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New Optical Glass

SCIENCE NEWS LETTER

THE DISCOVERY of a way to make optical glass out of rare chemical elements instead of common silica permits the production of a glass which has a very high index of refraction and a low dispersion, it is disclosed in a patent just granted to Dr. George W. Morey, of the geophysical laboratory of the Carnegie Institution of Washington, D. C. According to a description of the new glass in *Science News Letter*, for March 25, 1939, the discovery may be a major stride in the advance of photography, permitting lens makers to produce "faster" and better lenses.

Some of the optical glasses of Dr. Morey have the highest index of refraction (light-bending power) ever reported; more than 2. Only comparable refraction is that of the diamond, which is about 2.41. Moreover, high index of refraction and low dispersion permit better corrections for chromatic aberration, the annoying property of some lenses of bringing different colors to different focuses.

Chemical elements most people have never heard of are used in producing the glass. Yttrium, lanthanum, columbium, hafnium, tantalum, zirconium, strontium, boron, and barium are some of the rare elements. The new work is a continuation of efforts made in the United States since the World War to produce better optical glass.

Alsifilm—A New Material

INDUSTRIAL BULLETIN OF ARTHUR D. LITTLE, INC.

A NEW TYPE of transparent film material, for which the name "Alsifilm" has been suggested, has been reported by Dr. Ernst A. Hauser, according to the *Industrial Bulletin* of Arthur D. Little, Inc. Alsifilm, it is said, can be made from clay and may find uses as a mica substitute, an indestructible paper, a fireproof wrapping material, and a waterproof coating for paper articles.

The clay used is an especially "pure" type of bentonite, made up of alumina, silica, and water, and the individual particles are so small that most of them fall within the colloidal range. It has been found that the finer part of the colloidal fraction of the clay when mixed with the appropriate amounts of water forms a gel. If this gel is evaporated, the particles draw toward one another in such positions that they become permanently fixed by their attraction for each other, in strings or tiny fibrils. These strings in turn mat together similarly to the matting of wood fibers in forming paper, or wool in felt, so that ultimately the resulting structure is that of a tough, coherent, independent film.

Alsifilm may be made thick so that it is stiff and brittle, and in this state is proposed as a substitute for mica, for it looks like mica, has similar electrical properties, and is chemically inert. Both mica and Alsifilm are composed of alumina, silica, and bound water, possibly in much the same proportions and distribution.

In presenting his findings to the Technical Association of the Pulp and Paper Industry, Dr. Hauser stated that the new film may be made completely inert to oils, greases, organic solvents, and strong acids and salts. There are obvious useful applications for such a material available as a film or a thread, and possessing these properties. In the thin, flexible form, for cable wrapping, it would offer long life and the needed electrical properties. Foods, especially those which tend to take up odors and tastes readily, might be packaged in this inorganic transparent film. Dr. Hauser also indicated that Alsifilm will take ordinary printing, colored inks, and printing pastes, or it may be colored throughout, filled and coated, oiled, or given a surface pattern. Unaffected by climate, mold, or insects, it is seen as a permanent record material, handled as easily as any paper.

Alsifilm is to be introduced commercially by the Research Corporation for the Massachusetts Institute of Technology and Dr. Hauser. At the present stage of development none of the material is available for distribution, but a small commercial unit is being constructed and samples will be available within a few months. The cost of Alsifilm cannot well be estimated until further progress toward the production of larger quantities has been made.

Mineral Wool

MINING AND METALLURGY

MINERAL WOOL is a substance composed of fine, interlaced mineral fibers having the appearance of loose wool or cotton. It is a fibrous, glasslike material composed principally of silicates of calcium and aluminum, with other minor constituents. The production of it has grown to such an extent that last year the output was valued at $30,000,000, as compared to an output in 1933 valued at $1,700,000. The industry is still growing vigorously and should profit from the expected activity in building in 1939, for two thirds of the material is used for building insulation and to assist in fire retarding, in both new and old houses. It is also a concomitant of air conditioning. A description of the production, fabrication, and application of mineral wool is contained in an article written by J. R. Thoenen, supervising engineer, U. S. Bureau of Mines, and published in the February, 1939, issue of *Mining and Metallurgy*, the journal of the A.I.M.E.

Mineral wool is a generic term, says Mr. Thoenen, covering a number of similar products differentiated chiefly by the raw materials from which they are made, such as rock wool, slag wool, and glass wool or glass silk. Rock wool, as its name implies, utilizes as raw materials limestone, dolomite, shale, and clay, combined with silica in the form of sandstone, or quartz, or as an ingredient of the other rocks. Slag wool is made from slags resulting from the reduction of iron, lead, or copper ores. Other materials, such as limestone or silica, may have to be added depending on the chemical analysis of the original slag. Glass wool is made from the same materials that are required for making glass. Basically, these are soda ash, limestone, and silica. The addition or partial substitution of other ingredients changes the characteristics of the glass; similar substitutions in the raw mix enable the manufacturer to alter the character of the wool blown.

In the manufacture of mineral wool, a stream of molten rock, slag, or glass is directed to a jet of either steam or air which blows it into wool. Technically, however, the process is not so simple, since many factors enter into the process, all of which must be under rigid control to assure a commercial product. Merely projecting a molten stream of rock into a jet of steam does not always produce wool. Chemical constituents of the raw material, degree of viscosity, and temperature of the slag, size of slag stream, length of fall, and the pressure of the steam or air are only a few of the many variables that must not only be controlled individually but coordinated to make the process successful in producing the kind of wool desired.

The usual process consists of mixing raw materials with coke in alternate layers in a water-jacketed steel cupola, igniting the coke, melting the rock-slag ingredients to a fluid molten slag

slag through a small aperture, allowing the slag rop to a steam jet, and blowing the slag in tiny ough the air, whereby friction elongates the droplet read before it has time to solidify. These fine ds form the wool and are then collected and fabri- any forms of insulating products.

ufacturer of rock wool has introduced a spinning ce of the steam jet, which is revolved at high speed al axis. The molten stream issuing from the fur- the outer section of the disk, whence it is violently hrough the air in a manner similar to the action of jet.

itions are not exactly right, part of the original ill be cooled and solidified before it is drawn into mination of most raw wools will show fibers still what is left of the original particle of molten slag. idified globules are known in the industry as "shot," roduct.

plants the wool is blown into wool rooms as it leaves jet. These rooms vary greatly in size and construc- dern practice, however, requires a moving conveyer- Some wool rooms have elaborate ventilating sys- ereas others have no such provision. The wool n the moving floor and is carried out of the room in a f quite uniform thickness, the latter being regulated te of blowing and the speed of the conveyer. As the emerges, it usually passes under a heavy idler roll rther compacts it to uniform thickness. In some he blanket, as it emerges, is sprayed with a liquid o increase its structural strength or to promote ease in g the various shapes into which it may be cut.

ets intended for immediate fabrication are cut both nally and transversely by knives or revolving disks sizes required for batts to be used in wall insulation studding. These may be covered on one or both sides in or moistureproofed paper. They are then packed ns for shipment. Wool intended for other types of is usually gathered from the conveyer and sent to the tor, after which the shot is removed. These fine, shot- rs are bagged for shipment as granulated wool for blow- o the walls of houses already constructed.

ulated or loose wool is also mixed with suitable binders ssed or molded into insulating board, pipe covering, or apes. Mixed with clay or bentonite and asbestos, loose ulated wool is sold as insulation cement. Mixed with o form a paste, it can be formed around irregularly objects as an insulating cover. Loose wool as taken he conveyer is frequently placed between chicken wire el lath and sold in blanket form as insulation for steam- ting units in furnace walls and on ducts and bridgings, n petroleum refining for insulating process vessels and heat ngers. Railway cars and annealing ovens offer other ts. Insulating board or blocks are made up to any speci- on size and thickness for stove or refrigeration insulation. ulation of houses against excessive heat or the escape of al heat during the winter provides the greatest market ineral wool. It has been found that mineral wool, n. in thickness, has the same insulating value as 14 in. ellow-pine lumber, 33 in. of plaster, 56 in. of brickwork, 117 in. of concrete. However, the best insulator of all is ty space, as illustrated by the vacuum bottle. The next practically, is still air. In modern frame construction, walls of houses contain a dead-air space between the outside thing and inside plaster separated into vertical panels by studding. In masonry or brick construction similar dead s found in the furring spaces. Even if all these dead-air es were hermetically sealed, movement of air within each panel would occur, thus reducing its insulating value. But when filled with mineral wool, the original space is converted into millions of tiny air pockets entrapped by the interlaced wool fibers. The fibers thus prevent air currents or, in fact, any air movement. Mineral wool thus converts the dead-air spaces of house construction to still-air spaces.

Danger Units

THE TRAVELERS INSURANCE COMPANY

A NEW and unique concept of driving danger in terms of "danger units" is introduced in a booklet entitled, "Lest We Regret," just issued by The Travelers Insurance Company. It is pointed out that energy increases progressively as the speed of a car increases, but that the increment in energy far outstrips the addition in miles per hour.

Using the term "danger units" instead of "energy units" or "hidden forces" seems practical. In danger units or D. U.'s simple numbers tell the facts about the death-dealing energy which rides with a person who goes too fast. The energy to be absorbed if a person strikes an object while running 25 mph is just the same as if he fell a height of 20.9 ft. For thousands of years men have been falling off their two-story dwellings and out of trees, where the fall is about 20 ft. It is possible to survive this impact, although it is just about the "shock limit" for the human body. Thus it was appropriate to call this quantity of energy which each pound of the body and each pound of the car carries at 25 mph, "one danger unit of energy." At 35 mph, the blows are twice as heavy. At 75 mph, they are nine times as heavy.

In other words, the danger unit is mathematically equal to the energy developed in an automobile moving at 25 mph, to a street width (35 to 40 ft) of actual stopping distance, to one "roll-over" in case of an accident, or to an 80-ft turning radius on a curve. The rate of speed and the relative danger units, therefore, are 25 mph for one D. U., 35 for 2, 45 for 3, 50 for 4, 55 for 5, 60 for 6, 65 for 7, 70 for 8, 75 for 9, and 80 for 10. In this way it is easy for a driver to visualize that at 50 mph he will need four street widths to stop, he will roll over four times in case of an accident, or make one fourth as sharp a turn as he could at 25 mph or one danger unit.

McDonald Observatory

UNIVERSITY OF TEXAS

THE McDONALD OBSERVATORY together with its 82-in. reflecting telescope, which was constructed by the University of Texas from the proceeds of a trust fund amounting to $800,000 left by the late William J. McDonald, has just been completed and will be formally dedicated on May 5. Perched nearly 6800 ft on top of Mt. Locke in the Davis Mountains in western Texas, the observatory will be operated jointly by the University of Texas and the University of Chicago, which now operates the Yerkes Observatory in Williams Bay, Wis. The telescope is the second largest reflector type in actual use in the world. It is exceeded in size only by the 100-in. instrument at Mt. Wilson. Both of these will be topped at some future date when the 200-in. Palomar telescope is completed.

The contract for both the design and construction of the observatory and the telescope was let in 1933. The observatory structure was completed last year and the 3-ton, 82-in. mirror, in February, after four years of grinding and polishing.

The observatory itself is a cylindrical steel structure, 71 ft

...on. He was a leading authority ...anches of engineering, including ...pneumatics, gas distribution, ...engineering, bridge construction, ...sonry dams, strength and testing ...ls, and machine design. In the ...s he was well known for his work ...ernational Niagara Commission ...f textbooks which were widely ...country.

...in died in 1933 having been the ...nearly every honor that could be ...pon him by his fellow engineers. ...as president of the Institution of ...ineers and the Institution of Me... ...ngineers and was an Honorary ...of both bodies as well as of the ...Society of Civil Engineers and The ...Society of Mechanical Engineers. ...warded the first Kelvin Medal, the ...nor bestowed by British engineers. ...in Memorial Committee will be ...with any expression of interest by ...ers in the United States and it ...articularly pleased to have them ...Contributions may be sent to ...ker, Honorary Treasurer, 82 Victoria ...on S. W. 1, England.

...Hygiene Foundation ...ues Industrial Health Bulletin

...IES of informative bulletins on practi... ...engineering measures for combating ...al disease is being issued by Air ...oundation, 4400 Fifth Avenue, Pitts... ...a nonprofit organization for the ad... ...of industrial health. The first of ...deals with "Determination of Benzol ...the Atmosphere" and the second ..."Use and Care of Respirators."

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...lletin on respirators points out that ...important use of "respiratory protec... ...ices" is under working conditions ...otection is required intermittently, as ...ing-out operations, sweeping after ...in removing cores from large foundry ...shoveling, screening, and handling of ...ls, and the operation and maintenance ...sing equipment.

...ther bulletin describes the method of ...ing benzol vapor in the atmosphere, a ...of importance in the coking, steel, ...ive, fuel, and chemical fields. It lists ...s and reagents required and describes ...cedure for taking samples and for their ...s, either by a volumetric or a colori... ...method. References are given as well ...mation as to where the necessary ap... ...may be obtained.

M.I.T. Offers Special Course in Strength of Materials

A SPECIAL summer program and conferences on strength of materials will be held at the Massachusetts Institute of Technology for four weeks, beginning June 13, to extend the application of concrete, steel, and wood through a knowledge of their characteristics.

The different aspects of the strength problems of these materials will be critically discussed by experts on the staff of the Institute supported by certain outstanding authorities from industry and various laboratories. Representatives from the Forest Products Laboratory, Madison, Wisconsin, and the American Lumber Manufacturers Association, Washington, D. C., will take part in the lumber program. Talks on concrete will be given by specialists of the Tennessee Valley Authority and of the Thompson Lichtner Company, Boston.

One of the series of lectures will be devoted to a presentation of the known facts underlying the strength of steels and a comparison of these data with what is known regarding concrete and timber. Two all-day conferences at which representatives from industry will discuss the special features and new developments in these respective fields will conclude the program. The graduate school of the Institute will allow credit for nine units of advanced study (nine units of A subjects) for the satisfactory completion of this special course. Further particulars may be had from J. M. Lessells, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

Prominent Foreign Speakers at Applied Mechanics Congress

THE FIFTH International Congress for Applied Mechanics which meets at Harvard and M.I.T., Sept. 12–16, 1938, will be distinguished by a general lecture on the strength properties of steel by Dr. F. Koerber, director of the Kaiser-Wilhelm-Institut für Eisenforschung, Düsseldorf, Germany. A lecture on turbulence is scheduled to be given by G. I. Taylor, professor of the Royal Society, in which he will develop a new statistical theory of this baffling phenomenon. From France, Prof. J. Peres of the laboratory of fluid mechanics of the University of Paris, will discuss methods of analogy in applied mechanics.

I.E.C. Plenary Meeting to Be Held in England

THE COMMITTEE of Action of the International Electrotechnical Commission has accepted the British National Committee's invitation to hold the next plenary meeting in England, June 22–30, 1938. Arrangements have been completed to hold the sessions in Torquay, which is located on the south coast of Devonshire. Additional information may be obtained from the Central Office of the I.E.C., 28 Victoria Street, London, S. W. 1.

Foundrymen to Meet at Cleveland, May 16-19

MORE THAN forty technical sessions, luncheons, and dinners are scheduled during the 42nd annual convention of the American Foundrymen's Association which will be held in Cleveland, May 16–19. Items to be discussed include gray iron, nonferrous founding, foreman training, patternmaking, refractories, job evaluation, steel, apprentice training, cost methods, malleable cast iron, sand research, materials handling, foundry safety and hygiene. Further information may be obtained from the secretary, Dan M. Avey, American Foundrymen's Association, 222 W. Adams Street, Chicago, Illinois.

Lehigh Inaugurates Annual Anthracite Conference

SURVEYING recent engineering developments in the mining and utilization of anthracite, an Anthracite Conference, which is expected to become an annual affair, has been scheduled by Lehigh University for April 29 and 30. The conference committee, Herman Eckfeldt, chairman, and including the following A.S.M.E. members, Allen J. Johnson, Fred V. Larkin, and W. H. Lesser, has arranged for presentation of 18 technical papers. These are intended to focus interest on the rapid engineering progress being made in production, distribution, automatic burning and consumer economy of anthracite. Additional reports of the utilization of ash, and the nonfuel uses of anthracite will also be included in the two-day discussion.

Among the papers to be presented are the following by A.S.M.E. members: "Some Practical Considerations in Connection With Combustion," by Allen J. Johnson; "Air Conditioning and Refrigeration," by B. H. Jennings; "The Pulverization of Anthracite for Commercial Use," by Martin Frisch, and "The Relation of the Type of Fuel to the Cleanliness of Communities," by W. G. Christy.

Engineers Make Survey of New England Industries

THE EXTENT of modernization activities in New England manufacturing plants and the opportunities which exist for the further improvement of plant facilities and equipment are the keynotes of a survey which the New England Council and the Engineering Societies of New England, Inc., of which the Boston Section, A.S.M.E., is an affiliated body, are conducting among 2500 New England manufacturers. The survey, in the form of a series of self-analysis questions, will disclose the

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