PHOTOGRAPHY

New Photographic Film Will Wear Longer, Store Better

Inventor of Nylon Is Posthumously Awarded Patent On Film Base of Same Substance for Movies or Stills

A NEW kind of photographic film, that wears longer in use, and stores better than the cellulose nitrate and cellulose acetate films now universally used, has been devised in the laboratories of E. I. du Pont de Nemours and Company, Wilmington, Del.

This is revealed with posthumous issue of two U. S. Patents, numbers 2,216,735 and 2,216,736, to Dr. Wallace Hume Carothers, who died in April, 1937. The original patents for the du Pont synthetic fiber, nylon, were issued to him also. The new patents, like the old ones, are assigned to the du Pont Company.

The patent specifications point out that nitrocellulose is now most widely used for films, despite its inflammability, and that cellulose acetate, which has replaced it in some cases, has the disadvantage of low resistance to water, and poor strength and flexibility, especially when very dry. Fairly thick films must be used to compensate for the lack of strength. In color photography, where the picture may be coated on both sides of the film, and separated by its thickness, this causes a blurring of the picture.

Dr. Carothers found two groups of chemical substances which offer many advantages over the old material. One consists of linear superpolymers, and is covered in the first patent, the other includes linear polyamides. Both of these are crystalline, that is, they have a sharp melting point, and do not, like resins, gradually soften as the temperature is raised. In preparing the film, the material may be melted, and spread on a smooth, cool metal surface, or rolled between cool metal rolls, where it freezes into a thin sheet.

These substances, it is said, have extreme strength, good flexibility and resistance to water, and are non-inflammable. On account of their strength, movie films made of them will last much longer when exposed to the wear of repeated passage through the projection machine. It is also possible to use films half as thick as ordinarily. This promises to be very useful in color photography. Layers can be coated on opposite sides of the film without causing a distorted image.

In other methods of color photography, several layers of emulsion are coated on a single film base. Using thin films of superpolymers or polyamides, each with its own emulsion, a three-deck sandwich or "tripack" can be built up, in which the total thickness is still surprisingly little, and the emulsions are very close together, it is stated.

As an example of the advantage over older kinds, it is said that cellulose acetate film can be bent about 25 times before breaking, at 70% relative humidity, and about 10 to 15 times in a perfectly dry atmosphere. In contrast, at either degree of humidity, film made of one of the polyamides was intact after 250 bendings.

"This indifference to atmospheric conditions means that films of the present invention need not be stored under carefully adjusted conditions as is done with cellulose acetate," say the patent specifications. "This unique property makes them specially advantageous as permanent business, library and historical records."

The advantages of the new film adapt them for cut or roll film, amateur or professional movies, microfilm recording of documents or publications, X-ray pictures, color photographs and sound recording, it is stated.

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PHYSIOLOGY

New Heated Diving Suit Has Glass Insulation

See Front Cover

WITH new electrically heated diving suits, insulated with glass cloth, U. S. Navy divers will be able to descend deeper into the sea, stay down longer, and still retain clear heads, than they could before. Announcement of the official adoption of the new suit was made at the time of a demonstration in the experimental diving tank at the Washington Navy Yard.

WARM

Chief Torpedoman J. W. Thompson, U.S.N., is tired but warm at the end of an experimental dive in new glass-insulated, electrically warmed underwear. The diving suit which he wears over the warmed underwear is just being removed.

Formerly, a diver was supplied with ordinary air, which consists of a mixture of oxygen and nitrogen. To overcome the pressure of many feet of water above, this has to be considerably compressed. Under these conditions, nitrogen dissolves in the blood and enters the tissues. If he then ascends too rapidly, and the pressure is reduced, the nitrogen comes out of the blood, and forms bubbles in the veins and arteries, causing intense pain. This is called the "bends."

By using in place of air a mixture of oxygen and helium, once rare gas now used for filling balloons and airships, the danger of the bends is greatly reduced, because of the lessened tendency of helium to dissolve in the blood and body tissues. Also, it was found, the divers could maintain mental clarity over a longer period and at greater depths with the helium mixture.

When it was first tried, however, Navy divers found that they were much more sensitive to cold than formerly, and this, of course, hampered their work. Then electrically heated suits, with normally insulated wires in the underwear worn by the diver, were tried. This re-