

REDUX
MAGAZINE

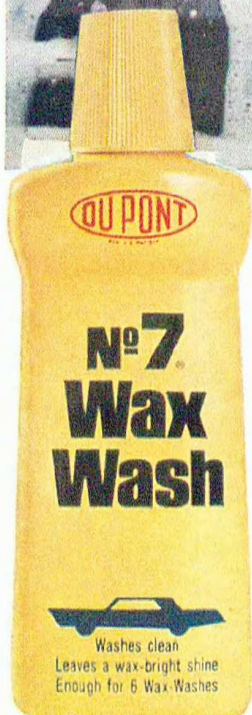


Better Things for Better Living
...through Chemistry



Cleaner sweep for streets

**that contains
self-polishing
wax...**



**New DuPont
No. "7" Wax Wash
gives you a
wax-bright shine
automatically**

Here's the quickest, easiest way to give your car a lasting wax bright shine as you wash it! With Du Pont No. "7" Wax Wash there's no scrubbing... no rubbing. Just pour two capfuls into a pail of water... sponge it on... hose it off... wipe it dry. And you can use Du Pont No. "7" Wax Wash over the entire car. An amazing electro-chemical action deposits self-polishing wax on the paint finish and chrome, but not on the glass. Du Pont No. "7" Wax Wash is recommended for all car finishes in good condition, especially for new cars. Use it every time you wash your car; the wax-bright shine builds up with every application. Unbreakable plastic bottle—enough for six wax-washes—only \$1.25*. At service stations, hardware and auto-supply stores, now!

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BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

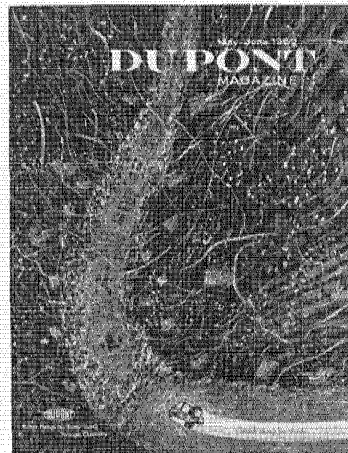
DU PONT No. "7" PRODUCTS

DUPONT

MAGAZINE

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THE COVER. For paraders in artist Allen Wexler's cover, showering confetti into city canyons is a joy supreme, a carnival of littering. But for the street sweeper, last man in the procession, joy is probably tempered by the fact that such a celebration represents several thousand tons of extra work.

A parade, of course, is a mote on the mountainous cleaning job U.S. cities daily perform. Sanitation men aim to beautify cities, forestall disease, eliminate an-

noyances to eyes, ears, nose and throat, remove safety hazards and prevent the clogging of drainage systems; they're the force behind phenomena ranging from alternate parking regulations and anti-litter campaigns to comfort stations for dogs. Always costs are a problem, so the past decade has seen a sharp swing toward mechanization.

How one city has solved problems of cleaning thousands of miles of streets is reported on page 2.

EDITOR WILLIAM G. HALLEY • ASSOCIATE EDITORS EMILY HEINE • JACK D. HUNTER • HARRY E. DAVIS

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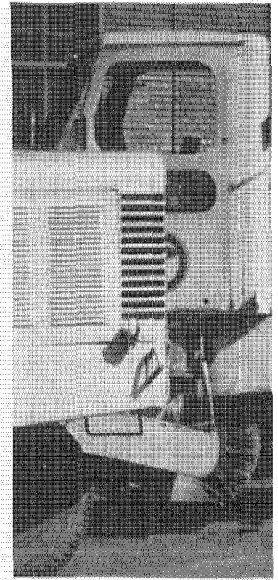
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Parade means several-thousand-ton cleanup job for Sanitation men.

Cleaner Sweep for Streets

New machines, broom materials and engineering studies are cutting the cost of cleaning cities



The incredible cascade, left, is an astronaut's eye view of what happens when more than four million city dwellers set out to do you honor: upon heroes Glenn, Grissom, Shepard fell an all-time record of 3,474 tons of confetti and ticker tape—200 tons more paper than dethroned champion Douglas MacArthur reaped in 1951, and roughly double the quantity dumped on Lindbergh in 1927.

When the revelers were gone, the paper remained, New York's Commissioner of Sanitation, Frank J. Luongo, unleashed a 1,000-man cleanup force armed with 100 of the city's \$10,000 mechanical brooms, 50 flushing trucks, ten bucket loaders and 12 tow trucks. Twenty-four hours later, the city's streets were trim as usual.

Dramatic as this cleanup appeared, the parade yielded only a foothill of the 205,000-ton mountain of dirt and litter that the Department of Sanitation routinely sweeps from city streets each year. The job currently employs one man for each 10,000 of population; sweepers clean downtown business district daily and sweep 3,400 miles of alternate-side parking streets two or three times weekly when once-a-week suburban areas are added, the total mounts to more than 800,000 curb miles a year.

"What we're really proud of," says Commissioner Lucia, "is not the size of the job, which we're used to—the way our operating force is cutting our costs while proving the quality of the job being done." Example is extensive testing in the selection of broom fibers. The department's 1959-60 Annual Report estimates that "at current costs and present level of the machine program, they have developed potential savings of \$232,000 annually."

Objective, detailed study of street cleaning is fairly new, but increasing steadily as members of the American Public Works Association circulate and exchange data. High labor costs and improved machinery give added impetus to cost analyses. Most of all, as cities grow, and multiply, population concentrates and sanitation standards rise, the cleaning job has outstripped the capacities



Armies of motorized brooms help New York clean 800,000 curb miles of street per year. Under each machine is long-wearing broom of nylon filament.

the traditional "white wing," the man on foot with broom and pushcart. In New York City, for example, Sanitation employees assigned to manual sweeping have declined in 20 years from 4,000 to 500.

In partial replacement, U.S. and Canadian cities are using some 12,000 mechanical sweepers; though they vary in design, such machines are in essence large motorized brooms-and-litterboxes. Two small, spinning gutter brooms sweep dirt from the curb toward the middle of the machine, where a large "pickup broom" sweeps dust, paper and litter into a large hopper.

"Street sweepers have progressed from the horse-drawn models of the early years to the modern, efficient sweeper which takes the place of seven 'white wings,'" New York's Lucia points out. "We are proud of the role the city's operating personnel have played in the development of today's mechanized broom."

Since 1950, New York's tractorlike mechanical sweepers have multiplied from 41 to 333. On a given day, 240 machines are at work in the city's 57 Sanitary Districts; each driver covers 10-12 miles per shift, and fills his three-cubic-yard hopper two to three times.

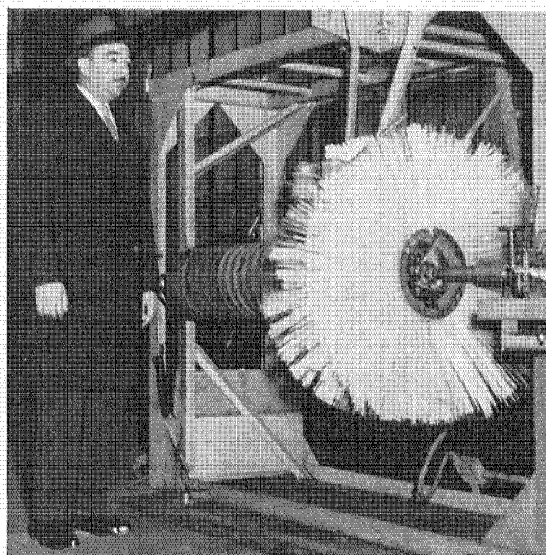
But large-scale introduction of machines didn't solve all problems. When the department's engineers launched a study of brooms and broom construction, the seemingly cheap vegetable fibers—palmyra, bass or split hickory—were actually found to be quite costly. A typical palmyra pickup broom wore out in 115 miles, only ten days of use. To the price of the short-lived fiber had to be added the cost of making brooms, of machine down time and operators' labor expended in replacing brooms. Even the logistical problem of shipping worn-out brooms daily from 57 garages to a central rewinding site was substantial.

Accordingly, in 1957, the department began a search for broom filling materials that would be more durable and thereby produce a chain of economies. After cost analyses of a range of plastic and other man-made materials, the

engineers concluded that the best performer for pickup brooms was plastic filament. Familiar to consumers in tooth- and hairbrushes, nylon stood up well under the harsh abrasion of street sweeping. In addition, the plastic, used as "broom straws," displayed excellent flex life and bend recovery; resisted solvents and chemicals, including alkalis; and was unaffected by gasoline, oil or other petroleum products.

Initial cost of nylon was far higher than palmyra, but the tough plastic zoomed New York's mileage per broom from 115 to 2,600 sweeping miles. By wearing longer, nylon cut the number of brooms needed; in 1958, for example, the central shop made 6,808 brooms, and last year only 289. Machine down time declined sharply,

continued



Broom-under-construction, inspected by Sanitation Commissioner Frank J. Lucia, will last 2,000-3,000 miles.

for a given sweeper changed brooms twice a year rather than 20 to 30 times. Even warehouse space was saved because an adequate inventory of nylon took up about 1/30th of the area once reserved for palmyra.

A Broom Deserves Respect

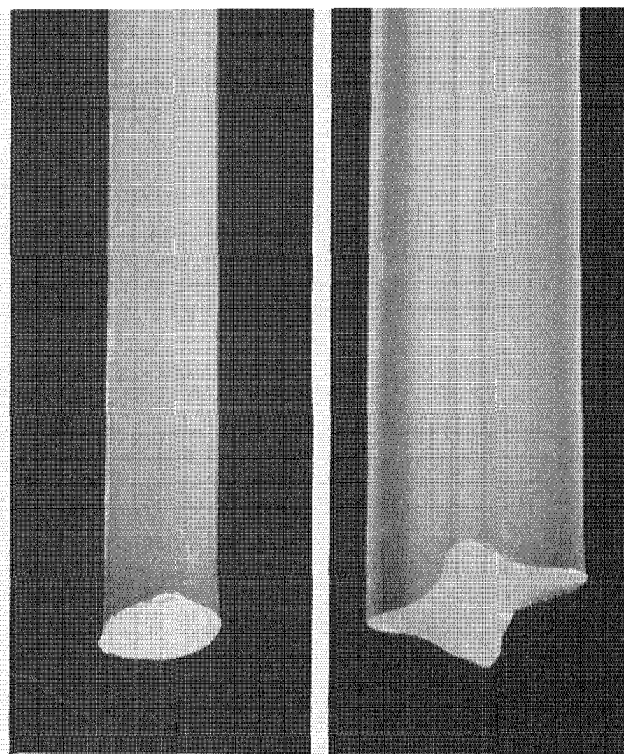
But to get maximum mileage and savings, Sanitation men early concluded it was essential to treat brooms with respect due expensive materials. Recalls Director of Operations Henry Liebman, "When we went to plastic, we were making an investment ten times larger per broom, hoping to get about 25 times more performance. How well we succeeded depended on the care with which the operator used his equipment."

Accordingly, in 1960, Operations instituted a training course for every sweeper driver. Run continuously since, the course emphasizes that the operator determines his broom's longevity by the pressure he exerts upon it. Under the aegis of the American Public Works Association, this training course has now been made into a 20-minute color movie, "Adjusting the Street Sweeping Machine," that will be available soon to public service agencies in the U.S. and Canada.

Importance of the trained operator is also suggested by Du Pont's own experiences in cities of all sizes that have used nylon. Example: one recent review of 50 communities found Long Beach, Calif., Newark, N.J., and Lake Forest, Ill., averaging 2,000-3,000 miles per broom; Vernon, Calif., got 4,400 miles. But several cities logged as little as 800-1,000 miles.

"When mileage drops, we have little doubt that brooms are improperly adjusted," says Howard Payne of Plastics Dept.'s Technical Service Laboratory. "But we're also aware that other variables affect broom wear. For example, one city may have smoothly paved streets, another bricks or patched concrete. One sweeper may be at work downtown brushing up light street litter, while another in the suburbs is digging washout mud. In such cases, wear rates are bound to vary. Eventually it dawned on us that perhaps the answer was to try to tailor brooms for specific jobs or sweeping conditions."

To test this idea, the Plastics Laboratory bought a commercial sweeping machine, plus pickup brooms of varied materials, fill weights and constructions. Under controlled conditions, brooms picked up sand, clay,



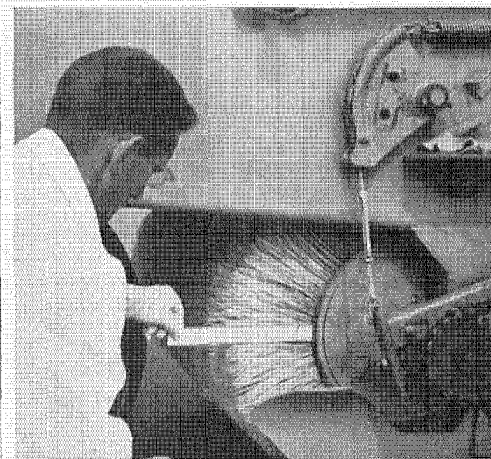
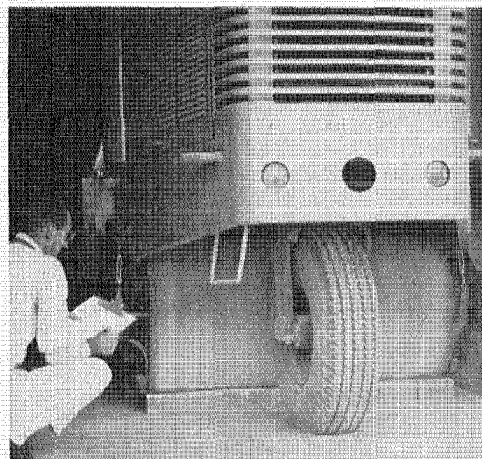
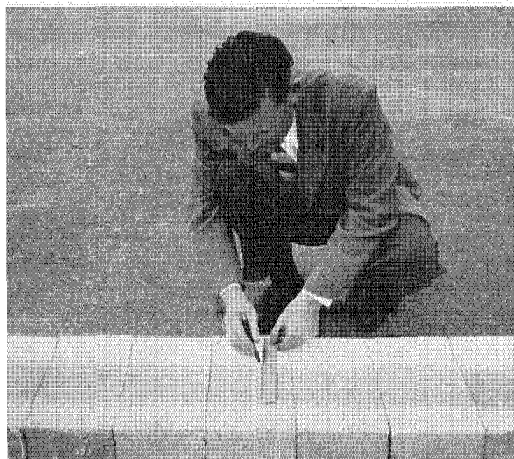
"Herrox" round nylon filament, left, is designed for routine street sweeping; stiffer I-beam filament, right, is for heavy duty.

stones and gravel, ground away on concrete blocks for 200 hours. Tight records were kept on wear.

"One significant finding was that the stiffer a broom filament, the faster it wears out," Payne reports. "Up to a point, stiffness is a virtue; then this property becomes costly, for an ultrastiff filament presses harder on the pavement; thus it abrades faster."

Result is that Plastics Dept. has started a family called "Herrox" nylon filaments. Currently it has two members, "Herrox" round for sweeping fine sand, powdery dirt and light debris, and a much stiffer, I beam shaped filament. The latter's multiple cutting edges improve its ability to dig out heavy dirt and debris.

"This tailoring of filament to a specific job," opines Du Pont's Payne, "seems a logical step as more and more cities set out to achieve both economy and a cleaner sweep for streets."



Six-inch sweeping pattern . . . was found in 200-hour Du Pont abrasion tests . . . to give cleanest sweep with least broom wear.

LEATHER'S LIVELLER LOOK

...COMES FROM
NEW CHEMICAL TREATMENTS AND A WIDER CHOICE OF COLORS, WISELY USED

By EMILY HEINE

Two trends are increasingly evident in the U.S. leather industry—a fuller offering of colors and stepped-up interest in new chemical treatments and finishes.

Dissimilar though these developments may seem, they have a common meaning for American consumers—more attractive shoes and other leather products. For tanners and footwear manufacturers, they could mean a boost in sales and profits, which have suffered in recent seasons.

Notable among the chemical materials are urethane polymers, first used several years ago as crack-resistant finishes for patent leather. "Urethane finishes have revolutionized the patent leather business," a tanner observes succinctly. In fact, they are used to make much of today's patent leather and are largely responsible for the trend to year-round wear of patent leather shoes, both black and colored. Du Pont "Hylene" organic isocyanates are a key ingredient in the manu-

facture of urethane finishes for shoes.

A more recent development is the use of Du Pont "Adiprene" L urethane rubber as a treatment for side leather, the hide generally used in children's and men's shoes. Here, it's winning favor because it makes the leather markedly more resistant to scuffing.

"Properly applied, 'Adiprene' also improves the break and tightens the grain of leather," says Albert Trostel, III, of Albert Trostel & Sons Co., Milwaukee tanners. "These are advantages that came to light as we worked with it. Add them to the improved scuff resistance, which was our prime reason for trying urethane, and you get a medium-priced leather that makes an expensive-looking shoe." Trostel is supplying urethane-treated leather to Genesco, Inc., Nashville shoe manufacturer. Genesco's enthusiasm for "Adiprene" L-100, in turn, dates back several years to its own re-

continued





LEATHER'S LIVELIER LOOK contin

Colorful kid leather is inspected and graded at Allied Kid Co., Wilmington, Del., before shipment to customer

search, which showed the advantages of this treatment. Boys' and men's shoes made from the leather are sold nationally by two of the largest chain stores.

"It isn't a simple matter to develop a satisfactory treatment with 'Adiprene,'" Trostel points out. "In some of our earlier trials, for instance, the leather was so beautiful that we told ourselves we would put calfskin out of business. Then, one day, we gave a sample the double bend test and you could hear the crack across the room. This was pretty disillusioning.

"The idea of that beautiful leather was too good to give up, though. We began again, going over our process step by step. We had some Du Pont people out from Wilmington for trial runs and, of course, Charlie Locke, our regular Du Pont representative, helped frequently.

"Eventually, we found a base leather that accepted 'Adiprene' better than any of our others. We then worked up this type of leather in the necessary weights, learned how very close our production control had to be and have been very happy ever since. We feel that we're doing something distinctive, something that can only be done with 'Adiprene'."

Where color is concerned, the leather industry is of necessity both a leader and a follower. To fill orders from footwear manufacturers, tanners must plan their line of colors a whole year before the shoes finally appear in stores. This is several months in advance of garment

makers' showings, which set the color fashions that leather will be expected to complement.

To help the industry out of this dilemma, the Tanners' Council of America, Inc., sponsors a colors committee that issues semiannual predictions of color trends and a set of official shoe leather colors.

Irving Glass, executive vice president of the council, explains that the committee amasses evidence of fashion activities and assesses it in the light of color cycles.

"This background," he says, "enables us to suggest which way the cat will jump at a time when the retailer is uncertain what the consumer wants and the wholesaler is uncertain what the retailer wants and the tanner is uncertain what the wholesaler wants."

When the committee met early in March to predict shades for the spring of 1963, shoes colored according to its spring 1962 recommendations were just starting to appear in stores. Tanners, meanwhile, were midway through production of leather for fall, guided by a palette chosen last September.

The merchandising of color in footwear and accessories will reach new significance in the fall and winter of 1962, the committee believes. The season will mark definitive changes in almost all color categories. Beiges and browns, in modified form, will continue at the top of the list. "True brown looks as if it were antiqued," Glass notes. "Grayed browns, variously known as Mushroom

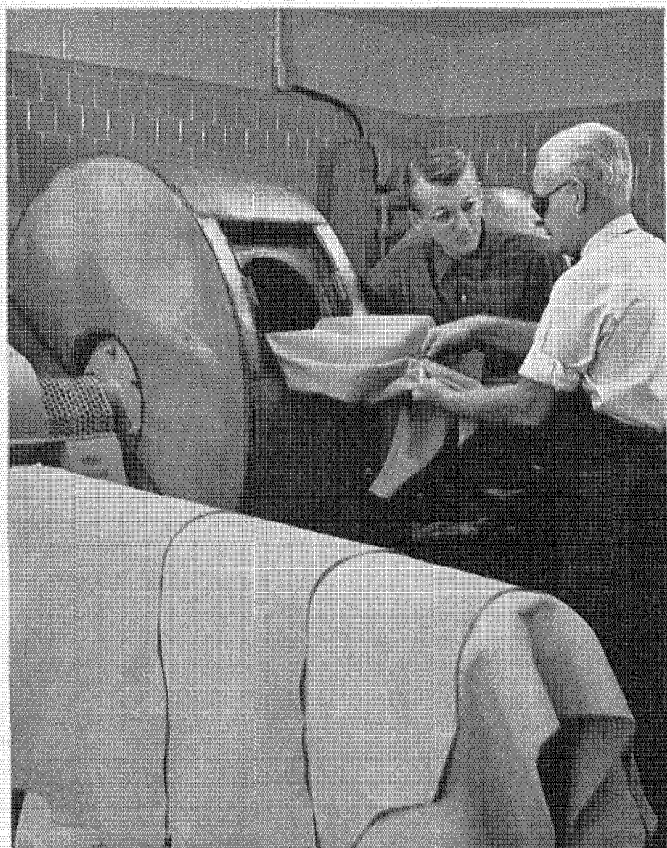
Elephant, Cobblestone, Cement and Dolphin, will be seen. The freshest look in blue will be Mallard, a blue green. There will be more than usual interest in dark gray. Expect a browned red that looks like catsup with a touch of Worcestershire sauce. Greened-gold also will be good."

By spring 1963, the committee predicts, American women will be ready for "a lovely clear glowing daffodil yellow, a lightened, subtle paler brown with some yellow coming through, a lightened and pale gray, stone blues that begin with porcelain and deepen into a sharp turquoise, a brighter-than-navy blue and a new cherry red."

As a major supplier of dyes for leather, Du Pont's Dyes and Chemicals Division has an active interest in such color trends. Once the Tanners' Council has made known its predictions, the division's leather laboratory works out the dye formulas needed to match them.

Frequently, Dyes and Chemicals sales representatives match shades on the spot for customers. When Charles Locke visits the Armour Leather Co. in Sheboygan, Wis., for instance, he expects to spend a large part of his time in the laboratory preparing and adjusting formulas.

"I've heard shade matching compared with trying to drive a car with a newspaper across the windshield," says Omer Schwaller, tannery superintendent. "Deep reds and purples are especially tricky. When you think you have them matched, you can generally carry them across the street and watch them change color under a different light." At any rate, tannery efficiency and economies are tied closely to dye formulas, which are tried first in the laboratory, then in a sample dyeing drum that holds 50 pounds of leather and, finally, in a 1,000-pound drum.



Under guidance of veteran dyer Harmer Foster, right, at Dyes and Chemicals Division's leather lab, Bill Studenic of Gloversville Leather Co. learns best dye formulations for his tannery's skins.

"Thirty years ago," says D. L. Miller, Armour's color stylist, "a tannery usually made about three colors—two browns and a black. Today we have more than 40 in our regular fall line for women's shoes alone. One of our current best sellers is Alhambra, a brownish green. Sage Brush, a light, grayed green, has done well, too. In Bonnie-skin, our delicate grained suede, a medium gray called Gray Frost has been especially popular. Manufacturers of men's shoes have shown particular interest in red browns, such as Castilian and Dark Oak."

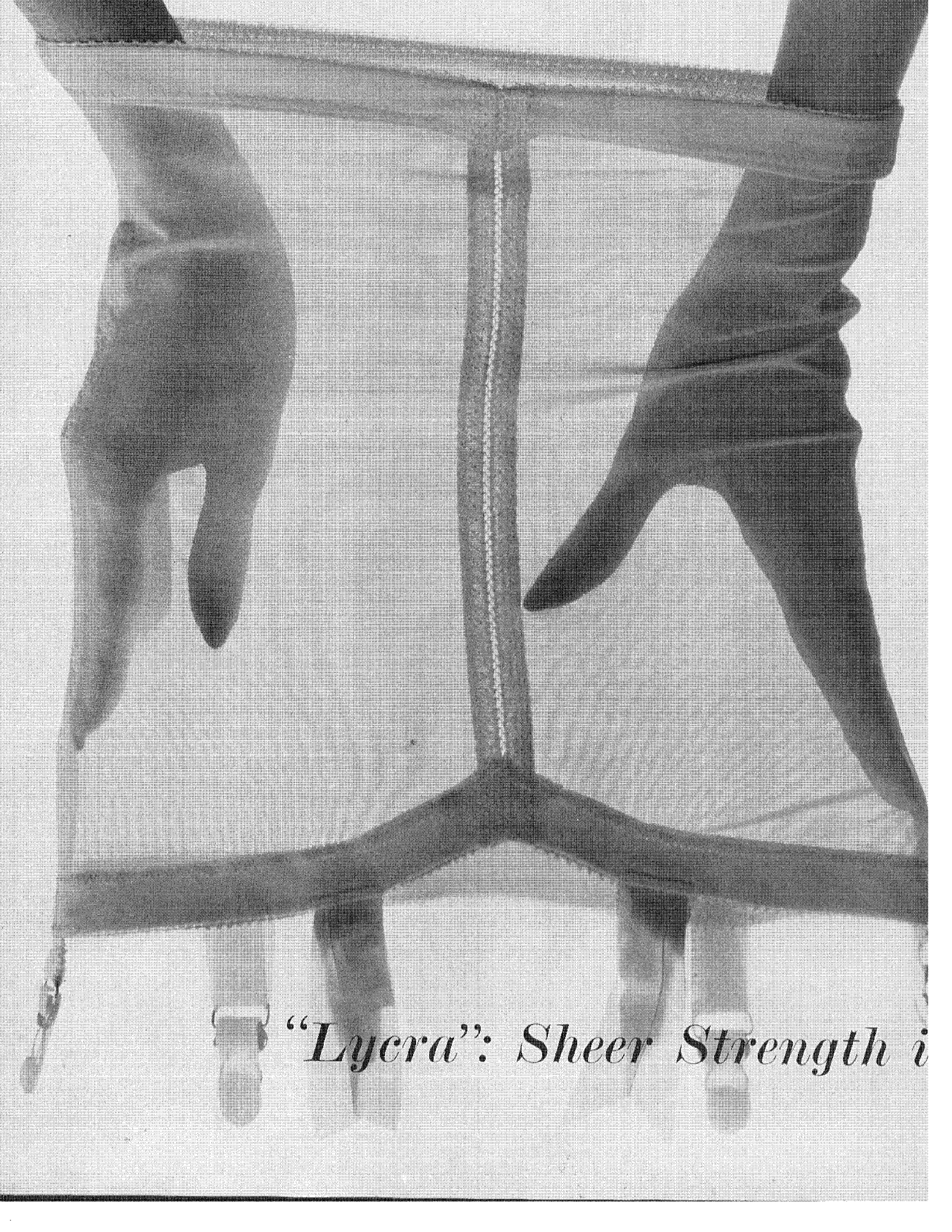
Shade matching, while a major activity at the Du Pont leather laboratory, is by no means the only one. Recently modernized and expanded, the lab also evaluates new leather dyes and chemicals and standardizes older ones. Tanners can come to the lab for a two- or three-week course in how to apply dyes; they learn on their own company's leathers. "Handbook for Leather Dyers," the fruit of many years' experience and several years' concentrated effort, was published a few months ago.

Newest material to get the lab's attention is "Methacrol" RB resin dispersion, an ingredient for both pigmented leather finishes and factory shoe finishes. In the words of Robert Journey, lab supervisor: "Our tests show that it has better flow characteristics than our other 'Methacrol' dispersions and gives a clearer, brighter finish. It's cheaper, besides. We expect it to be a most useful addition to our line."

The effects of "Adiprene" and dyes on leather are easily observed. But chemistry's connection with the tanning industry goes far deeper. Among the many Du Pont materials that participate in the complex transformation of raw hides and skins into finished leather are: deliming agents (ammonium chloride, formic acid, hydroxyacetic acid); unhairing agents (dimethylamine, hydroxyacetic, sodium cyanide, sodium sulfide); tanning agents and assistants (aluminum sulfate, formaldehyde, "G-942" tanning agent, sodium bichromate); materials that act as wetting agents, detergents, penetrating assistants, emulsifiers and softeners ("Duponol", "Merperline" and "Alkanol" surface active agents, "Avilone" softeners); a water repellent ("Quilon" chrome complex); pigments for whitening ("Ti-Pure" titanium dioxide) and coloring leathers; ingredients for leather finishes ("Methacrol" resin dispersions); solvents for finishes ("Hytrol" O cyclohexanone, tetrahydrofuran, trichlorethylene).



In modernized leather lab, colorist James Loper spots a dye solution to find strength relationships before making a sample dyeing.



“Lycra”: Sheer Strength i

Supplies of a light and mighty fiber are expanding to meet mighty heavy demand

"Lycra" spandex fiber, which Du Pont introduced four years ago, has a number of characteristics that have been much discussed. It is an elastic fiber that makes possible girdles that are lightweight and sheer, yet still excellent at figure control.

It opens new opportunities for fabric and garment designers, not only for foundation garments but also for swimwear, surgical hose, waistbands and other elastic products. To the consumer, it promises both exceptional comfort and long service.

But the most discussed point about "Lycra" has been its scarcity. Unlike many new products that must fight their way into established markets, the Du Pont spandex fiber won favor almost at once. Result: a shortage to rival the nylon situation in the early 1940's.

Happily, the supply situation will improve soon. The first commercial-scale plant for "Lycra" is nearing completion. By midyear, it should be turning out enough spandex to relieve the present scarcity in the foundation garment industry.

Right now, there probably are more garments made with "Lycra" in stores than at any point in the fiber's short life. Girdles in which it replaces rubber elastics come in a wide range of styles. Some, like the one at the left, are very sheer and simple; others are more elaborate, with even greater holding power. Most weigh about one-third less than conventional foundations. At least seven manufacturers have included swimming suits made with "Lycra" in their spring 1962 lines.

Spandex fibers, of which "Lycra" is just one example, may be somewhat confusing to the public, since nothing like them has existed before. Spandex, like nylon or rayon, is a generic term for a fiber of certain chemical composition. It is designated by the Textile Fiber Products Identification Act as an elastomeric fiber in which the fiber-forming substance is a long-chain polymer consisting of at least 85 per cent segmented polyurethane.

Unlike most other spandex fibers, which consist of one filament, "Lycra" is composed of several filaments combined into one fiber. Because of this form, fiber breakage from sewing machine needles is small. Rubber elastic almost always is covered by such yarns as nylon or rayon before use. "Lycra" can be used bare, permitting savings in both weight and cost. Because it can be dyed, there is a significant reduction in the problem of "grin through"—the visibility of an undyed elastomer core through a dyed cover. Girdles made with "Lycra" and color coordinated with other lingerie are proving especially popular.

One reason for the long delay in completing a commercial plant is that "Lycra" is made by the most complex process ever undertaken by Du Pont in the production of a textile fiber. But stubborn production problems that plagued the fiber's early years now have been solved, opening the way for supply to catch up with demand.

Lightweight swimsuits controlled with "Lycra" come in such fabrics as floral and striped knits (below), satins, printed marisettes.



an Elastic Fiber



Roof closed, arena is cool in summer, snug in storms.



Ruggedness and tasteful hues were specified for the 2,000 gallons of paint decorating the

COLORFUL ARENA THAT

By CHARLES F. GRUBE, JR.

Some call it "The Grapefruit." To others, it's "The Flip-top." Still others refer to it simply as "The Arena." But whatever the name, there's a proud ring when Pittsburghers speak of the new \$22 million Public Auditorium in the upper reaches of the city's Golden Triangle.

Even the most dispassionate out-of-towner will admit that there's justification for the civic pride that claims for Pittsburgh "one of the most amazing structures in America." The building stems from a million dollar grant made in 1944 to launch a drive for a new home for the Civic Light Opera, whose box office appeal came from productions staged under the stars. The gift's only stipulation: the auditorium, whatever its ultimate form, must have a movable roof so that productions could continue uninterrupted when rain threatened.

Pittsburgh now has this and much more.

As a sports arena, the huge hemisphere accommodates up to 12,500 persons, and for rodeos or circuses, blocks of its seats telescope manually to enlarge the "field of play." When it's used as an auditorium or theater, 2,100 of its seats rise 35 feet to expose a 118-by-64-foot stage. As a convention hall, it offers five meeting rooms for 1,500 delegates and 50,000 square feet of display area. Topping it all in any role is the world's largest movable dome, whose 15-story-high, 3,600-ton leaves roll back in 2½ minutes to open the Coliseumlike interior bowl to the sky.

The auditorium has become one keystone in an urban redevelopment program scheduled to transform Pittsburgh's once-blighted Lower Hill section into a spectacular 95-acre cultural and recreational center. Site-clearing

began in May 1956, and the auditorium was opened last fall. (Coming next: a building to house a symphony hall, an art museum and a repertory theater.)

Architects Mitchell & Ritchey, who designed the auditorium for the Public Auditorium Authority of Pittsburgh and Allegheny County, have augmented the soaring height of the giant dome by carefully selected color combinations. The interior of the retractable roof is a neutral tone deriving from the hundreds of white, prefinished perforated steel panels curving to its peak. Around its base, like a startling sash, are thousands of seats upholstered in brilliant red. The balance of color is supplied by some 2,000 gallons of Du Pont finishes that have been applied to most of its interior paintable surfaces.

Says F. J. Vater of A. J. Vater & Co., Inc., the Crafto Heights, Pa., firm that served as general painting contractor for the project: "Our instructions from resident engineer H. Rey Helvenston, who served as liaison between Auditorium Authority executive director Edward Fraher, the architects and the Dick Corp., general contractor, were that quality paints were to be used throughout. Not only must the finishes provide long life and easy upkeep but also serve specific functions in certain areas."

As an example he cites the lower of the auditorium's three levels, where the large exhibition areas are housed. Walls and pillars were finished in Du Pont "Flow Kote 460 White, while Alkyd Flat in deep blue-violet was applied to the ceiling. Vater says, "The over-all effect was lowering of the ceiling and the hiding of ducts and pipes.

One of the exterior decorative effects at the main



When open to the sky, huge Pittsburgh auditorium gives outdoor atmosphere for events ranging from light opera productions to trade shows.

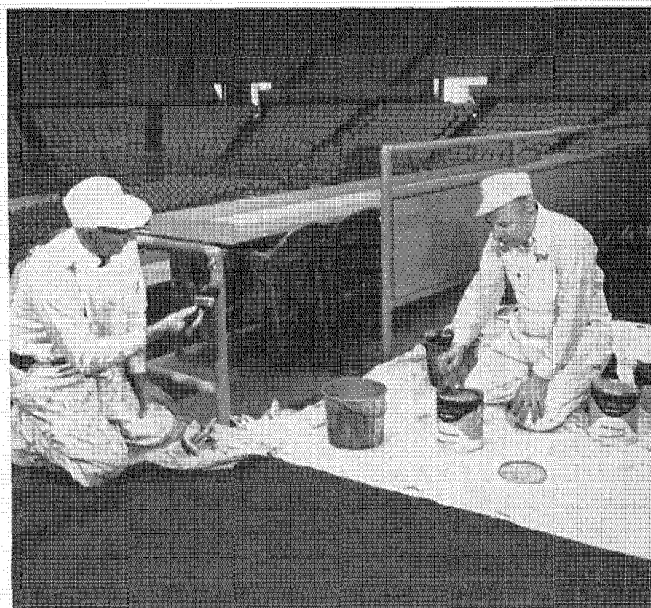
FLIPS ITS LID

entrance to the lower level consists of several walls of vertical porcelain-enameled panels in a gun-metal gray. At either end of these panels are service entrance doors topped by ventilation louvers. The builder wanted these refinished to provide an exact match for the hue and gloss of the panels. Du Pont matched the color and sheen with "Dulux" Auditorium Gray Enamel; then the doors and louvers were taken to a refinishing shop, prepared, painted and placed in an infrared oven. Result: doors and louvers with an automobilelike finish.

In the main area, all handrails, handrail panels and free-standing air conditioning units (the auditorium is cooled by a 900-horsepower compressor when the roof is closed) were finished in matching grays—"Dulux" Enamel on the rails, Alkyd Flat on the panels, and Semi-Gloss Enamel on the conditioners. The light control booth above the last row of seats was finished with "Dulux" Super White Flat to provide high reflection without glare.

Plaster ceilings in the corridors and washrooms received a coat of Du Pont Sealer and then were finished in "Dulux" Color Conditioning Semi-Gloss Enamel White. All interior entranceways and doorframes received one coat of Du Pont "Ovalite" Enamel Undercoat followed by a finishing coat of Du Pont Semi-Gloss Enamel tinted a sand color to match the prefinished metal doors.

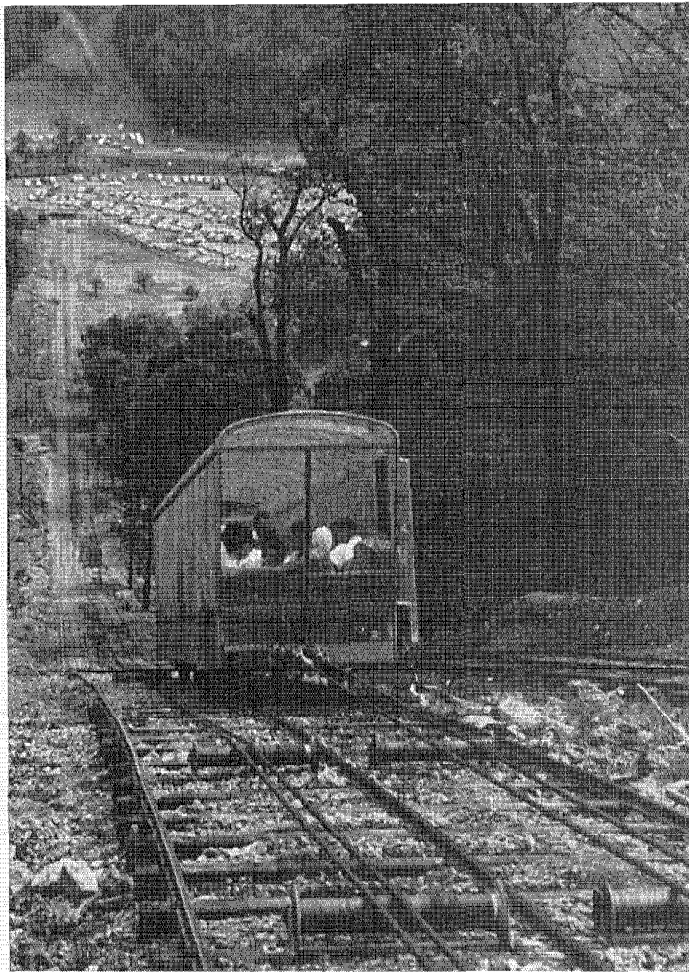
Through the auditorium's turnstiles (finished in "Dulux" Auditorium Gray Enamel) thousands of persons have passed since the building's dedication last year. They've seen ice shows, wrestling matches, hockey and basketball games, variety shows and musicals; between



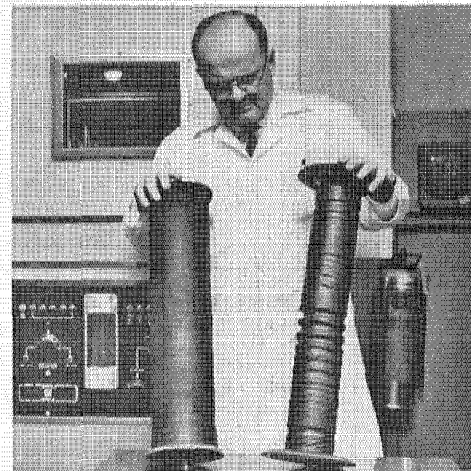
Interior paintable surfaces of arena complement over-all color scheme. Primary requirement for paint: long life and easy upkeep.

events, many thousands of others have entered simply to stare at and admire a building nominated this year by the American Society of Civil Engineers as one of the nation's "outstanding civil engineering achievements."

Among the latter has been Rey Helvenston himself, who has capped 30 years in the construction business with what he whimsically describes as an "impossible" assignment. "The building's 'impossible,'" he winks, "because, you might say, it's been built from the roof down."



Steel cables pulling tourists up steep Ghost Mountain grooved metal rolls in a few days. Neoprene-coated rolls wore seven times longer.



Plain metal roll, right, shows deep grooves cut by sliding cable; neoprene-coated roll is unscathed.

HIGH RIDE TO HISTORY

America's steepest incline lowers costs for raising tourists to a mountaintop

Maggie Valley, N.C.

In western North Carolina, the past is not behind, but nearly straight up on a Smoky Mountain summit.

Here, at an elevation of 4,600 feet, an imaginative former Virginian named R. B. Coburn is giving tourists a close-up look at life as it was lived on the frontier a century ago. Lopping off the peak of Ghost Mountain, Coburn has created four authentic pioneer villages: Western Town, Mining Town, Indian Village and Mountain Town. Visitors pan gold; witness a bank robbery; walk among redskins performing tribal war dances, and dine in a replica of a frontier saloon.

To climb backward to the past, tourists clamber aboard four cagelike rail cars and ascend 3,364 feet, 1,200 of which seem almost vertical. Three 6,000-pound cables pull the cars up grades ranging from 30 to a dizzying 76.1 per cent.

During the park's maiden season in 1961, the \$200,000 incline exhilarated visitors but exasperated maintenance crews. To minimize cable wear, the incline was studded with 136 soft metal rolls over which the cables slid. The cables lasted; but the rolls wore out. At points of severe stress near the pinnacle of the incline, for example, rolls had to be changed every couple of days. In addition, there was a continuous squeal of

metal grinding metal as the taut cables cut grooves in the rolls.

The solution to both problems came from a park visitor, who, with his family, was enjoying a week end outing from his job at Dayco Southern Division of Dayco Corp., a Waynesville, N.C., firm with extensive experience in making textile and steel mill rolls. His timely ride on the incline resulted in a suggestion that park management try covering the soft metal rolls with Du Pont neoprene.

"Not only did neoprene provide silent operation; it also immediately proved it would last longer than metal rolls," says Bill Branson, Dayco roll supervisor. "In places where metal rolls wore out in four days, neoprene lasted a month. As time went on, it became clear that neoprene-coated rolls lasted about seven times longer than plain metal. What's more, neoprene gave the additional advantage of resisting lubricating greases and oils."

Last winter, all the guide rolls were covered with neoprene by Dayco in preparation for the current tourist season in which park management estimates nearly one million passengers will take the high climb back into history on the precipitous incline.

Hydrogen Peroxide

Takes Off

If he led a modern army, Napoleon Bonaparte might think twice before pronouncing arbitrarily that an army travels on its stomach. The airborne trooper at right is traveling on his hydrogen peroxide.

Propelled by a version of a chemical patriarch that Du Pont has been making for nearly 50 years, this flying soldier is wearing a rocket belt created by Bell Aero-systems Co. He can rise to heights of 30 feet and spurt to distances of 360 feet at speeds of 20 mph. By twisting a single control, the flyer forces hydrogen peroxide into a gas generator; there it decomposes and streams groundward through jet nozzles. Like a space rocket, the thrust creates an equal and opposite reaction that lifts the soldier skyward.

The scientific pogo stick is being studied by the Army to transport troops over streams, ravines, barbed wire and mine fields; it might also aid amphibious landings by enabling soldiers to fly from ship to shore.

A far more dramatic tapping of the power in hydrogen peroxide is the X-15 research airplane project, a joint NASA-Air Force-Navy effort to study the effects of space travel on man. The piloted vehicle, part aircraft, part spacecraft, developed by North American Aviation, Inc., flashes to the atmosphere's fringes at six times the speed of sound; and on each lift, 90 per cent hydrogen peroxide rides along as power supplier for systems controlling fuel, electronic, hydraulic and lubricating mechanisms; likewise, the chemical controls the X-15's attitude in flight.

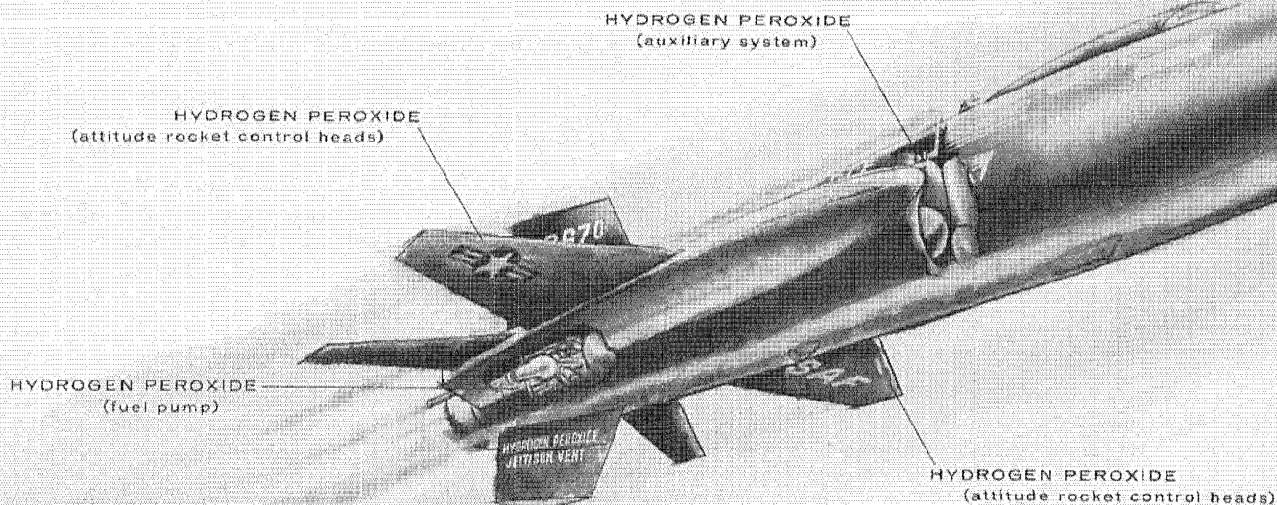
Ninety per cent peroxide is not the familiar household and industrial agent which pioneering women in 1873 discovered would bleach hair. The space product is a highly purified and concentrated solution Du Pont began marketing commercially in 1949. Its virtue is that with proper catalytic action, it unleashes fierce

continued

In stronger form,
it becomes a critical component in efforts
to advance air travel



Hydrogen Peroxide Takes Off continued



Peroxide performs from nose to tail of the X-15.

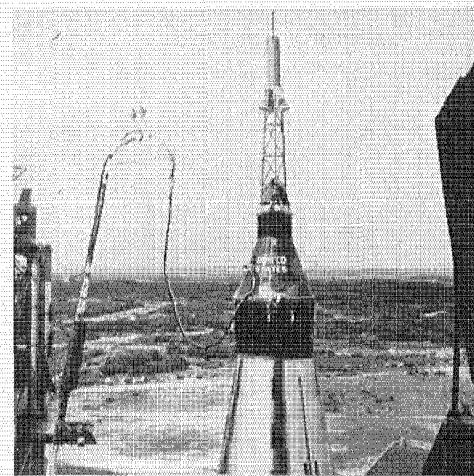
power which the X-15 can use from nose to tail.

The X-15's 57,000 pound-thrust engine, the XLR 99, developed by Reaction Motors Division of Thiokol Chemical Corp., is propelled by liquid oxygen and ammonia. Hydrogen peroxide's first job is driving the pumps which force the propellant into the firing chamber. Peroxide, impinging on a silver-screen gauze used as catalyst, decomposes to form a gaseous mixture of oxygen and superheated steam. The subsequent expanding force (temperatures rising to 740°C, and volume increasing 420 times) activates the fuel pump turbine.

By a valve controlling peroxide flow, the pilot regulates the firing chamber action, allowing acceleration and deceleration in flight, and safeguarding the precision firing chamber which is never fed more than a pint of propellant at any given moment.

Peroxide's purity is another advantage in the fuel system. Decomposed peroxide's oxygen and steam eliminate malfunction or damage from alien elements. In addition, peroxide simplifies storage and weight considerations, for the liquid can be stored on board in a container much smaller than one for a nonliquid such as compressed air.

Another peroxide source powers the X-15's auxiliary system, built by General Electric's Aircraft Accessory Turbine Dept. Consisting of two peroxide-driven, 40 hp units, this system provides hydraulic and electrical power to activate speed brakes, landing flaps and surface controls; it also powers 1,300 pounds of sensitive instrumenta-



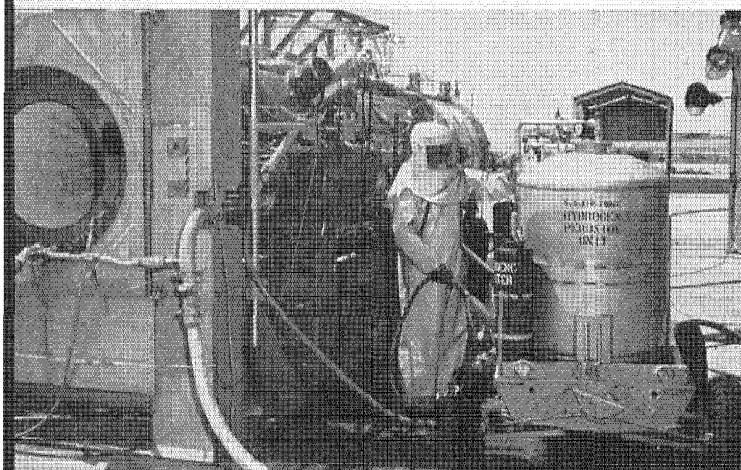
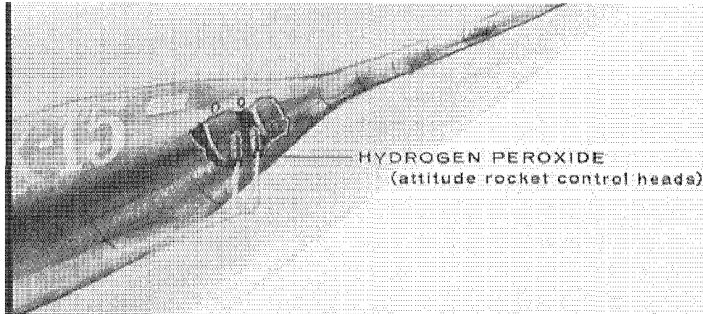
Project Mercury capsule turns from this launch direction to re-entry position by peroxide jets.

tion, heating elements in the pilot's pressure suit and cabin, inertial guidance system and computers, and communication, telemetering and recording apparatus.

Importance of this peroxide function is indicated by the fact that the electrical complex of the X-15 proposes more than 1,000 questions, from one to ten times every second. Large amounts of data are collected on board, but much critical information is relayed to strategically placed ground stations on the desert and mountain floor miles below. Examples: a flight surgeon electronically listens to the pilot's heartbeat and feels his pulse; engineers scan instruments penning critical fuel bay and engine pressures.

Peroxide likewise makes possible a self-contained lubricating system built into the auxiliary system gear box. The solution operates an axial-flow turbine that pumps oil during all flight attitudes and negative-G situations.

Part of the uniqueness of the X-15 is a ballistic control system conceived by Bell Aerosystems Co. With no atmosphere to support conventional controls during flight,



X-15 research program technician in protective suiting completes loading of peroxide prior to location test firing of XLR-99 engine.

maneuvers in the near-vacuum conditions of space are controlled by eight peroxide jets in the rocket nose to counteract pitch (up and down) and four jets in each stubby wing for yaw (side to side) movements.

Hydrogen peroxide is similarly used to control flight attitude in the Project Mercury space capsules. In orbital shots like Lt. Col. John Glenn's February 20 flight, peroxide jets, manually and automatically regulated, control capsule attitude. The jets turn the capsule 180 degrees from vertical launch position to one where the astronaut is orbiting backward. The object is to get the snub end of the capsule forward, thus properly positioning re-entry braking rockets and heat shield. Peroxide jets are also used on Project Mercury capsules to provide slight horizontal movement affording various observational vantage points for the astronaut. (In Glenn's flight, the automatic controls for this phase did not function, and Glenn completed his journey manually controlling peroxide jets.)

In prior suborbital flights, those flown by astronauts Alan Shepard and Virgil Grissom, peroxide was decomposed to activate fuel pumps of the smaller Redstone rockets in addition to controlling capsule attitude.

Between the man rocket belt and space exploration, there appear to be many other possible applications for 90 per cent peroxide. Example of a current experimental one is the Navy's use of peroxide jets for helicopter rotors in an effort to boost hauling capability and to achieve faster and higher flight for brush-warfare-type movements.

Specialty to Utility

Since the turn of the century, hydrogen peroxide has progressed from a specialty chemical to a large-volume commodity, generally sold in concentrations of 35 and 50 per cent. Industry first adopted it to bleach textiles. With the development by Du Pont in 1940 of a two-stage process, peroxide bleaching of cotton textiles, both rope and open width, nearly doubled.

Just as peroxide-treated cotton production increased, so did costs, especially after the war. One answer to cost problems came in 1955 when Du Pont introduced the simplified and improved Solo-Matic bleaching process. This, a one-step operation, offered excellent absorbency, whiteness, strength and elasticity, plus low capital investment and reduced utilities and labor costs. Then in 1960, Du Pont announced the more advanced Rapid-Bleach process, a continuous operation particularly effective on blended fabrics, such as cotton with "Dacron" polyester fiber. This series of breakthroughs has resulted in nearly 90 per cent of bleached cotton production being peroxide treated.

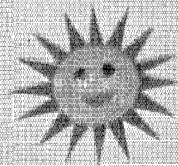
Its talents brought to light by the textile industry, peroxide has since moved out to other applications, several of which are:

Wood pulps: Peroxide bleaching is the preferred process for mechanical wood pulps, whether conventional groundwood pulps from softwoods or chip mechanical pulps from treated or untreated hardwoods. In the chemical pulp field, peroxide is used with chlorine dioxide in kraft bleaching.

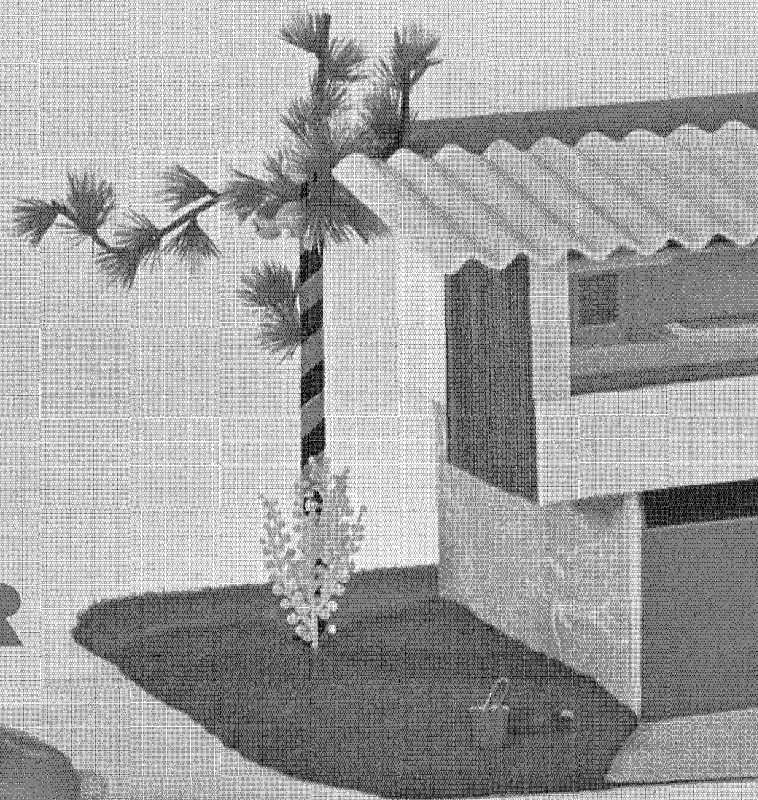
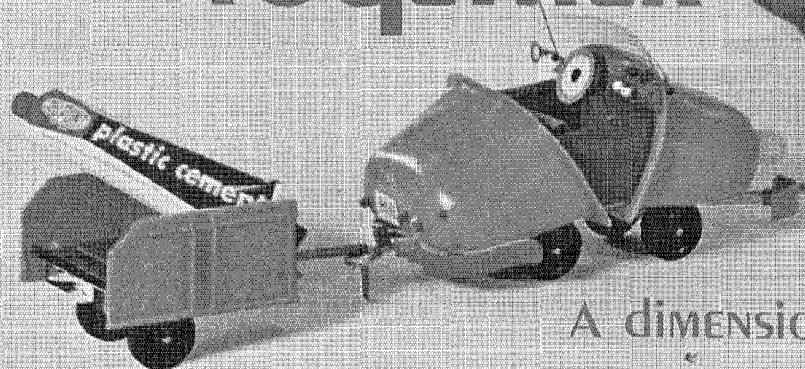
Commercial reactions: In this fast-growing area of applications, peroxide has become significant in epoxidation of oils and fatty acid esters used primarily as stabilizers and plasticizers for polyvinyl chloride resins. It is used in pharmaceuticals to introduce oxygen into chemicals and intermediates, in cosmetics and to produce menthol. Older commercial reactions include manufacturing organic peroxides for polymerization. Most important is dibenzoyl peroxide, an initiator in polymerization to produce certain polyethylenes, polyvinyl acetate and polyvinyl chloride.

Specialty applications: Six of these are particularly noteworthy. (1) Obtaining high brightness in paper made from recovered waste; (2) Bleaching woods of varying color to uniform, light shades; (3) Oxidizing vat dyes for finishing fabrics with minimum washing at lower temperatures and with no metallic residue; (4) Removing iron impurities from aqueous solutions such as copper, nickel and zinc sulfates; (5) In stannate tin plating, to change excess stannous ions to stannic ions, and also to produce whiter zinc deposits in zinc sulfate baths; (6) Cleaning and etching electronic components, particularly transistors.

Numerous other applications have appeared in the past several years and still others are under study. Consultation on specific uses and technical information are available from the Du Pont Electrochemicals Dept.



How TO hold A HOME TOGETHER



A dimensional designer does it with N

The bizarre look of the house above can be attributed to the fact that it is made entirely of junk: odds and ends of plastic housewares an imaginative Philadelphia designer has stuck together with a versatile new Du Pont cement.

In the talented hands of Robert Jackson, a caster becomes a television set; a pencil box a kitchen counter; and a ring-binder chimney spirals from a measuring spoon fireplace. Close scrutiny of the avant-garde architecture discloses other daffy structural components including a pet turtle's pond, a ballpoint pen, a child's jump rope, the grid from a model radar plotting board and a thimble.

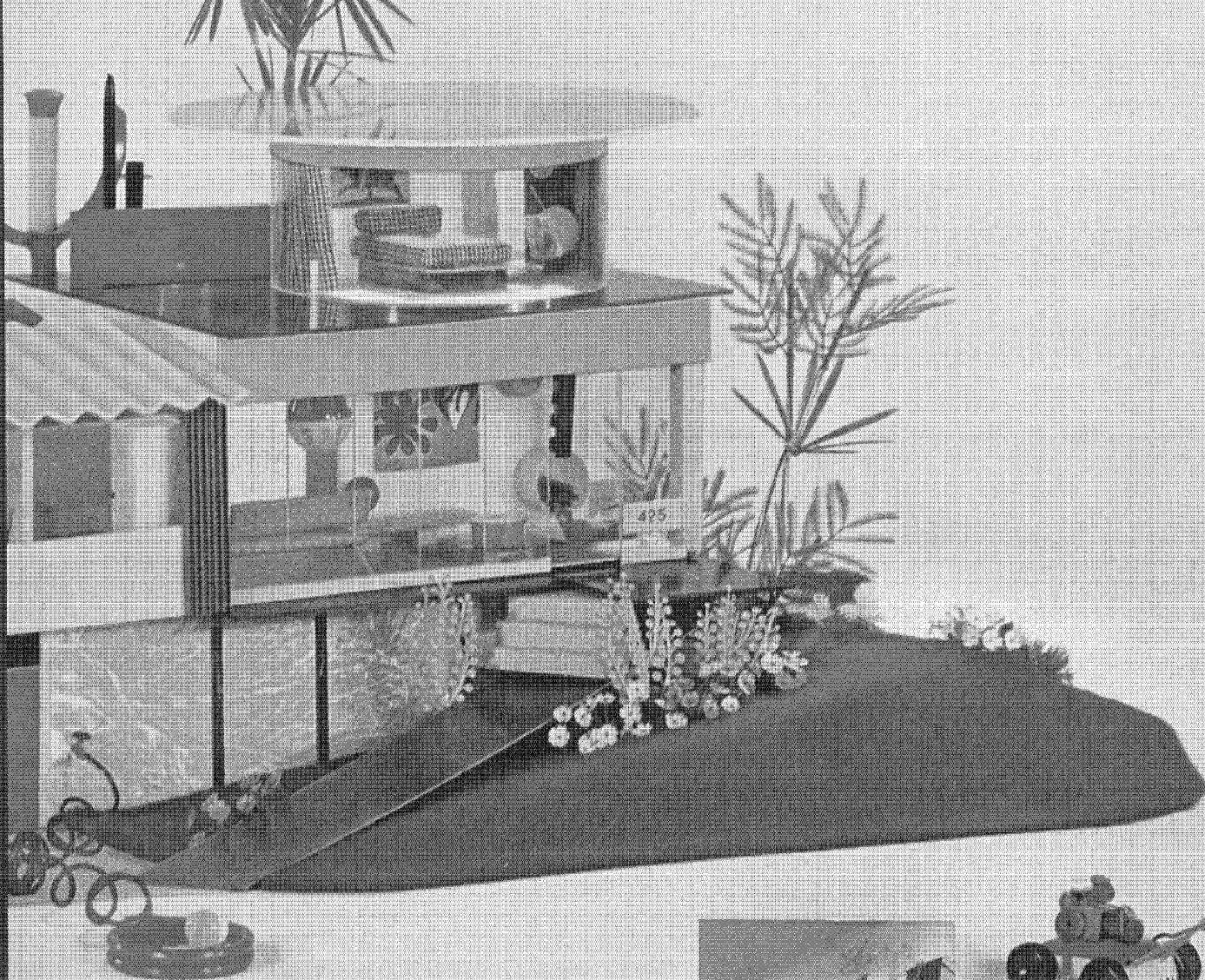
Jackson's ingenuity is usually sought by advertising and display agencies looking for a new approach to illustration. His creation above serves a different purpose: it is a vivid demonstration of the convenience afforded by a new household adhesive, Plastic Cement, which Du Pont designed with the home repairman in mind.

"In the past ten years, there has been a tremendous multiplication of plastics in the home," explains A. B. Van Sciver of the Du Pont Fabrics and Finishes Specialties

Division. "These hundreds of items are made largely from five different materials, each of which has particular characteristics—either strength with flexibility, rigidity and clarity or waterproofness combined with resilience. Repairing broken housewares has been a problem because prior adhesives have been compounded to work on just one type of plastic. A home repairman had to be an expert to know the right one to buy. Plastic Cement ends that confusion, because it works equally well on four of the five common plastics—vinyl, acrylic, styrene and phenolic."

The new adhesive's all-purpose holding power comes from a unique blend of acrylic resins and a plasticizer in selected solvents. The only plastic it's not designed to bond is polyethylene, for which there is no known cement. Plastic Cement is also effective for general repair of leather, wood, glass, china, metal and paper.

Jackson, who has experienced the home repairman's frustration while creating dimensional illustrations, is convinced of Plastic Cement's virtues. "I've always wanted to use more plastics in my work, but I've never been able



all-purpose Plastic CEMENT

to find a glue that performed satisfactorily on more than one material," he says. "To build the model house, I selected all the objects without worrying what kind of plastic they were, and Plastic Cement worked perfectly. It set quickly; I had to hold the pieces only for a few seconds. The parts didn't slide or skid either, but stayed where I put them. This was especially good where I was fixing pieces at right angles. It also formed a particularly strong bond."

Tensile shear tests in the laboratory bear out Jackson's testimony. Clear and waterproof, Plastic Cement sets solidly in about ten minutes. The product has holding power equal to or better than specialty adhesives designed for specific plastics; in addition, it's superior as an all-around adhesive.

To be sure, contractors won't follow Jackson's lead of constructing a new home solely with plastics. "But," says Du Pont's Van Sciver, "when the contractor is out and the homeowner in, Plastic Cement will certainly help hold the place together."



Dimensional designs using spare parts, left, are forte of Robert Jackson. Cementing trailer, below, was final step in model house of "junk" plastics.



By HARRY E. DAVIS

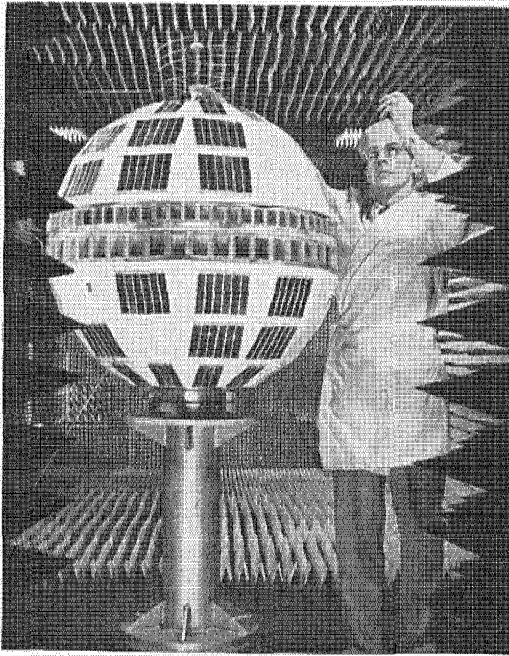
The world's largest earth-bound inflated structure, a 13-story fabric snowball near Andover, Maine, may soon play a part in relaying radio messages via satellite to almost any point on earth.

The air-filled bubble, 160 feet high and weighing 40,000 pounds, shields an earth station with receiving and transmitting equipment for Bell Telephone System's experimental "Project Telstar," which may point the way to a globe-circling communications network. A field test of the project is scheduled later this month when the first of two satellite-towers is launched from Cape Canaveral.

Telstar has grown out of the increasing load on undersea cables linking the United States to other nations (currently more than four million calls a year). A satellite system may also offer a way for handling specialized communications—for defense networks, high-speed business data transmission and television hookups.

A system which can accommodate mounting communications demands is microwave radio, which, however, has a limitation. Microwaves travel in straight lines and thus cannot conform to the curve of the earth. Bell System scientists believe satellites which intercept skyward microwaves and relay them down to distant receiving stations afford a quick and efficient remedy.

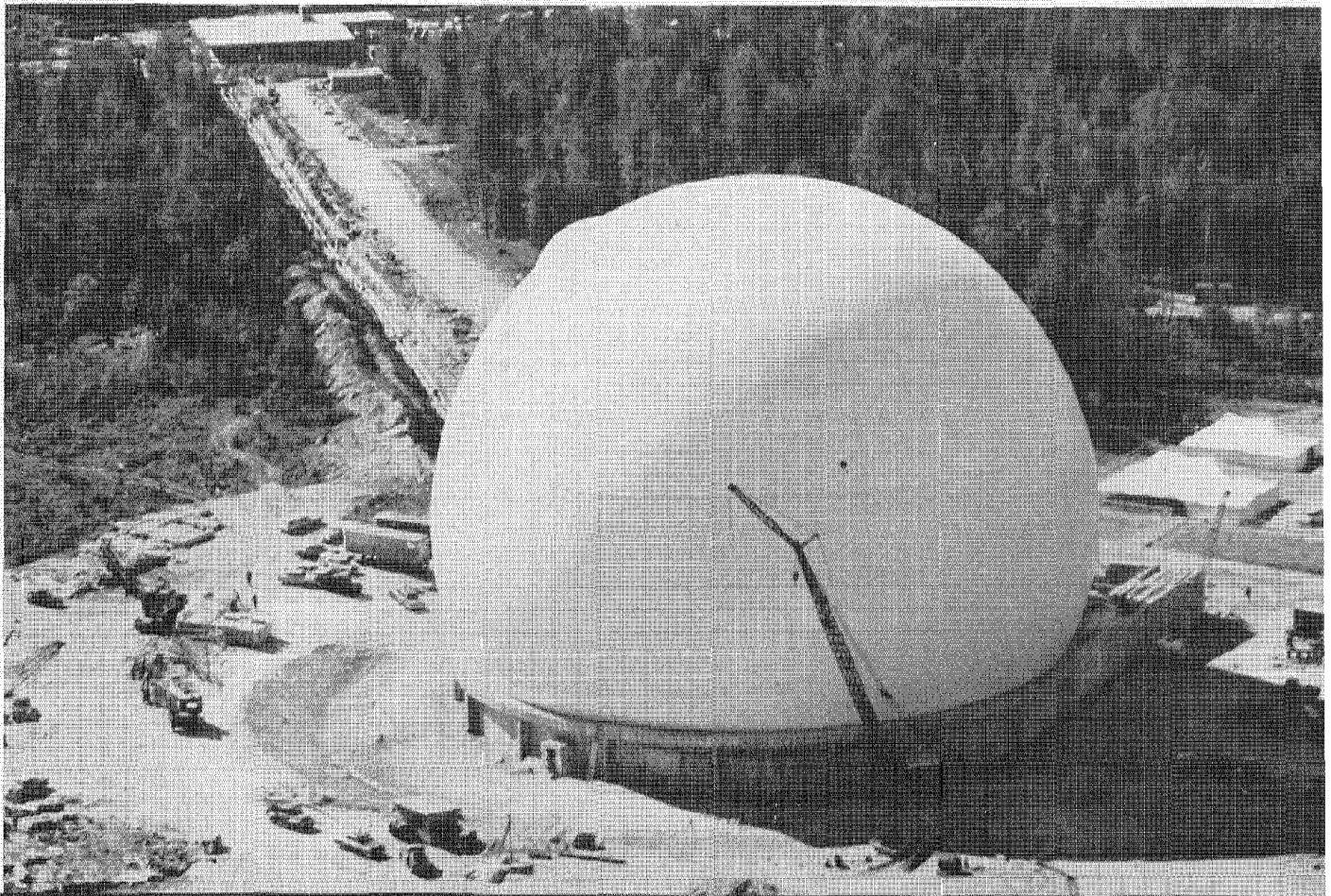
To prove their point, they will transmit wide-band communications signals from the Andover ground station to the soon-to-be-launched sky tower. The satellite, tracing an elliptical orbit from 600 to 3,500 miles away, will receive, amplify and relay the microwaves to a Bell Telephone Laboratories' receiver at Holmdel, N.J.



Telstar satellite, checked in a test chamber, will relay Maine antenna signals to Bell's Holmdel, N.J., lab.

CELESTIAL

Nation's largest inflated building is 13-story shield for antenna to send microwave signals to an orbiting satellite.



The 34-inch satellite is a 170-pound scientific package of solar cells, nickel-cadmium storage batteries, semiconductors, diodes, transistors and a traveling wave tube. The electronics components are sealed in a 20-inch polyurethane-filled aluminum canister, insulated with aluminized "Mylar" polyester film and glass fabric in alternate layers like a club sandwich. To protect it against shock and vibration, the canister is suspended within the air frame by nylon cord lacings. The satellite is capable of amplifying a microwave signal ten billion times.

Serving as the voice and ears for these space-traveling radio signals is a 300-ton, horn-shaped antenna and 40 tons of electronic equipment within the Andover radome. So sensitive is the 177-foot steel and aluminum instrument that misalignment of one-thirty-second of an inch can cause it to lose track of the orbiting satellite.

"To protect the antenna while we were building it, a temporary inflated structure of chemically treated nylon was erected in September 1961," recalls a Bell Laboratories spokesman. "This permitted technicians to assemble parts without interference from the weather. Later, the 210-foot wide, 160-foot high temporary dome was deflated and removed, and we put up the permanent shelter."

The permanent radome was inflated last month. Made of fabric by Wellington Sears Co., New York, the dome contains about 20,000 pounds of 1100 denier "Dacron" polyester fiber. It was coated with 20,000 pounds of "Hypalon" synthetic rubber by Chemical Rubber Products, Inc., Beacon, N.Y. It is supported by an average air pressure of less than one-tenth of a pound per square inch

greater than the atmospheric pressure.

"The radome provides a continuous and homogeneous surface which permits radio waves to penetrate with little loss and no distortion," the Bell Labs scientist says. "And it satisfactorily shields the antenna from sunlight, preventing uneven heating which could affect its operation."

The high protection from the relatively thin cover is afforded by the particular combination of "Dacron" and "Hypalon", which provides high tensile and tear strength with little stretch, good ultraviolet and general weather resistance and low water absorption.

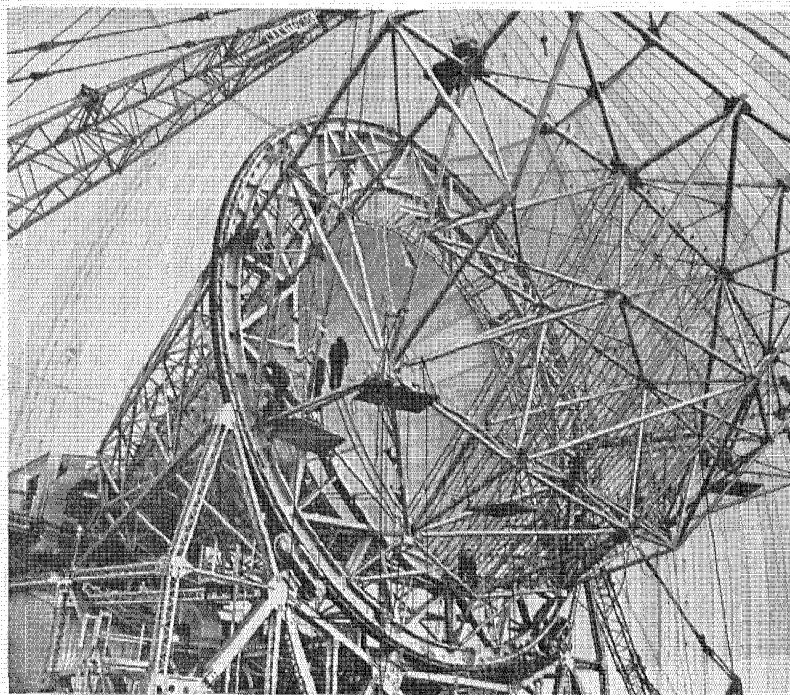
The permanent radome contains approximately 10,000 linear yards of material, according to Alvin C. Smith, manager of development and sales for Birdair Structures, Inc., Buffalo, N.Y., manufacturer of the bubble. Tying its parts together are seven miles of seams.

The "Dacron" is two plies of 17.5 ounce-per-square-yard material with a tensile strength of about 1,000 pounds per inch, warp and fill. One ply is straight and the second is biased at 45 degrees. With the coating of "Hypalon", the material weighs approximately 68 ounces per square yard and is .070 inches thick.

Telstar will soon take on international significance when a twin radome is completed by the French government, and a receiving and transmitting earth station is built by the British. The Bell System is firm in its conviction that once international signaling has successfully opened this new window into space, the satellite-microwave network will prove to be a practical supplement and substantial improvement to overseas communications.

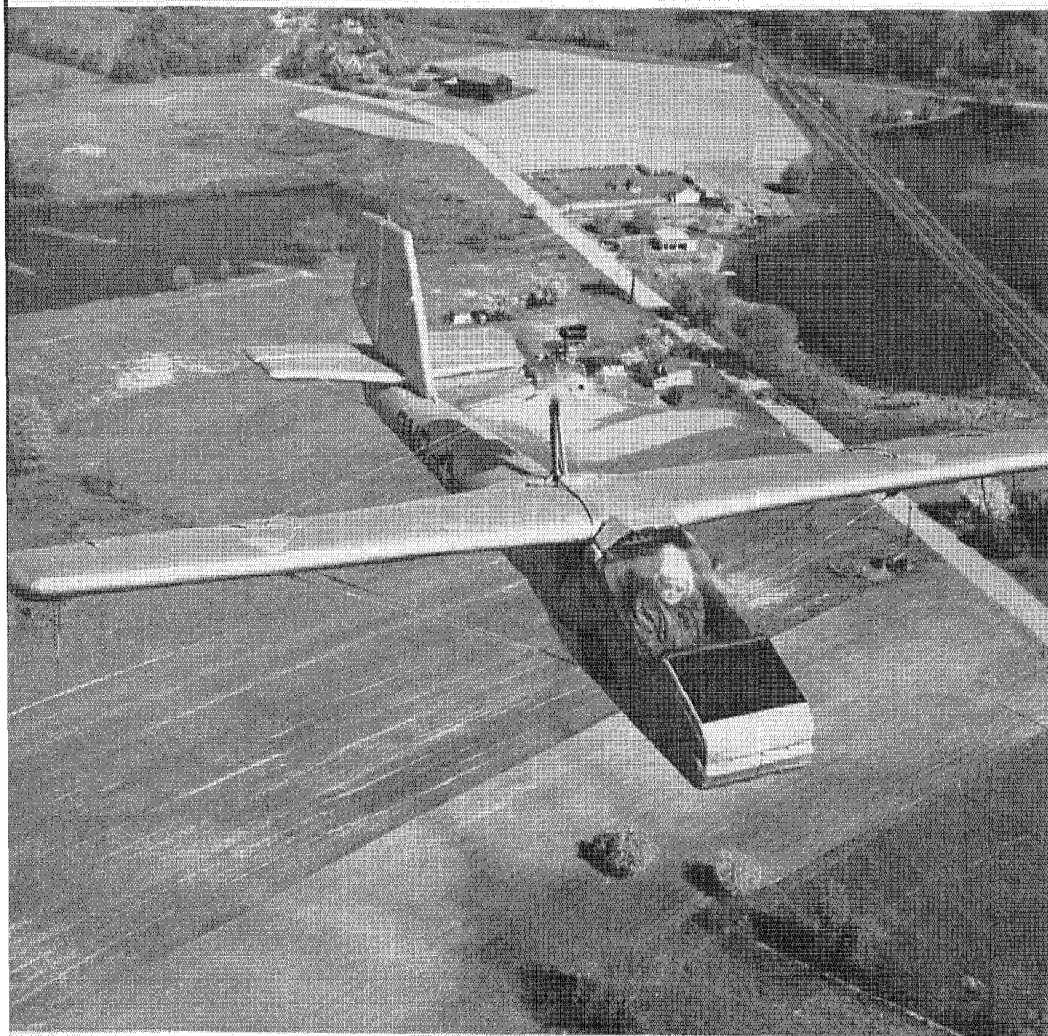
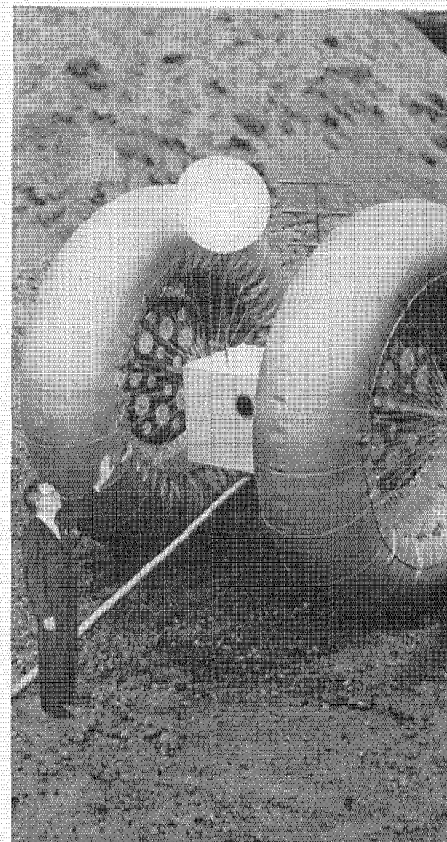
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SIGNAL CENTER



Massive steel and aluminum antenna will transmit microwaves to Bell's experimental satellite-tower through the fabric radome.

Moon exploration vehicle riding on 16-foot fabric tires of "Dacron" polyester fiber is proposed by The Goodyear Tire & Rubber Co. Tires would roll on jagged crust during moon day and deflate during long lunar night. Weight and collapsibility needs ruled out conventional tire construction.



Inflatoplane, a collapsible reconnaissance ship, was conceived by Goodyear Aircraft Corp. Its neoprene-coated nylon airframe can be inflated to seven pounds per square inch in five minutes. Plane can cruise at 60 mph for seven hours.



Seasonal warehousing problem was solved by The B. F. Goodrich Co. by storing 60,000 tires in two 180-foot radomes. First-year costs were 80 per cent below equal leased building space.

Inflation (Air) Saves Money

For size, the dome of Project Telstar is challenged only by such giants as a nine-story missile maintenance center near Washington, D.C. But countless competitors vie for honors in ingenuity of design and application.

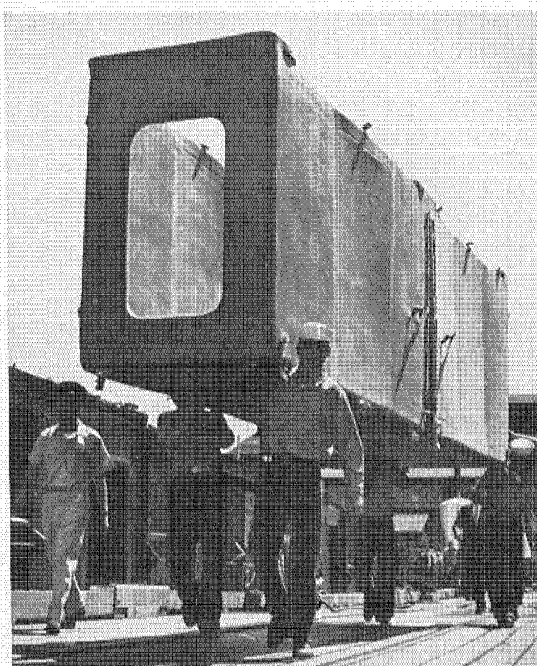
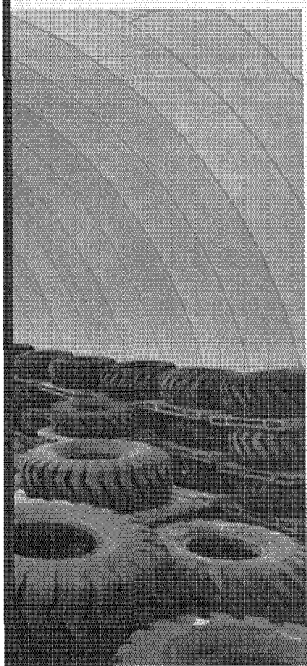
People go to church in air supported structures; they use them for boats or to cover year-round swimming pools; the Mechanical Division of General Mills has developed an Aerocap Balloon that lifts up to 15,000 pounds of aerial scientific equipment; the Goodyear Aircraft Corp. has made an airplane, left.

In the variety of air-supported offices, warehouses or seasonal storage facilities, breather balloons and dunnage bags, the common thread is economy. A large midwestern manufacturer, for example, uncrated a 4x10-foot fabric package, inflated it in 20 minutes to a 10,000-square-foot storage area, kept it erect with a three-horsepower motor driving a 30-inch fan. Deflation took ten minutes.

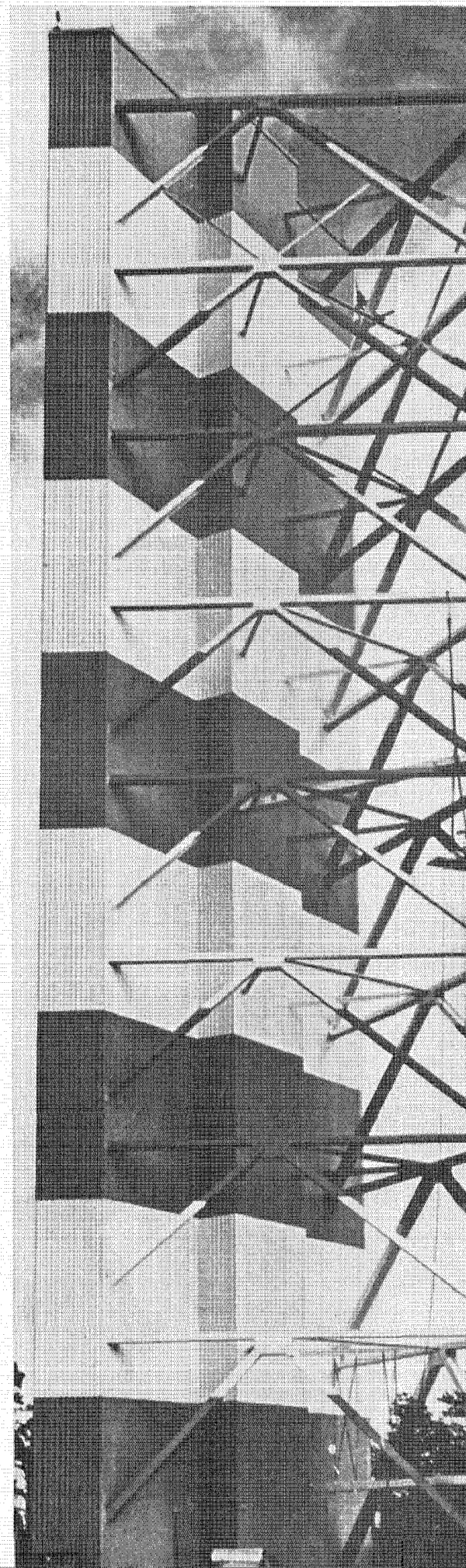
Dramatic example of the toughness and portability of fabric buildings of nylon or "Dacron" is the touring Atoms-for-Peace exhibit of the U.S. Atomic Energy Commission, which opened recently in Buenos Aires. This structure will withstand steady winds of 70 mph and gusts of 90.

Additional abrasion and corrosion protection can be given such structures by coatings of neoprene and "Hypalon" synthetic rubber, which also seal and can enhance appearance if color is added.

Radar antenna shield guards 13-story Atlantic City tower from weather, but is penetrated by the electromagnetic beams. Inflatable nylon fabric, made by Vulcan Division of Reeves Brothers, Inc., gets added weather and abrasion resistance from a coating of "Hypalon".



Inflatable gymnasium of nylon and neoprene is used in torpedo room passageway of Polaris submarine USS *Theodore Roosevelt*. The 22-foot gym is installed in half an hour; protects crewmen from sub's steel walls.





New Ling-Temco-Vought coin-operated dry cleaning machines, shown in Dallas installation, are designed to operate with "Valclene".

*Self-service dry cleaning is already a boon to people in a hurry.
Now "Valclene" promises even*

More Speed for Coin-Ops

By JACK D. HUNTER

There's much animated conversation these days among those who make up the U.S. dry cleaning industry. The subject: two new machines displayed at the industry's trade show in Chicago just over a month ago. The consensus: truly high-speed dry cleaning is a fact at last.

Outwardly the machines—one produced by Ling-Temco-Vought of Dallas, the other by Vic Manufacturing Co. of Minneapolis—are not unlike the coin-operated laundry and dry cleaning units already familiar to any housewife who's ever seen a suburban shopping center. But inwardly they're much different. They are the first to accommodate "Valclene" dry cleaning fluid, said to be the most significant development in the chemistry of dry cleaning since Du Pont introduced perchlorethylene some 27 years ago. With machines like these and with a cleaning medium like "Valclene", the comment goes, coin-op dry cleaning moves into high gear.

A combination of factors has served to launch the

young and lusty do-it-yourself dry cleaning business: (1) the American is generally a fastidious type; (2) he's also usually in a hurry; and (3) from childhood's first encounter with the penny chewing gum dispenser, he's conditioned to value received for coin inserted. The coin-op dry cleaning center caters to the first two by offering the third. Here, for a couple of dollars in change and less than an hour's time, the customer can dry-clean a load of garments that traditionally would have cost three times as much in money and considerably more in waiting.

Standard installations feature machines that clean about eight pounds at a time, tumbling them through perchlorethylene to which a detergent has been added. After drying in heated air, the clothes are deodorized by circulating fresh air. The entire cycle takes up to 50 minutes, depending on the equipment.

But with Du Pont's "Valclene" dry cleaning fluid, L-T-V's and Vic's machines will clean the same eight

pounds in 15 minutes or less. For coin-op entrepreneurs, to whom customer appeal and convenience as well as maximum equipment capacity are critical, this is a factor of great significance. Machines that cut the cycle by 15 to 35 minutes not only please customers in a hurry; they also increase the customers that can be accommodated.

Says Leon Mason, general manager of L-T-V's Industrial Division: "For the first time, materials can be dry-cleaned in less time than it takes to clean washable clothes. Furthermore, with 'Valclene' our machines safely clean not only synthetic and natural fiber materials, but also many types of suedes, leathers, elastic fabrics and plastics." The L-T-V machines are marketed by the Zeolux Corp., headed by Sam Zeoli, one of the coin-op industry's pioneers.

Two-way Answer

Irving Victor, who with his brother, Oscar, heads Vic, is equally enthusiastic. He points out, "We believe our machine will have considerable impact on the industry because its 14-minute cycle provides the answer to two problems involving present equipment. First, present machines take 'too long' for maximum customer and operator convenience; second, they require the customer to remove plastic buttons, trim and buckles before cleaning."

"Valclene" is a dry cleaning composition of chemicals never before used for the purpose. Based on a fluorocarbon, it's the result of long laboratory studies. In addition to high speed, "Valclene" has other merits: it's nonflammable and comparable to perchlorethylene compositions in cleaning action; it has the highest safety rating for dry cleaning solvents; and it's exceptionally compatible with fabrics, dyes and accessories commonly found in clothing. (One operator reports he has seen customers get excellent results with odd jobs. A man ran his hat through; a woman cooed over her spanking clean \$3,200 mink stole.)

A large part of the coin-op's rising success is the fact that customers often have quantities of clothing, blankets, draperies and other goods they forego having dry-cleaned because of cost. For about \$2, a self-service machine handles a load that a professional dry cleaner will usually charge \$6 to \$7 to process.

But the trade (including Du Pont as a major supplier of perchlorethylene) sees no serious threat to the professional. The coin-op price covers none of the custom services associated with professional dry cleaning, such as minor repairs, spot removal and pressing. Consequently, many professionals consider the coin-op as an adjunct to their regular service, rather than as a deadly competitor. Moreover, some have opened their own self-service centers, while others have elected to augment promotion of services they can offer that coin-ops find to be beyond them.

Nor does "Valclene" make perchlorethylene coin-ops obsolete. Sentiment in a wide area of the trade is that it will be history repeating itself. Du Pont's "Perclene" perchlorethyl-

ene, because of its high safety performance, made coin-op dry cleaning practical in the first place, just as it made possible the convenient neighborhood professional dry cleaning establishment. Despite perchlorethylene's superiority, petroleum solvents (upon which the dry cleaning industry was founded) are not obsolete even after 27 years.

Present perchlorethylene coin-op equipment cannot use "Valclene" without extensive modification. However, Du Pont expects that many coin-ops will offer both perchlorethylene and "Valclene" units—setting up, perhaps, a special section in the dry cleaning center for a sort of "express" service for customers in the biggest hurry. Also in sight: "Valclene" cleaning in supermarkets, motels, apartment houses, air, bus and rail terminals, operated by small independents or as outposts by larger professionals.

Du Pont believes coin-op dry cleaning is in its infancy and virtually all of the projected equipment requirements have yet to be produced and installed. Says George W. Davis of Du Pont's Electrochemicals Dept.:

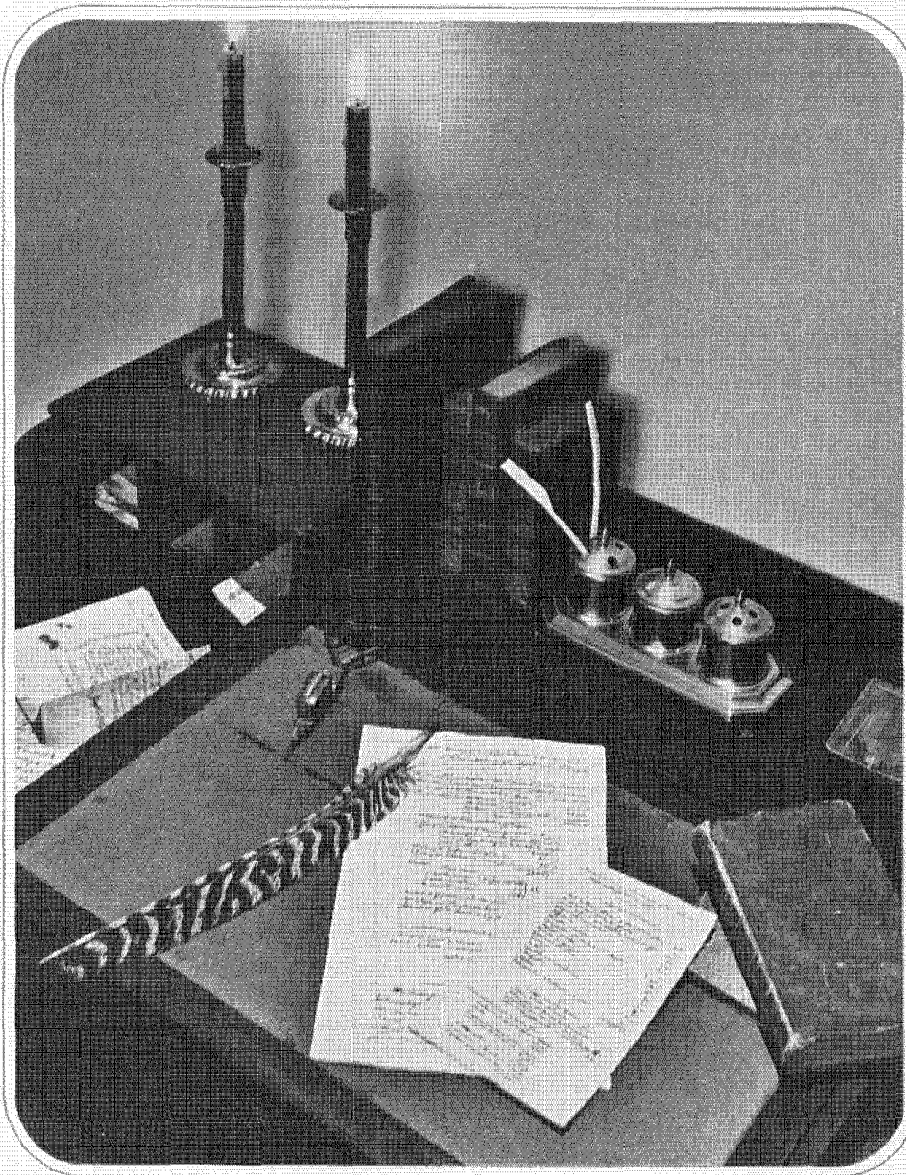
"We estimate that by 1970 coin-op dry cleaning will double the total poundage of garments now dry-cleaned. Most equipment manufacturers would consider this an ultraconservative forecast. The important point, though, is that it's not necessary to assume more than this increase to conclude that coin-op dry cleaning will be an important segment of the industry. We believe that this success will be achieved without reducing the total commercial dry cleaning sales."

Davis thinks the quality professional dry cleaner has little to worry about. The major share of the adjustment in this growth rate will be borne by the operator who doesn't compete in quality and whose costs are out of line. He believes education of the public to the differences between professional and coin-op dry cleaning will increase the customer's appreciation of quality cleaning.

Says Davis: "The customer who's used to seeing his suits come back neatly pressed, rid of grease spots and with missing buttons replaced isn't going to switch to the self-service system. Coin-ops simply make it easy and inexpensive for him to dry clean a lot more things more often."



Quantity of clothes at right can be cleaned with "Valclene" in same time it takes to do amount at left with older solutions.



160-year-old notes, on Du Pont founder's desk, mark firm's origin.

PUTTING THE PAST TO WORK

*New library assembles historical business data to
serve scholars of U.S. industrial scene*

Take a look at that interoffice memo before you throw it away. No doubt it's exactly what it seems to be—a scribbling unworthy of file among the more formal documents recording the events of your company's workaday world.

But is it?

Scholars of some future day might look at the scrap of paper in an altogether different light, finding in it a priceless commentary on the history of your firm and the sociological and economic backdrop against which it grew.

Such a possibility would certainly not be discounted by today's business historians. As a case in point, they'd cite the Eleutherian Mills Historical Library in Green-

ville, Del., where, among a collection of 40,000 volumes and a million manuscripts preserved in air-conditioned archives, there's a sheaf of notes jotted down 160 years ago by an obscure French immigrant named E. I. du Pont.

It would cost, M. du Pont's quill had scratched, at least \$30,000 a year to operate a mill to make the gunpowder required in the U.S. expansion: \$12,600 for raw materials; \$9,216.25 for 17 men's wages; \$6,183.75 for machinery repair and incidentals; and \$2,000 for his own salary. This yellowed memo not only marks the genesis of today's Du Pont Co.; it's also a key to the life and times of the industrial worker of those days and confirmation

that, even at the turn of the nineteenth century, obsolescence and depreciation were prime management considerations in the cost of doing business.

Historians and other academicians have long lamented the serious gap in U.S. annals caused by the unavailability of business records—whether due to actual loss or past willful denials on the part of businessmen themselves. Dr. Paul H. Buck, director of the Harvard University Library, said recently:

"The multiplication of materials accessible to scholars in most ranges of history has accentuated the pitiable inadequacy in the field of business history. We note that observers from abroad and historians at home for more than a century have celebrated as a major, if not the major, American achievement its business enterprise. But the fact remains that in most general accounts of American history the businessman and his activities have been presented in sinister terms. The result is a scandalous situation imperatively in need of correction."

Steps to help make such a correction have been taken by the Eleutherian Mills-Hagley Foundation, a nonprofit Delaware educational corporation. The foundation has preserved the original Du Pont powder mill area on the Brandywine as a historic industrial site; developed the Hagley Museum, devoted to early American industry; sponsored a fellowship program at the University of Delaware; and has now instituted the Eleutherian Mills Historical Library.

The library is designed to serve as "a center for scholarly research in the business and industrial history of the Middle Atlantic states area, which has exerted an important influence on the development of the American industrial economy for 250 years." The library's staff is collecting business records from the area, as well as related imprint materials, with special emphasis on the nineteenth century. From time to time it publishes guides to manuscript collections and textual editions of significant series of its documents.

Dr. Richmond D. Williams, director of the library, says: "The library as it exists today is the result of a merger of the Hagley Museum Library and the Longwood Library begun in 1914 by the late Pierre S. du Pont, who assembled a large collection of du Pont family books and personal papers at his Longwood estate. In 1955, trustees of the Longwood Foundation, who had accepted the responsibility of continuing Mr. du Pont's library project after his death, named Dr. Charles W. David, retired

director of the University of Pennsylvania Libraries, to be the first director of the Longwood Library. Under Dr. David's leadership, the manuscripts and imprints preserved by six generations of the du Pont family were organized, and the scope of the library was broadened to include materials in French and American economic history." Dr. David retired last December, and was succeeded by Dr. Williams.

New House for the Collection

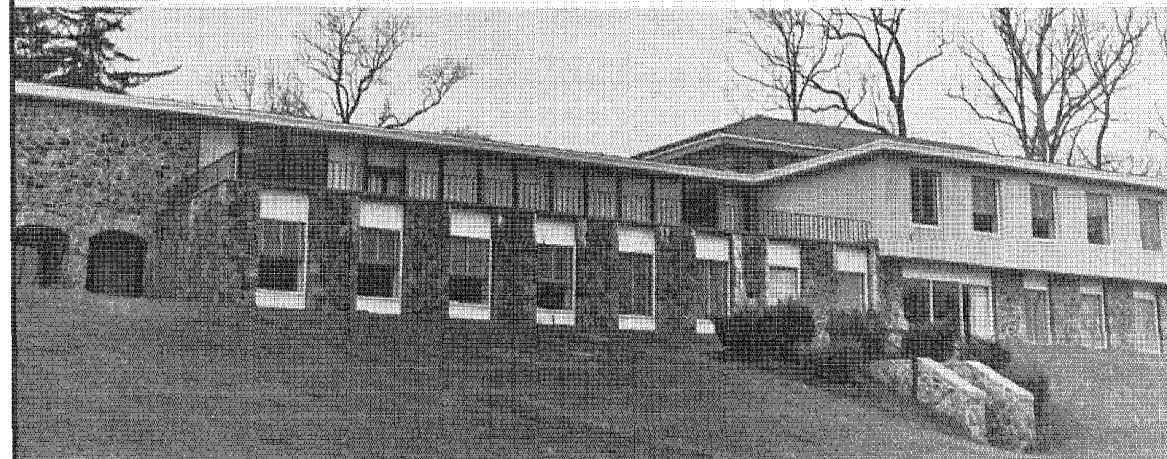
Three main bodies of papers make up the core of the Eleutherian Mills Historical Library: (1) the Longwood Manuscripts, more than a half-million du Pont family business and personal papers dated from 1780 to 1954; (2) the Henry Francis du Pont Winterthur Collection, about 150,000 items dating from 1588; and (3) the Hagley Museum collection of the Du Pont Co.'s records, dating from 1802. Says Dr. Williams: "These three groups complement each other to produce a remarkable unity."

With these three groups as a base, the library is expanding its program to include notable business and industrial records compiled by other companies and their founders. Among them: the Lukens Steel Co.; Dutihl, Dutihl and Wachsmuth, Philadelphia merchants; John Krider, Philadelphia gunsmith; the Lehigh Coal and Navigation Co.; Hollingsworth, Harvey & Co., marine engine builders; the Marshallton Iron Works; and the Pusey & Jones Co., shipbuilders. Books being added to the collection support the basic manuscript resources.

Harmony with Early Buildings

Visiting scholars will find a two-story structure of native Brandywine stone that harmonizes with existing early buildings nearby. There is a three-story stack area large enough to house 300,000 volumes under controlled temperature and humidity conditions; a rare book room, which converts into a lecture room seating 100 and displays 3,000 especially valuable volumes; a series of study rooms; and complete photocopying service.

Dr. Buck, in his address at the library's dedication, said: "This rich treasure house, open freely to scholars competent to explore its holdings, will make for better understanding of the role of business enterprise in our history, illuminate our social, political and military history in many ranges . . . In time, through accumulation of this nature, this library will embrace the industrial development of an entire area."



Eleutherian Mills library is research center of increasing importance to students of business history of Middle Atlantic states.



Corrosion is relentless enemy of covered hopper cars and their costly loadings. New Du Pont coating system will protect car and contents.

NEW LINING FOR HARD

"Flintflex" promises to lower the mortality rate and

Working on the railroad all the livelong day is no bed of roses for hopper cars.

In one conformation or another, they supply the nation's factories, feed its furnaces and deliver its groceries. And in the process, they're jiggled and jounced; pounded with mallets; shaken by vibrators; frozen in blizzards and baked by sun; filled and emptied, over and over, by some of the most abusive materials known.

One of the hardest-working and most rugged of these cargo carriers is the covered hopper car, which, with its protective roof and funnel-like interior compartments, is ideally suited to hauling hyperpure chemicals and dry bulk foods. Paradoxically, this car's deadliest enemy is not the physical abuse it takes but corrosion, which silently eats away at its innards and contaminates its loadings.

Rust, whether stemming from time and climate or from the chemical attacks of the loadings themselves, is a prime problem with a high price tag for U.S. railroads; some experts estimate it causes a \$400 to \$500 million drain on railroad resources annually. And for the railroad customer who ships, say, wheat, a rusted covered hopper car can prove to be a costly nightmare on wheels.

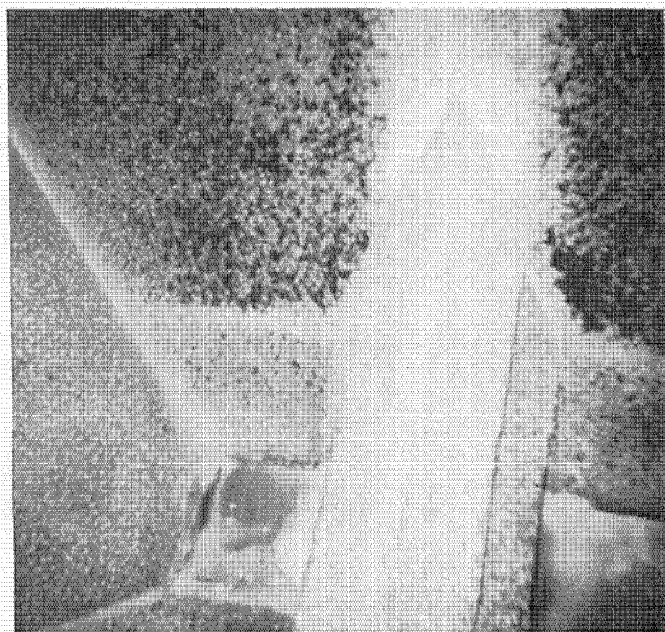
To combat this menace to corporate purse and shipper serenity, railroads have a three-pronged strategy: design of new cars that minimize corrosion risk, adoption of cor-

rosion-resistant structural materials and use of protective coatings. Providing a powerful ally in the latter category is a new Du Pont product—"Flintflex" Lining.

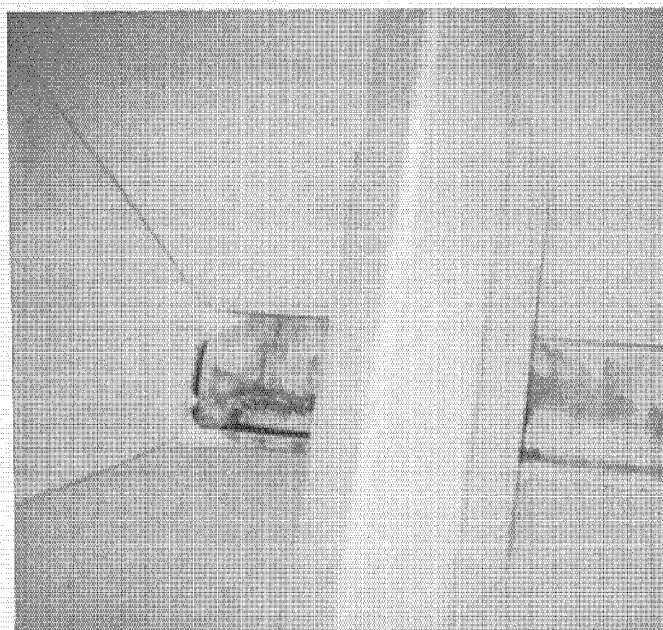
A system of organic coatings, "Flintflex" protects loadings from contamination by metal oxides and scale and prevents early corrosion of car metals resulting from abrasion and chemical actions generated by some cargoes. The coatings provide a lining with unusual smoothness, flexibility and abrasion resistance—of especial advantage for cars used to ship dry bulk foods such as grains and flour, hyperpure chemicals, such as polyethylene molding resins and abrasives, such as phosphate rock, cement and sand.

"Suitability of the new lining for such uses has been proven in two-and-a-half years of laboratory tests and field trials," says Neil Meyers, of Du Pont's Industrial Maintenance Finishes Section. "For instance, the lining is highly flexible—it doesn't crack, chip or lose adhesion even when bent around two-inch mandrels of various gauges of steel in temperatures as low as -10°F. The degree of flexibility enables the lining to withstand the impact of mallets when a car's exterior is struck to dislodge the load, the flexing of metal when cars are 'humped' in transit, and the use of vibrators in unloading procedures.

Meyers adds: "We've measured the abrasion resistance of 'Flintflex' in several ways—one of them a speci-



Unlined car interior, above, was scarred and pitted after 22 months of hauling refined common salt. Lined with "Flintflex", surfaces of car, below, are good as new after similar duty over equal span.



LIVING CARS

railroad hopper cars and their cargoes

tumbling test suggested by the U.S. Food and Drug Administration. In all cases the product performed remarkably well. Abrasion resistance is very important in hopper car linings, since many dry bulk ladings set up a severe eroding action during loading, unloading and travel. It's not only important for protecting bulk foods from contamination but also for protecting chemicals whose purity is essential to closely controlled industrial processes."

As for smoothness, or "slip," the new lining facilitates unloading when cars are emptied by gravity, air pressure or mechanical means. It does away with "hang-up" of lading in corners or slope sheets of cars, insuring delivery of full lading weight. Moreover, it simplifies car cleanup.

Finishing steps in the standard "Flintflex" system are a special undercoat followed by two topcoats of a completely different type of finish. Railroad and car lining shops report that they get fewer "sags" and runs during the undercoat application, an advantage that assures uniform coverage and smoothness, and less need to repair sags and runs by brush. The heavy-bodied undercoat allows one-coat spray application with standard spray equipment. Also finding approval among applicators is the fact that the topcoat of "Flintflex" air-dries for recoating in two hours, speeding up the lining operation.

Says A. T. Baldwin, Jr., of the Lithcote Corp., in

Melrose Park, Ill., "As applicators of a fairly wide range of protective coating materials, we can't recall any new product which performed so well and fitted in with our procedures as easily as 'Flintflex'. We normally encounter—and expect—far more difficulty with a new coating system than was experienced in this case."

Du Pont sees broader use for "Flintflex" than the railroad car. The company expects to find applications in food processing plants and truck fleets that handle dry edibles in bulk; in food storage equipment; and among construction companies, container suppliers and flour and feed distributors (since the lining complies with the applicable regulation issued by the FDA).

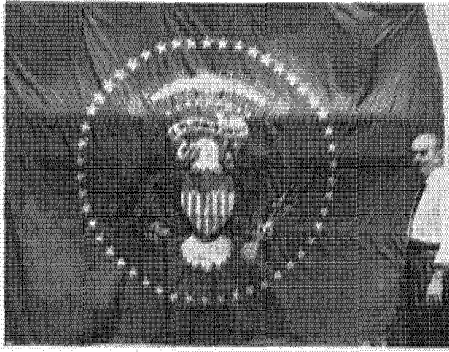
Information on the lining can be obtained by writing Room D-7035, Du Pont Company, Wilmington 98, Del.

When Dettra Flag Company, Inc., whittled away its backlog of orders for 50-star American flags near the end of 1960, sales manager William C. Spangler braced himself for a slump.

It still hasn't come. True, the pace is more pleasant than during the hectic 1960 summer when the company was so far behind on deliveries that it took its salesmen the road. But sales are continuing to fly high as Dettra heads into its peak selling season—the weeks immediately preceding Memorial Day, Flag Day and Independence Day.

"People are more eager to have a flag as a symbol of Americanism in a time of world turbulence," Spangler believes. "It almost seems, too, that John Glenn's victory in space has made Americans more openly patriotic." The Middle West, he notes, flies the most flags, eclipsing both the oldest and the newest states.

While they cherish the Betsy Ross legend, most Americans know little about modern U.S. flagmakers, who annually produce between five and six million flags.



Presidential flag was intricate job for Dettra seamstress, sales manager W. C. Spangler says.

A Flagmaker's Unflagging Business

Busy Dettra employees prepare for the peak flag selling season, the weeks preceding Memorial Day, Flag Day and Independence Day.



all types. Dettra, one of the two largest manufacturers, makes about one-third of them.

John C. Dettra founded the company in his father's chicken coop in 1901 to fill a 1,000 flag order handed him by a former employer. Now in his eighties, he not only is still active in the company's management but still sits down at a sewing machine to show new employees just how a flag should be put together.

Always interested in better fabrics for flags, Dettra explored the possibilities of nylon with Du Pont in the 1940's, as soon as civilian supplies were available. After a good many tests of different weaves and finishes, he narrowed his field to two fabrics. The first, a closely woven, continuous filament material, was suitable for outdoor flags; the other was coarser and draped more gracefully indoors because of its fuller body.

The Navy, which needed flags that could withstand salt air and mildew, was particularly enthusiastic about the new Dettra offering and has been a steady customer ever since. U.S. consulates and embassies all over the world also are long-time fliers of nylon flags.

Durability and Beauty

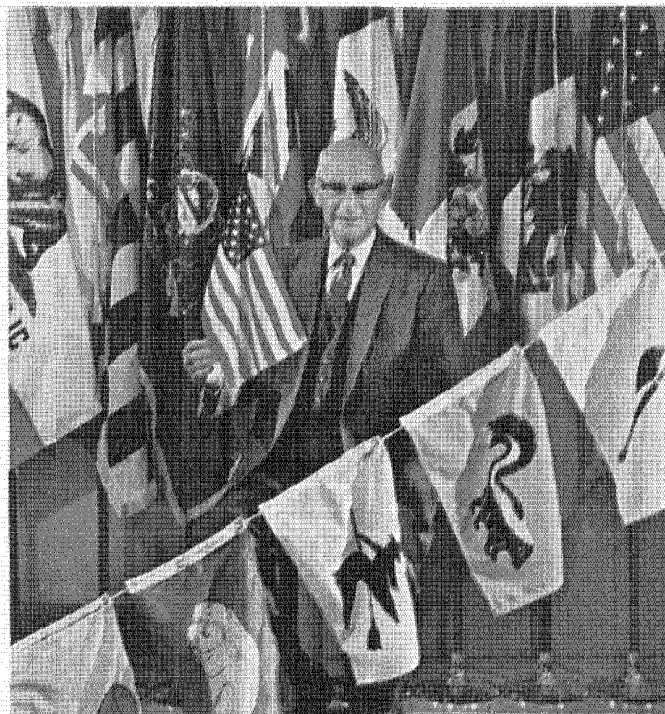
"Initially, we stressed durability in selling nylon," Spangler recalls. "But we soon realized that its beauty was equally outstanding. Because of their lightness, nylon flags fly especially well, even in a faint breeze." Dettra's special nylon fabrics are woven by Burlington Industrial Fabrics Co., and dyed to meet strict colorfastness specifications. Flags are sewn with nylon thread for added durability, a practice so successful that the company this spring extended it to cotton flags as well.

Spangler recalls the frantic period just after Alaska came into the Union in January 1959. "We watched the first public showing of the new flag on television, made a Polaroid photograph and, in five minutes, had a pattern. There was tremendous excitement among our customers and for weeks we turned out 49-star flags as fast as we could. Then, when Hawaii was admitted and it was only a matter of time until there would be 50 stars, we got armloads of cancellations."

U.S. flags account for about half of Dettra's business.



A growing part of business is making flags to order from sketches submitted by civic and service groups, fire companies and bands.



Founder John C. Dettra is surrounded by flags made of Du Pont nylon. Lightweight, the nylon flags fly well and are durable.

A rather wide range of other types, each interesting in its own way, rounds out the company's activities. Last year, for instance, Dettra made more than 50 nylon Presidential flags for John F. Kennedy. Such flags, in varying sizes, fly from a car or yacht or vacation spot when the Chief Executive is present. When he leaves office permanently, they go with him.

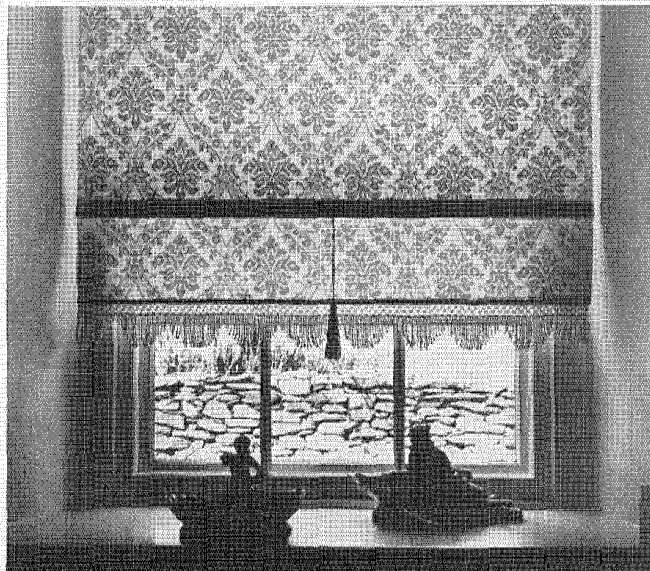
The intricate flags required days of pattern work and painstaking attention to fine details. "They are machine operators' nightmares," Spangler admits. "One woman did all the extremely fine detail work on the Kennedy flags."

The United Nations poses another sort of problem. When new countries join, it's frequently difficult to find out the design of their official flags. The U.N. representative, for instance, may be considered a king's personal envoy and so ordered to fly his flag instead of the nation's. Moreover, new countries frequently haven't reached a final decision on a design.

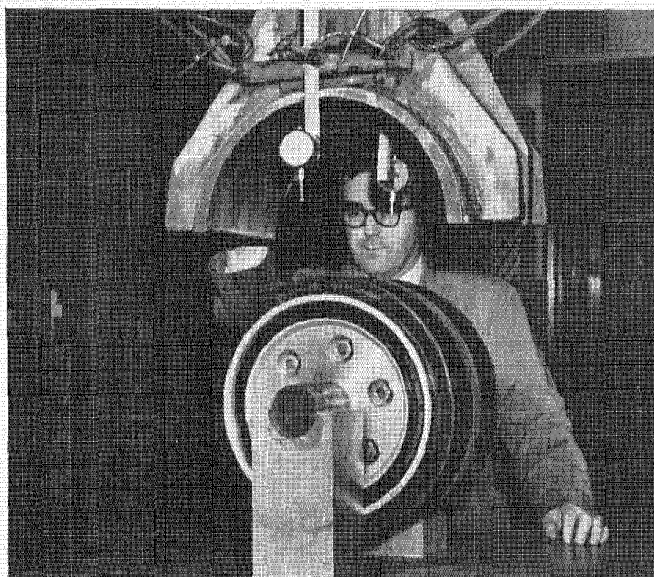
Civic and service organizations, fire companies and marching bands are big users of nylon flags, Spangler points out. Band directors especially like the fact that a nylon flag isn't permanently spotted if it gets wet or muddy at a football game. Dettra makes such flags to order from design sketches submitted by the organization.

Also available in nylon are church flags, state flags, merchant flags of all countries, U.S. yacht ensigns and a line of novelty flags for pleasure boats—among them a ball and chain to indicate that the wife is aboard and a witch to show that she's ashore.

WHAT'S NEW



Decorator window shades: New "Tontine" batiste window shade cloth—with floral, coin or geometric design—has been introduced by Du Pont's Fabrics Division. The "white-on-white" screen print is subtle when lighted from the front at night; it is prominent when back-lighted by day. Cloth is "Dacron" polyester fiber and cotton.



Bushing that won't bush: A 15-inch bushing of steel and "Adiprene" urethane rubber is used in doors of underground silos housing "ready" Atlas missiles. Designed by Isomode Division of MB Electronics, New Haven, Conn., bushing can withstand misalignment from nuclear blast and ground shock, instantaneous 500,000-pound surges and 350,000-pound hydraulic loads. It remains flexible from -65 to $+160^{\circ}\text{F}$.

► **Dishpan hands disappear:** The Princess dishwasher from Manville Manufacturing Corp., Pontiac, Mich., use major parts molded from corrosion-proof "Alathon" polyethylene resin, "Zytel" nylon resin and "Delrin" acetal resin. This kitchen accessory converts a sink rinse-spray attachment into a hand dish brush with button detergent control. Molders of Princess parts are three Michigan firms: Molmec, Inc., Walled Lake; MacDonald Manufacturing Co., New Baltimore; and Plastray Division of Bohn Aluminum and Brass Corp., Walled Lake.

► **Gaslight candle:** Candle of "Zytel" nylon resin, made by Prepo Corp., Edgerton, Wis., has a butane gas flame controlled by turning waxlike stem. Trademarked "Lumin" candle is clean burning, odorless, cleaned with a damp cloth and long lasting. It can be refilled in 30 seconds and fits standard holders.

► **New bolt action center fire rifle:** Remington Arms Co., Inc., has introduced a Model 700 series replacing Models 721, 722 and 725. New series features all-purpose stock, specially designed pistol grip, new raised open sight line, Monte Carlo comb and cheek piece and match rifle trigger. Available in de luxe and custom de luxe grades the 700 series has calibers for all types of hunting.

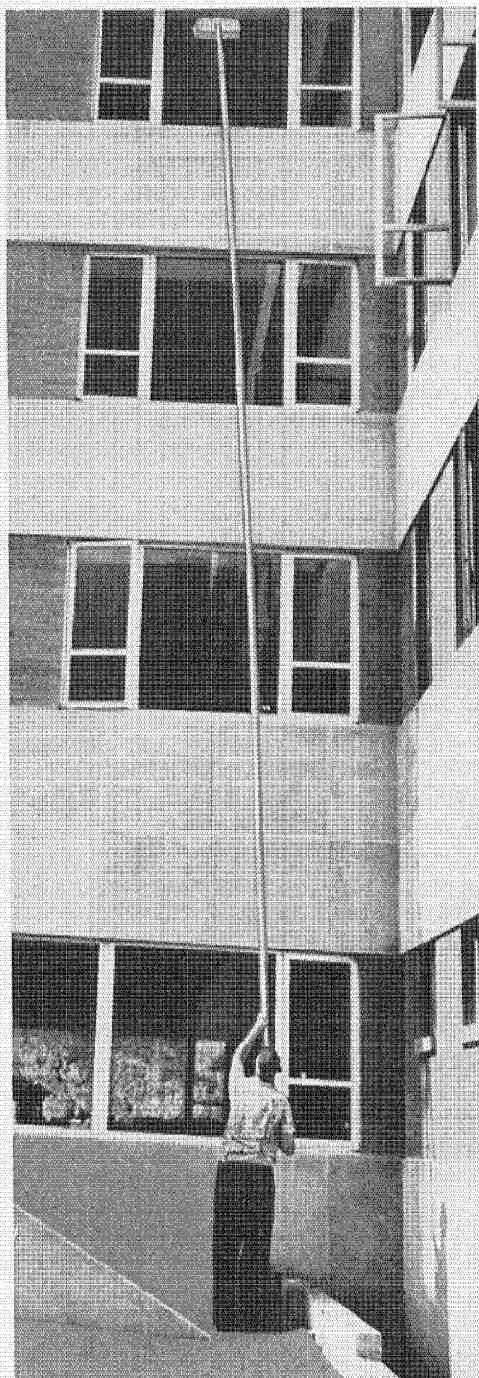
► **Carefree sun tanning:** Soft, fine-pored Du Pont cellulose sponges are fashioned into nongreasy sun tan lotion applicators by Angelique Co., Inc., Wilton, Conn. Lotion for single application is contained in each sponge, eliminating messy spills, broken bottles and sandy tubes.

► **Tear-tape carton for cellophane:** Du Pont cut-to-size cellophane sheets now come in new cartons that open with the zip of a pull tape. This eliminates skinned knuckles and the need for handling sharp knives. The top of the box converts to a wrapping tray. New king-size labels are color coded for easier identification and inventory control.

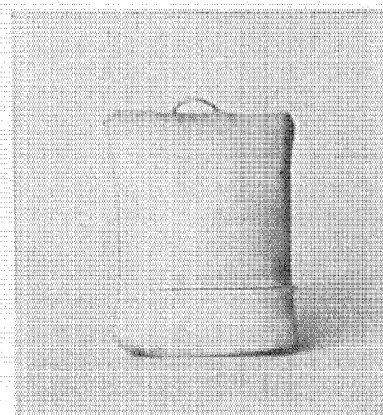
► **Dapper draperies:** Nylon reinforced "Hovotex" non-woven fabric provides new stiffness in top hems of draperies. A product of Hollingsworth & Vose Co., East Walpole, Mass., the new headers retain crispness through many washings; absence of sharp or jagged edges makes them particularly useful with glass-fiber drapes.

► **Safe, shatterproof shower door:** New folding shower or tub enclosure of "Alathon" polyethylene resin is manufactured by Showerfold Door Corp., subsidiary of Kinkead Industries, Inc., Chicago. Door is pliable, won't shatter, scratch or bruise the user; it won't shrink, peel, change color or mildew. Glides and rollers of "Delrin" acetal resin allow door to open or close from either end. Door folds to eight-inch width, providing 90 per cent tub access.

Brush with a boarding house reach: One man can wash all windows from basement level to 44 feet with a new "High" Window Washer by Tucker Manufacturing Co., Cedar Rapids, Iowa. Telescoping handle gives the reach; Du Pont "Tynex" nylon bristles in special brushes permit washing panes, edges and corners in one swipe. Washer attaches to any garden hose and dispenses detergent. Longer two-man models, with reaches to 84 feet, are also available.



Instant rainwear—just add showers: Come a quick rain, and a new all-weather coat by Rain-Paka Corp., New York, pops out of its own right-hand pocket. Come the sun, and the coat folds back into its pocket, eliminating hard-to-keep-track-of travel cases. The coat is a wash-and-wear poplin of "Dacron" polyester fiber and cotton. Trademarked "Rain-Paka", it is available in five colors and off-white. A three-fourths self-fabric lining insures good repellency.



THE ANATOMY OF A

rumor*

With one witty sentence, Mark Twain effectively silenced rumors that he had died. "The reports of my death," he cabled the Associated Press in 1897, "are greatly exaggerated."

Dr. John Zapp, director of Du Pont's Haskell Laboratory for Toxicology and Industrial Medicine, wishes he could find an equally successful means of denying a tenacious fiction about the company's "Teflon" fluorocarbon resin. "Teflon" is widely recognized as the tough guy among plastics because it survives exposure to virtually every known chemical as well as to soldering irons, electric arcs and prolonged sunlight. The rumor seems almost as tough as the plastic itself.

Sometime in the middle 1950's, the story goes, a machinist smoked a cigarette contaminated with a little "Teflon" and subsequently died. In its most extreme version, the machinist is said to have taken one puff; his lungs then filled with fluid and he died within five minutes.

"It is interesting," says Dr. Zapp, "that this rumor spread through official safety bulletins of responsible industrial concerns and military installations. In no case did a bulletin state that the fatality had occurred in the company or headquarters issuing the bulletin. An aircraft plant on the West Coast, for example, attributed the incident to a certain eastern Air Force installation. Another Air Force installation attributed it to an aircraft plant on the West Coast. Following thorough investigations, the Inspector General of the Air Force reported in 1958 that the rumor was 'completely unsubstantiated.'"

Dr. Zapp reports that within the past 12 months the same old rumor has enjoyed a remarkable resurrection. A magazine dedicated to the users of a certain kind of radio equipment printed the rumor in an article entitled "Danger: 'Teflon'." The communications chief of a Florida city police force sent the article via teletype to police forces in southern Florida. Inevitably the teletype appeared in a daily newspaper.

False accounts of danger have also been published in connection with the new nonstick fry pans that are lined or coated with "Teflon". Before their U.S. introduction in 1961, more than two million of these fry pans had been bought in Europe. In France, three notable studies were performed by three reputable laboratories. All agreed there was no hazard to health from cooking in pans lined with "Teflon". Meanwhile, as the sole manufacturer of "Teflon", Du Pont carried on its own safety tests and submitted the results to the Food and Drug Administration.

Extensive laboratory studies showed that no trace of "Teflon" enters food from the coated pans in normal cooking. In a kitchen with normal ventilation, moreover, there is no significantly greater hazard from drastically overheating the pan than from overheating common organic substances—including the handles of most pans or such common cooking aids as corn oil, peanut oil and butter.

Since the pans make possible greaseless cooking, which limits so-called fried-food indigestion and reduces cholesterol content in the diet, their use actually may be beneficial from a broad health standpoint.

*Adapted from a paper delivered by Dr. Zapp before the Industrial Hygiene Foundation. Reprints available.



Du Pont MYLAR® makes this package tough enough to boil...

What can it do for your package? This heat-in-bag package was filled, sealed, frozen, stored, then boiled. Only Du Pont MYLAR® polyester film has the strength, clarity and printing properties needed for an ideal heat-in-bag package — that's why MYLAR is a leader in this promising new market.

Would a tough, transparent package increase your profits? Manufacturers in the meat and cheese, gourmet-food and turkey industries, among

others, have found that MYLAR dramatically improves their packages and offers new marketing opportunities. Recent price reductions have broadened the range of potential uses of MYLAR. It might be just the film for one of your packaging needs. For information and names of Authorized Converters, write: Du Pont Film Department (DM), Wilmington 98, Delaware.

*Du Pont Reg. Trademark



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