and heavy weather, or to errors of calculation, or to carelessness on the part of the officers in charge, there is left a considerable number of casualities of this kind, of which a satisfactory explanation has never been given, and probably never will be. One of the most recent and significant instances is to be found in the recent loss of the "Mohegan," off the southern coast of England.

The remarkable disparity between the figures representing what we might call deep-sea and shoal water disasters, naturally raises the question as to whether, after we have exhausted the possible and probable causes, or combination of causes, of such an appalling list of strandings, there is not some other and unsuspected force at work against which no amount of care on the part of the navigator can avail. The subject was discussed at considerable length by the late Captain Cornelius W. McKay, in a paper which is published for the first time in the current issue of the SUPPLEMENT. Mr. McKay's explanation of these marine disasters is summed up in the statement, "it is respectfully submitted to the nautical world that the modern twin-screw ship does not always sail as she is pointed; in fact, that she cannot." The author argues that the extreme length of the modern merchant steamer renders it extremely difficult properly to control her course by means of a rudder acting at its rear end; and he argues that under certain conditions as, for instance, when wind and sea are acting on the bow and the helm is thrown over to counteract the effect, the resultant motion of the vessel is in a direction which makes a greater or less angle with the line of her keel. It is pointed out that if a modern Atlantic record-breaker should vary in her course only one degree it would have no serious consequence in the navigation of the Atlantic Ocean, but that "one degree more or less might mean something when dusting the white-wash off the lighthouses on the shores of the English Channel in the endeavor to cut time."

While we are not prepared to agree with all of Capt. McKay's conclusions, the subject is worked out in an ingenious and very readable manner, and the article carries weight, as coming from one so well qualified to speak on the subject. The point is well made, that the enormous disparity in casualties from stranding, as compared with those occurring from other causes, may well make us seek for some unsuspected or little understood cause for this class of marine disasters.

THE HEAVENS IN APRIL.

BY HENRY NORRIS RUSSELL, A.M.

The evening skies during April present the greatest number of first magnitude stars visible at any one time during the year. Twelve of the sixteen brightest stars visible in this latitude are above the horizon at once, and the brilliant spectacle which they afford is well supported by their less conspicuous neighbors.

At 9 P. M. in the middle of the month Orion hangs close above the western horizon, the three stars of his belt forming a nearly horizontal line. Above them is the bright red star Betelgeuse, in the giant's right shoulder, and equally far below the White Rigel marks his left foot. Between the belt and Rigel are three fainter stars in an almost vertical row, which form his sword. All three of these appear in a field glass as interesting double stars; and around the middle one spreads the great nebula, one of the most magnificent of telescopic objects.

The line of Orion's belt points on the left to the brilliant Sirius, and on the right to the ruddy Aldebaran, beyond which are the Pleiades. Above Sirius, and forming an almost equilateral triangle with it and Betelgeuse, is Procyon, the lesser dog-star, while farther north above Orion, starry Gemini displays its twin brilliants, Castor and Pollux, and still farther to the right is the bright star Capella, near the Milky Way.

The Great Bear is almost overhead, in the highest part of its circle around the pole. Farther south is Leo, only too well known to those who watched vainly for the meteors of last November, which is marked by the familiar "sickle" with Regulus at the end of the handle. Arcturus shines at a considerable altitude in the eastern sky, while below and to the right the paler Spica marks the constellation Virgo, and far in the northeast Vega is once more above the horizon, after some months' absence from the evening skies.

THE PLANETS.

Mercury is a morning star in Pisces, rising about an hour before the sun at the beginning of the month, and nearly an hour and a half at the close. On the evening of the 21st, it reaches its greatest apparent distance from the sun—about 27°. This is considerably greater than usual, because Mercury is in that part of its eccentric orbit which is farthest from the sun, its greatest distance being reached on the 16th. This circumstance affords a good view of the planet to those early risers who choose to look for it in the morning twilight, but is partly compensated for by its loss of brightness, due to the fact that at its greatest distance from the sun it is exposed to less than half the light and heat which pour upon it when nearest.

Venus dominates the evening sky, remaining above the horizon for fully four hours after sunset, and far surpassing in brightness its stellar neighbors. During the month it traverses the length of Taurus, passing close to the Pleiades on the 5th. It is very bright, continuing to increase in this respect throughout the month and can easily be seen in the daytime with the naked eye, if one knows just where to look for it.

There is really no difficulty at all in seeing Venus (when near its elongation) on any clear day, even at noon. The difficulty consists in finding so small an object without anything to guide the eye to it. When once found the planet is easily seen, and may be shown to others by getting it in line with the top of a tree or any other object which serves as an object guide.

Such a pointer will be furnished by nature on the afternoon of the 2d, when the moon comes close to Venus. The distance is least about 9 P. M., when it is less than twice the moon's diameter. So throughout the afternoon Venus may be seen, weather permitting, above and to the left of the crescent moon, at a distance of three or four of its diameters.

It will be interesting to note the contrast in brightness between Venus and the moon. In spite of its very small apparent size, Venus appears much more luminous than the moon.

This is explained by the two facts that Venus enjoys a sunlight twice as bright as ours, and that it reflects over half the light which falls upon it, while the moon reflects only about one-sixth.

Mars is a morning star in Pisces, but is distant from the earth and faint. It passes close to Mercury on the forenoon of the 2d.

Jupiter is gradually coming into position for evening observation, rising a little before midnight on the 1st and at about 10 P. M. on the 30th. It is in Scorpio, about 5 degrees north of the bright star Antares.

Saturn is a morning star in Sagettarius, rising about 1 A. M. at the beginning of the month and two hours earlier at its close. Its rings are very widely opened out, but it is too far south for favorable observation. Uranus is in Scorpio, quite close to Jupiter, and Neptune in Taurus, but too faint to be seen without a telescope.

THE MOON.

First quarter occurs on the afternoon of the 6th, full moon on that of the 14th, last quarter on the morning of the 22d, and new moon on the night of the 28th.

The moon is nearest to the earth on the morning of the 11th, and most remote on the night of the 26th.

Besides the conjunction with Venus, already mentioned, the moon passes Jupiter (quite closely) on the morning of the 18th; Uranus the same afternoon; Saturn on the morning of the 20th; Mercury on that of the 27th, and Mars the same afternoon.

Princeton University Observatory.

THREE TYPES OF AUTOMOBILES.

At a meeting of the New York Electrical Society, held in this city on the 22d instant, talks by representatives of three different kinds of automobiles was given, accompanied by illustrations, for the purpose of enabling those present to form an opinion as to which was the superior.

The first speaker was Mr. A. L. Riker, the inventor of the Riker Electric Vehicle and Running Gear. He stated that the advantage of electric power was that it was like the horse, in giving a great quantity when needed, easily and quickly. Then he explained three plans for connecting up the storage battery for producing different speeds by using sections of the whole battery and connecting them up in multiple or series, according as a rapid or slow speed was desired.

For pleasure vehicles, from 12 to 15 miles an hour was the fastest speed.

This plan of the subdivision of the battery is more economical than the use of resistance coils in cutting down the current, and has the advantage, in case of a rupture in the high-speed circuit, of enabling the vehicle to be taken home on the remaining cells grouped for the slow speed. Illustrations were shown of the controller operated by a single lever; when moved forward from a zero point the vehicle moved forward, and when moved backward from zero reversed the motor and moved the vehicle backward.

Special devices are provided to lock the lever at the zero point. On the front dashboard is placed the voltmeter and ammeter indicating the condition of the battery when discharging. In a battery of 44 cells the voltmeter should show 80 volts. Starting at this figure the vehicle may be run till the voltage falls to 68 volts, then the battery should be recharged. In going away from home it was well to return when the voltage dropped to 74

The charging plug was shown, and is constructed in such a way as to prevent any mixing of the battery pole terminals. In New York, the Edison Company would soon establish electric hydrants in front of their stations for the purpose of facilitating carriage charging. There were illustrations of storage battery crates showing the plan of burning the lead terminals together, also of the motor, the single and double gear equipments, the double-gear steel frame being very flexible. The differential gear is located in the hub of one of the wheels of the rear axle, on the single-gear frame, which allows a solid steel axle to extend between the two wheels. The gear wheel meshing into the pinion of the motor is supported upon a tubular axle, within which is the solid axle. This construction is much stronger than the old system of having the axle divided and the differential gear located in the center.

The steering gear was explained, also the two plans of applying the brakes and several illustrations of completed vehicles of different styles were shown.

Mr. C. J. Field discussed the "Present Development of the Gasoline Type of Automobile," showing by diagrams the general construction of the four-cycle flanged-jacket motor. He thought the reason why these motor carriages were used abroad more than in the United States was on account of the more general production of electricity here, the facilities for the charging of batteries of electric vehicles being better, but for pleasure touring over long distances he regarded the gasoline-driven vehicles as superior. The four-cycle type of engine was preferred.

Ninety per cent of the difficulties in starting or operating gasoline engines was due to the imperfect electrical construction or insufficient electric power to produce the proper spark. The jump spark and wiping spark are preferable and mostly used. Special flanged cooling tanks are provided, through which the water flows from the water jacket of the engine and is cooled by the air impact. This improvement allows a smaller weight of water to be carried.

The most approved carburetor for heating the vapor gas is called the Areile; heated air surrounds the outlet of the gasoline vapor, mixes with the latter, heats it, and further on is mixed with cold air, then passes on to the engine. The devices for obtaining variable speeds from a constantly running shaft, he stated, were still crude and clumsy.

Some of the hydrocarbon racing machines abroad had engines of 24 horse power, and made records of 35 miles an hour, some going above 40 miles.

He spoke of the Belgium system of combining gasoline and electricity in the same vehicle in connection with a small storage battery which had some promise of value and economy.

Succeeding Mr. Field, Mr. J. A. Kingman reviewed the history of the steam carriage, showing a picture of Cugnot's carriage, invented as early as 1769. Many other steam coaches and stages were shown, until the era of liquid fuel brought the speaker down to the latest improvements of Whitney, a relative of Eli Whitney, the inventor of the cotton gin, and Stanley, known as the locomobile, where the miniature boiler is located under the seat. The pressure carried is 160 pounds to the square inch and steam can be generated within five minutes. The fuel is vaporized and combustion is promoted by compressed air.

After the presentation of the three forms of vehicles there was a brief interesting discussion. The opinion expressed was rather more favorable to the electrical vehicle, one member stating that he did not fancy the idea of sitting over a boiler under a pressure of 160 pounds to the square inch.

MUTUAL AID SOCIETIES FOR FRENCH SCHOOL CHILDREN.

A great many mutual aid societies called "petit-cavés," from their founders, MM. Petit and Cavé, are now being organized among the school children of France. They are established under a law of 1856, and made operative by a law of 1898. The object is to accord assistance to the child members during sickness and to furnish a pension fund for old age. The maximum amount which can be obtained as a pension is only $69.48 per annum. The children deposit 2 cents per week, one cent going to the fund for aid in sickness and the other to the pension fund. This money is placed in the government repository where it is invested in government bonds. The government aids these societies; for every child who contributes during an entire year, the state gives a franc, or nearly 20 cents to the common fund. It also gives a sum equal to the entire amount deposited by the children. The one cent deposited weekly which goes to the pension fund can never be reclaimed except in the form of a pension. The money derived from the reserve fund passes to the next of kin in the event of the death of the depositor. Each child is given a bankbook in which the deposits may be entered and which gives tables and information regarding the plan. The aim of the children's societies is to aid parents by paying them an indemnity during the sickness of their children of 10 cents per day during the first, and five cents per day during the second and third months of their sickness; also to create annual pension funds and to imbue all children at an early age with the element of economy, to accustom them to the use of a bankbook, and to the consciousness of having money at work earning something for them and held in reserve for their old age. The society is spreading rapidly throughout France, specially among the working classes. The savings banks at the present time are being overrun with deposits; the money limit for any one depositor at present is $386, but after August of this year this will be reduced to $289.