THE SKY IN MAY.

BY GARRETT P. SERVISS.

During this month a splendid opportunity will be afforded for seeing the planet Mercury after sunset, an opportunity which no one should lose, because Mercury, on account of its proximity to the sun, is difficult to catch sight of except under very favorable conditions. It will be visible in the west all the month, but will be best seen about the middle, when it is at its greatest distance from the sun. It attains its greatest eastern elongation on the 16th, when it will be seen shining between the horns of Taurus, a few degrees south of the second magnitude star, β, or El Nath. With a telescope it will then appear in the form of a half moon. Although Mercury is probably at all times an exceedingly hot world on account of its nearness to the sun, yet its orbit is so eccentric that the solar light and heat received on its surface vary to an enormous extent, being more than twice as great at one time as at another, and passing from one extreme to the other in the short space of six weeks. At the time when Mercury is most conspicuous in the sunset sky, about the middle of May, it will be passing from perihelion, a point reached on the 25th of April, toward aphelion, which will be attained on the 8th of June.

While Mercury is on exhibition as an evening star, Venus, the typical evening star when it lies eastward from the sun, will remain inconspicuous in the morning sky, gradually drawing nearer to the sun, behind which it will pass early in July. At the beginning of the month Venus will be in Pisces; at the end in Taurus.

Mars is a morning star, moving slowly in the course of the month from Aquarius into Pisces, and at the close of the month it will rise about 1 o'clock in the morning.

Jupiter, remaining in Cancer, and slowly drawing nearer the "Beehive" cluster, will continue to be the most brilliant planet in sight throughout the month, and, in fact, throughout the early part of summer. Castor and Pollux in the Twins are so near the great planet that its presence serves to point out those famous stars to persons unfamiliar with the constellations. Being brighter than any fixed star, Jupiter ought to be readily identified, but there is an easy way for those who possess a strong field glass or spy glass to make the identification doubly sure. Such an instrument cannot fail to show one or more of Jupiter's moons, and, in favorable circumstances, all of the four principal moons.

Saturn, in the constellation Libra, rises early in the evening, and by 9 or 10 o'clock is in an excellent position for observation. Being in opposition to the sun, it is, roughly speaking, at its nearest point to the earth, and, consequently, most favorably situated for telescopic study. The earth is not quite so far north of the plane of the rings as it was at the end of winter, but the change is not sufficient to cause the rings to appear to the ordinary observer appreciably narrower, and, in fact, the whole planet, in all its dimensions, looks a trifle larger on account of its nearer approach.

Uranus is also in Libra, nearly between the fourth magnitude stars γ and ι. Coming into opposition on the 12th, it should be visible to the naked eye, but, in order to identify it, the observer should watch it with a field glass, and note its position from night to night in relation to small stars near it. For those who may wish to find it with the aid of a star atlas, I give its approximate right ascension and declination for the beginning, middle and end of the month: On May 1, R. A. 15 h. 22 m., Dec. S. 18° 14′; on May 15, R. A. 15 h. 20 m., Dec. S. 18° 6′; on May 31, R. A. 15 h. 17 m., Dec. S. 17° 56′.

Neptune is in Taurus and Mercury will be near it at the middle of May.

The new moon of May occurs on the afternoon of the 12th; first quarter on the morning of the 20th; full moon on the afternoon of the 26th, and last quarter (the last of the April moon) on the forenoon of the 4th. The moon is in perigee on the 24th and in apogee on the 8th.

The moon's monthly calls on the planets strung along the zodiac will take place as follows: Mars on the 7th; Venus on the 11th; Mercury on the 14th; Neptune on the 14th; Jupiter on the 18th; Saturn on the 25th; Uranus on the 25th.

A peculiarity of the starry heavens in the evenings of the month of May is that then the Galaxy, or Milky Way, lies stretched level upon the northern horizon, extending from Scorpio in the southeast around under the pole to Monoceros in west. In the city, or in any neighborhood where electric lights are clustered, of course this phenomenon is practically invisible, but it should be easily seen on a clear moonless night in the open country, unless hidden behind nearby hills.

For the benefit of those using small telescopes I append a few phenomena of Jupiter's satellites, and also of those five of Saturn's satellites which telescopes of moderate size may be expected to show.

On May 1, at 7:37 P. M., Satellite I will enter on the edge of the disk of Jupiter, and at 8:52 P. M. its shadow will follow it upon the disk. A little before 9:50 P. M. Satellite II will reappear from eclipse in Jupiter's shadow, and about seven minutes later Satellite I will pass off the disk, its shadow following it off at 11:12 P. M.

On May 8, at 9:33 P. M., Satellite I will enter upon the disk, and twenty-three minutes later the shadow of Satellite IV, which will have been crossing the disk since late in the afternoon, will pass off. At about 10:42 P. M. Satellite III will reappear from eclipse, having passed into Jupiter's shadow soon after seven o'clock in the evening. At 10:47 P. M. the shadow of Satellite I will enter upon the disk.

On May 15, at 9:46 P. M., Satellite II will disappear behind Jupiter, and nine minutes later Satellite III will reappear from behind the opposite edge of the planet. At 11:08 P. M. Satellite III will disappear in Jupiter's shadow.

In the following list the satellites of Saturn are mentioned in the order of their distance from the planet, beginning with the nearest of the five. The times are approximate: Tethys will be at its greatest eastern elongation on the 12th at 11:15 P. M., on the 14th at 8:30 P. M., on the 29th at 10:56 P. M., and on the 31st at 8:15 P. M. Dione will be at its greatest eastern elongation on the 2d at 9:50 P. M., and on the 13th at 8:30 P. M. Rhea will be at its greatest eastern elongation on the 14th at 8:15 P. M. and on the 23d at 8:50 P. M. Titan is so easily seen that it is hardly necessary to give its times of elongation. It will be east of the planet on the evening of the 2d, west of it on the evening of the 10th, and north of it on the evening of the 14th. Japetus will be near its western elongation, the position in which, owing to some peculiarity of its surface, it is best seen, during the first week of the month. It is just at the elongation point at five o'clock on the morning of the 4th of May.

Spontaneous Combustion.

BY G. D. HISCOX.

Although many of the mysterious fires attributed to spontaneous combustion may have originated in some other way, there can be no doubt, from the long record of facts, that a large proportion of such fires are really due to this cause.

The reduction of fire risks is a most important point of economy and of vital interest to many manufacturers, or others that make use of any material or stock that is liable to be made combustible by the application of oil of any kind for facilitating its manufacture. The first care is to guard against the accumulation of such material or stock while in an oily condition, in heaps or in contact with heating pipes, or even in iron receptacles, without providing against its accumulation of heat by its absorption of oxygen from the air. This may be done by spreading such stock so as to secure a cooling effect from an extended air contact and circulation.

In the case of oily waste and rags, especially with painters' rags, one of the most dangerous of this class, when allowed to accumulate, oily sawdust, or any vegetable or woody fiber used for cleaning machinery or the wiping up of waste oil, the only safety is found in its immediate immersion in water.

Oily waste and rags holding any of the lubricating compounds so much in use in engine rooms and on locomotives are perhaps the most dangerous materials to be cared for, but when thrown into out of the way places, they readily become the originators of mysterious fires.

We have often seen the results of throwing a handful of oily waste from a locomotive upon the ties or into the grass at the roadside, which, taking fire in an hour or two, has set fire to ties or grass. Perhaps not a few wooden railroad bridges have been mysteriously set on fire in this way. Journal drippings in flour mills and saw mills are no doubt the cause of many mill fires; started by the accumulation of flour dust or fine floating sawdust upon oily surfaces around journal boxes or where the drippings fall. Dust of any kind from fiber or wood as found in cotton and jute mills, woolen mills and woodworking factories becomes in this manner a source of danger.

The increasing use of cotton seed oil, and the fact that its properties are but little known by the users, is a new source of danger, and needs great caution in exposing it to the conditions favorable for spontaneous combustion.

Like linseed and other vegetable oils, the sprinkling of wool, jute, hemp or other fiber with cotton seed oil for the purpose of manufacture generates heat in the mass, and thus becomes a source of danger. Such material should never be allowed to lie in contact with steam or other heating pipes or surfaces, or to be heaped in large piles.

Sawdust should not be used for absorbing waste oil or drippings, unless it be immediately placed beyond harm by immersion in water or burning in a proper place. Sand is the safest material for such use.

Spontaneous combustion is not confined to oily mixtures alone, for water plays a most dangerous part when the proper conditions are present. Sawdust as packing in barrels and boxes becomes a most dangerous element of spontaneous combustion when by accident or neglect it becomes wet. Sawdust in boxes used for drying metal goods after washing is liable to take fire in a few hours. Spreading so that it may quickly dry is the only safe way of using such material. Empty ice houses have been burned by the spontaneous combustion of a heap of damp sawdust left in them. The careless neglect of removing sawdust from sawmills is a fruitful source of fire. Oil or water may be in contact with the dust and air finishes the work of ignition.

The mysterious fires in ships loaded with cotton are probably due to excessive moisture reaching the interior of the bales, or possibly to a bale that had been exposed to rain previous to stowage. The shipment of wet bales is a source of danger. Rags in bales on shipboard contain the elements of combustion in the coloring matter and the grease of cast-off clothing, and are in a ready condition for the reaction of the moist air in a ship's hold. They not only heat, but are in a condition for spontaneous combustion from any excess of moisture. The heating of and occasional fires in large heaps of bituminous coal is due to moisture or exposure to rain. Covering or forced ventilation is the usual remedy.

Fires originating near steam or hot air pipes have been attributed to the partial charring of the wood or fibrous dust by the heat, and its absorption of oxygen from the air. Starch is quickly affected by the heat of steam pipes, and paper holding a starchy constituent is known to become of the texture of punk when left in contact with or near steam pipes, and becomes very susceptible to ignition.

The explosive flash of the impalpable dust of coal, wood, flour and starch, when lodged on the framework of factories and warehouses, is known by sad experience. It only needs a spark or a lightning stroke for a quick-spreading fire. The electric spark from large running belts is a dangerous element in dusty mills.

The heating of hay and grain when stored in mows in a damp condition is well known, and in a few cases has been found to be the direct cause of fire. Probably many of the mysterious barn burnings are due to spontaneous combustion. Corn and other grain stored in large warehouse bins heats to a degree that requires constant aeration by changing its place by conveyors, or the injection and expansion of compressed air. Heating soon destroys the grain, and, if continued by neglect, it becomes liable to spontaneous combustion.

A Moving Mountain in France.

A phenomenon which, from its remarkable character, has attracted much attention in Europe, recently occurred in the department of Gard, France, where Mount Gouffre, a mass of rock 650 feet in height, suddenly gave way at its base and began moving toward Gardon River, upon the left bank of which it was situated. The movement began on the 15th of February, and on the 23d the advance had destroyed the machinery in the pits of the Grand 'Combe Colliery and nearly a mile of the Alais Railway, and had deflected the course of the Gardon 6½ feet. Six hundred persons were obliged to leave their homes at Grand 'Combe, and a water famine having been created, it became necessary to install an engine up stream to pump water from the river to supply the inhabitants of the mining center.

On the 29th the mountain came to a standstill, but it is believed by engineers that this state of rest will be but temporary, and that the rocky mass will resume its motion, cross the Gardon, and finally abut against the mountain that skirts the opposite side of the river. Should this occur, very important geological and topographical modifications will of course be made in the region and it will become necessary to prepare new channels for the Gardon and Gard rivers.

The cause of the accident is shown by the geological structure of the mountain, which consists of grit, green marl, limestone and triassic rocks resting upon a deep bed of clay. These different strata dip at considerable of an angle toward the Gardon. The mountain was therefore influenced by its own weight to follow the slope offered it by this inclined plane. The position was unstable and the danger imminent. Rain or the water of the Gardon must have infiltered and accumulated upon the stratum of impermeable clay, and such infiltrations will have disintegrated certain points of support of the mountain and led to its sliding, which was prepared for by the very arrangement of the ground. The noise made by the mass while it was moving is described as having been frightful.

THE GINGERBREAD TREE.—The Hyphæne thebaica, a species of palm 25 or 30 feet in height, growing in Egypt, Abyssinia, Nubia, and Arabia, produces its fruits in long clusters, each of which contains from one to two hundred. These fruits are of an irregular form, of a rich yellowish brown color, and are beautifully polished. In upper Egypt they form part of the food of the poorer classes of inhabitants, the part eaten being the fibrous, mealy husk, which tastes almost exactly like gingerbread, whence the popular name of gingerbread tree in Egypt.

A Great German Telescope.

The Berlin Industrial Exhibition opens May 1, 1896, and in connection with it the Astronomical Observatory of Grunewald will be transferred to Treptow near Berlin. One of the features of the exhibition will be photographs of old instruments, models of telescopes, reproductions of astronomical drawings and kindred subjects. As the largest refractor hitherto erected in Germany has only been one of 18 inches aperture. it is gratifying to note that one is now being constructed having an aperture of 28 inches.

The mounting is so arranged as to receive two objectives, of which one is designed for direct visual, the other for spectroscopic and photographic observations. For this reason the latter will be a double objective of short focal length, 20 to 23 feet, and large aperture, 43⅓ inches, which for the present will be exhibited in an unfinished condition, as the means for the purchase and polishing of the enormous lenses, which have been very successfully cast by Dr. Schott, can only be raised during the exhibition. The rough disks of glass for the lenses of the telescope have been furnished by Dr. Schott and Genossen of Jena, while the polishing has been executed by Messrs. C. A. Steinheil of Munich. The mounting of the instrument was intrusted to the Berlin Maschinenbau Anstalt C. Hoppe, "who was assisted" by the firm of G. Meissner, Berlin, in the execution of the minute mechanical portions. The other objective, on the contrary, is completed, and has an aperture of 27½ inches and a focal length of 68 feet.

Instead of the usual dome, the telescope is provided with a cylindrical protective envelope, which together with the tube is mounted on a rigid box, which can be rotated round the declination axis. The polar axis is placed in the interior of the pier; attached thereto, and therefore revolving round it, is a kind of bell, which incloses the observer's seat; the above mentioned box revolves with the bell round the polar axis. The observer sits in the prolongation of the polar axis, in such a manner that his head is in the turning point of the whole telescope, so that he can easily follow its movements by slightly turning his head. The counterpoises for the tube extend at either end of the box; besides which there is attached a second bell, which serves to relieve the polar axis, and for this purpose runs on two antifriction rollers fixed to the pier.

AN IMPROVED SORTING MACHINE.

The illustration represents a machine adapted to sort into different sizes not only potatoes and other vegetables and fruit, but a great variety of different substances, the size, strength and other details of the machine being varied accordingly. A patent was recently granted for the improvement to C. G. Poulson, Jr., deceased, of Linwood, Pa., of whose estate C. G. Poulson, Sr., is administrator. Within the box body of the machine is an inclined screening or separating table, mounted to have end motion, the table consisting of slats or bars, which are diamond-shaped in

POULSON'S POTATO SORTING MACHINE.

cross section, and wider apart at the tail than at the head of the table. Beneath the table are hoppers adapted to receive the different sized material passed through the bars at the narrower and wider spaces. The sorting table swings freely on hangers and is moved by turning a crank, on the shaft of which are cams, the table being moved against spiral springs which force the table against a buffer four times for each revolution of the crank shaft. Material shoveled into the machine at the top, as shown in the illustration, feeds automatically to the proper sized openings between the slats, when it instantly drops into the spouts, to be conveyed into bags or baskets, or any desired receptacle.

A SAFETY HAT FOR MINERS.

A hat designed to withstand blows of falling material, such as pieces of coal, rock, etc., and which is thoroughly ventilated and fits easily on the head of the wearer, is shown in the accompanying illustration, and has been patented by James McNamara and Frederick W. Peppler, of Calumet, Mich. The shell and brim of the hat are formed of a single piece of sheet metal, and inside the shell is a lining or inner

PEPPLER & McNAMARA'S MINER'S SAFETY HAT.

shell of suitable textile material, to the edge of which is attached a leather head band. The inner shell and band are somewhat smaller than the exterior shell, and air holes provide for a circulation of air. The band and inner shell are secured to the outer shell by a series of spring clips, the spring of which allows the band or lining to conform to the head. On the front of the hat is a socket plate to receive the hanger of a miner's lamp. The hat is very durable, is waterproof, will not absorb grease from candles or oil, and the lining may at any time be taken out without ripping or tearing it.

Practical Disinfection of Rooms.

The frequency with which second and third cases of scarlet fever appear in houses that have been disinfected by the inspectors of sanitary authorities, says the Lancet, causes grave doubts as to the efficiency of the procedure usually adopted, despite its official sanction. Stripping the walls, lime washing walls and ceilings, and scrubbing woodwork and floor boards with soap and water are indeed effectual enough, and to these when thoroughly done we are disposed to ascribe any successful results rather than to the more technical process of so-called disinfection by sulphur fumes, which is little better than a superstitious rite or incantation shorn of the religious character it had in the mind of Ulysses when he "fumigated" the halls desecrated by the massacre of his wife's suitors after removing the corpses and washing away the blood with a promptness that precluded all thought of other than moral pollution. But in the light of bacteriological experiments dry sulphurous acid fumes, whether generated by burning sulphur or carbonic sulphide, or, as has of late become the fashion, by opening cylinders of the compressed gas, are for all practical purposes useless. The gas would act as a fairly powerful germicide on articles or fabrics previously saturated with water, but its bleaching action precludes its employment in this way with colored materials, carpets, or curtains, and it is as what is called an "aerial disinfectant" that it holds its ground in popular esteem. But aerial disinfection is an absurdity; no one wants to purify the foul air, which is easily enough removed by simple ventilation. In disinfecting a room the true aim is to kill the germs contained in the dust on ledges or in the crevices between the boards, or adhering to the walls and other surfaces, and the dry gas is powerless for this, which is best attained by a sublimate solution of the strength of 1 part in 1,000, or by lime (not white) washing, provided the lime be fresh burnt and caustic; the carbonate or chalk used in whitewashing under the name of whiting, and into which lime is converted by long exposure to the air, being inert. The series of experiments on the infection and disinfection by various means of wall papers, distempers, and other wall surfaces conducted by Dr. Cronberg, under the direction of the late Prof. Uffelmann, at Rostock, showed that subsequent scrapings were invariably and almost instantaneously sterilized by washing or spraying with the sublimate solution, and equally so by lime wash after the lapse of twelve to twenty-four hours. The danger of corrosive sublimate is, we believe, exaggerated, for the smallest fatal dose for an adult being probably three to five grains—equal to at least a quarter of a pint of the solution—accidental poisoning with the solution is practically not probable, and as a further safeguard it might be colored with indigo or "laundry blue." Carbolic acid, which is sold without restraint and is in universal use, is more dangerous on that account, and is, indeed, frequently employed with suicidal intent and with fatal effects. In France, Germany, and Italy sublimate has nearly superseded all other disinfectants and its neglect in this country is inexplicable. As to carpets, curtains, bedding, and clothing, all that is capable of being washed should be plunged in a copper of boiling water for a quarter of an hour and such articles as would be spoiled by this treatment should be disinfected by steam.

How to Find Negatives.

Much time is lost and patience expended in what is very often a futile search for some particular negative. Perhaps an hour, or even more, is wasted by hunting through two or three hundred of one's photographic successes and failures. To obviate this expenditure of time, we would like to suggest a method of indexing that the writer has found very useful.

The pecuniary outlay for the necessary materials is trifling, and is covered by a few pence. Two note books, indexed, are all that one requires. The one contains a numerical, the other an alphabetical, index.

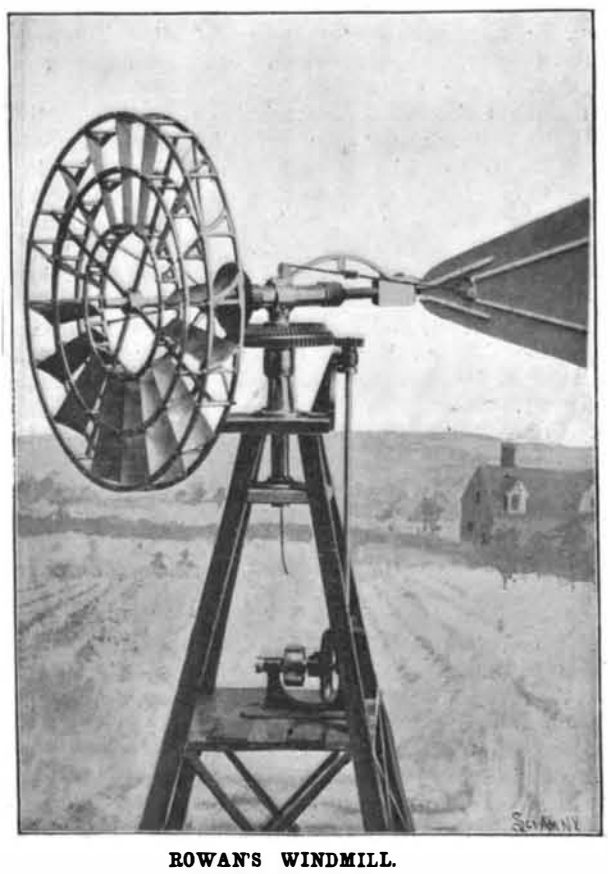
Empty plate boxes are used for storage purposes. Every box should have a gummed label affixed upon the side of the box, each label bearing its own distinctive number. Plate boxes when filled may be kept ranged on a shelf like so many books. A system of double indexing is used.

The numbers 1, 2, 3, etc., refer to the boxes; under the alphabetical headings are found the titles or subjects of the various pictures. A concrete example will perhaps make my explanation more lucid.

One wishes to find a negative exposed, let us say, in Guernsey. Reference to the letter G in the alphabetical index shows one that Mail-boat Approaching Guernsey 6:30 A. M. is stored in box 12. By adopting this method much time and temper is saved.—The British Journal Almanac.

A DURABLE AND EFFICIENT WINDMILL.

The illustration represents a windmill of substantial construction, with thoroughly braced and rigid fans or blades, and powerful gear mechanism for transmitting power from the wind wheel to a shaft from which the power may be taken. The improvement has been patented by W. McD. Rowan, of Garden City, Kansas. Secured to the timbers of the tower is a platform supporting a hollow post having an annular flange supporting the main gear wheel, whose hub fits over the flange and rests on ball bearings. This gear wheel has vertical and beveled teeth, the latter engaging a bevel pinion on the horizontal shaft carrying the wind wheel, the bearing of this shaft being secured to the upper end of a vertical hollow shaft projecting down through



ROWAN'S WINDMILL.

the hollow post. A curved brace extends from this bearing to the bearing of the hinged tail or vane, which may be moved to throw the wheel out of the wind by means of a cord or cable passing over suitable guide pulleys and down through the tower. The vertical teeth on the main gear wheel mesh with a gear wheel on the upper end of a vertical shaft which has at its lower end a bevel gear meshing with a similar gear on a horizontal shaft carrying a pulley from which power may be taken in the usual way.