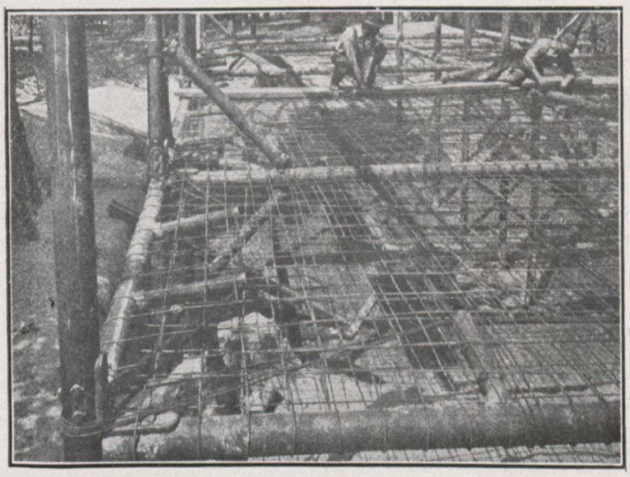
the architect of this residence, and the construction was carried out by G. A. E. Kohler, of Kohler Brothers, Fisher Building, Chicago. A complete skeleton of steel tubing was first erected, all the pipe being cut to length and drilled in the shop. The columns extend down to the basement floor and rest on concrete piers or footings which were the only foundation required. None of the pipes were threaded, but were put together with a special malleable fitting which was bolted through the column and girder. A number of different fittings have been devised, but in the construction of this building only one type of fitting was required and this was an angle cast in malleable iron concave on the side next the pipe. These fittings were bolted onto the girders in the shop and the girders were then poured full of concrete, and after the frame was erected the columns were filled with concrete, so that all bolts are cemented in position and the interior of the pipe is protected against corrosion. A frame of this kind can be set up with common labor and in a remarkably short time, as the only work is to hoist the pipe into position and bolt it together. The strength of the pipe is greatly increased by being filled with concrete, and in the construction of this building it



The Horizontal Truss System of Reinforced Concrete.

was found that the frame was so rigid that no bracing was required, although a system of diagonal bracing was originally planned.

After the pipe frame was completed, a system of horizontal trusses was constructed around the outside of the building on a level with the floors (see illustration), which formed an incompressible frame work upon which to draw the floor wires. These trusses were constructed by wrapping the wire around the columns and driving in short pieces of pipes for struts. The same method of trussing is used under the girders where especially heavy loads occur, and any desired strength can be obtained by using a sufficient number of wires.

After the truss wires were in place, wire was drawn around the girders in both directions, either the entire length of the structure or in such sections as desired, and these wires attached end to end with a specially devised coupler. This process gives a continuous wire stretched around the girders, drawn under a tension of nearly one thousand pounds, and left free to adjust itself to the strain as applied. For this purpose No. 0 to No. 3 wire was used, wound as close as required for the strength of the floor. The side walls were wound in the same manner and the window frames were attached to the wires with the same couplers used for joining the floor wires. The walls of each story were wound separately, so that it is impossible for a girder to deflect, as each girder hangs from the girder above, and is supported its entire length. Expanded metal or wire cloth was placed under the top wires of the floor and was tied to these wires with specially designed clips; this wire cloth served only as a medium to hold the concrete until it had hardened. The wires at this stage of the construction were very stiff and the floor could be walked on and for wheeling the concrete only a single plank was required. The concrete was dumped or shoveled onto this floor mattress and leveled off to an even surface. As the fresh concrete was placed the weight deflected the floor wires and, as they were wound continuous, they slipped over the girders and drew the under wires to a high tension with practically the same strain on every wire. When the concrete hardened each of the upper wires was thoroughly covered with concrete and the under wires, carrying the ceiling, were perfectly straight. Expanded metal or wire cloth was then applied to the under wires and the plaster was put on the ceiling in the usual way. Floors three inches thick and with spans from 14 to 16 feet were successfully constructed in this manner.

The outside walls were formed by applying wire cloth to the vertical wires, as above mentioned, and the plaster was put on the same as in any other form of cement plaster finish. Where hollow inside partitions were used, they were formed similar to the outside walls, but slight, solid partitions can be constructed with this method. Where partitions were to run, a horizontal wire was stretched in the floor before the concrete was placed and vertical wires were suspended from this one about 10 inches on centres. After the concrete was placed on the upper floor, these wires were attached to the wires in the lower floor, so that when the concrete was put on this floor the weight of the floor stretched the partition wires; wire cloth was then attached to these vertical wires and the partition was plastered in the usual way. The roof was constructed in the same manner as the floors and the finished cement surface was left exposed. This roof was finished with a float and has stood throughout the entire winter and spring and no leaks have developed.

The concrete for the floors was composed of one part cement, three parts lake sand, and five parts gravel; the roof was composed of the same concrete, on which was placed a ¾-inch covering of mortar composed of one part cement, three parts sand and finished with a wooden trowel. The walls, inside and outside, and the partitions were covered with Portland cement plaster; the outer walls were given two coats of plaster composed of one part cement (1 bag), three parts of sand (3 cu. ft.), hair to the amount of ½ bushel per barrel cement was mixed with the sand. The exterior was finished with a pebble-dash composed of one part cement and two and one-half parts coarse sand and gravel which passed a ⅜-inch screen and was retained on a ⅛-inch screen.

The residence is complete with plumbing, hot water heating and electric wiring all of which were installed without difficulty. With the exception of interior trim, no wood was used in the construction, as all exterior mouldings and ornament were formed of cement, cast on the ground and wired in place before the plastering was done.