

New Materials

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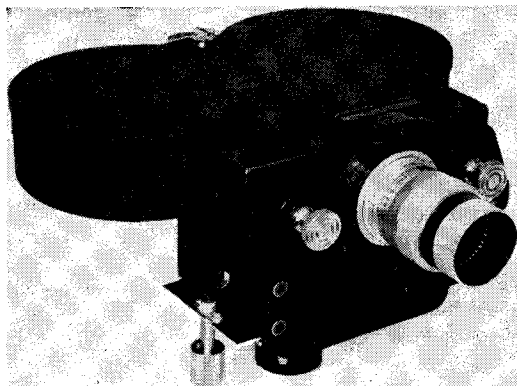
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The advertisement has a dark blue background with abstract circular patterns. On the left, there is a circular inset image of a man with glasses and a beard, wearing a white lab coat, looking at a piece of equipment. To the right of the image, the text reads: 'On the way to a graphene spin field effect transistor' in large white font. Below this, in smaller white font, it says 'by Prof. Barbaros and the Özyilmaz Group at National University of Singapore'. In the top right corner, the Oxford Instruments logo is displayed, consisting of the word 'OXFORD' above 'INSTRUMENTS' inside a white rectangular box, with the tagline 'The Business of Science' below it. At the bottom right, there is an orange rectangular button with the text 'Download a FREE application note' in white.



Provision is made for control of the taking rate by means of an external electrical tripping pulse if desired. This feature widens the scope of usefulness of this camera and makes it adaptable to many additional problems. Large magazine capacity (200 feet) and automatic operation make the unit well suited for applications in remote locations which might be left unattended for long periods of time. The film magazine can easily be replaced with a fresh cartridge when required.

Other features of the Type A-1 Camera are as follows: 1. Film transport is effected by a precision Geneva Type intermittent. 2. All castings are of a high impact strength aluminum alloy. 3. Bearings are of a lifetime porous bronze. 4. Emphasis has been placed on ruggedness and dependability of all components.

Some of the more obvious applications of the camera include photographing of meter readings, oscillographic records, chemical reactions, and general laboratory use.—COOK RESEARCH LABORATORY, 1457 Diversey Parkway, Chicago 14, Illinois.

Manufacturers' Literature

Electronic Supplies—Aerovox General Catalog lists capacitors of many different types, many of them new; an entire section is given over to television capacitors for TV servicing. Wire-wound and carbon resistors are listed, and vibrators and test instruments.—AEROVOX CORPORATION, Bedford, Massachusetts.

Fractional-Horsepower Motors—Over 200 specifications are listed to fit almost any fractional horsepower requirement—plain motors, and speed reducer motors—in all popular winding classifications. Contained also is such information as connection diagrams, dimensions, how to measure machine torque, how to increase speed reducer motor life, and a listing of typical motor applications. Copies are available upon request.—BODINE ELECTRIC COMPANY, 2254 W. Ohio Street, Chicago 12, Illinois.

Burrell Announcer—No. 50 6 39, describes laboratory centrifuges, "Monochromatic" Colorimeter, and other laboratory apparatus.—BURRELL CORPORATION, 2223 Fifth Avenue, Pittsburgh 19, Pennsylvania.

High Frequencies—Catalog 20-A, 1950, lists and illustrates a Pulse Generator for radar, nuclear, and TV circuits; Signal Generators for measuring receiver performance, standing wave ratio, gain, antenna and transmission-line characteristics; attenuators for use in measuring gain, frequency response, voltage ratios; and other laboratory instruments.—HEWLETT-PACKARD COMPANY, 395 Page Mill Road, Palo Alto, California.

Springs—Catalog No. 6, lists and illustrates beryllium copper spring data, including compression, standard brush, flat, strip, etc.—INSTRUMENT SPECIALTIES COMPANY, INC., Little Falls, New Jersey.

Oxygen Equipment—Aircraft Oxygen Equipment Engineering Manual describes typical installations and recommended

practices, and covers masks and accessories, regulators and flow gauges, cylinders, connections, pressure gauges, etc.—OHIO CHEMICAL AND SURGICAL EQUIPMENT COMPANY (a division of AIR REDUCTION COMPANY, INC.), 1177 Marquette Street, Cleveland 14, Ohio.

Biophysics—Catalog No. 3-49, Tools for Biophysics, presents measuring and testing equipment for the experimental biologist or biophysicist.—PHIPPS AND BIRD, INC., 303 South 6th Street, Richmond 5, Virginia.

Biophysical Measurements—Bulletin No. 675, illustrates the "Manometricron" for micro gas reactions and the Dubnoff Metabolic Shaking Incubator.—PRECISION SCIENTIFIC COMPANY, 3737 W. Cortland Street, Chicago 47, Illinois.

Electronic Instruments—Summer 1950, issue of the Cathode Press describes a rotating anode tube, a miniature ceramic triode, x-ray tubes for thickness gauging, and other electronic instruments.—MACHLETT LABORATORIES, INC., Springdale, Connecticut.

New Materials

Forest K. Harris: Associate Editor
in Charge of this Section

National Bureau of Standards, Washington, D. C.

Zirconium in Surgery

Various metals and alloys have been utilized at one time or another in surgery, including gold, silver, aluminum, magnesium, tantalum, brass, steel, and vitallium. These uses have been to suture wounds with wire, to unite broken bones with plates and screws, to connect broken channels with tubes and to cover holes in the skull with plates. Materials used in these operations must conform to exacting specifications as to strength, durability, malleability, resistance to fatigue and to corrosion, etc. Materials for cranioplasty should not produce inflammation or foreign body reactions when implanted in tissue. The ideal material should be non-irritating electrically and chemically, equivalent in strength to the skull but easily adaptable to the contour of the defect, light in weight, non-absorbable, non-toxic, unaffected by therapeutic procedures of x-rays and diathermy and by the extremes of heat and cold encountered by humans, unaffected by infection, and inexpensive.

It has been suggested that stress "corrosion" may take place in alloys used as structural replacements, which are initially corrosion-resistant. Thus a bone plate, subjected to multiple stresses over a period of years may become irritating and necessitate a second operation for its removal. For this reason an element is preferable to an alloy.

Tantalum is the only element that has been used so far in surgery with any degree of safety. It is used mainly in cranioplasty (to cover holes in the skull), as small clips to stop bleeding from blood vessels in the brain and as thin sheets to wrap around cut nerves. However, there are several drawbacks to its use. It is rare, extracted with difficulty from its ores, and expensive. Plates are difficult to fashion and usually require careful time-consuming molding in advance. In view of these disadvantages it was decided to study the application of zirconium to surgery. This study was carried out at the Harrison Department of Surgical Research of the University of Pennsylvania Medical School.

Zirconium is relatively abundant, and has been available in a ductile form for a number of years. Although it is extremely active at high temperatures, it is almost completely inert and corrosion-resistant below 200°C. Fully annealed, it is soft and malleable, and can be drawn or shaped easily. Although it work-hardens to a considerable degree, it has a high work capacity and can be fully annealed in 15 minutes at 750–800°C. Chemically one of its most

important properties is its corrosion-resistance. Physically, its malleability and low specific gravity are advantages. Its electrolytic action when immersed in a physiological saline solution is, like that of tantalum, minimal.

In animal experiments zirconium wire has been used as sutures in the abdominal wall. In a second experiment zirconium screws and pegs were inserted into the leg bone. Thin strips of the metal have been inserted into the brain along with tantalum and silver. Skull defects have been covered with zirconium plates. Microscopical studies in all experiments proved that zirconium caused little reaction in muscle, fascia, bone, and brain. The third experiment was considered to be a delicate method of evaluating the reaction to brain tissue, and zirconium compared favorably with tantalum. It was much better than silver which was included because it is used in neurosurgical clinics as clips to stop bleeding. Some surgeons feel that tantalum is too hard and cannot be pinched tightly enough to insure adequate compression of the vessel. It is probable that the more malleable zirconium will find use in this application.

These preliminary studies indicate that zirconium has a place in surgical procedures and that further experimental and clinical study is warranted. In addition to hemostatic brain clips, it may be used in the form of plates to cover skull defects and give adequate protection to the brain. It can be machined into screws for fixation of bone plates. It can be drawn into wire of sufficient strength and malleability for use as suture material. Zirconium tubes are being made for the repair of bile ducts. Thin sheets of the foil may be used to seal the ends of cut nerves, and the foil may be used as a burn dressing. It is possible that zirconium rods will prove adaptable for intramedullary bone pinning in which the ends of a broken bone are aligned by a metal rod passed down the central core. Zirconium powder has not been used experimentally or clinically but it will show up on x-ray and might be used to mark the location of certain operations such as intervertebral disks and frontal lobotomies. At present vitallium, 18-8-SMO stainless steel and tantalum are used in surgical operations and can be buried in human tissue for many years without undue irritation. Zirconium appears to be relatively inert and, being an element like tantalum, will also find a place in the operating room.

The above material was abstracted from an article entitled "Zirconium in the Operating Room" by Dr. J. I. Bates. This article appeared in *Foot-Notes* 22, No. 1, 1950.—FOOTE MINERAL COMPANY, 18 West Cheltenham Avenue, Philadelphia 44, Pennsylvania.

Permanent Magnets

Hyflux Alnico V magnets have a guaranteed energy product of at least 5.25×10^6 BH. This is about 16 percent more than the highest published, guaranteed value for regular Alnico V. These stronger, smaller magnets permit greater compactness in design. They are the result of a special production technique applied to regular Alnico V, not a new alloy.—INDIANA STEEL PRODUCTS COMPANY, Valparaiso, Indiana.

Static Elimination

Alphatron static eliminators are essentially bars, strips, or foils of brass or nickel on which polonium is electrochemically deposited. The active area is covered by a thin layer of electroplated gold which is finally coated with lacquer. The alpha-particles emitted by the polonium ionize the air and dissipate either positive or negative static charges. Used as a bar, the eliminator is placed about an inch from the surface of moving sheets or films to render surfaces completely neutral. Foils may be placed on the inside of nozzles or blow-guns and the ionized air blown across surfaces to remove dust. Since the surface is neutralized in the process it loses its tendency to attract further dust from the air. Attached as a strip to a brush in such a position that it leads the stroke, it facilitates the cleaning of surfaces by brushing. While it will completely neutralize a charged surface, the action is not of course permanent in that the surface could be recharged by the normal causes for the formation of static. The manufacturer states that

the short-range alpha-particles emitted by the polonium do not constitute a radiation hazard.—Recco, 205 East 43rd Street, New York 17, New York.

Diamond Abrasive Kit

A kit containing the six most widely used NBS grades of diamond compounds is offered by the manufacturer of *Dymo* brand diamond abrasives to facilitate experimental and development work with these materials. The selection is such that almost any desired finish can be produced on carbides, mold, and tool steels and other hard materials. Each grade of diamond abrasive compound is distinctly color-marked and is contained in jars with matching colored tops. The kit is in a sturdy, compact wood case with a hinged top.—ELGIN NATIONAL WATCH COMPANY (Industrial Products Division), Elgin, Illinois.

Carbide Marking Pencil

A tungsten carbide pencil is now available for permanently marking glassware. Only slightly below the diamond on the hardness scale, tungsten carbide is cheaper than diamond and comes to a definite point rather than an edge as is found on a diamond tip. The point is permanently mounted in a knurled steel pencil shaft and is protected by a cap so that the pencil may be safely carried in the pocket. The pencil is useful for a variety of laboratory tasks: sealed vials can be permanently identified; sheets of glass can be accurately scored for breaking; tubes and rods can be scored more rapidly than with a file.—FISHER SCIENTIFIC COMPANY, 717 Forbes Street, Pittsburgh 19, Pennsylvania.

Plastic Products

Lustrex glass mat consists of styrene reinforced with random glass fibers. Molded products have all the advantages of styrene and the additional value of greatly improved strength. It is recommended for molding trays, housings for mechanical devices, paneling, structural laminates, boxes, and other containers where improved strength and chemical resistance are needed. Technical details are available in a bulletin prepared by the manufacturer.

Lauxite UF 77A is a new cold-setting urea resin glue with catalyst incorporated, having greatly improved storage stability. It was developed to meet the hot-weather storage problems of woodwork manufacturers. High standards of strength, water resistance, working life, setting speed, and color have been maintained in developing this product. It has been laboratory- and field-tested successfully both for ordinary cold gluing and for high frequency gluing.—PLASTICS DIVISION, MONSANTO CHEMICAL COMPANY, Springfield, Massachusetts.

Flame-Retardant Insulation

Rulan is a plastic electrical insulation that will not support combustion. Whereas flammability has been a characteristic disadvantage of plastics with good electrical properties, tests with this material have shown that it will not burn after a flame has been removed, nor will it drip when molten, a further advantage since plastic drippings can spread fires. Its electrical properties are comparable to, although not the equivalent of, those of polythene, one of the best insulating materials known for high frequency applications. It has a power factor of 0.002, and a dielectric constant of 2.5. It is non-tracking and retains its electrical properties after long immersion in water at elevated temperatures. Its mechanical properties are good and its low temperature properties excellent. It can be injection-molded and extruded on to wire at high speeds. Its use is suggested as insulation for high voltage hook-up, signal-control, lead-in, and flame-retardant line wire, and for high voltage street-lighting cables. Molded electrical parts and extruded tape are also being developed for uses where flammability is a consideration.—E. I. DUPONT DE NEMOURS AND COMPANY (Polychemicals Department), Wilmington, Delaware.