

MORNING AND EVENING STARS IN 1906.

BY F. R. HONEY.

The representation of a portion of the solar system illustrating this article is designed to assist the non-professional reader to identify the planets which rise before and set after the sun for any day of the present year.

The orbits of Mercury, Venus, the earth, and Mars are here plotted, and the position of each planet is indicated, in each case, at intervals of eight days. The orbits of Jupiter, Saturn, Uranus, and Neptune fall beyond the limits of the page; but since the motions of the last three are limited to very small angular measurements, and that of Jupiter is not more than about one-twelfth of a revolution, the reader will be able, with the assistance of the drawing, to determine approximately the position in the heavens of each of these planets at any assigned date.

Mercury performs his journey round the sun in very nearly eighty-eight days (more exactly 87 days and 23¼ hours). His position is shown for January 3, and thereafter at intervals of eight days. After one revolution Mercury reaches on April 1 the same position he occupied January 3. The dates are then given for the second revolution, which is completed June 28. The dates for the third and fourth revolutions then follow in order. The third revolution is completed September 24; and the fourth on December 21.

Since Mercury performs his revolutions in a very small fraction of a day less than eighty-eight days, it is evident that, after this exact interval of time, he will have passed a little beyond his position of January 3; and similarly for each of the successive revolutions. After an interval of three hundred and fifty-two days, i. e., after four revolutions and a small fraction, the planet will reach a position which is about ½ deg. in advance of that occupied January 3. For the present purpose the positions are made identical. The drawing is sufficiently accurate, and confusion is avoided. The planet is represented in the position it occupies at four different dates; and similarly for the intermediate dates.

Venus performs her revolution in two hundred and twenty-four days and sixteen and three-quarter hours. Omitting the hours, 224 days brings her almost to the termination of her first revolution. Two hundred and twenty-four is exactly divisible by eight. Her first position is shown for January 3; and at intervals of eight days thereafter. This number of days is selected in order that the reader may readily compare her position with that of Mercury, the earth, or Mars for the same date. Since Venus makes about one and five-eighths of a revolution during the year, it is easy to show her different positions without confusion. She begins her second revolution on August 15, and is represented by the open circle which falls a little behind that of January 3. Thereafter she is represented in a similar manner with the new date attached. The earth and Mars are also shown for January 3; and for every eighth day.

For the intermediate dates the reader will have no difficulty in determining the position of each of the planets in its orbit. Jupiter's position on January 3 is on the line drawn from S, which represents the sun, and at a distance from it over five times the distance from the sun to the earth. He will reach the positions indicated on April 1, June 28, September 24, and December 21.

The position of Saturn is shown for January 3, June

28, and December 21. Saturn is at a distance from S equal to nine and a half times that of the earth.

The directions of Uranus and Neptune are indicated for January 3 and December 21. The former is over nineteen times, and the latter thirty times, the distance from the sun to the earth. Since these planets move very slowly, it is unnecessary, for the present purpose, to interpolate intermediate dates.

In order to determine the planets which rise before the sun, the reader must bear in mind that the earth revolves on its axis in the direction represented by the arrow (shown at the date September 24). At sunrise the observer emerges from the shadow area. If the drawing be held in such a position that the earth is between the reader and the sun, and he can read the date without turning his head, he will have a correct exhibit of the relative positions of the sun and planets at that date. In this position, if a planet is on the right of the sun, it evidently rises before him. Should the planet be exactly in line with the earth and sun, as e. g. in the case of Mercury or Venus, if the planet is on the near side, it is in inferior conjunction; if it is on the far side, it is in superior conjunction. If it is at or near conjunction, it will be lost in the sun's rays. At sunset the observer is entering the

seen advantageously in the early evening after June 28 when approaching aphelion. The last position indicated is December 29, when Mercury will rise before the sun.

Venus rises a short time before the sun on January 3 and thereafter. She will very slowly approach superior conjunction, which she will reach on February 14. She will be seen satisfactorily in the evening about the middle of June. Venus will then approach nearer the earth until November 30, when she will be in inferior conjunction. Her dark side will be presented to the earth, and she will be lost in the sun's rays. She will then rise before the sun until the end of the year.

Mars will be visible in the evening before July 15, when he will reach conjunction; and will then rise before the sun for the remainder of the year.

Some Wholesome Advice to Lawyers.

New Jersey's lawyers recently paid a deserved tribute to their most distinguished associate, the one who has been longest in practice in the State and who, throughout its boundaries, is recognized as the dean of the profession—Cortlandt Parker, of Newark. In the course of an excellent address Mr. Parker said:

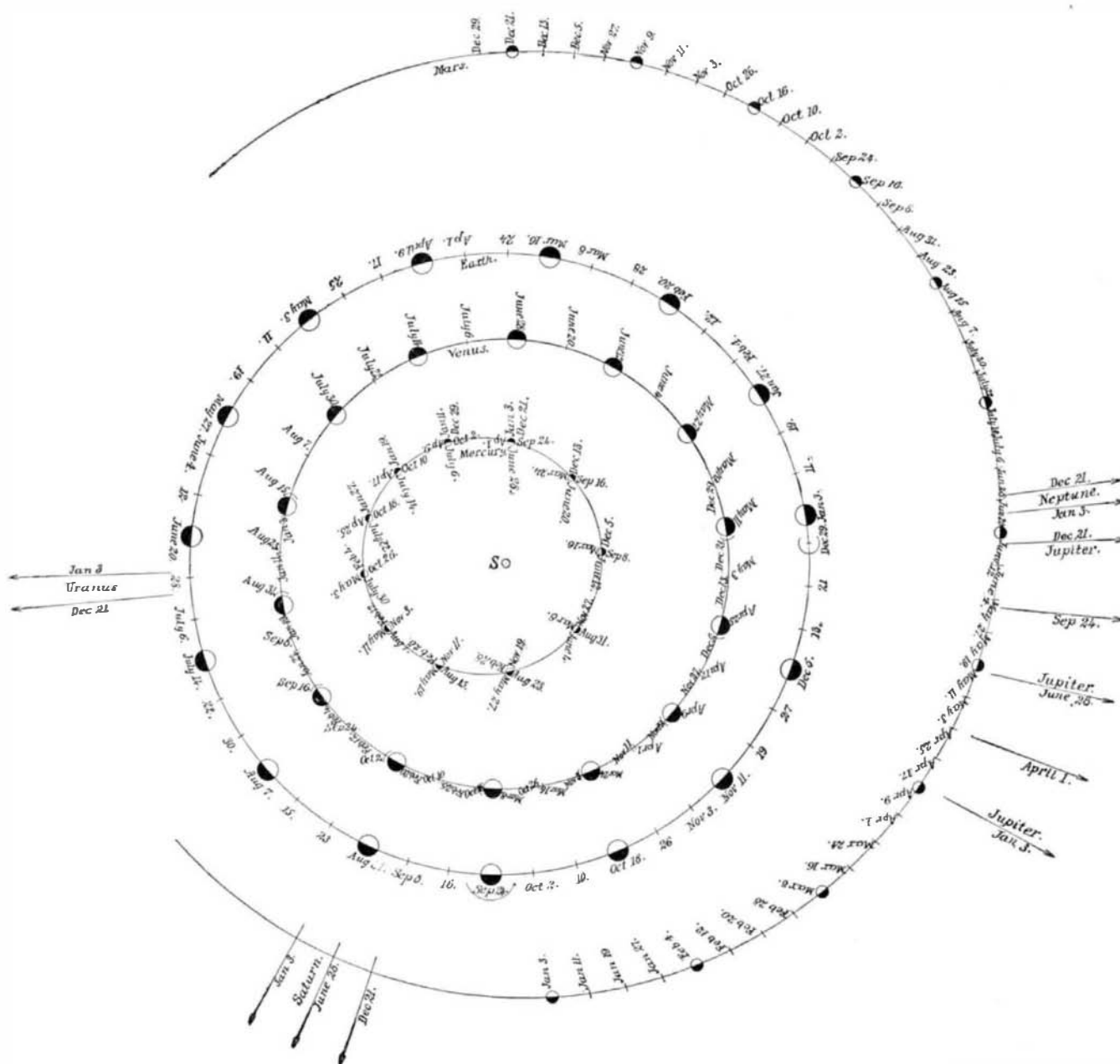
"To my young friends, a word of advice: Stick to the profession—seek to elevate it. Do not seek by it to make money. Doing that makes it a trade—not a profession. Be fair in charges. Help the poor, with advice and with professional aid. If it occurs to you, as it should, to look out for old age, believing that Webster was right when he said that the fate of a lawyer was to work hard, live well, and die poor, use economy, and as you acquire something to lay up, buy in some growing town or city a building, a business one, if you can, even if it involves a mortgage for part; rent will keep down interest and pay taxes and the property one day will enrich you. You will have hard work to get well off by simply saving, and the community will expect you to live comfortably. Do not speculate. Be known in Christian work, and in charity, public and private, according to your means.

Study law and history in all spare time, and manifest it by your action in the courts. Do not be a politician. But always vote and do the duty of a citizen. Be member of a party, but independent—a slave to no one. Deserve honors and office. If they come, as if you deserve them they should, do honor to them. If they do not, never mind. There is One who seeth not as man seeth, whose 'well done, good and faithful' is worth all the dignities of all the world."

THE NEW ARMORED CRUISER "TENNESSEE."

The successful completion of the official trials of the new armored cruiser "Tennessee," which took place on the government course on February 12, marks the addition to the United States navy of one more of a class of ships of which the United States navy is very justly proud. The average speed over the whole 80-mile course was 22.15 knots an hour.

The armored cruiser which, in the earlier days of its development, was intended to hold something of a middle position between the battleship and the protected cruiser, has grown so steadily in size and power that the modern type, as represented by the "Tennessee," approximates in fighting efficiency to the battleship. This is evident at once when we bear in mind that the "Tennessee" carries as her main armament



A MAP WHICH SHOWS THE POSITIONS OF THE MORNING AND EVENING STARS FOR THE YEAR 1906.

shadow area. When the drawing is held for a given date in the position above described, if the planet is on the left of the sun, it will set after him. In order to familiarize himself with the use of the plot, the reader is recommended to confine his attention to one planet at a time, and trace its movements relative to the earth and sun throughout the year. For example, if he will revolve the drawing until the earth is between him and the sun for the date January 3, he will read the same date attached to Mercury. Being on the right of the sun, he rises before him. If the drawing be revolved until the date February 20 is reached, Mercury will then be on the far side of the sun, i. e., in superior conjunction. For some time prior to and after this date, the planet will be lost in the sun's rays. After this he will be on the left side of the sun, and will therefore set after him. He will be in conjunction—alternately superior and inferior—six times during the year on the following days: February 20, April 5, June 8, August 12, September 24, and November 30. If the earth were stationary, there would be twice as many conjunctions as revolutions, i. e., eight; but this number is reduced by two on account of the revolutions of the earth around the sun.

Mercury will be seen to good advantage after May 3 before sunrise when near aphelion. He will also be

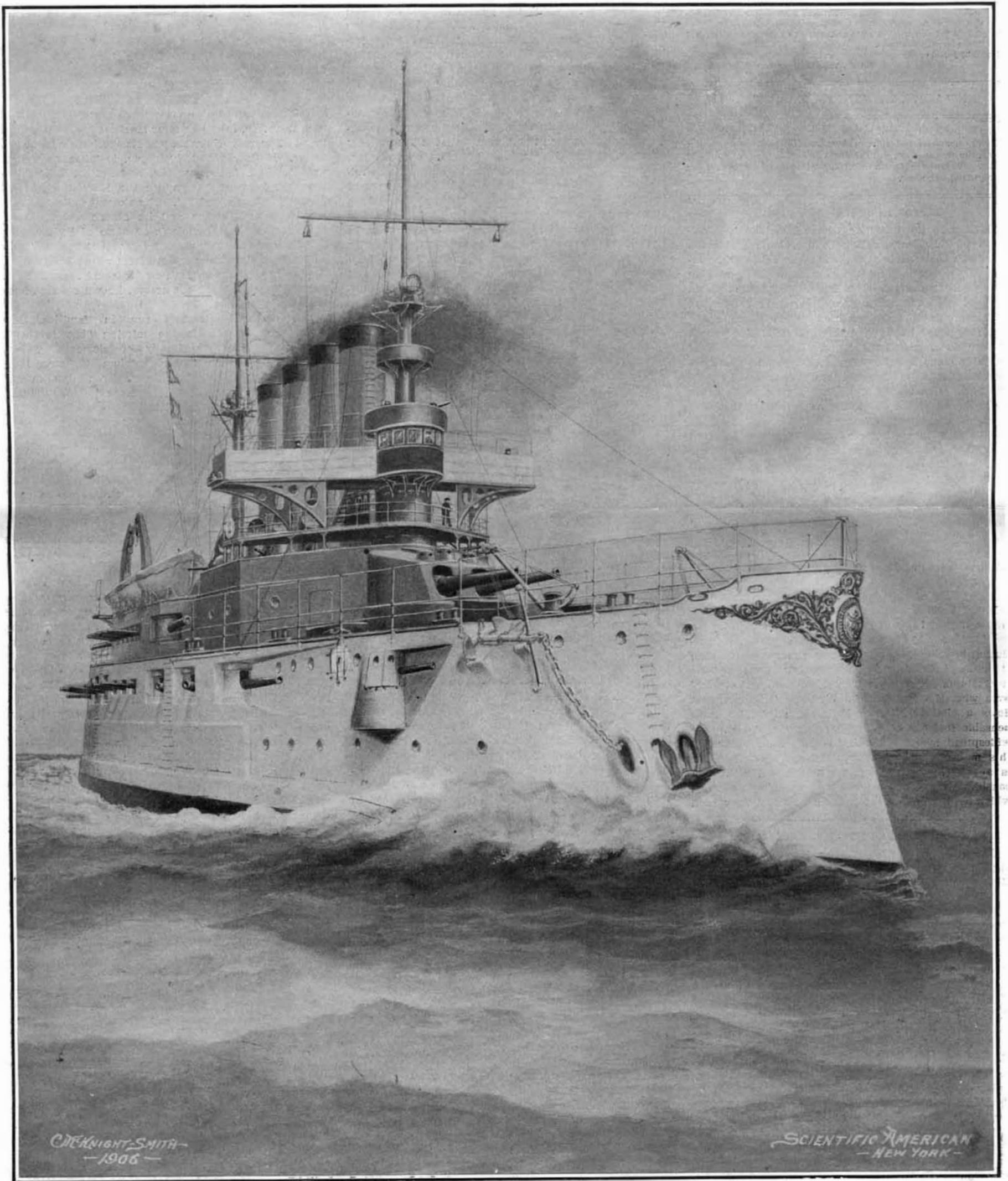
SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1906, by Munn & Co.]

Vol. XCIV.—No. 11.
ESTABLISHED 1845.

NEW YORK, MARCH 17, 1906.

[10 CENTS A COPY.
\$3.00 A YEAR.]



Displacement, 14,500 tons. **Speed,** 22.15 knots. **Maximum Coal Supply,** 1,950 tons. **Armor:** Belt and side, 5 inches; barbettes, 7 inches; turrets, 9 inches. **Protective Deck,** 1½ to 4 inches. **Armament,** Four 10-inch, sixteen 6-inch, twenty-two 3-inch, twenty-six smaller guns. **Torpedo Tubes,** Four submerged, 21-inch. **Complement,** 827.

The "Tennessee" is the Latest of a Fleet of Ten Powerful Armored Cruisers. Four of These, "Tennessee," "Washington," "Montana" and "North Carolina" Carry 10-inch Guns; the Other Six, "California," "Pennsylvania," "Colorado," "Maryland," "South Dakota," and "West Virginia," Carry 8-inch Guns in the Main Battery.

THE NEW ARMORED CRUISER "TENNESSEE."—[See page 230.]