

# MAKING THE TOOL TO MAKE THE THING: THE PRODUCTION OF R.G. LETOURNEAU'S PREFABRICATED CONCRETE HOMES

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## DESIGNING THE MACHINE OR PRODUCT?



Figure 1. *All's Fair at the Fair*, 1938, still from the cartoon, National Telefilm Associates, Inc., A Max Fleischer Color Classic. Direction Dave Fleisher, Animation Myron Waldman and Graham Place, Approved Certificate No. 01979 Western Electric Noiseless Recording.

While researching prefabricated housing, I was intrigued by the 1936 cartoon *All's Fair at the Fair* that my children were watching (Figure 1). At first I saw the cartoon and didn't think much about it; later I realized the relevance. The machine and methods that created the house are modern in design while the design of the house remains traditional. It seemed to me that more thought went into the design of the machine than went into the design of the house. The machine was a complex Rube Goldberg-like contraption; the house was conservative and traditional.

## EXPERIENCE WITH PLACE

When I talked to my father about my interest in prefabricated housing, he mentioned that I lived in a prefabricated house. Puzzled, I asked him what he was talking about. As I had no recollection of living in a prefabricated house he said the "little white house" at "LeTourneau," it was a prefabricated house. I have always had a

really strong memory of the place; I remember the heated, polished concrete floors in the winter; I had wrongly assumed that the house was built of concrete masonry units. He said that it was made by a machine that LeTourneau had invented. The machine, as I would discover, was the Tournalayer.

Robert Gilmore LeTourneau was my father's employer from 1964-1975 in Vicksburg, Mississippi. The "little white house" community in Vicksburg had been created in 1945 by R.G. LeTourneau Inc., where my father and grandfather learned to weld and manufacture LeTourneau's large equipment.

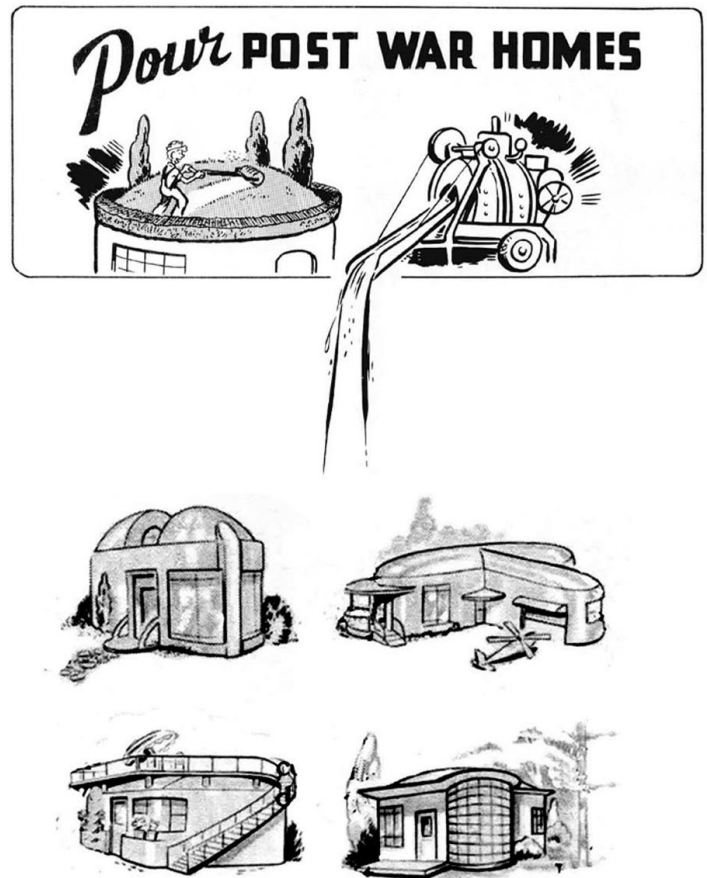


Figure 2. "Pour Post War Homes," Detail from *NOW*, Feb. 18, 1944, Vol. 8 No. 40. *NOW* is the in-house publication of R.G. LeTourneau Inc.

LeTourneau would make his own machines to make his own machines. When he had a need, he would not hesitate to create what he needed as well as the tools to make it. As an example, LeTourneau asked Firestone to produce large tires for his large equipment. Firestone couldn't make the mold because they didn't wish to invest the money or time. LeTourneau asked what they needed for a mold and then proceeded to make and deliver the mold to Firestone.

LeTourneau, having several manufacturing plants, had many employees. He began in Stockton, California and expanded to Peoria, Illinois - Toccoa, Georgia - Vicksburg, Mississippi - and finally Longview, Texas. The first two locations already had infrastructure; when he started the plant in Toccoa, which had no infrastructure, he designed, patented and manufactured a steel panel house system that he would first use for his employees to develop a community. When World War II began, steel was only used for "necessary" equipment. In 1943 he experimented with concrete as a monolithic housing material; the steel panel housing had been monolithic in material as well. There appeared to be a pride with applying one material to solve all design problems. This self-imposed limitation had a bearing on the designs.

#### LEARNING FROM FAILED EXPERIMENTS

In Vicksburg, LeTourneau began to experiment with concrete forms and developed a patented double-wall system.<sup>1</sup> He designed a kit-of-parts of different cast concrete forms that were designed to connect together to form the home (Figure 2). He would never connect any of the forms because he felt the curved walls were too limiting spatially. He designed roof gardens, occupiable roof conditions and interlocking curvilinear forms. He imagined that the homeowner would select their own kit of parts to suit their needs and property configuration as well as be able to expand their home at a later date due to the ease of connecting the pieces. The pieces were not made by a single machine like the Tournalayer but by a crane, mixer and multiple complex forms.

Several different concrete pieces of the kit-of-parts were actually constructed but were never assembled into larger units. After experimentation of the curved forms LeTourneau decided to develop a machine that would form rectilinear sections. The rectilinear forms could be connected and stacked with greater ease. The resulting machine was the patented Tournalayer. He would decide to design a machine that could have forms that would cast straight walls with an integral flat roof and ceiling. He would market the Tournalayer with some success as there were many communities of these homes (See Figure 3).

Experimentation and invention were constant with LeTourneau and he was not afraid of failure; only a small percentage of his machines worked as intended initially, they would be fine-tuned later, but the ones that did - worked well. Ultimately, LeTourneau was a craftsman who used his knowledge of earth moving equipment to create several housing systems that established communities across America and

eventually the world.<sup>2</sup> LeTourneau's ideas on how to create new techniques for production and new forms of housing constantly evolved from the mid 1930s until the mid 1960s and now serve as a point of reflection for architects to consider how the principles of the machine crafted home can still be pertinent to architecture today.

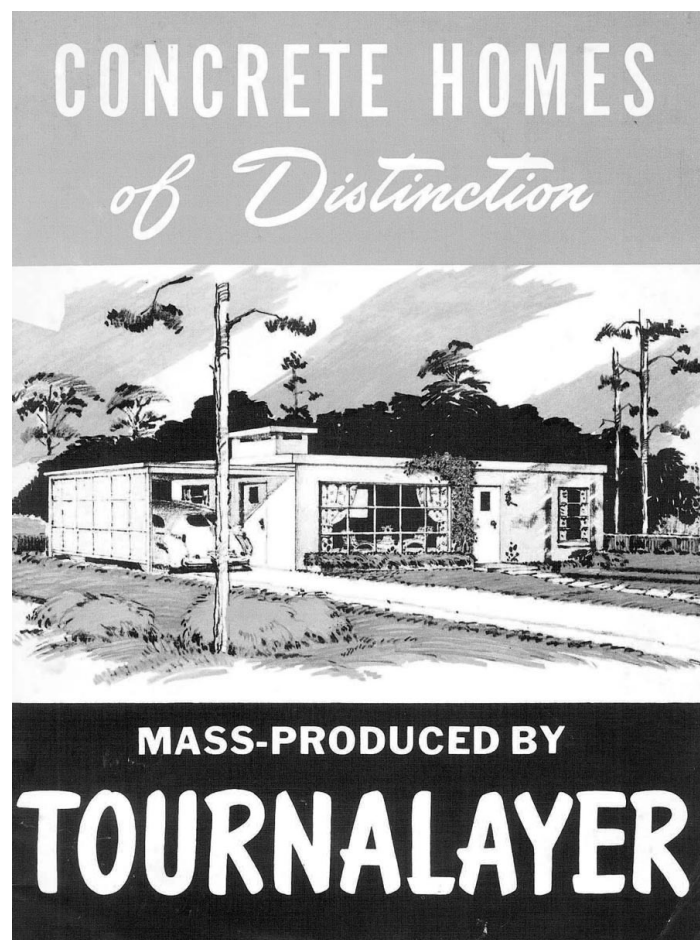


Figure 3. R.G. LeTourneau, "Concrete Homes of Distinction: Mass-Produced by Tournalayer," 1947 Pamphlet. File R1-10, courtesy of the Margaret Estes Library, Letourneau University, Longview, Texas, Robert G. Letourneau Collection

#### MAKING THE TOOL

Using Martin Heidegger's outline as to what brought about the final technology that produced the Tournalaid homes we can unravel the material of the final forms, the shape in which the material finally enters (and evolved), and the "causa finanalis" in which the everyday life of the inhabitants of the homes dwell(ed) daily.<sup>3</sup> The ordering of the parts themselves reveals in itself a way to understand the series of events.

Being involved in earth moving equipment design and construction, LeTourneau had used other manufacturers "prime movers" such as the ubiquitous Caterpillar tractor. The Tournalayer was made up of

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several of LeTourneau's inventions. The main driving force was the two-wheeled tractor called the Tournapull.<sup>4</sup>

The immense size of the Tournalayer enabled it to create large sections of houses or whole houses. The Tournalayer was bolted so that it could be disassembled and shipped by train and ship. The communities that were created were located near railroad lines or waterways for shipping.

LeTourneau would develop much of his own technology as well as rely on others already developed technology. He gave attribution and appreciation for others hard work and designs. He would also improve upon others designs. He approached Westinghouse to ask them to design and build a motor that would start under a dead-load; they said it could not be done, so he designed, patented and built it himself.<sup>5</sup>



Figure 4. Tournalayer No. 2, Peoria, Illinois, Concrete house casting and laying system in the process of construction, 1946, Courtesy LeTourneau University Archives.

Figure 4 reveals the inner and outer forms and how they and the Tournapull is connected on the lower right. The inner form would have the door and window openings located with wood or steel forms, and then the reinforcing steel would be added. The outer form would then be lowered over it and the concrete poured. Many different forms were constructed for each Tournalayer. Two story houses, occupiable roof conditions and irregular plans were obtained with these forms.

Once these forms set, the Tournapull and Tournalayer would pick up the house and place it at another location. The cast house was poured at a central pouring location and carried to the final site.

Much like the first cartoon 'All's Fair at the Fair' LeTourneau designed and built the machine that made the house. There was

still work to be done after the house was laid; the floor still needed to be poured and the openings needed to be filled with windows and doors, and the houses were typically painted on the interior and exterior.

Before Robert Gilmore LeTourneau began his plant in Peoria, Illinois he was called Bob. When he started the plant there, he was then called "R.G.", because, as one of the men in the plant jokingly said "we thought R.G. stood for Rube Goldberg." LeTourneau's machines were complex and made to accomplish a simple task, much like the drawings by Rube Goldberg.

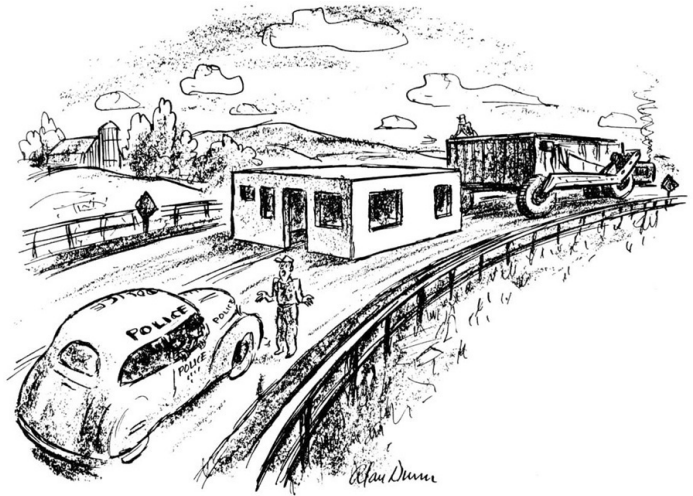


Figure 5. Alan Dunn. *The Last Lath: An Architectural Record Book*, New York, 1947. Caption: "I'm terribly sorry about the Tournalayer, sir – we didn't know it was loaded."

### MACHINE FOR PRODUCTION

The Alan Dunn cartoon in Figure 5 pokes fun at the Tournalayer as if it was a gun loaded with house-bullets that could dispense houses at will and little effort. The Tournalayer required much more than just the base Tournalayer itself. It would need a Tournacrane<sup>6</sup> and Tournamixer.<sup>7</sup> The Tournacrane helped to assemble the heavy forms that the Tournalayer required; it also was used to assemble the Tournalayer itself as it would arrive in pieces to the construction site typically by train. The Tournamixer would be invented to deliver the concrete to the top of the form and it would pour concrete up to 16 feet.

The arrival of LeTourneau to Longview, Texas was a large event and an entire edition of the local newspaper dedicated to his story. Many pieces of his equipment were on display including the Tournalayer. For the Longview, Texas plant's grand opening, LeTourneau poured and placed a house in order for thousands of people to tour it. A community of around one hundred houses was created on LeTourneau property in order to house his employees. The Vicksburg community of around one hundred houses had already begun and was well under way with the first Tournalayer.



## EVOLVING HOME DESIGNS

Frank Lloyd Wright was involved with prefabricated home design in 1915 where he stated that “there will be a new simplicity, a machine-made simplicity.”<sup>8</sup> He also understood that the houses would evolve and become a “harmonious whole.” He believed the machine-made house would become a reality with the guidance of designers who were understanding of the new technology.

As more and more Tournalaid communities were established in the United State and around the world, the designs of the home evolved as owners and contractors required more complex forms from the Tournalayer. In many locations the solid form of the initial structure was the building block from which the house grew.

The first community in Vicksburg of simple “little white houses” was very different than the later houses that were created in French Mongolia, Israel, Brazil and Argentina. The later houses began incorporating more handwork and details. The first homes were produced more as molded objects whereas the later homes used materials other than concrete such as terracotta, occupiable roof decks and hand-laid masonry units. The later homes used a cast concrete base unit as a building-block, not as the finished product, and more controlled sensitive tuning began to appear.

While manufacturing processes may not at first allude to poetics, the potential exists for a meaningful dialog between the machine and the craftsmen to be forged. The manufacturing processes of the Tournalayer evolved from much experimentation. Many of the Tournalaid communities exist, thrive and have evolved.

The history of the Tournalaid communities demonstrates how building materials, innovative technology and the unique “house in a day” construction system came together to form neighborhoods with lasting cultural bonds. The Vicksburg Tournalaid community lasted for over half a century until the mid 1990s when it was destroyed; the Longview, Texas community has several houses remaining. In view of the fact that the Vicksburg houses have been removed, the community bonds and memories are still being revealed, though they are gradually becoming lost.

## ENDNOTES

- 1 R.G. LeTourneau. 1943. Building Construction. US Patent 2,469,603, filed Feb. 15, 1943 and issued May 10, 1949. Note that this experimental system was tested in Vicksburg, Ms. There were two of these houses constructed.
- 2 The Letourneau steel house communities were in Peoria, Illinois (1936-1940) and Toccoa, Georgia (1940- ). The Tournalayer/ Tournalaid communities that have been identified at the time of this paper are Vicksburg, Mississippi (1944-1990); Longview, Texas (1945- ); Muroc, California – *Edwards Air Force Base* (1947-2008); Yuma, Arizona (1948- ); Corpus Christi, Texas (circa 1949- ); Los Angeles, California (circa 1949- ); Sao Paolo, Brazil (1947- ); Toccoa, Georgia “Atomic Bomb-Proof Tourist Court” with Baby-Tournalayer (1951- ); Beer Sheva, Israel (1947- ); Monrovia, Liberia (1953- ), and French Morocco (1950- ) .

- 3 Martin Heidegger. *The Question Concerning Technology*. Harper and Rowe; NY. 1977, 6.
- 4 R.G. LeTourneau. 1946. Two-Wheel Tractor. US Patent 2,454,070, filed April 22, 1946 and issued Nov. 16, 1948.  
R.G. LeTourneau. 1946. Mobile Form and Transport for Cast Structures. US Patent 2,593,465, filed May 17, 1946 and issued April 22,
- 5 R.G. LeTourneau. 1950. Electric Vehicle Wheel. US Patent 2,726,726, filed Aug. 23, 1950 and issued Dec. 13, 1955.
- 6 R.G. LeTourneau. 1935. Portable Crane. US Patent 2,078,393, filed Oct. 15, 1935 and issued April 27, 1937.
- 7 R.G. LeTourneau. 1946. Cement Mixer. US Patent 2,492,299, filed Oct. 29, 1946 and issued Dec. 27, 1949.
- 8 Bruce Pfeiffer. *Frank Lloyd Wright Collected Writings; Volume 3 1931-1939*. Rizzoli; NY. 1992, 123.