

AN ATOMIC STRUCTURE MODEL

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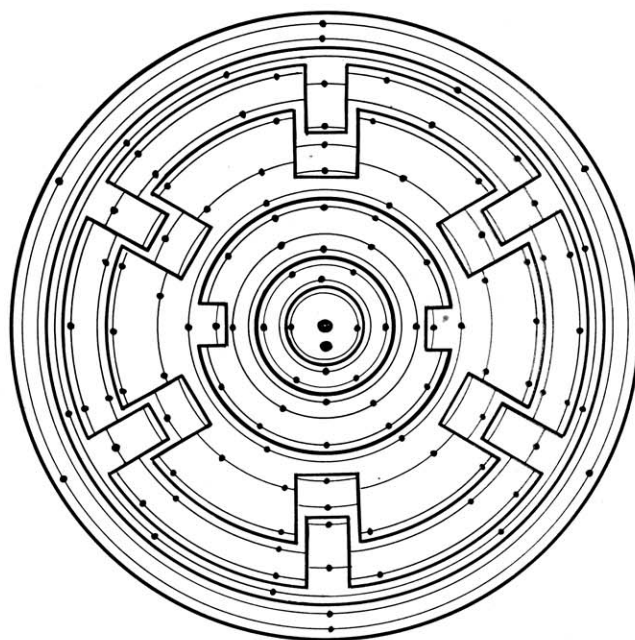
THE accompanying illustration is a drawing of a model which has been constructed by the author in an attempt to show the manner in which the electronic configurations of the various elements may be produced by adding electrons to a hydrogen atom.

In the actual model, the seven main electron shells are represented by discs of quarter-inch Upson Board each having two holes near the center (the larger black dots on the drawing) for mounting on two pegs driven into a wooden support. Two mounting holes are used so that the alignment of the discs will always be the same when they are assembled as shown in the drawing. The heavy black lines in the drawing represent the outlines of these discs some of which have cut-out portions for a reason to be explained later.

On these discs are drawn circles (the lighter circles in the drawing) representing the various subshells. These subshell circles are drawn with approximately uniform spaces between them on the discs in the following order: *1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 5f, 6d, 7s, and 7p*. It should be noted that the order of subshells *4f* and *5d* as well as that of *5f* and *6d* may be reversed in the cases of certain atoms and therefore these cannot be represented by means of this model. On account of the overlapping of the main shells, it has been necessary to cut out sections of some of the discs so that at least portions of all of the subshell circles will be visible when the model is completely assembled as shown in the drawing.

The discs should be painted in various pastel colors so that they may be distinguishable at a distance and the subshell circles drawn with black paint or crayon.

The heavy black dots on the subshell circles indicate possible positions of electrons. The positions of these dots have been arbitrarily fixed so that they will all be visible in the completely assembled model. In the model, these positions are indicated by wooden pegs



driven into the board. In using the model, electrons are represented by large wooden beads which are impaled upon the appropriate pegs depending upon which atom is to be represented. The pegs should be painted in a contrasting color so as to be visible, as should also the beads.

By means of this model the electronic configurations of the various elements can be shown, the principle that an added electron having a number of possible positions available to it will always occupy the one in which it will have the least possible energy (the one nearest the center) can be illustrated, and the difference between the transition elements and the others can be made clear.