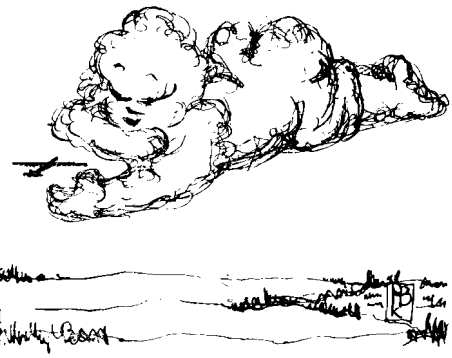
Standing Wave



Despite war conditions by far more severe than ours, the British still show keen interest in all subjects pertaining to motorless flight. A number of their aviation magazines devote considerable space to gliding and soaring with most articles stressing the importance of it in the post-war era as a medium of aviation education, research and development of aeronautical skill.

One of such articles, an excerpt of which is reproduced here, was published in the January 1945 issue of the British Magazine "Aeronautics." Its author Terence Horsley is a former glider pilot.

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THE least known of all the phenomena met under the roof of the Tropopause is the Standing Wave. It is not aggressive or evil in its character, but is quite sensational in its effect, having carried pilot and sailplane to an altitude as high as 28,125 feet. Wherever it occurs it creates an ocean of moving air which in meteorological sense has never been fully explored.

In simple terms, it is the result of a stream of air flowing over high ground and encountering a step to a lower level so that the stream follows the contours of the ground until it rises up again forming a series of standing waves to leeward. The same effect is seen in a smooth stream of water when a submerged rock causes a series of ripples or standing waves on the downstream side.

When the German soaring pilot, Erwin Ziller, flying a Kranich sailplane, entered the cloud at the crest of the wave which formed on the lee side of the Gian Mountains in Silesia on the 21st of November 1938, he expected the sensational result which followed and was equipped with oxygen and warm clothing. "I entered the cloud at 11,800 feet" he writes, "and the instruments immediately became iced up. I had to do without them for a long time. I was still in the cloud at 21,300 feet, when I made an attempt to get into clear air. This brought me into the downward part of the wave and I was carried back to 7,500 feet." Ziller then made another attempt in which he found again the upward portion of the wave and climbed to over 28,000 feet. "From 19,000 feet to the summit," he says, "it was necessary to fly through ice clouds where the temperature fell to minus 40 degrees Centigrade, so that even my fur boots gave little protection from cold."

Glider pilots have long sought for vertical currents of such an extent and all knowledge of it belongs to their fraternity. An experiment conducted by several glider pilots in the famous wave which forms along the Hartside Ridge in Westmorland resulted in the capture of a British altitude record for gliders.

The phenomenon at Hartside (where the fells of the Pennine Range drop suddenly for 1500 feet to the floor of the Eden Valley) was well known in the last century. It was signalled by a bar of cloud which formed parallel with the ridge at between 2500 and 5000 feet and hung there for as long as three days, revolving visibly like the shaft of some giant piece of machinery. Immediately above it, and sometimes as high as 16,000 feet, a second bar might form, and at times of high humidity this would be joined to the lower cloud by a solid wall of vapor which would stand up in the heavens like a prison wall. Downwind across the valley at intervals of a few miles the formation would be repeated, the sky in between always being blue and cloudless.

The farmers did not seek to explain the phenomenon, but they took very practical precautions with their hay ricks and their houses. They built the latter without any windows in the eastern wall, and so weighted the former that the furious wind which would rush down the slope with a strange roaring sound should not pick them up and carry them away. In later years, a scientist who set up an observatory on the slope of Cross Fell a few miles to the south, discovered that the wave favored an inversion at between 4000 and 6000 feet, and that when this was accompanied by a very strong wind from the north-east it was reasonable to expect the appearance of what has become known locally as "The Helm." It blew, perhaps, three or four times in a year.

According to the theory of the pilots of Newcastle glider who sought to ride this wind (and which was later proved in practice), the wind was pouring over the ridge and down its 1 to 5 slope with an accelerating velocity. Instead of shooting out overhead and leaving a calm area under the shelter of the slope it was clinging to the ground, creating the roaring noise which was already famous and wreaking periodical havoc among cottage roofs and crops. Then, at the bottom of the slope, the air