain. Just beyond the clock tower will be noticed the obelisks surmounting the pavilion of Austria. At the right of the cut, near the bottom, is the section of Norway, which is admirably filled with the products of the land of the midnight sun.

Beyond the Norwegian section is the carved wood pavilion of Russia, which contains marvelous works executed in silver, malachite, rhodonite, and lapis lazuli. This section was opened by a mitred bishop of the Greek Church, with all the pomp and ceremony of the Greek ritual. The Belgium pavilion is beyond the Russian section, and beyond this again is the very ornate facade of the French section. The entrance to the French section is very imposing, and is justly admired. The column with the ball on the top, just beyond the clock tower, is the beginning of the United States section, the column being directly above the exhibit of Messrs. Tiffany.

Queen of the Evening Sky.

Venus, after an absence of nearly a year, has again made her appearance as an evening star, and may now be seen for a short time in the early evening in the west. She will continue to adorn the western skies during the remainder of the year, growing brighter and brighter, and not reaching her greatest brilliancy until the 6th of January next.

As Vesper, the evening star *par excellence*, this brilliant planet, which Homer, ages ago, apostrophized in words indorsed by all succeeding generations as "the most beautiful star that stands in the heavens," is always a welcome visitor and an object of keen interest for every one whose eyes are open to the beauties of the starry firmament. As a "naked eye" object, it stands without a rival. Even Jupiter, the giant of the solar system, and Sirius, the giant among the fixed stars, pale before Venus when at her brightest.

One would suppose that Venus would form a splendid object for a telescope. On the contrary, it is one of the most difficult objects in the heavens to see satisfactorily with this instrument. Its dazzling light brings out all the defects of a telescope, and, being low in the heavens after dark, it is always more or less tremulous. The best telescopic views of Venus are obtained in broad daylight, when it is high above the horizon. All astro-

nomical studies of it are made at that time. Thus viewed, with its strong light subdued by the glare of the day and posed upon a background of blue sky, it is indeed a beautiful object, resembling the moon seen under the same conditions, but free from the dark blotches that disfigure that luminary.

Venus has no markings distinguishable with a small telescope. It is interesting mainly for its changing phases. Being an "inferior" planet, and passing at times between us and the sun, it goes through the same changes of aspect as are familiar in the monthly changes of the moon, with the important difference that, being when "full" nearly seven times as far away as when in its most slender crescent phase, it undergoes a corresponding change in apparent size.

As it appears now, having but just emerged from behind the sun, it is nearly full. On December 6 it will be at its greatest apparent distance from the sun, and on January 6 it will have attained its greatest brilliancy. After this last date it will draw rapidly toward the sun, and its crescent will grow more and more slender until it becomes invisible, except through the largest telescopes.—*Phila. Record*.

An Invention Wanted.

United States Consul Edward Bedloe, writing from Amoy, China, to the State Department, says:

A fortune lies in store for the man who will discover some process for cheaply making wood proof against white ants. These pests are the curse of existence in Amoy and every other tropical or sub-tropical city. Their voracity is incredible. They ate the framework of a new door in this consulate in three weeks. In the same period they almost consumed a large and handsome cabinet in the court room and a heavy pinsettee in the anteroom. Their work is invisible. They attack the wood from a mere point, through which they bore to the interior and there eat everything until only a shell or film remains. Wood which will successfully resist these insect pests must be thoroughly charged with some powerful chemical, both poisonous and non-evaporable. A solution of corrosive sublimate, chloride of zinc, arsenic, or antimony would seem to meet the want. But how to force these into the fibers until the latter are saturated, and to do so at a merely fractional cost of the wood itself, is the problem that confronts the inventor. The American genius is so prolific in invention and discovery that I feel assured the problem will be satisfactorily solved.

The Comet through Lick Lens.

Director Holden, of the Lick Observatory, has presented the *San Francisco Examiner* with an exact reproduction of a photograph made with the Lick telescope by Professor W. J. Hussey, of the comet now attracting attention in the northwestern sky. The plate was exposed from 9:10 to 10:20 on the evening of Thursday, July 13. The picture is intensely interesting.

It shows, says the journal mentioned, "what was doubtless the earliest apparition of the 'secondary' comet. In the tail of the great comet is to be plainly discerned the nucleus of an 'auxiliary' comet forming, just as the Holmes comet was seen to divide into separate components when Barnard photographed that very interesting object last November. Usually comets have been supposed to divide at the nucleus through some force not thoroughly understood, as in the case of the celebrated comet of Biela, or again when Sawerthal's comet of 1888 exhibited no less than three distinct nuclei. But with the Holmes comet, and that now under observation, the separation seems to be effected in the tail of the comet. It would certainly seem, from these photographs, that the tail of the comet must be composed of solid particles, else how could a secondary comet be formed from it?"

There is no record in all astronomical history of one comet within the tail of another. As yet there is not enough of data obtained to determine whether the comets have the same or different rates of speed, or whether they are near to or remote from each other. It may be that the "secondary" was formed out of the brighter comet, either through some internal disruptive action, or as the result of the more or less intimate contact with some other celestial vagrant like itself. Of course, comets have been known to dissolve. Some also have been observed to break up; but the parts have never been seen to present the like apparent relative positions as in the present instance. Theories to account for the phenomenon may be imagined in any number; but there are not enough of well-ascertained facts to sustain a single plausible one of them.

Large Guns for the Navy.

The experience of Great Britain and Italy has not tended to predispose our authorities in favor of exceptionally heavy ordnance. The 110 ton guns have been removed from Italian ships. The war vessels *Indiana*, *Massachusetts*, and *Oregon* are each to be supplied with four 13 inch pieces. They are nearly 40 feet in length. The diameter at the breech is somewhat over 4 feet and at the muzzle 21 inches. These guns throw a projectile of 1,100 pounds, with 550 pounds of powder as a charge.

An Anti-Smoke Law.

The legislature of Massachusetts, at its last session, enacted the following law relating to the prevention of smoke:

"In cities of over 800,000 inhabitants, no person shall, after the first day of July, in the year 1893, use bituminous coal for the purpose of making steam in boilers in any building, unless the furnace in which said coal is burned is so built, managed, arranged, or equipped that at least 75 per cent of the smoke from said coal is consumed or otherwise prevented from entering the atmosphere, the degree of suppression being determined by the quantity of such smoke emitted, as shown by the density and color of the issuing smoke, and the length of time which it is visible, the maximum standard of comparison being a continuous discharge of dense, dark smoke during the time the furnace is in active operation."

MILL ENGINES.

The illustration represents a pair of high-pressure non-condensing reversing mill engines, as constructed by Galloways, Limited, Manchester, for Messrs. Leach, Flower & Co., of the Melyn Tin Plate Works, Briton Ferry, and shown in the *Engineer*. These engines

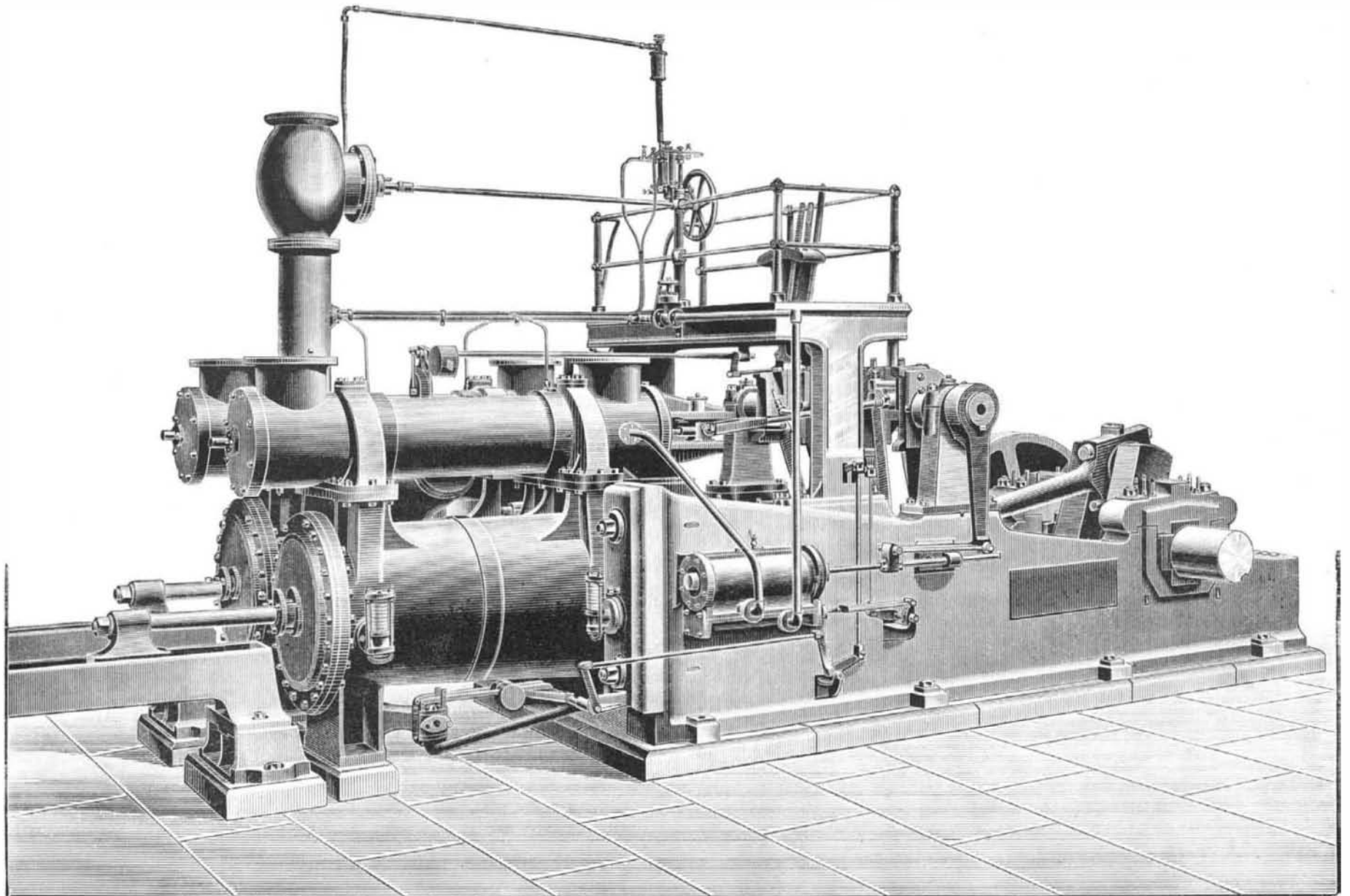
Volatility of Metals.

Interesting experiments with the electric furnace, says *Nature*, described by M. Moissan in the current number of the *Comptes Rendus*. By attaching to the furnace a condensing tube of copper shaped like the letter U, and so constructed as to be surrounded by an outer jacket of cold water constantly changing under high pressure, M. Moissan has been enabled to distill and condense most of the elements which have hitherto been found so refractory. When a piece of metallic copper, weighing over a hundred grammes, was placed in the inner crucible of the furnace and subjected to the arc furnished by a current of 350 amperes, brilliant flames shot forth from the apertures through which the carbon terminals were inserted. The flames were accompanied by copious yellow fumes, due to the combustion of the issuing vapor of copper in contact with the oxygen of the air. After the expiration of five minutes nearly thirty grammes of copper had been volatilized. Under the cover of the furnace an annular deposit of globules of metallic copper was found, and upon examination of the condensing tube a large proportion of the volatilized copper was discovered condensed in almost a pure state.

It has long been known that silver is volatile; it is

limite of a deep purple color. Manganese is remarkably volatile. A quantity of the metal weighing four hundred grammes entirely volatilizes in ten minutes. Iron is likewise readily distilled, and is deposited in the form of a gray powder, among which are interspersed numerous small particles exhibiting brilliant surfaces.

Not only are the metals capable of distillation at the temperature of the electric arc. Silicon rapidly volatilizes and condenses in the copper condensing tube in minute spheres and dust. Carbon becomes almost immediately converted to graphite, which distills over into the condenser and deposits in the form of light semi-transparent plates, which by transmitted light exhibit a beautiful chestnut color. Distilled carbon would thus appear to consist of the fourth variety of the element recently described by M. Berthelot. The refractory alkaline earths appear also to be capable of distillation in the electric furnace. The experiment succeeds best, however, with a more powerful arc. Employing an arc furnished by a current of a thousand amperes, M. Moissan has distilled one hundred grammes of lime in five minutes, the vapor condensing in the copper tube like fine flour. Magnesia passes over somewhat more slowly than lime, but its distillation is one



ROLLING MILL ENGINES, MELYN TIN PLATE WORKS.

embody the results of the very large experience which the makers have had in supplying machinery for the tin plate trade and rolling mill purposes generally. The engines in question have cylinders 40 in. bore and 4 ft. 6 in. stroke, the main shaft has a single-sweep crank for one cylinder, the other cylinder being connected to a crank pin secured in a disk at the end of the shaft, this disk being arranged to balance the connecting rods of both engines, as well as the sweep crank, so constituting a very simple and efficient form of connection to the mill. The valve gear, as will be seen, is on Joy's system, which lends itself admirably to the type of engine here illustrated. The platform is so arranged that the man handling the engine looks direct to the rolls, and has under his immediate control the reversing gear, steam stop valve, regulating valve, waste water valves, and the lubrication of the steam cylinders.

Natural Water Pipes.

A curious phenomenon has been discovered near Eddy, New Mexico. In Dark Canyon, about three miles from Eddy, a number of tunnels were run in order to tap streams of water to get a supply for the waterworks. The water was found running in small natural pipes, made by the deposit of lime from the water. The whole space cut by the tunnels was found to be perforated with these lime pipes.

now found that at the temperature of an arc of the above description silver may be brought to full ebullition in a few moments, and it distills with ease, condensing in the copper condenser in the form of globules, whose size varies from that of small shot to spherules of microscopic dimensions, and a certain proportion is usually deposited in the form of arborescent fragments. Platinum fuses in a few minutes, and very soon after commences to volatilize, and condenses in the U-tube in brilliant little spheres and fine dust. Aluminum distills very readily, and condenses in the form of a gray powder, containing admixed spherules exhibiting brilliant metallic luster. Tin likewise distills with facility, and the condensed product usually contains a considerable proportion of a curious fibrous variety of the metal. The distillation of gold in the electric furnace is particularly interesting. Abundant fumes of a light yellowish-green color are emitted at the electrode apertures, and the metal is deposited in the condenser in the form of a powder, exhibiting a beautiful purple sheen. The powder consists of minute regular spheres, which, when examined under the microscope, appear to reflect the usual yellow color of gold. Upon the under side of the cover of the furnace three distinct annular deposits are observed, the inner one consisting of yellow globules of considerable size, round which is a metallic deposit of smaller spheres of such a size as to reflect a bright red tint, and outside this is an annular sub-

of the prettiest of these remarkable experiments, the tints assumed by the escaping fumes and the brilliance of the incandescent vapor being particularly striking.

Illustrations of the electric furnace and other interesting particulars will be found in the *SCIENTIFIC AMERICAN* for May 13, 1893, and in our *SUPPLEMENT*, Nos. 896, 901, 904, 905.

A Locust Year.

The Department of Agriculture has sent out circulars making inquiries over a wide extent of territory regarding the "seventeen-year locusts," which have made an appearance this year in eight States of the Union. The object of the department is to ascertain accurately the limits of the areas occupied by the insects. There are twenty-two known broods of them, and they turn up in different years in various parts of the country. Though to some extent the infested territories overlap, each brood comes out of the ground only once in seventeen years. Strictly speaking, the insects are not locusts, but cicada. Some years ago it was sought to introduce these insects as an article of diet; but the experiments in that direction did not promise success. Clearing of land has done much to diminish the number of these creatures; but their most destructive foe is the English sparrow, which drops every other kind of food and feeds on them exclusively when it has the opportunity.