



**AUTOMATIC PUNCH PRESS**—A forerunner to an automatic assembly machine, the work of the punch press is controlled by an electronic computer, which reads information on the size, number and location of holes to be punched from a perforated card. The techniques employed to make it automatic may also be applied to machines for drilling, riveting, etc., the General Electric engineers who developed the punch press state.

## PHYSICAL CHEMISTRY

## New Atomic Clock

► AN "ATOMIC CLOCK" has been developed to measure reliably the age of 44,000-year-old relics to within 37 years.

Devised by Dr. James R. Arnold, assistant professor of chemistry at the University of Chicago's Institute for Nuclear Studies, the clock measures the strength of radioactive carbon 14 as the first step in finding the age of the sample.

Carbon 14 normally is found in all living things. After being formed, it decays at a definite rate—a fact that makes it useful as a tool for dating ancient objects.

The new "atomic clock" uses two photomultiplier tubes to watch for tiny flashes in a fluorescent solution containing a dissolved sample of the specimen to be dated. The photo tubes are so sensitive that they must be kept at food-freezer temperatures.

The liquid sample is housed in a four-inch long tube surrounded by a container of liquid mercury, which provides a compact shield against the background radiation produced constantly by cosmic rays.

When the photo tubes detect bursts of light in the solution, they amplify the light's energy and translate it into electrical impulses. The strength of these impulses is proportional to the intensity of the light flashes. Through an electronic system, the impulses are sorted out. Only the ones at the energy level of the radiation given off

by carbon 14 are counted. From this count, the sample's age can be determined.

The new atomic clock is an improvement on the original technique worked out in 1949 by Dr. Willard F. Libby, professor of chemistry at the University's Institute for Nuclear Studies. Dr. Libby's method does not date objects as old as does Dr. Arnold's technique, nor does it have the accuracy of the latter's.

Dr. Libby's method is reliable to about 25,000 years in history with a possible error of 120 years. Dr. Arnold has pushed the time back to 44,000 years and increased accuracy to 37 years. His system has a potential accuracy of 17 years, he told the Scintillation Counter Symposium in Washington.

Dr. Arnold's technique has not yet been applied to the dating of archaeological relics, or of samples of wood or petroleum, or items of geological interest. His method, he pointed out, holds promise for industry in investigations dealing with rusting, gasoline processes and nutrition.

Only small amounts of carbon 14 would be required using Dr. Arnold's technique.

The two-day conference was sponsored by the American Institute of Electrical Engineers, the Atomic Energy Commission, the Institute of Radio Engineers and the National Bureau of Standards.

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## PHYSICS

## Topsy-Turvy Top Throws Scientists in Turmoil

► THE RED-AND-WHITE topsy-turvy top that tips over on its slender stem and spins "like a sleeper" has thrown scientists into a tizzy for an explanation.

The toy made its debut several years ago both in this country and abroad.

When not in action, it sits with its stem up in the air. If flipped over, it rolls back into this upright position. But when spun, the stem flies out and works its way under the top. It supports the spinning toy until the top nearly stops. The top then falls over and the stem bobs into the air as the rotation ends.

The tricky twistings of this turnover toy inspired a four-page article in the *American Journal of Physics* (Jan.). William A. Pliskin of Poughkeepsie, N. Y., declared in his article that sliding friction causes the toy top to up-end. He includes diagrams, algebra, trigonometry and vectors to prove it.

He admits that his explanation does not agree with the theory propounded by J. L. Synge, another author who set forth his views in *Philosophical Magazine* back in 1952. Mr. Synge claimed the instability of the top caused it to flip over, and that friction's role was trifling.

But Mr. Pliskin points out that his explanation agrees with the solution worked out independently by two other investigators, C. M. Braams and N. M. Hugenholz, both of whom declared their findings in a third physics magazine. Speaking of his own work, Mr. Pliskin states:

"This independently derived analysis shows that the force due to sliding friction is in such a direction as to result in a torque which causes the angular velocity components to vary in a way which necessitates the rising of the center of gravity."

Science News Letter, February 6, 1954

## MEDICINE

## New Drug Succeeds As Heroin Antidote

► FIRST CASE, so far as is known, of a patient saved from heroin poisoning death by a relatively new drug, nalorphine, or Nalline, is reported by Dr. Murray Strober of Brooklyn, N. Y., in the *Journal of the American Medical Association* (Jan. 23).

The patient was brought to Kings County Hospital in an unconscious state and no longer breathing. She was put in a respirator but there was no improvement. She was then removed from the respirator and given artificial respiration manually and an injection of nalorphine into a vein. Within one minute she started to breathe, her pupils dilated, she rapidly became conscious and sat up.

Nalorphine, a chemical derived from morphine, has hitherto been reported useful as an antidote to morphine itself and to various other narcotic drugs.

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