solid with projections on the rear face to bond with like projections on the blocks laid up to form the opposite face of the wall. This gives a good bond and is a simple arrangement easily cast allowing a wetter mix than that generally used in block construction.

All these efforts have made an appreciable improvement over the solid wall type, but generally the air spaces provided have been unnecessarily large and allow convection currents within the closed space.

A comparison of the results obtained by some of the above with the results of refrigeration insulating has led to investigation in a general way as to what might be done by using concrete as the structural member of the wall and combining with it an efficient insulating material.

As a basis a monolithic concrete wall 4 inches thick with 1 inch of corkboard insulation has been considered. It is not the intention to say that either the 4-inch concrete or the 1-inch corkboard is an ideal. In actual practice the thinnest concrete that will give adequate service and any insulating materials of the requisite qualities for the work should be used. There are many insulating materials on the market and if a demand is created for still different ones we may be sure that some resourceful manufacturer will soon be able to meet it.

There is no perfect insulating material. Of the more common ones the heat transmission factor varies very closely in proportion to the density of the structure. The cellular ones such as wood, pitch, cork, wool, etc., are best for house insulation. Any of these materials must be kept dry to give the best service.

The following table from "Mechanical Refrigeration" by Prof. Macintire of the University of Washington, gives the heat conductivity of some of our common building materials. The table indicates heat conductivity per square foot per inch thickness per degree difference in temperature per hour.

1 in. Common brick	4.66
1 in. Concrete (1:3:5)	4.29
1 in. to 4 in. Hollow tile	0.625
⅞ in. Lumber (tongued and grooved)	0.83
Air space (from 1 in. to 6 in. thick)	1.66
1 in. mineral wool	0.67
1 in. builders paper	0.30
1 in. pitch	0.79
1 in. shavings (dry)	0.67
1 in. granulated cork	0.48
1 in. cork board (all cork, compressed)	0.26
1 in. cork board (artificial binder)	0.28
1 in. hair felt	0.31
1 in. indurated fibre board	0.42
1 in. compressed mineral wool board	0.33

For thickness of insulating materials up to 8 inches the conductivity is in almost inverse proportion to thickness. The effect of change of temperature on conductivity is very slight through the range of temperatures required in house heating.

As a comparison of the 4-inch insulated wall with the two usual types of furred concrete walls the following is submitted from heat transmission tables compiled by Wm. R. Jones of the University of Pennsylvania. The heat transmission factors are:

(1) 8 in. solid concrete wall with 2 in. terra cotta or wood furring and plaster ..... .53

(2) 8 in. hollow concrete wall (two 4 in. thicknesses of concrete) centre air space and furring as above ..... .38

From Peclets formula the transmission factor of—

(3) 4 in. concrete wall with 1 in. cork board .18

Assuming that we have a house 26 by 26 feet in plan, two stories high with 1,450 sq. ft. net wall area, an average difference in temperature of 35 per cent. for 20 hours per day would show the following amounts of coal burned to make up for heat losses:

(1) 53.65 pounds per day.
(2) 38.57 pounds per day.
(3) 18.27 pounds per day.

Thus it is seen that the thin insulated wall would show a saving over the other types of 35.38 and 20.30 pounds of coal per day respectively.

Assuming that the condition as above continues for an average of 150 days each winter and that coal will cost $12 per long ton (U.S.) the savings capitalized at 6 per cent. for a thirty-year period would justify expenditures of $400 and $228 respectively for the insulated wall over the other types. Or to come back to the square foot unit, 27½ and 15.7 cents respectively.

The saving of materials in the thin wall and the space saved by using them can be computed readily. If the same outside dimensions are maintained in the house the floor space for the thin type wall would be approximately 11 per cent. more than with the usual types.

The matter of increased comfort to the tenant has not been given a money value, but it is safe to assume that from a commercial standpoint that would be far more than any of the preceding. Once a builder has established a reputation for making a safe, satisfactory, comfortable house, economical in maintenance, he can be assured that his services will be in constant demand and his profits can be larger as a consequence.