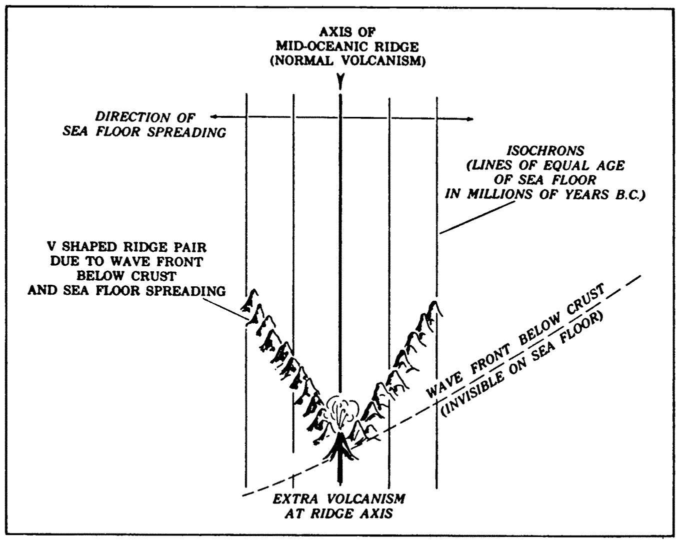
Such matters will undoubtedly be brought up at Senate hearings on the nation's fire problems, to be held Feb. 15-17. The commission also touched briefly on the peculiarities surrounding the Ohio nursing home fire when it met with the National Academy of Sciences' Committee on Fire Research on Jan. 28. ☐

A V-shaped clue to the mantle's flow



In the Vogt and Johnson model, mantle waves passing under midocean ridges form V-shaped patterns like the wake of a ship.

NOO

Most of the major theories on the motivating force for continental drift involve thermal convection in the earth's mantle (SN: 7/25/70, p. 74). Last March, W. J. Morgan of Princeton University proposed that the mantle hot spots that have been detected in various locations around the world are convection plumes where hot magma from deep in the mantle wells up into the asthenosphere, the fluid part of the mantle. The magma then spreads out, dragging continents along with it. Morgan proposed about 20 such plumes throughout the world (SN: 3/13/71, p. 180).

Now Peter Vogt and Leonard Johnson of the U.S. Naval Oceanographic Office have found a peculiar topographic feature on the ocean floor in the North Atlantic that lends partial support to Morgan's theory. They found a V-shaped ridge flanking the Reykjanes ridge which they believe is a manifestation of convective flow from a hot spot below Iceland.

The scientists theorize that a convection plume under Iceland brings five to ten cubic miles of semimolten basalt upward, to spread out in the asthenosphere. The upwelling does not appear to be a steady process, says Johnson; instead, waves of magma seem to spread out periodically from Iceland. They believe that whenever one of these waves crosses below the Reykjanes ridge, a midoceanic spreading center, it causes a volcanic burst on the sea floor in which an extra dose of magma wells up to form a topographic peak. As normal sea-floor spreading at the Reykjanes ridge continues, this peak, originally located at the ridge crest, would split, and the two halves be pushed aside, to be added to the arms of the V. Meanwhile, the wave that created the first peak moves southward to form another.

As the flow spreads southward, the theory continues, it loses momentum and slows down, so that each successive topographic peak is closer to the one before it, and the V's become progressively narrower. The angle between the limbs of a V-shaped structure and the axis of the Reykjanes ridge, Vogt says, are thus a measure of the rate of flow from the Iceland plume. This rate, at the point where Vogt and Johnson made their observations (about latitude 61 degrees north), is about six centimeters per year. Johnson says the mantle wave that formed the V they found probably left its source under Iceland 5 million to 7 million years ago.

The rate of spreading at the Reykjanes ridge is about a centimeter per year. If mantle convection from the plume moves the crustal plates, Vogt says it is encouraging that the calculated outward flow from Iceland is greater than the rate of ridge spreading. "It had to be greater; otherwise it couldn't exert enough viscous traction to crack or separate the crust and then drive the two plates apart." Vogt and Johnson believe mantle plumes may not be the only force driving the plates, but that they are important in certain locations.

Though the two researchers found only one such V-ridge, Johnson points out that bathymetric charts of the ocean south of Iceland reveal V-shaped shallow contours that may, he believes, be ridges such as the one they found. The researchers predict that similar V-ridges may be found near other hot spots, such as one in the Azores. ☐