



Exhibition Plant Houses, Royal Botanic Garden, Edinburgh.

at the University of Liverpool (see *Nature*, **222**, 613; 1969) each receive one of the new awards.

On the new universities, the trust describes the designs for the University of East Anglia as the "boldest" of the master plans for the twenty-two new universities established in the past ten years. The first stage, which has been designed by Denys Lasdun and Partners, is set on the south-facing slopes of an open valley. Much of the credit for the high standard of university building, the trust says, is "due to the enlightened commissions" from the universities. "Why," it asks, "should not every government department and nationalized industry be given an equal lead in every new building for which they are responsible?" This is not to say that government departments do not win awards from time to time—indeed, the trust notes one or two schemes in the latest batch of awards—but, compared with the universities and with office buildings, government sponsored building is, as the trust says, not impressive. One that has made the grade is the Exhibition Plant Houses which have been built by the Ministry of Public Building and Works for the Royal Botanic Garden in Edinburgh. The buildings, which house subtropical and tropical plants, have supporting structures outside the glazing to protect them from the corrosive conditions normally found in plant houses. The assessor describes them as fitting in admirably with the adjacent herbarium (itself an award winner in 1966) and with their long horizontal lines and delicate pattern of external framing, they are "both gay and formal, an entirely appropriate character for their environment and one very difficult to achieve".

CONSERVATION

Italy's Obscene Harvest

THE Italian Government has ushered in what was to be known as European Conservation Year with a measure that could be described as inauspicious. It has passed a bill which permits the netting of small birds, a practice which was banned in most of its aspects three years ago, as a result of which some 10 million migrants crossing between Africa and northern Europe are expected to perish each season, beginning from this autumn.

The bill, which has been passed on the initiative of the Italian Minister of Agriculture and Forests, and with the zealous support of the Under-secretary at the ministry, Signor Arnaldo Coleselli, is said to be necessary because the 1967 law impeded the capture of

birds for scientific research. This has been denied by the Italian National Research Council.

An article in the Milan newspaper *Corriere della Sera* refers to the bird netting as an "obscene harvest" which will lose Italy friends abroad and even engender enough resentment to harm the tourist trade. Italy is the only European country in which small birds are netted for sport and eaten. A bill passed in 1967 which forbade the shooting of birds was intended to be the first step towards the total abolition of bird hunting. But the Ministry of Agriculture has now put the clock back against the appeals of the National Research Council and the protests of conservation societies.

ENGINEERING

Mr Howden's Ingenious Machine

AN engine that can convert the thermal expansion of solids or liquids into useful mechanical work seems, on the face of it, not to be the most workable of ideas. Mr Patrick Howden thinks otherwise. He has not only developed his thoughts far enough to get several universities interested, but has built a working model to prove his point. Although what has emerged so far is clearly primitive, Mr Howden—a London physicist—claims that his engine promises in theory to be more efficient than the internal combustion engine.

In its simplest form, the Howden engine consists of two long metal tubes forming an elongated V shape and mounted on a common pivot. One is heated while the other is cooled—in the model this is done by passing hot and cold water through the tubes—and the effect of the expansion is to move the base of the V horizontally. The cycle is completed by cooling the first tube and heating the second, whereupon the base moves in the opposite direction. A ratchet converts the oscillations into continuous rotation. In a televised demonstration this set-up achieved a speed of one third of a cycle per second, but six cycles per second are apparently feasible.

The difficulties to be overcome are both theoretical and mechanical. The industrial development unit at the University College of North Wales, Bangor, has performed a thermodynamic analysis which reveals that, to obtain an efficiency of 50 per cent, pressures of a million atmospheres would be required within the expanding metals. In spite of this result the unit is continuing to investigate the engine's possibilities, for it may be that given the basic idea someone will be able to envisage a more practical way of applying it. Mr Howden, undeterred, has higher hopes for a version that would use a liquid of large expansion coefficient as its working substance instead of a metal; and obviously higher temperatures would be needed than can be attained with water.

On the practical side, the present form of the Howden engine makes heavy demands on the metal from which the expansion element is made. The model uses aluminium, but the desired combination of a large coefficient of expansion with high thermal conductivity might lead to a search for new materials if the engine is ever developed. Its advantages would include cheapness and reliability, and it could run on absolutely any fuel. But at the moment the Bangor unit finds that the problems arising from theoretical work on the engine are somewhat discouraging.