

Apart from the use of natural light-weight aggregates the first attempts to produce light-weight concrete artificially were directed along these lines.

With the introduction of artificial light-weight aggregates such as perlite and vermiculite the theory has changed to virtually foaming the aggregate instead of the concrete. This change of technique produces an aggregate suitable for the making of light-weight concrete by normal methods as used by the farmer or anyone making concrete by semi-controlled methods.

With air-entrained or foamed concrete a balance must be struck between required strength and insulation properties, the density and relative strength being varied by the degree of foaming or air entrainment given. Under these conditions water, foaming additive, cement, and sand ratios and mixing times are critical to produce a concrete of any particular density and must be closely controlled for each batch or mix to ensure no variation between mixes.

Light-weight aggregates, being foamed in themselves, can be produced in densities regulated by the gases given off by chemical reaction during the calcining process. This differs with the raw materials used. Some minerals when treated become virtually a mass of tiny bubbles giving an extremely light aggregate; others have varying degrees of air impregnation which will produce concrete of corresponding densities.

With the very light, highly bubbled aggregates concrete density can be controlled by mix proportions; for example, with one particular aggregate a mix of 1 part of aggregate with 1 part of cement produces concrete of a density of 84lb. per cub. ft., whereas a mix of 8 parts of aggregate with 1 part of cement produces concrete of 21lb. density.

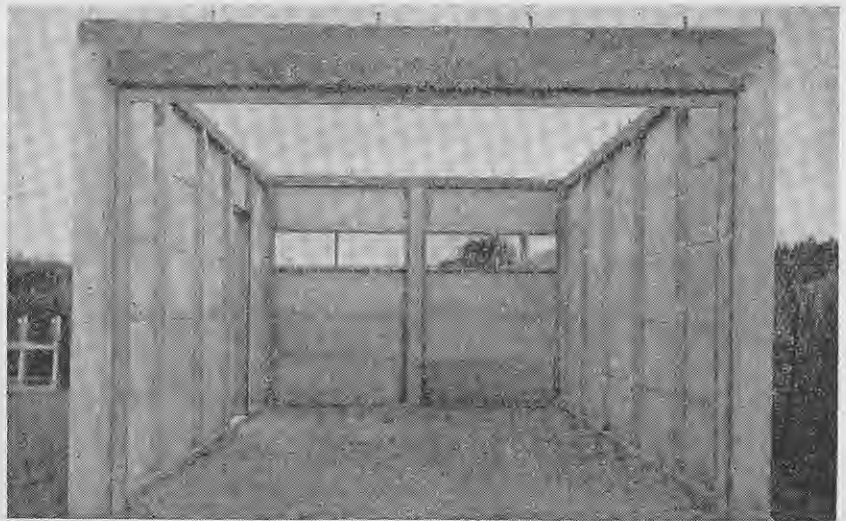
The density of concrete produced with aggregates having more of an air-entrained nature than bubble formation, though depending on the density of the particular aggregate used, can be varied to some extent by grading the aggregate. Generally the larger is the aggregate the less dense the resultant concrete.

Foamed Concrete

As foamed concrete lends itself to factory production, unit building materials can be factory produced. If these are designed for simplicity of erection, they give a satisfactory building from permanent materials.

A method of using foamed concrete units for building construction is shown in the illustrations in this article of an implement and storage shed and a garage.

The construction to top plate level is carried out in piers and panels. The strength and rigidity sacrificed in producing a light-weight panel are regained in the piers and reinforced-concrete top band. Both piers and panels are pre-cast in foamed concrete



A garage being built with reinforced panels and piers of foamed concrete. The reinforced concrete top band, piers, and foundation give rigidity and support to the panels.

of a density of 90lb. per cub. ft. Grooves are provided in the piers into which the stepped edge panels fit. Both piers and panels are reinforced, the pier reinforcing being bonded into the foundation and top band reinforcing, thus producing a rigid structure. The foundation, piers, and top band provide the rigidity and support for the panels.

Being factory produced this unit building material requires very little labour for erection and can be produced quite cheaply. For example, the implement shed shown was erected complete with roof and guttering by 4 men in 8 days, 230 miles from the factory, at a total cost of 10s. per square foot, which compares more than favourably with the 8s. 6d. per square foot for the bare implement shed with steel frame mentioned earlier and which had a non-permanent sheathing in place of this permanent material.

Plastic Sealing Compounds

The conventional practice of sealing joints in sheathing members such as glass to window frames, butts in weather boarding, etc., against the elements is to use a putty or bituminous preparation which hardens with time. Ordinary putty composed of whiting and oil becomes rock hard in time and quickly cracks with repeated expansion and contraction. Even bitumen-based preparations harden out to become unserviceable. So-called non-hardening putties also harden in time, but take considerably longer than ordinary putty.

As nearly all structural joints are subject to working through several causes, any putty which sets hard is not a suitable medium with which to seal such joints. With the advent of

plastics putties have been produced which will not harden with age. These putties skin on the outside and can be painted over, but retain a permanently soft core which gives them flexibility. For this reason they are not suitable for sealing in places where the putty cannot be given some volume; for example, if used for stopping gaps or cracks up to $\frac{1}{8}$ in. wide, they will skin right through and become useless as a sealer. Where, however, they can be used in grooves say $\frac{1}{8}$ in. wide or as a fillet for sealing in corners such as glass in window frames, the skinning effect cannot penetrate right through and the soft, flexible core is retained.

Plastic sealers of this nature which are specially designed to seal moving joints permanently and satisfactorily are available in different types each particularly suited to certain applications. There are types for sealing cracks in concrete water tanks and joints in concrete slabs; there is a type which can be readily moulded into special jointing shapes for pipe flanges and other joints, and there is a type which can be used for all sealing purposes where ordinary putty can be used, provided it is given volume. This latter type is marketed in a form suitable for application by hand gun, which greatly simplifies its application, as fillets can be run or grooves sealed with an even disposition of material by simply operating the gun. Possession and use of one of these sealing guns constantly bring to light new uses for this material such as the sealing of joints in replacement guttering, which is normally a difficult job, as the guttering is under the overhang of the roofing.

These guns are not expensive and are an excellent means of applying the