The Governments of Spain and Portugal endeavoured to have charts drawn up with the greatest possible accuracy. King John II. of Portugal created a commission for the further development of these sciences; Martin Behaim was one of its members. In Spain Amerigo Vespucci was appointed Chief Pilot in 1508, and soon became the head of a hydrographic bureau, superintending the execution of charts. These charts were prepared with scrupulous care, and became the types from which others were drawn. It was ordered at the same time "that henceforth all navigators sailing towards known or unknown parts of India, who should discover new regions, islands, harbours, or bays affording some interest for the general chart, should, on their return to Europe, report the same to the Chief Pilot, so that all these indications might be noted on the large chart." This was a formal order issued to all sea-captains, and must have led to the acquisition of much information respecting the ocean; but the information did not spread abroad for some time. The Portuguese forbade, under pain of death, the exhibition of the charts showing the route to Calicut. Some idea may be formed of the importance which they attached to the proper construction of these charts, when we remember that in Spain they sent for foreigners to correct or complete these documents. It was for this purpose that, in 1512, the celebrated English navigator Sebastian Cabot, and, in 1515, the Roman Antonio Maurino, repaired to Spain.

The First Hydrographic Signs.

The Universal Chart, executed at Seville in 1527, which is now in the Library of Weimar, and a second similar chart, of 1529, bear the first hydrographic signs—crosses and dots for reefs and other dangerous spots; these are also to be seen in the first printed portulano published in Venice in 1528 under the title of "Portulano delli Lochi maritimi ed Isole del mar di Pietro Cappo." Ortelius (1527–1598) published the first atlas under the title *Theatrum Orbis Terrarum* (1570).

Cabot observed with great care the changes in the variation of the compass, and he first made allowance for magnetic changes; after the first thirty years of the sixteenth century navigators were careful not to neglect this datum when drawing charts. Charts were further improved by a more accurate outline of the sea-coast, and by more precise indications of the position of each of the points; the progress made in this direction was in direct relation to the improvement in the methods used for determining latitude and longitude, and the improvements made in nautical instruments. There was, however, a certain slowness in attaining these improvements. At the commencement of the period under consideration the charts in use were still drawn up with the mariners' compass. P. Nuñez, a Portuguese, was one of the first to draw attention to the defects of these charts. It was reserved for the Germans, the Dutch, and the Flemish to introduce, towards the middle of the sixteenth century, scientific modifications in cartography.

The astronomers Stabius and Johann Werner, and after them Varenius and Hase, developed the stereographic projection, and applied it to the representation of terrestrial surfaces. In 1514 Werner produced a stereographic projection of the globe, as far as the