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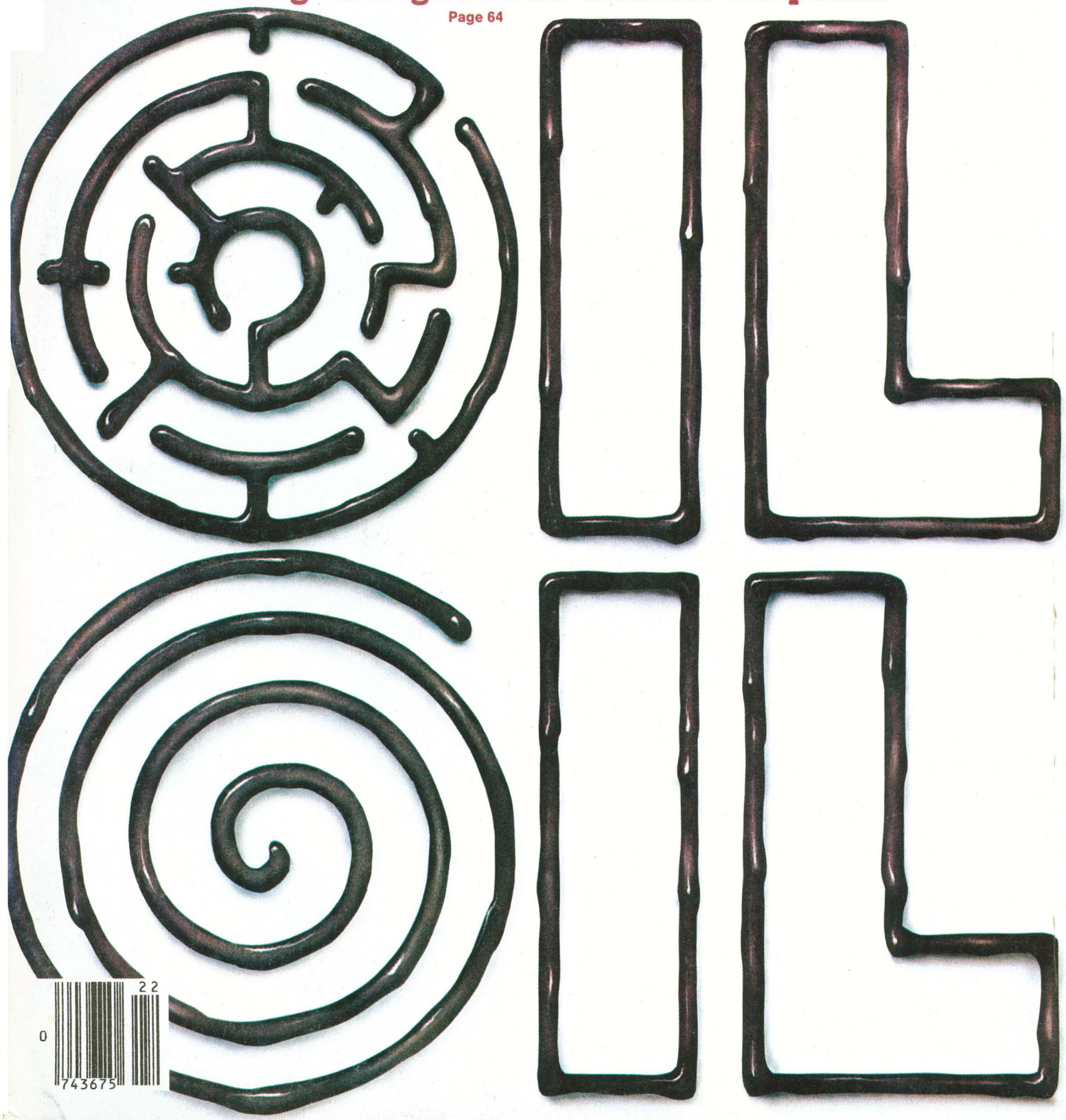

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The sunny future of passive solar energy

Architects and homebuilders may have found the closest thing yet to a free lunch: passive solar design. By taking a few relatively simple and inexpensive steps in the design of a house, they can slash the house's heating requirements by 50% or more compared with a conventional design. And, unlike solar hot water heating, there are no pumps, valves, or other moving parts to fail.

In passive solar design, the house is positioned on its site and so built that large windows face southward to capture the sun's rays, and it is provided with thick, interior brick walls, for example, to absorb and store the heat. Until recently, such features were mostly a fad, limited to costly, custom-built homes.

Today, in a disastrous housing market, passive solar homes are one of the few bright spots for builders. "About 15% of the homes being built today include some elements of passive design," says Michael A. Bell, assistant director of technical services for the National Association of Home Builders. Within a few years, he believes, nearly all homes will be built to take at least some advantage of solar energy.

Passive solar is not without some problems, and the term "passive" is the main cause. Many homebuyers are suspicious of claims for reduced heating bills because they cannot see any devices, such as solar collectors, that would do the job. And even honest builders find it hard to predict savings accurately. "We need the equivalent of a miles-per-gallon rating for homes," says Harrison Fraker, a Princeton (N. J.) architect.

No tax credit. Moreover, passive solar features are not eligible for the 15% tax credit that homebuyers can take for insulation and active solar devices—this despite the fact that passive designs may save more energy than solar collectors. "The IRS apparently decided, 'what the hell, they're going to put windows in anyhow—why give them a tax break for that'?" says the NAHB's Bell.

None of these problems, however, have been serious enough to slow down the growth of passive solar homes. So far, most of the activity has been by small builders in the West and Southwest. In Santa Fe, N. M., more than 5% of the city's population turned out one weekend in April to inspect a passive solar tract house built by Communico Inc., a local company. Communico signed up enough buyers to meet its 1980 production target of 10 houses.

Although passive solar's payoff is greatest in such areas, where the sun is strongest and heating requirements lowest, the technique is by no means limited to Southern climes. Los Alamos Scientific Laboratory, which does studies for the Energy Dept., estimates that passive solar design can supply 80% of a home's heating requirements in the South or Southwest, and 70% in the North—in both cases cutting in half the normal total costs of heating. Notes architect Fraker, who is designing passive solar homes that will be built in a large development in St. Charles, Md.: "You need more insulation in the Northeast and more glass because there isn't as much sun, but passive solar is only slightly less cost-effective than in the South."

Mimi Forsyth

Communico's Nichols: Fast sales for a solar house.

Other larger builders are beginning to get involved. Carroll Brock, senior vice-president of M. J. Brock & Sons, of Sacramento, which puts up about 500 homes a year, says that "wherever possible, we're laying out the lots so the house is oriented in a north-and-south direction to receive the most sun." Brock says his company has tried also to adapt its designs so that a large amount of window space can easily be put on the southern side of the house, whether that is the front or back.

Research program. Many of the largest builders are only now investigating passive solar. Some of their interest is due to a $5 million research program of the Energy Dept.'s Solar Energy Research Institute. SERI has signed up 25 of the country's largest homebuilders and building products manufacturers to design and test passive solar techniques for large-scale tract housing. "These are the guys who can make a difference in a hurry," says Michael Naybaum, chief of Energy's Passive & Hybrid Building Div. The first prototypes incorporating passive solar systems will be built this year. Energy hopes to see 2 million passive homes built in the U. S. by 1986 and 50 million by 2000.

Passive solar is hardly new. Desert peoples built thick-walled adobe huts that would store heat during the day and release it at night. Cliff dwellers selected south-facing caves. The Greeks designed entire cities with south-facing windows and thick interior walls to capture and retain the heat from the winter sun. More recently, Victorian solariums were passive solar systems.

Now many architects are relearning techniques that were discarded early in this century when a combination of cheap energy and efficient central heating systems became available. They are adding new techniques, however, such as "phase change walls," which contain liquids that freeze during the night and thereby release heat. They are also using "movable" insulation—highly reflective coverings that can be rolled down over outside masonry walls at night, or louvers that can be shut easily. "Passive solar is 30,000 years old in terms of technology," says Wayne D. Nichols, vice-president of Santa Fe's Communico, "but only three years old in terms of scientific research."

For the most part, however, passive solar systems rely on traditional tech-