
Ancient Chinese Sundial Found Extremely Accurate

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CHEMISTRY

Castor Oil, Coal Newest "Silkworms" For Stockings

Patent on Synthetic Fiber Reveals It as Made From Substance Nature Creates in Death, Chemists from Coaltar

CASTOR OIL and coal appear potentially to be the "silkworm" from which may be made the silk stockings American women will wear tomorrow.

With these basic ingredients chemists are now fashioning, in their test tubes, a viscous fluid which can be drawn into fibers that are finer and stronger than natural silk and have amazing elasticity. While not yet ready for commercial production, chemists studying the new fibers aim at the goal of producing sheerer two-thread stockings that will have the durability of four-thread hose.

In the posthumous patent (No. 2,130,948) of the brilliant du Pont chemist, Dr. Wallace Hume Carothers, recently granted by the U. S. Patent Office, is revealed this strange fiber that gives promise of being silk's crucial rival in the hosiery field.

For the past month du Pont officials have maintained a complete silence, in the face of many rumors, on the nature and properties of a new fiber which was superior to silk and potentially could battle silk for control of the hosiery field. News of this new fiber, without details, leaked into chemical circles.

In the new patent, fiber experts at the National Bureau of Standards believed they have discovered the long-awaited and very important announcement.

Finer Than Silk

Completely synthetic in their origin, the new fibers can be easily drawn to a size equal to the diameter of a natural silk filament, or in the extreme case, to only one-seventh the diameter. Yet the new fiber shows a tensile strength equal or better than that of silk. In some cases the fibers are 150 per cent. stronger than silk.

"The elastic recovery of these fibers under moderate elongations was very remarkable," states the patent, "and in this respect was much superior to existing artificial silks."

The fibers are "lustrous and silky in appearance" and are almost completely insensitive to moisture. When made into fabrics the synthetic fiber fabric pos-

sesses a far better elastic recovery than natural silk.

The Carothers patent, with 56 broad and basic claims, describes the production of fibers from long chain amine compounds. These are prepared by reacting diamines and dibasic acids. Out of this reaction come acid salts which are crystalline solids having fairly definite melting points.

Eight specific ways of creating the new fibers are described. A typical reaction is a mixture of 14.8 parts of pentamethylene-diamine, 29.3 parts of sebacic acid and 44 parts of mixed xylenols.

The new silk is not rayon, for its origin is not from the cellulose of growing plants like cotton or wood, but from coal and its highly important coal tar derivatives.

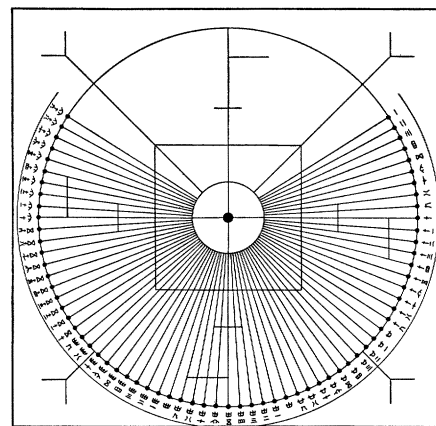
Coal tar has already produced thousands of organic compounds that range from perfumes which nature never knew, to explosives and dyes and even to organic compounds of the human body itself.

Products of Death

In fact, one of the ways to prepare the new synthetic silk fiber might be to make it out of a human corpse. A basic ingredient of the fiber is the chemical known as cadaverine that is formed in the human body after burial. Cadaverine is formed by nature as a decay product of the lysine which occurs in many of the body proteins, in serum albumin and in the fibrin of clotted blood. After death lysine breaks down and forms the evil-smelling and poisonous cadaverine. Cadaverine is known to chemists as pentamethylene-diamine.

But chemistry, with its ingenuity, does not need to depend on death for its supplies of this material. Out of sticky black tar, formed as coal is heated and its vapor caught by distillation, a long series of steps can duplicate cadaverine. It is by this completely synthetic method that Dr. Carothers prepared his material from which the silk-rivalling fibers come.

Castor oil enters into production of the new fiber because it is used to



ACCURATE

The sundial, of which this is a line drawing, was made about 2300 years ago at a time when the Chinese divided the day into 100 parts. The dial has an accuracy of one part in 2500.

ASTRONOMY

Ancient Chinese Sundial Found Extremely Accurate

ONE of the world's oldest sundials, unearthed in China and dating from the Han Dynasty, about the third century, B.C., impressed astronomers with its accuracy and precision of construction when Dr. Peter M. Millman of David Dunlap Observatory, Richmond Hill, Ont., analyzed it in a report to the American Astronomical Society.

Divided into 69 equal segments each 1/100 of a complete circle, there is a circle inscribed with an accuracy of one part in 2500. The Chinese were known to divide the day into 100 parts in that period. Other lines on the stone were used to determine the solstices. The dial was evidently placed in the plane of the equator and Dr. Millman considers it probable that it was a standard type made for use over a fairly wide range of latitudes.

The dial was brought from China by the Rt. Rev. W. C. White, and it is now in the University of Toronto's Royal Ontario Museum of Archaeology. It is the only one of its kind known in any collection at the present time.

Science News Letter, October 1, 1938

form an acid which reacts with the cadaverine. This is sebacic acid. To make it, chemists first make a castor oil soap (just as soaps are made out of palm oil and other vegetable oils). Heating this castor oil soap with sodium hydroxide creates sebacic acid.

A remarkable property of the new