

by the sound arising from shaking rods within it, Mr. Andrew Haddow, the engineer, lowered four eight-inch bar-magnets (placed end to end, with the south pole down) into the bore. The north pole of a compass-needle in the mine moved first to the west, and then to the east, of magnetic north, as the magnets were lowered, indicating that the magnets were to the westward of the compass. While the heading was being enlarged in this direction, Mr. Haddow experimented by passing a magnet around the compass, and drawing a series of curves for positions of the magnet, which produced different angular deflections of the needle. The compass was then placed successively at two different points in the heading, and the deflections caused by the magnets in the bore-hole were noted, — at one point $3\frac{3}{4}^{\circ}$, at the other $6\frac{1}{2}^{\circ}$. The two points were then marked on the plan of the mine, a tracing of the magnetic curves just referred to was placed over each point, and the intersection of the curves corresponding to these deflections was noted. Upon excavating to the point thus indicated, the bore was found, being about eight feet from the true vertical.

In a second case, in Australia, the diamond drill, in going down three hundred and seventy feet, had deviated beyond sensible magnetic influence, and the search by underground mining was continued for nearly twelve months without success. Mr. E. F. Macgeorge then employed glass phials partly filled with melted gelatine, and having a compass-needle in a lower connected bulb of the phial. When these were carefully lowered in the bore to different depths, and the gelatine congealed, the needle would become fixed in the magnetic north, and the surface of the gelatine would be horizontal. These two indications, when the phial was withdrawn, showed the inclination and magnetic bearing of the bore-hole at that point; and a sufficient number of observations at convenient depths permitted the erratic bore-hole to be completely mapped from top to bottom. This map showed a deviation of nearly forty feet at three hundred and seventy feet down (the point so long searched for), and of between seventy and eighty feet at the full depth of five hundred feet. A drift straight for the indicated spot found the lost bore thirty-seven feet and a half away from its proper place, and the bottom was found seventy-five feet astray. This device has since been perfected and patented.

FISHING-INTERESTS IN HUDSON BAY.

THE chief commercial value of this district undoubtedly lies in its immense fishing-interests, if we include in that term whaling and sealing.

American whaling-vessels have for more than a quarter of a century been conducting a very profitable fishery in Roe's Welcome, a large basin in the north-western portion of Hudson Bay. The vessels usually leave New England in July, and reach Marble Island in September, where they winter, one or two every season, and occasionally more. Sawing out of the ice in the following June, and pressing northward

as fast as the ice will permit, they fish until about the first of September, unless sooner loaded, and then sail for home. During the eleven years preceding 1874, about fifty voyages are known to have been made; and the returns give an average of \$27,420 per voyage, which shows a large margin of profit to the small sailing-vessels usually engaged in the trade. It is estimated that the aggregate value of oil and whalebone already obtained is about two and a quarter million dollars, and every thing points to a large extension of the industry.

The porpoise-fishery is extensively carried on by the Hudson-Bay company; the fish, as they are popularly called, being held in check by means of trap-nets on flats in coves where the tide rises ten or fifteen feet, and left high and dry when the water recedes. Last year the company secured nearly two hundred in one tide at Churchill, and a much larger number at Ungava Bay. The blubber weighs from two hundred and fifty to four hundred pounds, and is very rich in the finest of oil. Formerly the blubber was exported; but the company has established extensive refineries at several of its northern stations, and now ships the oil in casks.

The company also carries on a walrus-hunt, sending two sloops annually from Churchill to two very productive walrus-grounds north of Marble Island, where they have never failed to obtain full cargoes of blubber, ivory, and hides in a few weeks, besides carrying on a valuable trade in oil, ivory, musk-ox, and other skins, with the northern Eskimo.

During the exploring-steamers *Neptune's* visit to Stupart's Bay, the Eskimo were living on the harp-seal (*Phoca groenlandica* Linné), and had in their possession skins of a good many harbor and square-flipper seals (*Phoca vitulina* Linné, and *Erignathus barbatus* Fabricius), seals of all kinds being abundant.

The Hudson-Bay company has a steamer, the *Diana*, plying between London and Ungava Bay direct, fitted up with refrigerating apparatus, and engaged solely in conveying salmon fresh to the London market. Last year's cargo is reported to have realized eighteen thousand dollars. Nearly every stream contains both salmon and trout in vast quantities, chiefly where the salt and fresh waters mingle.

Cod abound in the vicinity of Chudleigh, though not up to the present time found in Hudson Bay. Newfoundland schooners even now work as far north as Nachvak, and seem to be going farther each year. The cod, though good, are not equal to those of the Banks. While the *Neptune* was at Port Burwell, both in going and on returning, the anchorage teemed with cod, which were taken in great numbers by jigging from the ship's deck.

THE DRAINAGE SYSTEM OF BRAZIL.¹

THE hydrographic features of Brazil are to a certain extent determined by the orographic system, and by the distribution of mountains and plains described

¹ From the *Rio News*.