by BOB RUSNAK

So You Think It's New . . .

This month I am going to deviate slightly from the former trend of this feature; in order to illuminate the past accomplishments of the TECHNIC, this month the feature will deal with a seemingly recent idea that was written up by this magazine several years ago.

The concept dealt with was the peacetime use of atomic energy. Amazingly enough the article was written in February 1934, before there was even a thought of using this vast energy source as a weapon of destruction.

Continually probing the mystery of the elements, scientists have resorted to many means of breaking down the more complex atoms into hydrogen and helium nuclei and studying the radiations and emanations occuring when these transformations take place. Probably the most interesting of these methods is that of bombarding metals with positive ions which are given enormous velocities by the use of high potentials. At the present time there are three such set-ups in the country; the gigantic one at The Massachusetts Institute of Technology, one at Washington, D.C. and one in our own East Physics Building.

Under the supervision of Professor James Cork, this super experiment is being set up and operated. The apparatus is housed in a very large room which extends in height through both the basement and sub-basement of the Physics Building. Perhaps the most striking object to one viewing the apparatus is the large aluminum sphere which is used to collect the electric charge. This sphere is six feet in diameter and was constructed in the shops of the University. It is supported by a "Texolite" pillar, eight feet high and three feet in diameter which is constructed of impregnated, laminated, pressed paper. The finished cylinder is coated with ceresin which is impervious to water and has a very high surface resistance. Since the sphere attains very high voltages, the pillar must be made of excellent insulating material. The base of the pillar rests on a large compartment which houses the equipment for spraying the electric charge on moving belts which carry the charge to the sphere at the top of the pillar.

In order to produce very high voltages which serve to accelerate the ions, it is necessary to get as much charge on the sphere as possible, since its voltage is proportional to its charge. The moving belts which carry the charge from the base of the pillar to the sphere move inside the pillar. They are made of paper sixteen inches wide and each is capable of supporting one and one half tons in tension. The charge is sprayed on these belts at 20,000 volts with a screen arrangement. A device in the sphere takes the charge off the belts, transferring it to the sphere. Theoretically it should be possible to reach a voltage of 3,000,000, Professor Cork said, but so far the maximum obtained has perhaps been about 1,500,000 volts.

Projecting from the side of the sphere to a balcony in the room is a large, horizontal glass tube, seven feet long and four inches in diameter. In this the positive ions are given their acceleration. The tube is kept evacuated by means of a mercury pump. Nine corona shields encircle the tube in order to keep the field constant. Inside the sphere is equipment for heating a specially prepared filament which gives off positive lithium ions. This filament is mounted at the sphere end of the evacuated tube. The ions are accelerated by the very high voltage of the sphere and strike the target at the other end of the tube with an enormous velocity. When an ion smashes into the target it has been found that nuclear transformations may occur, giving rise to entirely different atoms than those of the elements used. At the present time Professor Cork is bombarding lithium with lithium. As this element appears in nature, it is a mixture of two isotopes of atomic weight six and seven respectively, hence three possible results of the bombarding present themselves. The end products to be expected are alpha particles (helium nuclei) and perhaps the newly discovered particles, neutrons and deuterons.

The products formed in the nuclear collisions are at present detected by observing their range with a "Geiger Counter." This is an arrangement of ionization chamber and vacuum tube amplifier, such that a single alpha particle entering the chamber will actuate a counter in the output circuit of the amplifier. Thus a record of the total number of particles arriving in any interval of time is obtained. The instrument is so sensitive that cosmic radiation moves the pointer every so often and a radioactive substance held close to the ionizing chamber makes the pointer move at a lively clip.

At the present time Professor Cork and his assistant are setting up a "Wilson Cloud Chamber" method of observing the ionized particles and expect to put it to use in a short time. This consists of a chamber containing air and saturated water vapor. In passing through air, the alpha particle creates a multitude of new ions. Now if the chamber is suddenly expanded, vapor condenses on the ions formed, leaving a trail which can be photographed thru a transparent window in the chamber. Two photographs are taken simultaneously from different angles, in order to give a three dimensional picture of the path of the ion.

Measuring the voltage of the sphere presented a variety of difficulties but they have been overcome by using a substance known as xylene for a resistance. Xylene is a liquid having a very high resistance and is contained in a long, thin, glass tube which runs from the sphere to the base of the pillar. A galvanometer measures the current through the resistance and hence the fall of potential.

Great strides have been made by scientists in laying bare the riddle of the atom. Who knows but what the near future will see further discoveries made which will eventually lead to harnessing of the atomic energy?