ASPECTS OF THE PLANETS FOR FEBRUARY.

VENUS

is morning star, and stands first on the February list, not only because she crowns "the smiling morn with her bright circlet," but also for the incidents she contributes to diversify the planetary history of the month. On the 16th, at 2 o'clock in the morning, she reaches her greatest western elongation. She is then 46° 52′ west of the sun, and, bound to him by an invisible chain, can go no farther. The inner or inferior planets move in this way, oscillating in straight lines east and west of the sun. It is easy to keep the run of these movements, especially in the case of Venus. Those who were eye-witnesses of the transit have a tangible standpoint from which to commence observation, and can readily follow the planet's path until in September she reaches superior conjunction with the sun, and is hidden from view in his radiant beams. Half of her synodic period is completed, as well as her role of morning star. She then passes to the sun's eastern side, becomes evening star, and repeats the same phases in reversed order until she again reaches inferior conjunction. Her whole course is then completed, that is, as she appears to move when viewed from the earth, and she begins over again her unswerving routine among the stars. Thus, on the 6th of December, Venus passed between the earth and the sun, the passage being witnessed by millions of observers. Since that time, she has been moving westward from the sun, rising earlier every morning, passing her period of greatest brilliancy, and turning, like the new moon, more of her illumined face toward the earth.

On the 16th, a change occurs. She reaches her extreme western limit, ceases her retrograde or backward motion, and becomes stationary for a time, as she is traveling directly from us. She then takes on her direct motion, making her way back toward the sun. Observers who watch her course will see that from inferior conjunction to western elongation she rises earlier every morning, and moves with rapid pace. After elongation, she rises later every morning, and moves more slowly, until, at superior conjunction, she rises and sets with the sun.

Seen in the telescope, Venus retains the crescent form until elongation, when she takes on the beautiful phase of a half-moon. After that, she appears in gibbous form until superior conjunction, when her whole disk is illumined like the full moon. She would then be a glorious object in our sky, but she dwindles to small proportions on account of her great distance. For she is one hundred and sixty million miles away, instead of twenty-five million miles, her least distance, and her apparent diameter is 10″ instead of 64″.

On the 20th, at 5 o'clock in the morning, Venus is in conjunction with the small star, Pi Sagittarii, passing 1° 30′ north. The right ascension of Venus on the 1st is 17 h. 49 m., her declination is 19° 10′ south, her diameter is 29·8″, and her place is in Sagittarius.

Venus rises about eight minutes after 4 o'clock in the morning; at the end of the month she rises at a quarter after 4 o'clock.

MARS

is morning star, and gets up a small incident to enliven his monotonous way. He is in conjunction with swift footed Mercury on the 13th, at 6 o'clock in the morning, being 4° 23′ south. The conjunction ranks among invisible phenomena, both planets being too near the sun to be seen. But none the less surely does it take place, for in the risings and settings, the meetings and partings of the planets, there is no change, no shadow of a turning from the accurate calculations that astronomers are able to make for years ahead.

The right ascension of Mars is 20 h. 4 m., his declination is 21° 21′ south, and his place is in Capricornus.

Mars rises now about half past 6 o'clock in the morning; at the end of the month he rises a few minutes before 6 o'clock.

URANUS

is morning star, and is fast approaching the point where he is in the most favorable condition for being seen with the naked eye. He is on the border land between Leo and Virgo. Those who have small telescopes will easily pick him up by sweeping the sky in the vicinity, for he will show a pale sea green disk as soon as he comes into the field of vision, entirely different from the twinkling points around him. Denebola is the nearest bright star in his vicinity, several degrees north.

The right ascension of Uranus is 11 h. 34 m., his declination is 3° 35′ north, his diameter is 3·8″

Uranus rises about half past 8 o'clock in the evening; at the end of the month he rises about a quarter before 7 o'clock.

MERCURY

is evening star until the 5th, and morning star the rest of the month. On the 5th, at 6 o'clock in the evening, he is in inferior conjunction, passing between the earth and sun. If he were then at or near one of his nodes, he would make a transit precisely as Venus did on the 6th of December. As he will not reach his descending node until twenty-three days later, he will pass above the sun and the passage will be invisible. Mercury will not make a transit until the 9th of May, 1891. Transits of Mercury, though much more frequent, are considered of far less importance than those of Venus. Mercury looks much smaller than his fair neighbor as he makes his way over the sun's face, and can never be seen with the naked eye in transit. After inferior conjunction, Mercury passes to the sun's western side, and becomes morning star. The last week in the month, he may be seen rising an hour before the sun, four degrees north of the sunrise point. His conjunction with Mars on the 13th has been referred to.

The right ascension of Mercury is 21 h. 31 m., his declination is 11° 37′ south, his diameter is 9·8″, and his place is in Capricornus.

Mercury sets a few minutes after 6 o'clock in the evening; at the end of the month he rises about half past 5 o'clock in the morning.

JUPITER

is evening star, and ranks *facile princeps* among the three thousand stars that are visible at one time on exceptionally clear nights to observers blessed with good eyes, well trained to note the stars. Nothing on starry pages now open before us is more beautiful than the view he presents through nearly the entire night, as he leads the glittering host of twinkling mysteries from east to west in the grand procession of the azure vault of the sky. He was brighter at perihelion in 1880, but he never was more beautiful, and never trod the heavens with more regal step than he has done and will do in the first two months of the present year.

The right ascension of Jupiter is 5 h. 23 m., his declination is 22° 57′ north, his diameter is 42·4″, and his place is in Taurus.

Jupiter sets about 4 o'clock in the morning; at the end of the month he sets about a quarter after 2 o'clock.

SATURN

is evening star, and, though still a lovely object in the heavens, glowing with soft, serene light, is perceptibly decreasing in size and luster as he travels from the earth and approaches the sun. This is not strange, for on the 8th, at 6 o'clock in the morning, he arrives at quadrature, being just half way on his course from opposition to conjunction. He is then 90° from the sun, rises about noon, and sets about midnight. His motion during the month is direct, and he is traveling northward.

The right ascension of Saturn is 3 h. 10 m., his declination is 15° 32′ north, his diameter is 17·4″, and his place is near the border line between Aries and Taurus.

Saturn sets at a quarter after 1 o'clock in the morning; at the end of the month he sets at forty-nine minutes after 11 o'clock in the evening.

NEPTUNE

is evening star, and reaches quadrature on the 4th, at 11 o'clock in the evening, four days before Saturn and under similar conditions. He is still very near Saturn, there being only thirteen minutes' difference in the time of transit. Neptune will be of little account until September, except to follow in the mind's eye his unseen course in the heavens. Discovered in 1846, he will not complete a revolution round the sun since he became a known member of the solar brotherhood until 2011, seven years after the next transit of Venus.

The right ascension of Neptune is 2 h. 56 m., and his declination is 14° 57′ north.

Neptune sets at 1 o'clock in the morning; at the end of the month he sets about a quarter after 11 o'clock in the evening.

THE MOON.

The February moon fulls on the 21st, at thirty-four minutes after 7 o'clock in the evening. She appears in only three phases during the shortest month of the year—as new moon, at her first quarter, and as full moon. The waning moon is near Venus on the 4th, the crescent and the morning star being only one degree apart. On the 6th she is near Mars, and on the 7th she is near Mercury. On the 13th she is near Neptune and Saturn. On the 16th she passes at her nearest point to Jupiter, and on the 23d she is near Uranus.

When the moon is in conjunction with a planet, she is in the same right ascension or longitude, though she may be several degrees north or south of the planet. As the moon moves eastward at the average rate of 13° a day, she must, during a revolution, pass near all the planets, in the order of their position in regard to the sun. Thus the old moon, fulfilling her course for the present month, passes near the morning stars—Venus, Mars, and Mercury—on the sun's western side. The new moon of the 7th, in the same way, is near the evening stars—Neptune, Saturn, and Jupiter—on the sun's eastern side, and completes the list by her conjunction with Uranus two days after the full. The various phases and motions of the moon form an astronomical study as easily understood and plain to the unassisted eye as it is varied and interesting.

UTILIZATION OF ANTS IN HORTICULTURE.

BY PROF. C. V. RILEY.

Rev. Dr. H. C. McCook has published in the "Proc. Ac. Nat. Sc., Phil.," 1882, pp 263–271, a most interesting paper on "Ants as Beneficial Insecticides.' He was led to discuss the question by an article from Dr. C. J. Magowan, which appeared in the *North China Herald* of April 4, 1882, and of which I published a short abstract in *Nature* of June 8, 1882. It appears that in parts of southern China the custom has long prevailed of using ants as a means of protecting the orange trees from the ravages of certain worms. For this purpose the orange growers import from the neighboring hills two species of ants which construct bag-like nests suspended from the branches of various trees. These ants are trapped by means of pig or goat bladders baited inside with lard and applied with their orifices to the entrance of the ants' nest. When the ants have entered the bladders, they can easily be transported and colonized on the orange trees. Bamboo rods are then stretched between the different trees, so as to give the ants easy access to the whole orchard.

Speaking first of the advantage which plants derive from the domiciliated habits of ants, Dr. McCook first raises the question as to whether the known domicile habits of ants are favorable to their encouragement by horticulturists, and brings together a number of interesting facts as to nest-building species. He enumerates the arboreal species which are known to science, and among the few that construct nests like the Chinese species, only two belong to the North American fauna, both occurring in Mexico. No mention is made, however, of the nest-like structures built by several ants occurring in the United States around twigs or among leaves. Mr. Walsh (*Practical Entomologist*, ii., p. 41) thus observed a species of *Myrmica* ("probably the *lineolata* of Say") building cases around the twigs of the red osier dogwood, and another undetermined species of *Formica* surrounding willow twigs with tent-like structures. Another undetermined species I find quite commonly making nest-like structures on blackberry bushes infested with the blackberry flea louse (*Psylla tripunctata*) and a pale aphid, which live in the crumpled leaves. While these structures may not be called perfect nests, and appear to be built mainly for the protection of aphides, still the fact that the ants are thus "domiciliated" bears on the subject here under consideration. Nor is any mention made by Mr. McCook of the *Azteka mirabilis*, Smith, perhaps the most striking instance on record of protection afforded to a tree by a species of ant domiciliated upon it, of which Dr. Fritz Muller has given us such a vivid picture in his paper, "Die Imbauba und ihre Beschutzer" (*vide Kosmos*, vol. iv., pp. 109–115). This species, already observed by Humboldt, inhabits the natural capacious cavities in the stems of the older imbauba or candelabra trees (*Cecropia*) in South America. Almost every full grown tree contains, according to Fritz Muller, its colony of azteka, and no such tree is ever known to be attacked by the formidable leaf cutting ant which likes to defoliate young imbaubas not yet inhabited by the azteka. Other enemies of young imbaubas, especially a weevil of the genus Baridius, are kept away from older trees by the aztekas, which derive from the tree shelter as well as nourishment, both without injury to the tree.

Dr. McCook further shows that ants are generally carnivorous; that there are species beneficial to agriculture, *e.g.*, the cotton ant, *Solenopsis xyloni*, McC.; and finally that there would be no serious obstacles in the way of successful introduction and colonization of the Chinese ants.

While I agree with these statements, and while I take it for granted that the Chinese arboreal ant is beneficial to orange culture in its native home, still, the question of its introduction is a more serious one than would appear at first glance. The introduction of any species of insect involves many consequences that cannot be predicted with certainty, as experience has already demonstrated. Not only does change of conditions often produce change in habit, but the introduction of a species sometimes very curiously affects the native species. There are species in which we cannot imagine that any change of habit would take place in consequence of their being transplanted to foreign countries, *e. g.*, hymenopterous parasites, and I would unhesitatingly favor their introduction. But in the case of a formicid it would be impossible to predict the consequences of its introduction. There is already one instance on record of an unforeseen inconvenience resulting from the introduction of an ant. A correspondent of *Nature* (June 15, 1882, pp. 159–160) calls attention to the following extract from Tennent's "Natural History of Ceylon," taken from the *Ceylon Observer* for April 26: "To check the ravages of the coffee bug (*Lecanium coffeæ*, Walker), which for some years past has devastated some of the plantations in Ceylon, the experiment was made of introducing the red ants, which feed greedily upon the coccus. But the remedy threatened to be attended with some inconvenience, for the Malabar coolies, with bare and oily skins, were so frequently and fiercely assaulted by the ants as to endanger their stay on the estates"

To return to the particular case of the proposed protection to our orange tree by the introduction of the Chinese ant, it is to be remarked that the principal enemies to that tree in our country are not "worms," but various species of scale insects, all other orange insects being of secondary importance. It has never been proved that ants prey upon and destroy scale insects, and for this simple reason the introduction of the Chinese ant would not be likely to produce any favorable results.

CUT OR UNCUT.

The appearance of the SCIENTIFIC AMERICAN is so much improved when delivered to subscribers with the leaves uncut that for the last two or three issues we have followed that mode of publication. The uncut form is also quite desirable for the neat binding of the paper. We have received, however, a few letters from subscribers and advertisers who say that they much prefer to have the edges of the paper trimmed, as heretofore, owing to its greater convenience. If there are others who share in this preference, we shall be glad if they will signify to us their wishes by a postal card. We should like to have as general an expression of the desires of our readers as possible; and if we find that any considerable number of them prefer to have the leaves cut, we shall try to accommodate them.

Vigilance Necessary in Building.

The difficulty of getting a house built to one's satisfaction is well illustrated in the experience of a Chicago gentleman, as related in the *Sanitary News*, who has just completed a comfortable home. He gave his architect most definite instructions, but he soon found that hardly anything was being done as he had directed. Nobody employed about the building seemed to manifest the slightest interest in his work, and bricks and boards were put together with the utmost disregard of the fitness of things. Lumber was wasted as though it were to be had for the handling. The gentleman came to the conclusion that it would be advisable to stay about the premises, and he did so most of the time, watching as many of the movements as he could. The result was that each day usually opened with tearing down or pulling apart the work of the day previous. For example, he thought he saw something wrong in the laying of the main drain for the sewerage. He reported to the architect, who was to be held responsible for defects. The workmen insisted that everything had been done just exactly as it should have been. The drains were dug up, nevertheless, and it was found that no connection had been made with the street sewer at all. The last section of the pipe had been too short by several inches, and to the crafty drain layer, who was interested in saving time and material, it was not considered necessary to lengthen it. The fresh air duct leading to the furnace had been ordered built of unusual capacity, for the reason that the owner wanted none of the common difficulty about getting sufficient air to ventilate as well as warm his house. He watched the work on this air duct very closely and was congratulating himself that it was well made, but, at last, discovered that the workman narrowed the inlet by drawing in each succeeding course of bricks as he neared the top. When remonstrated with, he said he thought he was doing the proper thing, as the duct wouldn't let in so much cold air if smaller. So in everything done about the house—the workmen had no more conception of the purpose which a healthy, comfortable, and convenient house was to serve than the tools which they used. By hiring an architect to watch them, and then watching the architect himself, he succeeded at length in getting a house in which he takes some pride; but it was at the expense of extra funds, much valuable time, and patient waiting.

The Lay Torpedo.

Colonel Lay has recently submitted his torpedo to a severe test in the Bosphorus by discharging it over a course of a mile at a target only 60 feet long. The path of the projectile was crossed by three distinct currents, of which two flowed slowly upward, and one strongly downward. In addition to this the sea was very lumpy, especially at the junctions of the currents. Yet in spite of the difficulties of the course, the torpedo was steered without trouble through the space separating the boats which represented the target, and after passing them was caused to turn round and return to the spot where the examining committee, among whom were Woods Bey, and Frost, Hassan, and Hobart Pachas, was stationed. In the Lay torpedo the steering is effected by electricity transmitted through a cable, carried in the body of the torpedo and paid out as it runs. Thus the line does not require to be dragged along, and forms no hinderance, either to the speed or the manipulation of the projectile. The course is followed by means of two small sight rods, which project above the surface of the water, and can be seen for a mile or so by aid of a good glass. These are the only parts of the apparatus that are visible when the torpedo is in motion. At rest it projects about an inch above the surface, but immediately it starts it buries itself completely, and if the sight rods be lost it is difficult to again find them. At night the rods carry lamps that direct the light backward, and are invisible to the enemy. The torpedo experimented upon is not of the latest pattern; it is a cigar shaped boat 26 feet long, and 24 inches in diameter at the largest part, and weighs when fully prepared for action, with 90 pounds of dynamite, one and a half tons. In the more recent examples the speed has been increased to 12½ knots, and the disturbance of the water lessened by the use of twin propellers, while the change of explosive has been augmented to 150 pounds.

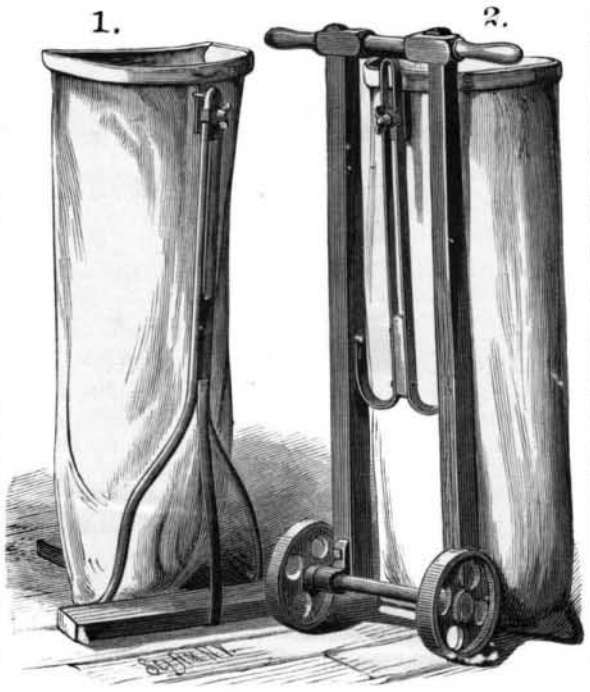
Engineering says that the results of the trial were so satisfactory that a contract was prepared between the Ottoman government and Messrs Lay and Nordenfelt. At the last moment, however, this fell through, owing to the request of the United States minister that no decision should be come to until the Berdan torpedo could he tried also. It is claimed for this latter that it will break through the steel wire netting that is used in the English navy, and which is believed both here and in Turkey to offer a good defence to both the Whitehead and the Lay torpedo.

According to the *Journul des Fabricants de Sucre*, the production of beet root sugar in Europe this year amounts to 1,920,000 tons, an increase of 137,500 tons over last year. Germany is still the greatest producer, heading the list with 675,000 tons; Austrian-Hungary ranks next with 450,000 tons; France third, with 410,000 tons; Polish Russia fourth, 275,000 tons.

NEW BAGHOLDER.

A convenient and inexpensive device for holding bags while being filled and for moving them about is shown in the engraving. The holder may be used separately or applied to the truck, or it may be attached to platform scales so that the bag can be filled and weighed at the same time. It can be readily attached and detached, and while it saves the labor and wages of one man it does the work better.

It is made entirely of wrought iron and is very light and readily managed. It is manufactured in various sizes to adapt it to bags in ordinary use. It is adjustable up and down on its support, and the hoop to which the bags are applied adapts itself to bags of various sizes. The construction will be readily understood by reference to the engraving. All thrashermen, millers, warehousemen, farmers,



BAG HOLDER AND BAG WAGON.

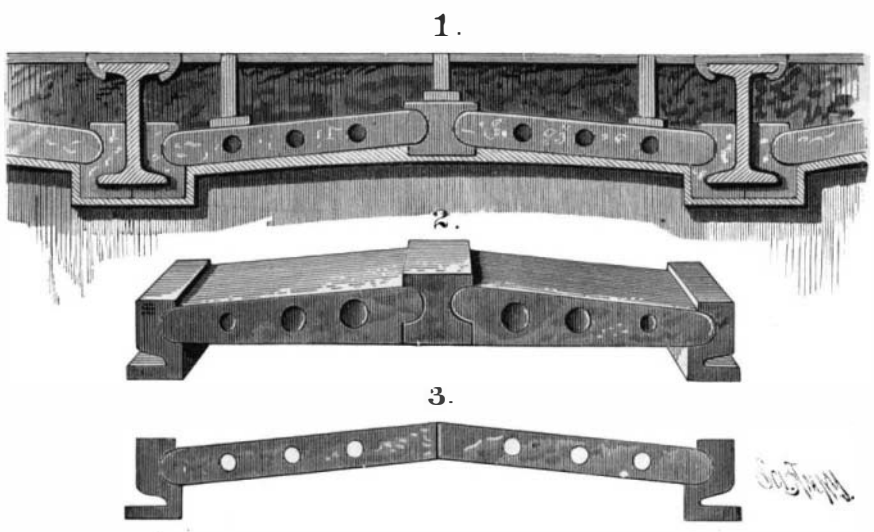
and others who have use for an article of this class will appreciate its advantages at a glance.

Further information in regard to this useful invention may be obtained by addressing the manufacturer, Mr. C. F. Dinkle, Carlisle, Pa.

NEW FIREPROOF FLOOR AND CEILING.

The frequent recurrence of disastrous fires in which scores and often hundreds of lives are sacrificed to improper construction and inflammable building material, demands the universal adoption of fireproof construction wherever there is the slightest question as to the safety of occupants.

Walls of brick, iron, or stone, beams of iron, and floors and ceilings of incombustible material are the usual elements of fireproof construction. While the walls and the beams are much the same in all fireproof structures, the filling between the beams differs. We give an engraving of one of the latest and best forms of filling, which consists of buttresses planted against the beams resting on the lower flanges and extending partly across the lower edge of the beam, and struts which with a central or key piece form a toggle arch between the beams. The engraving shows three forms of this filling. In Fig. 1 the struts are flat, with rounded ends fitting in corresponding bearings in the buttresses and in the key piece. The device shown in Fig. 2 is nearly the same, the only difference being the horizontal face on the under surface of the arch. Fig. 3 shows an arch in which the key is dispensed with, the struts abutting in the middle.



CAMPBELL'S FIREPROOF FLOOR AND CEILING.

The floor is laid on strips placed on the struts or buttress blocks and key, and the spaces between its strips and above the struts are filled with concrete. The under face of the arch is finished in any desirable way. The great advantage of this system is that the arch can be placed without the use of scaffold or stages of any kind, thus greatly cheapening the construction. A pair of buttresses and a pair of struts with the key are placed, then other buttresses are placed on the beams, and another pair of struts placed in position with their ends resting on the buttress and on the rebate and key projecting from the first pair of struts, the buttresses being arranged to break joints with the struts. Another pair of buttresses is now inserted, then another pair of struts placed, and so on. This filling adjusts itself automatically to its bearings, and is strong and well calculated to perfectly insulate one floor from the effects of heat in another. To make the filling as light as possible without impairing its strength, it is apertured lengthwise. This device is the invention of Mr. Andrew J. Campbell, of 552 to 558 W. 33d St., New York city.

Pure Bred, Thoroughbred, and Full Blood in Stock Raising.

The three principal designations of stock are: 1, pure bred; 2, thoroughbred; and 3, full blood.

1. A pure bred animal is one descended from a pure or original race without intermixture of other blood. The Devons are a pure race of cattle. The wild cattle of Chillingham may be called a pure race. The buffalo is a pure race. The true Arabian horse is a pure race. Wild animals are pure races.

2. A thoroughbred is an animal originally of mixed lineage, but which has been interbred so long without recourse to foreign sources that the progeny comes true, or nearly true, to the type established. The Short-horns and Herefords among cattle and the racers among horses arising from a mixed lineage are thoroughbreds. That they have not yet ceased the endeavor to improve these breeds, through the careful selection of sires and dams, always carefully within the line of the oldest and well defined blood of the varieties from which they originally sprang, is proof that breeders do not believe that their ultimate excellence has been reached.

3. The term full blood indicates neither purity of blood nor thorough breeding, except relatively. An animal of the common blood of a country may be bred indefinitely to a pure blood, and yet never reach purity. The first cross would be one-half blood; the second cross, three-quarters blood; the third cross, seven-eighths blood; the fourth cross, fifteen-sixteenths; the fifth, thirty-three thirty-fourths of the pure or the thoroughbred blood, if none other has been used in the cross. Yet the resulting progeny would always contain a fraction of the original or pure blood. Yet often seven-eighths, and especially those fifteen-sixteenths bred, show the characteristics to so great a degree that none but experts can distinguish from outward observation between the full blood and the pure or thoroughbred type. Hence seven-eighths or fifteen-sixteenths bred animals are by courtesy sometimes called full bloods.

A grade is an animal containing some pure or thoroughbred blood. A seven-eighths grade is sometimes called a high grade.—*Prairie Farmer.*

How the Pictures in the Louvre are Cleaned.

A correspondent of the Philadelphia *Evening Bulletin* has taken the pains to find out how the galleries and the pictures in the Louvre are kept clean. On Mondays the palace is closed; it is then that the weekly cleaning takes place. The first thing done is to cover the floor with damp sawdust to the depth of an inch or so. Oak sawdust is used for the boards, and elm dust for the marbles. This is allowed to remain some time and is then removed, and with it goes every particle of dust or dirt which may have adhered to the floor. Then the men buckle on to their feet large stiff brushes, and, armed with a stout stick, to one end of which is fastened a great piece of prepared beeswax, they first rub the floor with wax, then skate over it with their brushes, and finally give it the finishing polish with a great woolen cloth made expressly for this purpose. The same cloth is passed daily over the floor before the opening of the museum, which is all that is required until the following Monday. In this way no dust arises, and the pictures need rarely to be cleaned. When this becomes necessary, which happens about once in four or five years, the museum is closed for several days. No one is allowed to touch a picture unless the "Conservateur du Musee" be present. The pictures are taken down, and it is the "Conservateur" himself who places a thick sheet of clean wadding over the painting, pressing it down gently in such a way that every particle of dust adheres to the wadding. After this is done, a thin coat of oil or some mixture which replaces it is rubbed on, and the picture is not again touched until the next general house cleaning.

An Extensive Irrigating Project.

There has just been opened in the Punjab, India, the Sirhind Canal, one of the greatest works of the kind in the world. The canal is over 500 miles long, with subsidiary channels measuring some 2,000 miles more. The canal is designed to irrigate an area of over 1,200 square miles. It is fed by the Sutlej River, and great and numerous engineering difficulties were overcome in its construction. Three-quarters of a million acres will be brought under cultivation by means of this gigantic work.