are so well known to our readers, and have been so persistently presented in the Commissioners' reports, and reiterated in the SCIENTIFIC AMERICAN, as to be thoroughly familiar to our readers. The most crying evils are that the work has to be done in cramped and altogether inadequate quarters, and that the records have long ago overtaken the accommodation for properly filing them. As the Commissioner says, "Many of the records are almost inaccessible, and by reason of lack of sufficient space, so arranged that it requires double the time it ought to find them. A fire-proof safe should be built in which to store those records that cannot be replaced. The legal title to millions of dollars of property would be jeopardized by the destruction of our assignment records."

The justice of the claims of the Patent Office to more consideration is rendered even more evident when it is borne in mind that the office is not a tax on the public, but actually has a sum of over $4,000 000 to its credit in the Treasury.

WIRELESS TELEGRAPHY.

General Greely, Chief of the Signal Corps, has made public the result of recent experiments with wireless telegraphy which have been tried by the Signal Corps of the United States Army. He states that since the announcement of the tests in space telegraphy by Signor Marconi, some two years ago, the subject has been under consideration, and recently experiments have been begun with the object of thoroughly testing the value of this means of communication for military and other governmental purposes. Special forms of apparatus have been designed and constructed for these tests and they have already shown sufficient promise to warrant further and systematic trials.

In the experiments thus far carried on, several forms of transmitters for the generation of the Hertzian waves have been used, and much promise has been realized from the use of a large alternating current coil as a generator instead of the ordinary Ruhmkorff coil employed by Marconi. This coil is energized by a three-quarters horse power rotary transformer furnishing an alternating current at 125 volts, and this arrangement makes a very powerful and efficient source of Hertzian radiation. The former receiver used has been substantially the Brankey "coherer," discovered in 1891, and the signals transmitted are recorded upon a receiving tape. The transmitter has been mounted upon the western elevation of the State, War and Navy building, utilizing the present wooden flagpole as the vertical wire for the transmitter. The receiver was first placed at the old Naval Observatory grounds, about three-quarters of a mile distant, and later moved to the Signal Corps station at Fort Myer, Va. During the experiments constant communication was kept up by heliograph and flags between the transmitting and receiving stations, and this greatly facilitated the work of experimenting. Signals, letters, and words have been transmitted and received between these stations, but the great delicacy required in the present receiver has made the transmission of regular messages as yet unreliable and uncertain. The presence of large buildings and masses of iron and metal, necessarily present in cities, make such places undesirable for carrying out experiments of this character.

The distance over which signals may be transmitted by a given apparatus is governed by the height of the vertical wire used at either end, and this has naturally suggested the use of small balloons such as have already been used for signal and other purposes by the Signal Corps. A supply of these balloons has already been obtained, and will be used for this purpose in the near future. General Greely considers that the value of wireless telegraphy for communication between light houses and lightships and the shore is very great, especially where cables cannot be permanently maintained. For the signaling between ships at sea, and to replace ordinary flag methods in use between naval vessels, it should prove invaluable, since no kind of weather, fog, darkness, nor storm will affect its use, but that it will supplant to a material extent the use of wire for ordinary commercial telegraphy is not believed. The use of metal reflectors to augment and direct the radiation to particular points has already met with partial success, and should be thoroughly investigated. At present the radiation proceeds from the transmitter in all directions, and the same message can be received at any point within a proper radius at which a receiver is placed. A satisfactory reflector and a receiver of the proper electric capacity, or in other words tuned to the vibration of the particular transmitter, will make a great advance in space telegraphy. While secrecy of transmission is among the probabilities, the present stage of experiment does not justify its positive prediction.

Members of the Lighthouse Board stationed at Tompkinsville, Staten Island, N. Y., will in a few days begin a series of experiments intended to test the value of wireless telegraphy for use in lighthouses and lightships. One set of instruments will be set up in a station near St. George, and efforts will be made to communicate with the Scotland lightship. Other experiments will include the Sandy Hook and Fire Island lightships. If the experiments are encouraging, they will endeavor to communicate with the Highland lights. The instruments will be isolated as far as possible from other electrical apparatus and it is not believed that there will be anything in the intervening space between the instruments which will interfere with the signaling. The instruments used will be of the Clarke type, which we have already illustrated.

THE BICYCLE INDUSTRY.

The opening of the wheeling season gives special interest to some figures just prepared by the Treasury Bureau of Statistics. These tables, which present the statistics of bicycle exports during the past few years, show that American wheels are now being ridden in all parts of the world. In the wilds of Mexico and Central America; under the blazing skies of Cuba, Porto Rico, and other West Indian islands; across the pampas of Argentine, Brazil, and other South American states; amid the densely populated areas of China, British East Indies, and Japan; and in the jungles of Africa, the American wheel is making its way. Even in the great manufacturing countries of Europe, where workshops and skilled workmen abound, millions of dollars' worth of American bicycles are sold each year. During the four fiscal years 1896, 1897, 1898, and 1899, the exportations of American bicycles amount in round numbers to $20,000,000.

That such large numbers of a machine requiring such high grades of workmanship in its production should be continuously and successfully exported in competition with the workshops of the most successful manufacturing countries of the world is a factof which American workmen and Americans generally may justly feel proud. Four million dollars' worth of American bicycles will, during the fiscal year about to end, go to European countries—countries in which the manufacturing industries antedate by generations those of the United States. To France, with all her skilled workmen and ingenuity, exportations of American bicycles in the fiscal year 1899 will be more than double in value those of 1897; while the fact there has been a general lowering of prices indicates that in numbers the increase has been very much greater. To Germany the exportations of bicycles in 1899 will be 60 per cent in excess of those of 1897, though something less than those of 1898. To other countries on the Continent of Europe the bicycle exports of 1899 are 50 per cent in excess of those of last year or the year before. To the United Kingdom the bicycle exports of the year are materially less than those of 1898 as measured by values, though the fall in prices probably accounts for much of the apparent reduction, as shown by the figures, which give values exclusively and do not indicate the number of machines exported.

One curious and interesting fact in regard to the exports of bicycles illustrates the general tendency of our export trade in manufactures. This is the fact that a very large proportion of our exports of manufactures go to manufacturing countries. Two-thirds of our bicycles go to countries which make a specialty of manufacturing, and this export to manufacturing countries increases rather than otherwise. It will be remembered that predictions were made a year or two ago that the exports of bicycles to Japan would decrease as soon as the Japanese had obtained sufficient numbers as models for their own factories and had established themselves in the manufacture of wheels. This prediction, however, has not proved true. The exports of bicycles to Japan which in the fiscal year 1897 amounted to $52,179, were in 1898 $88,905, and in the fiscal year which ends next month will reach fully $130,000.

The largest single buyer of our bicycles in the fiscal year 1898 was the United Kingdom, which took $1,852,-166.

Germany's purchase of bicycles from us last year amounted to $1,724,404. Canada came next in amount of purchases in this line, the total being $611,402, while France was next with purchases amounting to $482,682; British Australasia next, $309,906; Netherlands, $251,918; Denmark, $226,370; British Africa, $148,503; British East Indies, $90,388; Japan, $88,905; China, $27,449; Dutch East Indies, $13,-368; and Africa, $11,647. To many of these distant places the exports of bicycles in the present fiscal year will exceed those of last year.

THE HEAVENS IN JUNE.

BY GARRETT P. SERVISS.

With the opening month of summer the magnificent Arcturus comes to the zenith in the early evening, say at 9:30 o'clock at the beginning of the month and before 8:20 at the end. Arcturus is sometimes referred to as a red or reddish star, but in fact it shows very little color except when it is near the horizon. When rising it often assumes a flaming appearance, owing to the unsteadiness of the air, but as it approaches the middle of the sky its ruddiness as well as its flickerings vanish, and it shines steadily with a pale yellowish light. But turn a telescope upon it, even when it is nearest the zenith, and it appears of a rich orange hue, and very beautiful. This is one of the very greatest of the stars, and even Sirius, probably, would make but a poor showing in the comparison if placed at an equal distance. In fact, some of the estimates of the quantity of light and heat sent forth by Arcturus are almost incredible, and if they are correct no planet could survive as near to Arcturus as the earth is to the sun.

While Arcturus reigns in midheaven, another star, whose actual magnitude is not much less, while it exceeds its rival in beauty, Vega, in the constellation Lyra, is the cynosure of the northeastern quarter. I have entertained a "telescope party" for an hour or more, simply by turning the glass in succession from Arcturus to Vega and back again. The contrast of their colors is delightful to look upon. To the naked eye Vega appears brilliantly white—"as white as a diamond"—but in the telescope it assumes a dazzling blue tint which is superb. The change from the deep orange of Arcturus to the piercing blue of Vega, and vice versa, is peculiarly pleasing.

A third great star whose actual magnitude, being unknown, because of its immeasurable distance, may be safely assumed as immense, Antares, in Scorpio, is seen in the southeast while Arcturus is overhead and Vega is sparkling in the northeast. Antares may be correctly enough described as a red star, and yet it, too, when on the meridian in a clear night, often appears nearer yellow than red. In the telescope its ruddy hue is pronounced, and, with a glass of four or five inches aperture, when the air is steady, the amateur observer may catch a glimpse of the little green companion of Antares, one of the most surprising of all double-star views.

THE PLANETS.

Jupiter is now so clearly the prince of the celestial legions that he should be placed first in the enumeration of the planetary phenomena of June. In the constellation Virgo, almost directly south of Arcturus, and some ten degrees east of Spica, he crosses the meridian about 8:30 P. M., in the middle of the month. Being situated south of the equator he comes more readily into view for the casual star-gazer than he would do if further north, although his southerly declination is otherwise a disadvantage. I can only repeat the advice to all owners of telescopes, however small they may be, to study Jupiter with diligence. Next to the moon there is no heavenly body whose features can be so easily discerned, and they are always interesting on account both of the variety of color and form and the gradual changes which they present. The motions of the satellites are a perpetual source of interest. I mention a few of the phenomena connected with them:

On June 5, at 8 h. 24 m. 15 s. P. M., Satellites I and II will be occulted, i. e., will disappear behind the planet, at nearly the same instant. On the 6th, between 6:32 and 8:44 P. M., the shadow of Satellite I will be upon the planet's disk; also on the 13th between 8:27 and 10:39 P. M. On the 14th, at 9:03 P. M., Satellite III will reappear for occultation, while between 7:19 and 9:39 the same evening the shadow of Satellite II will be upon the disk. On the 21st, at 9 h. 44 m. 6 s. P. M., Satellite I will reappear for eclipse by the planet's shadow. About 10 minutes later the shadow of Satellite II will pass upon the disk.

From Jupiter the observer will turn to Saturn, in the constellation Ophiuchus, rising about 8 P. M. at the opening of the month, and sufficiently elevated to be fairly well seen by 10 o'clock. The wings are widely opened, their northern face being presented toward the earth. Saturn is in opposition to the sun on the 11th, and but for its great southern declination would be well placed for telescopic study. A look at Saturn's rings with a telescope is a very convincing argument for people who are skeptical about the wonders of astronomy.

Mars will be found in Leo, setting before midnight, and too faint and far away to be interesting even for telescopic observation.

Venus is a morning star, moving from Aries into Taurus, and gradually approaching the sun. It rises soon after 3 A. M.

Mercury, traveling from Taurus through Gemini, is in superior conjunction with the sun on the 14th, becoming thereafter an evening star, and visible in the twilight about the end of the month. Mercury and Neptune will be in conjunction on the morning of the 15th.

Uranus is in Ophiuchus, rising before sunset, and Neptune is in Taurus and comes into conjunction with the sun on the 15th.

THE MOON.

New moon occurs on the 8th; first quarter on the 16th; full moon on the 23d, and last quarter on the 29th. The moon is nearest the earth on the 24th, and farthest from it on the 12th. A total eclipse of the moon occurs June 22-23, invisible in the eastern United States, but partially visible on the Pacific Coast.

The lunar conjunctions with the planets occur as follows: Venus, on the 5th; Mercury, on the 7th; Neptune, on the 8th; Mars, on the 14th; Jupiter, on the 19th; Uranus, on the 21st; Saturn, on the 22d.

MISCELLANEOUS.

The sun enters Cancer and astronomical summer begins on the 21st at 11 A. M.

There will be a partial eclipse of the sun on June 8th, invisible in the United States, except in Alaska, but visible in Europe.

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