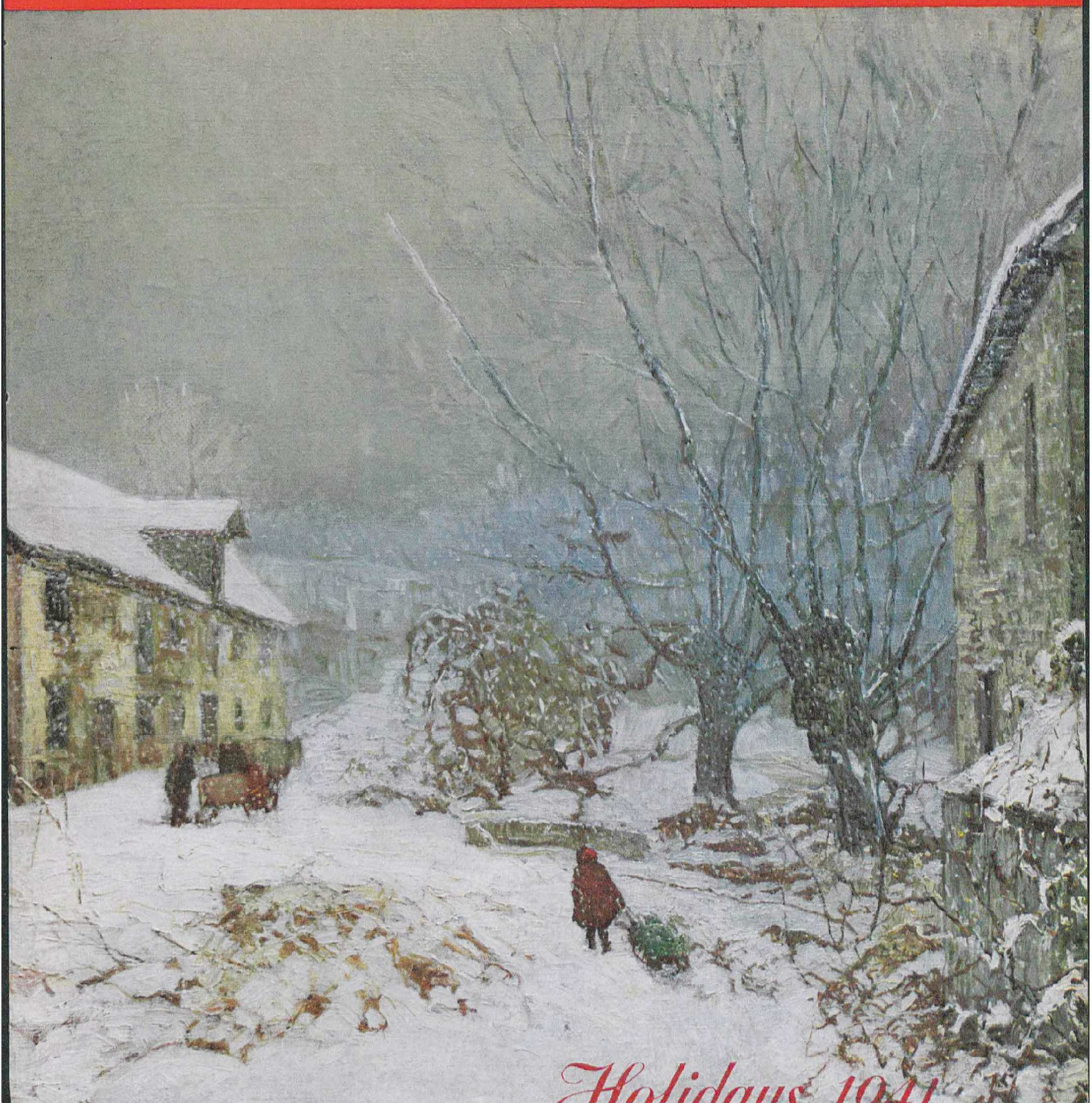
THE DU PONT MAGAZINE

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



Holidays 1941

Merry Christmas

to Tom — from Mother and Dad
(Here's the Remington .22 you wanted
And here's why we're giving it to you)

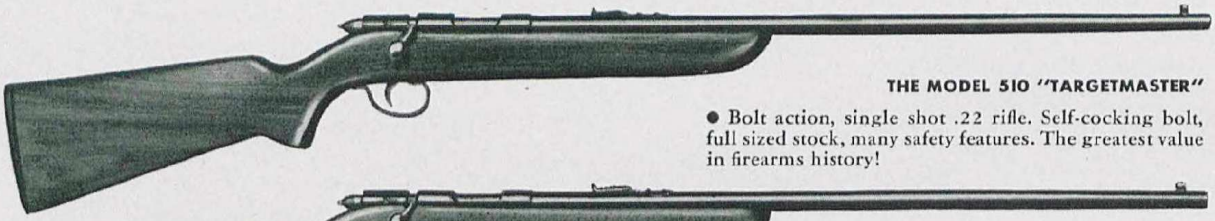


"THERE'S A SAYING . . .

"You give the great outdoors, when you give a gun!"

• "We want you to know and enjoy the great outdoors. We want you to build up the strength, health, resourcefulness and independence which outdoor living develops. You'll find hunting a sport which you can enjoy for the rest of your life. And more than any other sport, hunting will bring you and your Dad together in an even closer companionship. During the past century and a quarter, millions of American boys have been given Remington rifles as the first badge of their young manhood. This is yours."

THERE'S NO BETTER GIFT TO GIVE *(or to receive)* THAN A REMINGTON



THE MODEL 510 "TARGETMASTER"

• Bolt action, single shot .22 rifle. Self-cocking bolt, full sized stock, many safety features. The greatest value in firearms history!



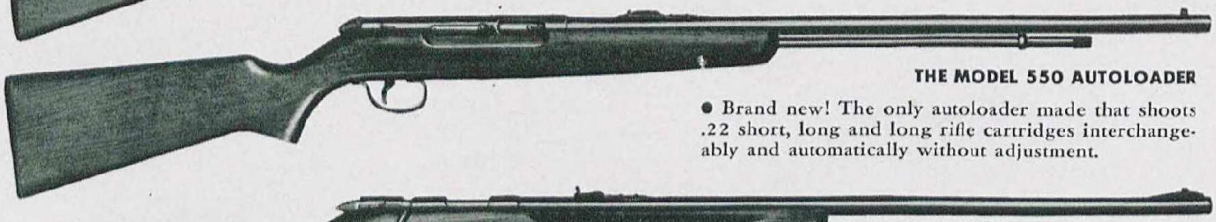
THE MODEL 511 "SCOREMASTER"

• Bolt action, box magazine .22 caliber 7-shot repeater. No other rifle offers so many features at such a low price.



THE MODEL 512 "SPORTMASTER"

• Bolt action tubular magazine .22 repeater. Exceptional magazine capacity . . . holds 22 Short, 17 Long, or 15 Long Rifle cartridges.



THE MODEL 550 AUTOLOADER

• Brand new! The only autoloader made that shoots .22 short, long and long rifle cartridges interchangeably and automatically without adjustment.



THE MODEL 513S SPORTER

• A smart, racy .22 caliber sporting rifle of top-notch quality for general use. Outstanding accuracy. Beautifully made and finished throughout.

Targetmaster, Scoremaster, and Sportmaster are Reg. U. S. Pat. Off. by Remington Arms Co., Inc.

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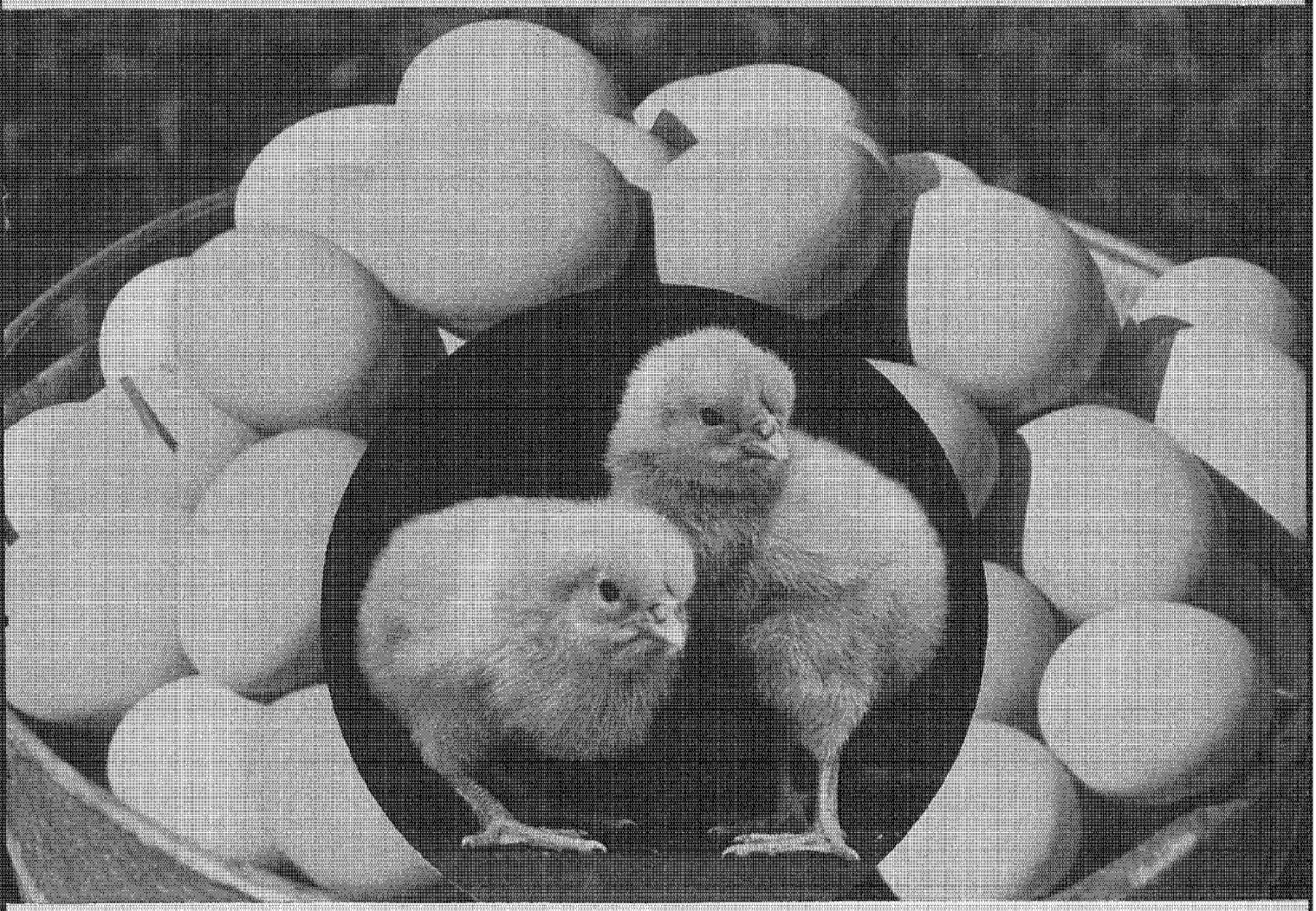
DU PONT

THE DU PONT MAGAZINE

VOLUME XXXV NO. 12 HOLIDAY NUMBER, 1941



A new chapter in Poultry Nutrition

Chemistry has developed a new source of Vitamin D for America's billion-dollar industry

By LEAVITT S. WHITE

BREAKFAST is but an incident in the start of a busy day in tens of thousands of American homes. So stereotyped are the breakfasts of most of us, in fact, that a hue and cry is immediately raised when Mother or the cook has the temerity to suggest a change in the morning menu.

Yet one of the parts of this menu that mothers insist on nowadays is an egg. Few if any foods are more important for growing children.

Boiled, fried, scrambled, poached, shirred, baked or coddled—Americans consume eggs by the billions, chiefly at breakfast, but also in cakes, custards, salads and other delicacies of the kitchen. And the more than one billion dollars the American farmer receives annually as poultry income indicates the importance of eggs and chickens in our national economy.

During the past twenty years, farmers have come to understand a lot about scientific agriculture. New



For good egg production, without loss of vigor or "laying life," poultry feeds must be fortified with adequate amounts of Vitamin D.

methods, equipment, fertilizers and feeds, wholly unknown to our grandfathers, are but a few of the factors introduced into modern farm operation. The poultryman, too, has found that science is a mighty powerful ally in supplying eggs for the American breakfast table and "chicken for dinner."

The once-lowly chicken is becoming an aristocrat, not of the barnyard but of her own special, scientifically-planned quarters. Hens raised and maintained on a commercial basis today are both properly housed, befitting a contributor of substantial income, and fed controlled diets over which experts ponder. For only under such conditions do they produce the most and the best eggs, and grow to maximum attractiveness for the cooking pot and oven.

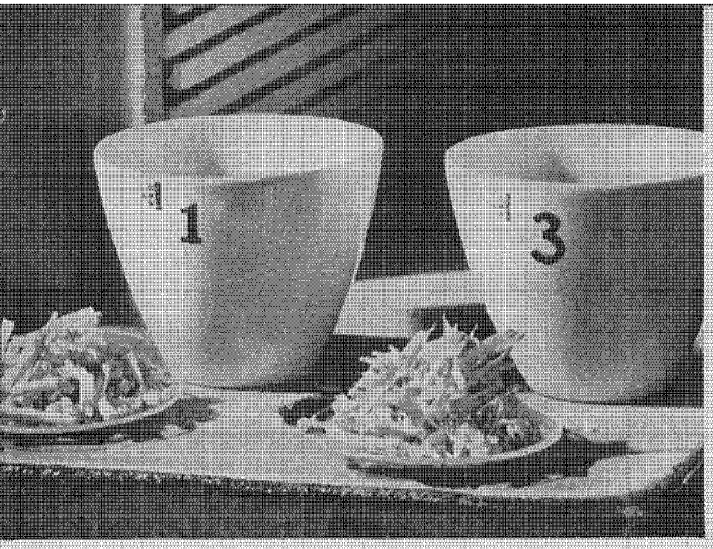
Indeed, just as with children, science has specified precise diets that contain all the vital factors known to produce sound growth in baby chicks. And just as Vitamin D, the "sunshine vitamin," is considered absolutely essential to children for the prevention of rickets, so is this same vitamin of equal importance in the development of each and every healthy baby chick. Normally, children obtain much of the sunshine vitamin they need through exposure to the sun, because the sun's rays activate substances below the surface of our skin to form Vitamin D, which is taken up by the blood. Vitamin D may be formed in similar fashion below the surface of the skin of a chick, but—again like humans—baby chicks, as well as full-grown hens, seldom get all the sunshine they need.

Many children, deficient in the sunshine vitamin, are fed cod-liver oil, which has been recognized since the early 1920's as containing Vitamin D. Yet of the 15,000,000 gallons of cod-liver oil imported annually before the present war began, only one-fifth was consumed outside of the poultry industry. Chickens are by far our largest consumers of Vitamin D.

Scientific interest in this vitamin for poultry can be traced back nearly two decades. However, after it was found that Vitamin D is important to a chick, and after it was learned that supplements of Vitamin D to the daily ration make a good chicken better—even then science was hardly started in its work on the sunshine vitamin and its relation to poultry.

In 1927, research chemists at the University of Wisconsin discovered that certain chemical compounds, known as sterols, when irradiated with ultra-violet light, form a Vitamin D that compares with cod-liver oil for effectiveness on growing animals. Shortly afterward, Du Pont chemists became interested in what rapidly developed into a search for a new and better source of Vitamin D; for it was found that this vitamin obtained by irradiating sterols of plant origin, while effective for humans and certain animals, was not effective for poultry.

The research road followed by the chemists during the next few years had many turns and many forks. Compound after compound was irradiated and investigated. Masses of data were collected. Deductions were drawn, new tests initiated. Then, in 1934, the secret of a really effective source of Vitamin D for poultry was dis-



The percentage of ash of dried bones is the final test of normal calcification in chicks. Note the difference in ash content of two test groups. The ash from the bones of birds fed with "Delsterol" is shown on the plate at the right.

covered. Instead of using chemical compounds or sterols derived from plant sources, the Du Pont investigators experimented with sterols derived from animal sources. When irradiated, these sterols provided Vitamin D for poultry as effectively as did cod-liver oil, the measuring standard of the day.

This original discovery, coming after years of patient work, was the most important result of Du Pont's search for a new Vitamin D for poultry up to that time. But many problems remained to be solved before the new vitamin could be placed on the market. Not the least of these was to find a source of suitable animal sterols in quantities large enough to permit economic manufacture. So the work continued. Once again days lengthened into weeks, weeks into months, months into years. More tests were carried through, more data collected.

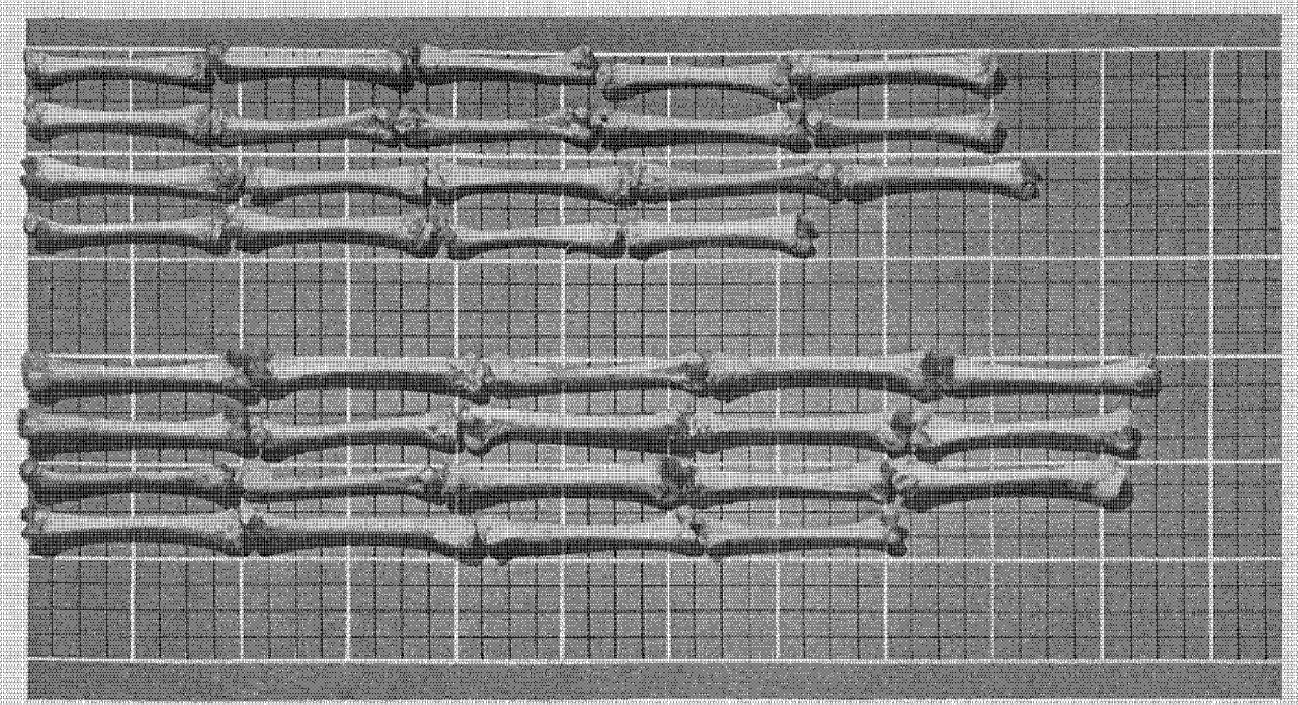
The answer to the problem came in 1937. Suitable animal sterols were discovered. They could be separated from their raw-material source without too much difficulty, and they could be irradiated to produce the Vitamin D effect. And at long last, the manufacture of "Delsterol" "D"-activated animal sterol was begun.

However, there were still production factors to be straightened out, tests to be carried through, raw-material sources to be stabilized, and markets to be developed, if "Delsterol" was to solve fully the needs of poultrymen for a dependable source of Vitamin D. Indeed, for some time poultrymen had been so confused about Vitamin D requirements that many were in the habit of adding generous amounts of cod-liver oil to their feed despite the fact that reliable feeds were fortified with it. This practice was followed simply to be sure that the chicken—now often being kept in close confinement—received enough of the sunshine vitamin.

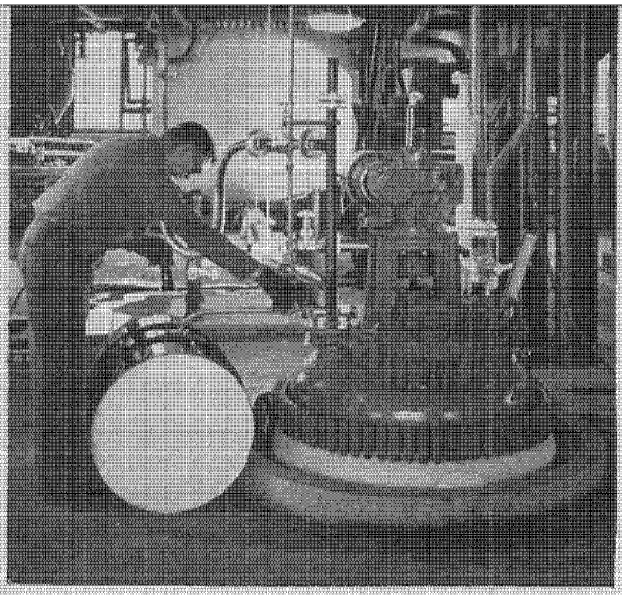
The chemists were able to correct initial production difficulties in the manufacture of "Delsterol." Then they went to work to develop an edible powder that might be used to carry the Vitamin D product to the chicken, through special feeds already distributed by feed manufacturers throughout the country. Such a powder was perfected and it was seen that it had many advantages. It eliminated odors and "off" tastes; it mixed more readily with feeds, and it would not congeal in cold weather.

Long and arduous had been the trail, but still the end was not in sight as far as "Delsterol" was concerned. Not content with their sources of sterols, the chemists pushed on with renewed vigor now, for they realized that with the outbreak of war in Europe in 1939, imports of cod-liver oils might be cut off.

The final link in the chain of discoveries leading to present production of a Vitamin D from domestic sources was forged little more than a year ago, just at the time



There's a difference in bone growth of chicks fed on a control diet (upper group), and those fed with "Delsterol" (lower group). Bones from the control group are shorter and less fully developed than those from birds fed with Du Pont's source of Vitamin D.



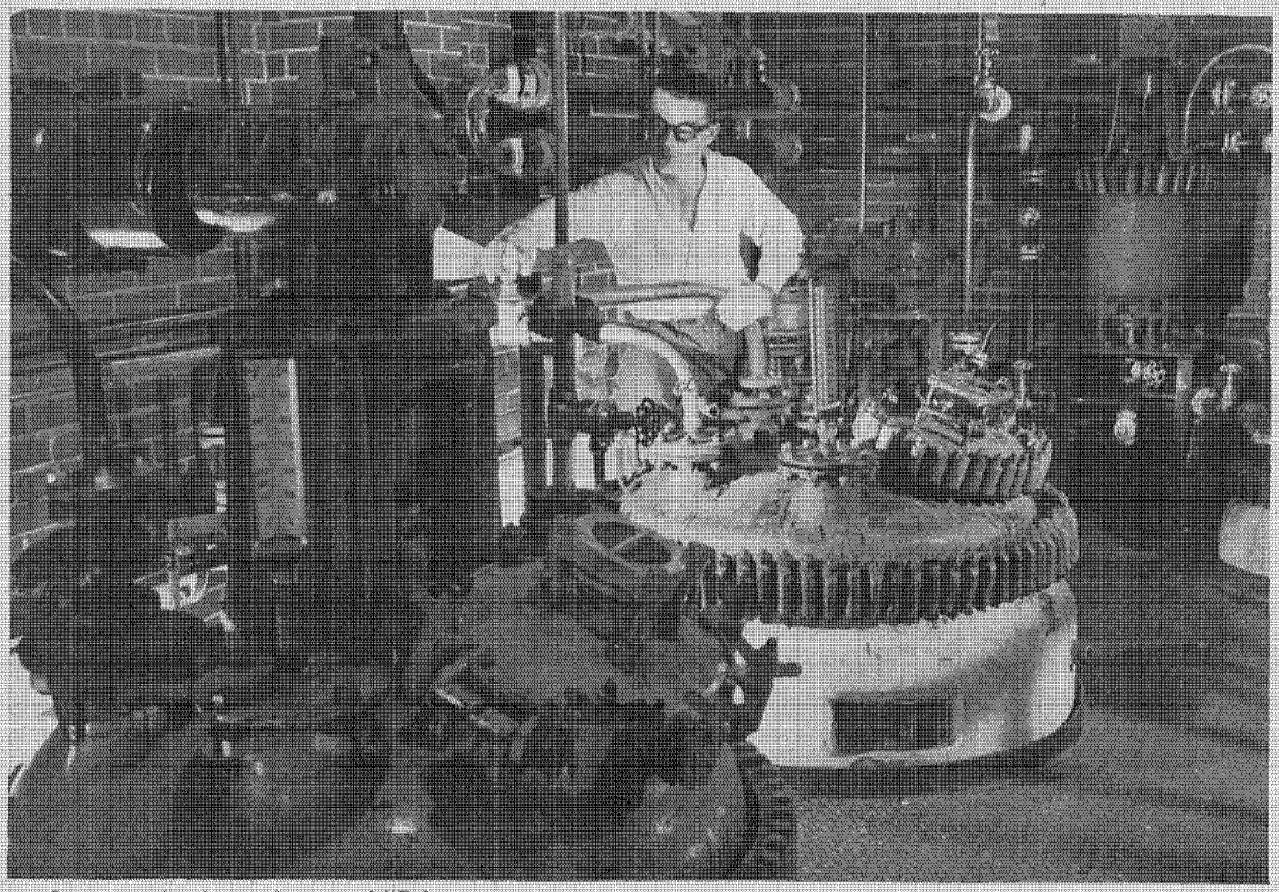
Glass-lined equipment is used for the purification of the pro-vitamin, which is that part of the chemical substance or sterol converted into Vitamin D by irradiation with ultra-violet light.

that cod-liver oil imports were being reduced by approximately eighty per cent. Among the natural resources of the United States there was discovered to be an abundant supply of suitable animal sterols for "Delsterol." And early this fall, following the perfection of chemical manufacturing processes and initial distribution of "Delsterol" in the powder form, it was announced that a Du Pont plant in New Brunswick, New Jersey, could supply the Vitamin D requirements for poultry in unlimited quantities.

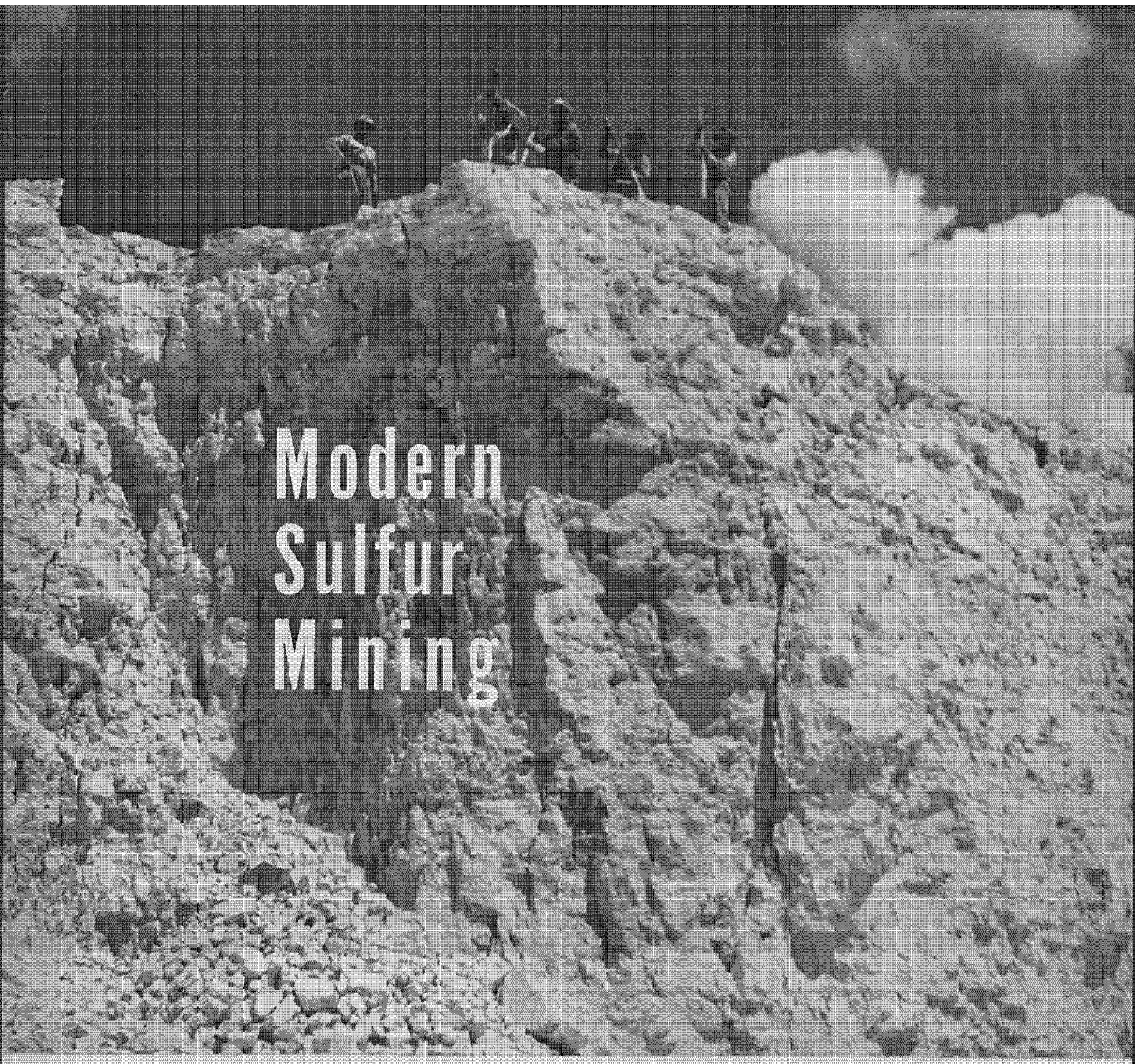
"Delsterol" actually is Vitamin D. Briefly, the stages involved in its manufacture are (1) the extracting of sterols from their animal sources, (2) the irradiation of these sterols with ultra-violet light to produce Vitamin D, and (3) the incorporation of this vitamin with an edible powder carrier which may be added to the chicken's daily feed.

Returning for a moment to your breakfast tomorrow morning, it might be stretching a point to suggest that your egg absolutely depends on "Delsterol"; that without it there might be fewer eggs on the market. After all, chickens have been laying eggs since the dawn of recorded history—and probably before. Yet since the modern poultryman has introduced new methods and new techniques into the age-old problem of how to keep more baby chicks alive after hatching, and how to increase egg production, and since among these new methods is the addition of a Vitamin D to the daily feed, it is certain that our poultry industry could not maintain its present levels should a Vitamin D supplement for feeds be unavailable.

"Delsterol" supplies an essential need if the poultry industry is to continue on a year-round basis, and it must do so if the industry succeeds in producing the forty-eight billion eggs expected in 1942 by defense-feed-program officials. The development of "Delsterol" must rank among the significant contributions of chemistry to American farming.



One stage in the production of "Delsterol." This operation precedes the light-irradiation process that results in the production of Du Pont's new source of Vitamin D. Scientific control makes possible the uniformity of the finished product.



Modern Sulfur Mining

How the pure product is pumped out of the ground at Newgulf, Texas, largest sulfur mine in the world

By R. C. SHERMAN

THE ancient Greeks called it theion. Scriptural translators gave it a more descriptive name, brimstone, which has unpleasant connotations for those who stray from the "straight-and-narrow" path. But the pale-yellow earthy material that burns with a blue flame and a pungent odor is best known as sulfur. At least 2,000 years B. C., pagan priests were using it in their ceremonial rites. Homer, in his *Odyssey*, cited its use for fumigation. Pliny mentioned four different kinds for medicinal and textile applications. In fact, ever since the beginning of human history this product has been utilized in one way or another in the arts and industries. It excited the imaginations of the alchemists in the Middle Ages, and what chemists do with it makes it an

essential material for national defense purposes today.

Until comparatively recent times Sicily was the chief source of the world's supply. Back in the fifteenth century a large deposit of sulfur, mixed with limestone and other impurities, was found there. But there was no extensive development of this resource until about two hundred years ago when sulfuric-acid manufacture called for sulfur production on a large scale. In those early days miners dug the ore, dumped it in shallow, plaster-lined pits, applied a covering of volcanic dust to shut off the air, and applied fire. A smothered burning followed. About half of the sulfur was consumed, and the rest, in a molten state, was drawn off, cooled, collected and shipped. Sicilian sulfur dominated the world market until early in the present century.

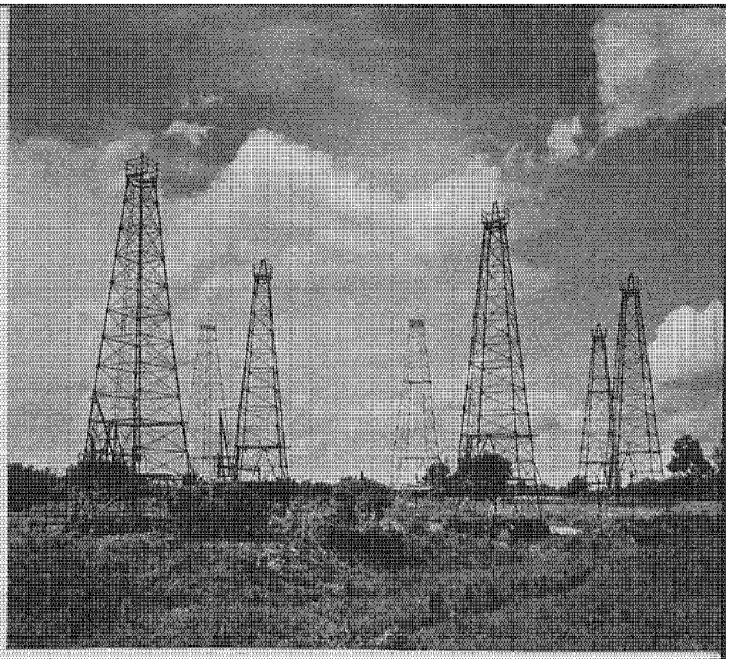
For the past thirty-five years practically all of the elemental sulfur consumed in this country has come from mines located in the Gulf Coast regions of Louisiana and Texas, where large deposits are found in the cap rock overlying certain salt domes at depths ranging from 500 to 1,500 feet below the surface. Here, too, the sulfur occurs in pure crystals disseminated through limestone and gypsum. The sedimentary beds of the gypsum type comprise the most important deposits; from them comes more than ninety-five per cent of the world's sulfur supply. But the mining practices of the Texas Gulf Sulphur Company, largest operator in the world, are entirely different from those of the Sicilians.

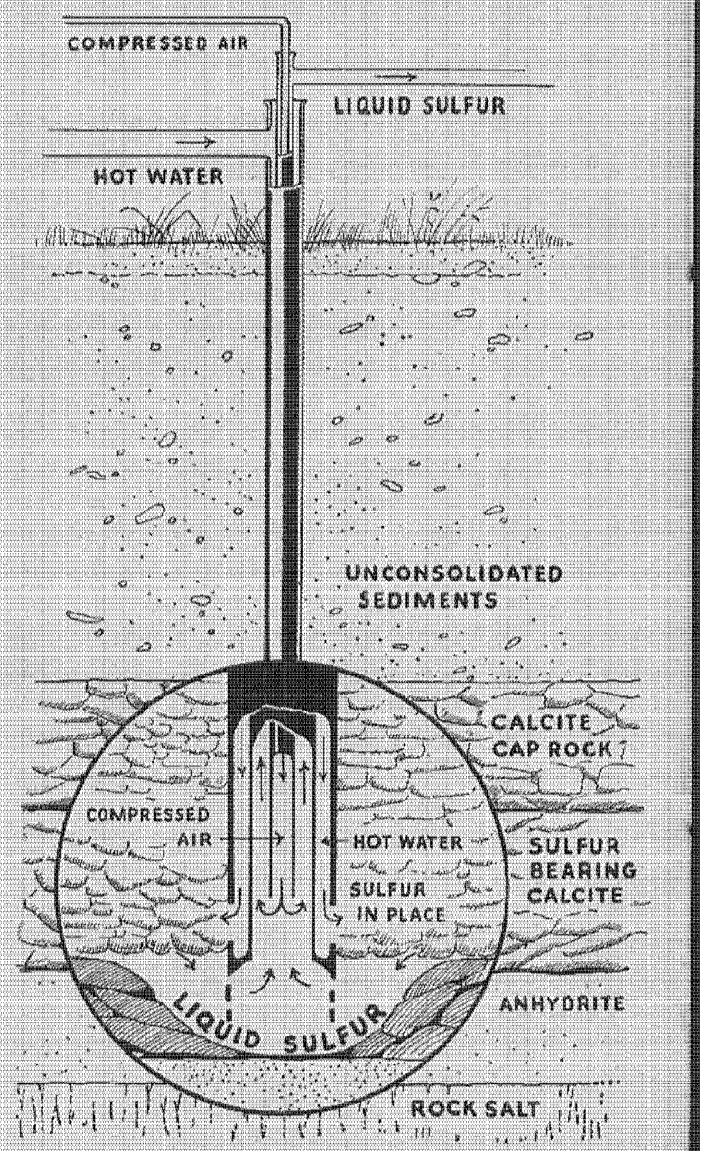
Hot-Water Mining

The modern process, known as the Herman Frasch method, was developed in 1891, but was not commercially successful until 1903. Crystalline sulfur melts at 240° F., and heat is the agency applied by pumping superheated water into the deposit far underground; and the melted sulfur, almost chemically pure, flows away from the gangue and is pumped to the surface, where it is allowed to solidify in wooden or sheet-metal bins.

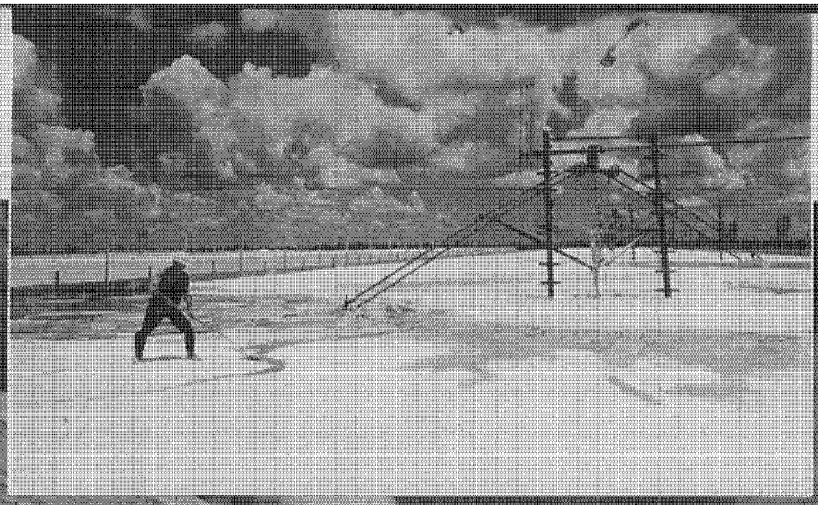
Wells are drilled with rotary rigs like those used in the petroleum industry, and each well is equipped with pipes of various sizes, placed concentrically and extending from the surface to the sulfur deposit as shown in the accompanying sketch. One is a six-inch casing that extends through the sulfur-bearing stratum and rests in the upper portion of the underlying gypsum bed. Inside this casing is placed a three-inch pipe that reaches nearly to the bottom of the sulfur-bearing rock, but rests on a collar set within the outer pipe, thus sealing the annular space between the two. Finally, a one-inch air line, inside the three-inch pipe, extends to a depth slightly above the collar just mentioned. The six-inch casing is perforated at two different levels, one above the collar, and the other below it. Through the upper set of holes superheated water flows out, and through the lower set, the molten sulfur flows in.

In "steaming" a well, hot water under high pressure is pumped down the annular space between the six-inch and three-inch pipes; it discharges into the porous formation through the perforations already described, with the result that the entire region through which this water circulates is heated to a temperature above the melting point of sulfur. And since molten sulfur is heavier than



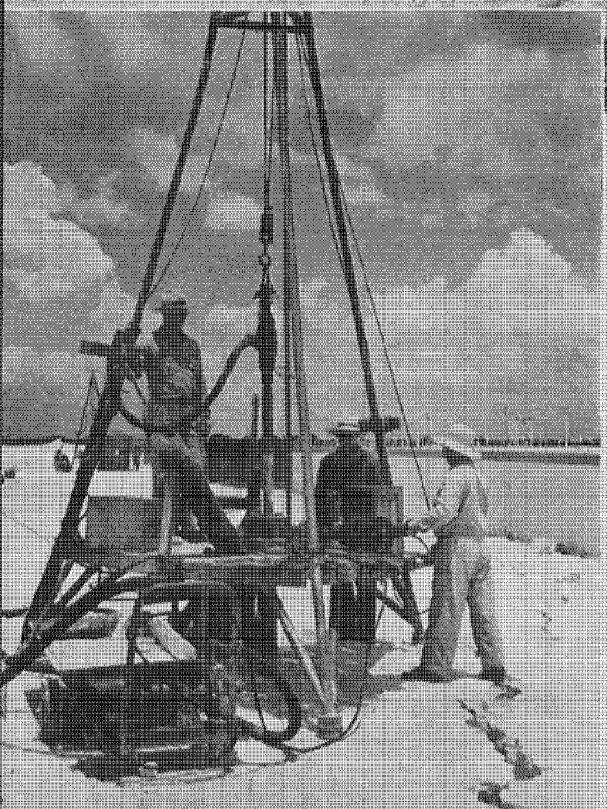


At the top, a typical group of sulfur-well derricks in the Texas field. The sketch above will help you visualize the piping system underground.



RIGHT: *The end of the production line where a continuous flow of molten sulfur is discharged on top of the storage vat. It's important to spread it over a large area to cool uniformly.*

One of the huge blocks of sulfur in the storage area at Newgulf, Texas. In molten form and almost 100 per cent pure, it was pumped into the vat. But the hard, solid mass of sulfur must now be broken down for shipment.



Drillers start work on top of the vat and about twelve feet back from the face. Rotary machines of this type bore 3½-inch diameter holes down to nearly the bottom of the block.



Breaking down a sulfur vat is essentially a quarrying operation. Skillful blasters handle this task at Newgulf. Here are two of them busily employed in loading and tamping a dynamite charge for a "snake-hole" shot.

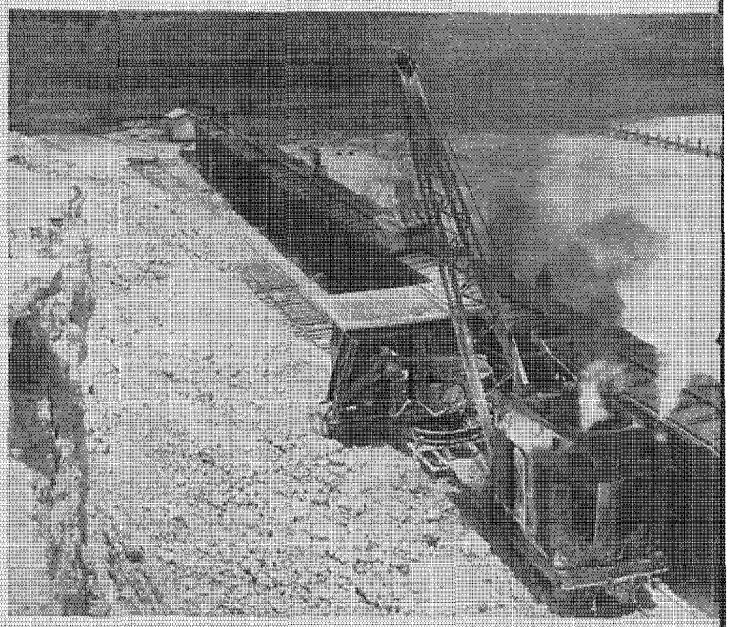
water it makes its way downward, forming a pool around the bottom of the well. There it finds an entrance through the bottom perforations and rises in the three-inch pipe. Compressed air, released at the bottom of the central one-inch pipe, raises the liquid sulfur to the surface of the ground, where discharge lines from the wells deliver it into sumps at the pumping stations, which are located within a few hundred yards of the most distant tributary well being steamed.

The sumps vary in capacity, depending upon local operating requirements, but each unit is lined with cast iron, and each has steam pipes in service on the bottom and sides to keep the sulfur in a molten condition. Motor-driven centrifugal pumps, next brought into use, force the product through pipes leading to the storage vats. These pumps are specially designed so that the moving parts are either submerged in liquid sulfur or they are steam-jacketed. Heat is continuously applied. Not only are the pipe lines well insulated, but each one carries inside a small pipe through which live steam circulates to keep the sulfur in a fluid condition and moving freely with a minimum of friction until it is finally discharged into the vats by means of distributors located at one-hundred-foot intervals along the walled-in enclosures.

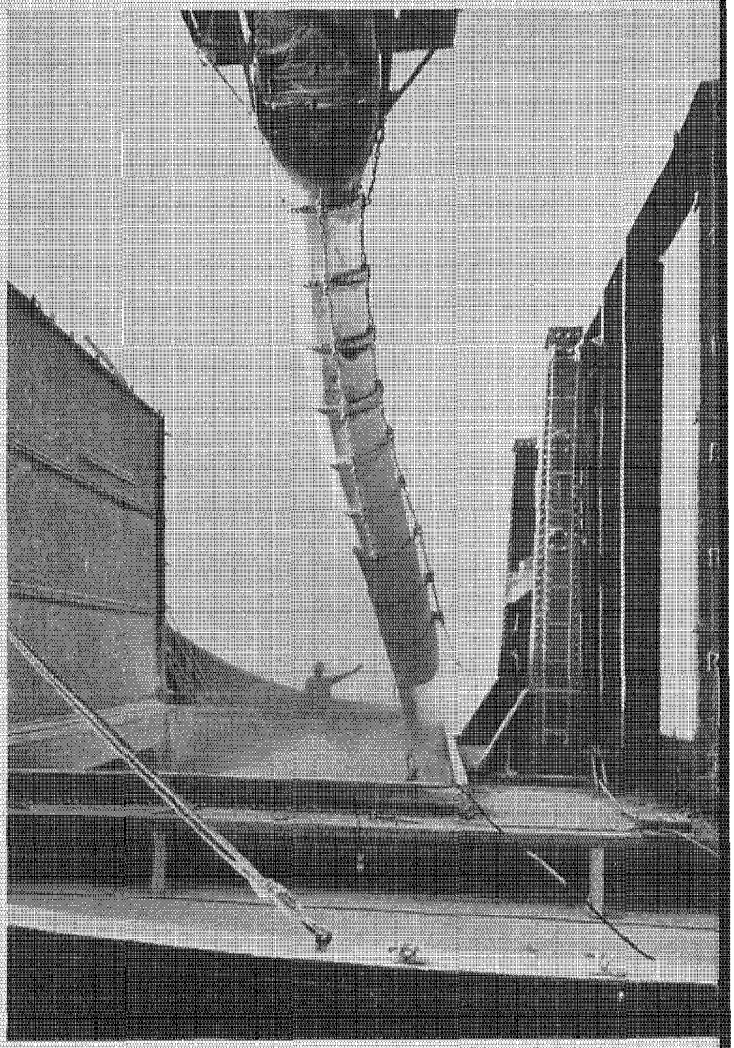
STORAGE

The vats are of various dimensions, depending upon the rate of production and the area of cooling space that will be required. A single day's discharge represents a large tonnage, but when it is spread out evenly so that it will cool and solidify uniformly, the vertical increment represents only a few inches of increased height. Progressively the wooden or sheet-metal walls are built up as more sulfur flows in, and the walls are tied into the mass by means of short planks. The top of the vat structure is never more than a few feet higher than the surface level of the sulfur, but when one is completely filled and the side walls are removed, there is exposed a solid block of sulfur, and it is of truly monumental proportions, for a vat of average size is about 1,200 feet long, 160 to 200 feet wide and fifty feet high and will contain more than 500,000 tons.

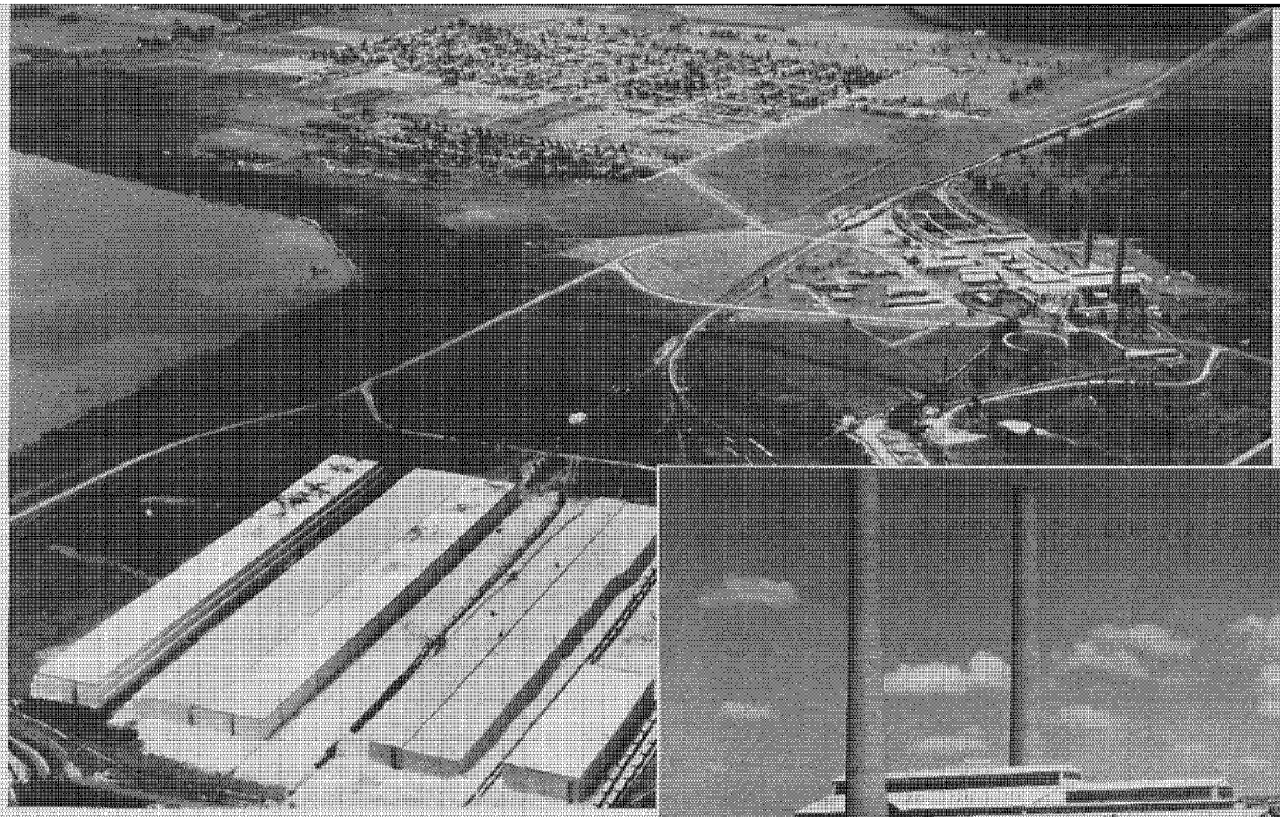
Having described briefly how the sulfur is mined, there is point in mentioning that the operations are located in regions remote from cities and towns. The Texas Gulf Sulphur Company, for example, started mining operations in 1929 at Newgulf and in 1930 at Long Point, Texas, forty-seven miles and thirty-five miles, respectively, southwest of Houston and forty miles inland from the Gulf of Mexico. The town of Newgulf, built by the company, is new, but already well advanced in all developments that contribute to a well-rounded community life. Provisions have been made for a population of about 1,500 by the construction of 300 individual dwelling houses. Each house is set on a large lot and is designed and built for maximum comfort. Recreation facilities have been provided by golf links, tennis courts, athletic field, and a well-equipped, up-to-date community house. The town has surfaced roads, a modern water supply and sewerage system, electric lighting, gas and telephone services, as well as stores, a hospital, a school, churches and library.



Loading sulfur at Newgulf, Texas, for an all-rail shipment. The broken material is first dropped through grates below the clam-shell bucket, whereupon the automatic loader fills the box cars.



Modern loading equipment in action at Galveston as a steamer receives its cargo at the Texas Gulf Sulphur Company's pier.



An aerial view of Newgulf, Texas. Notice the sulfur vats in the foreground, the reservoir, extreme left, the plant structures at the right, and in the distance the residential area.

Every mine has its power plant, and the one at Newgulf is especially well equipped to supply heat, compressed air and electricity. Here also are located the offices and shops.

Plant Facilities

The Frasch mining process requires enormous quantities of water and extensive equipment for operating needs. At Newgulf a 260-acre reservoir has been constructed with a capacity of more than 700,000,000 gallons. Water is pumped into it from the San Bernard River at the rate of 40,000 gallons a minute. This reservoir is located at some distance from the sulfur area to avoid the possibility of its being affected by a surface subsidence which might result from the extraction of sulfur underground. The Cochrane hot-process, lime-soda-softening plant at Newgulf treats as much as 30,000 tons of water per day and is the largest plant of its kind in the world. The fuel used in the plant comes from natural-gas wells located at some distance from the property. In addition to the turbo-generators for producing electricity, the power-plant equipment includes several compressors to operate the air lifts which require 500 to 600 pounds pressure per square inch.

While we are discussing power applications, suppose we go back to the vats where drillers and blasters are working with power of another kind. The huge blocks of sulfur must be broken down before the product can be loaded and shipped. Dynamite here comes into use in what is essentially a quarry-blasting operation. On top of the block, about twelve feet back from the face, drillers put down a series of vertical holes, as shown on page seven, left. These holes, three and one-half inches in diameter, are spaced fourteen feet or more apart, and are drilled to a depth of forty-eight feet. The blasters, using Du Pont "Extra" ammonia dynamite packed in two-inch-diameter cartridges, first load and fire two-stick charges to "spring" or enlarge the holes at the bottom. After a sufficient time has elapsed for cooling, they reload the holes, this time with forty to eighty sticks per hole, and the shot is fired with electric blasting caps. As in a quarry blast, the broken material is thrown down where cranes with two-yard clamshell buckets can dump it into railroad cars.

The sulfur is loaded in box cars for an all-rail movement. If shipment is to be made by water, open cars are used to haul it to the docks at Galveston either for direct transfer into the holds of ships or into storage bins with a capacity of about 35,000 long tons. The accompanying pictures showing these operations tell that story adequately. It remains only to be said that loading facilities are modern and adequate for shipping needs.

Industries that burn sulfur and employ the gas in their operations account for more than four-fifths of the brimstone consumed in this country. In Du Pont manufacturing operations, from early in the nineteenth century to the present day, sulfur has been an indispensable raw material. During the first twenty-five years, E. I. du Pont, founder of the Company, used nearly a million pounds of it as an ingredient in manufacturing black powder. Domestic production of sulfuric acid on a commercial scale started when John Harrison built his first plant in downtown Philadelphia in the early 1790's. And Eugene Grasselli built the first acid plant west of the Alleghenies in 1839. These enterprises

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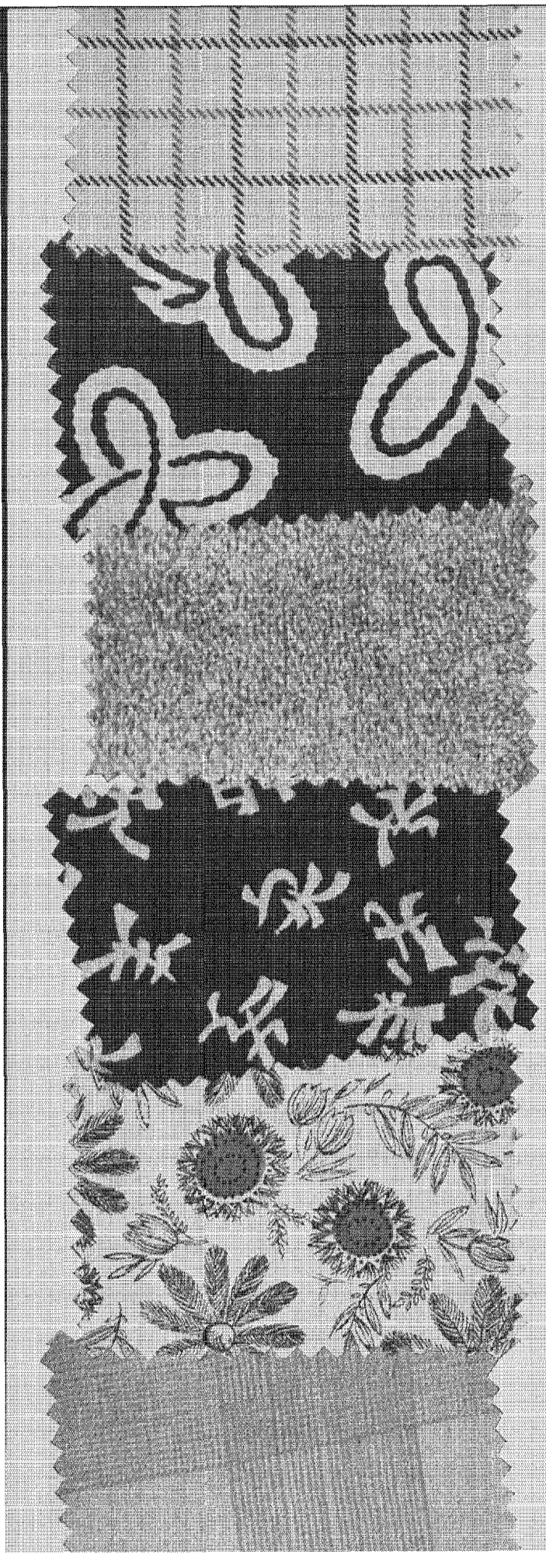




. . . Many of them are inspired

By HELEN AMES

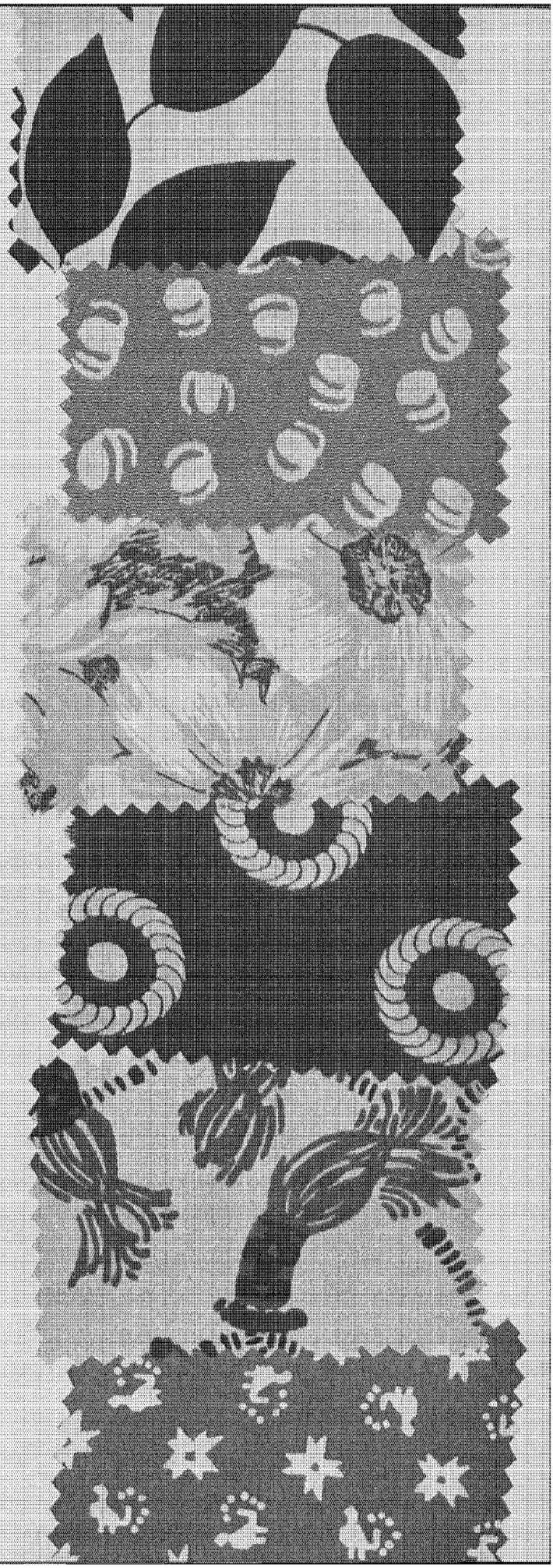
DESPITE the disturbed conditions affecting industry today, fashion-conscious women face an alluring prospect as they survey the season's new rayon fabrics. From simple travel suits and practical outdoor clothes to the more elaborate evening gowns, these materials assure an all-around wardrobe.

The new fabrics are more richly textured than the rayon weaves of the summer, in keeping with the brilliance of tropical scenery. Exotic prints are found on a variety of rayon grounds, and solid-color classics are enhanced with ornamental surface treatments. Casual sports weaves provide the same tailored trimness as regular sports fabrics, and sheer crepes contribute soft draping qualities as well as hot-weather comfort.

In a collection of current fabrics woven with Du Pont rayon, prints stand out importantly, ranging from monotone patterns to multicolor motifs inspired by South American and American Indian themes. Large designs are used for evening and dinner gowns, medium-sized ones for afternoon apparel, and tiny figures for sports frocks and travel suits. Rayon grounds for dressy prints include dull crepes, canton crepes, marocain crepes, moss crepes, novelty weaves, and sheers decorated with seed

New Fabrics of Du Pont Rayon

by South American and Indian themes



yarn. For sports prints, backgrounds show such diverse treatments as "Thick-and-Thin" rayon weaves, nubby textures, shantungs and challis; also linen types in jersey effect, sheers and heavy slub weaves.

Washable, crush-resistant, linen-type weaves come in such variations as heavy suiting and slack weaves, thinner and lighter dress-linen qualities, and colorful printed fabrics. For torrid days there are linen types of tissue-like thinness.

New versions of rayon shantung range from natural tones to pastels and bright colors. Fine washable gabardines are ready for mannish-tailored clothes, and fine light-weight flannels from the men's sportswear field are now favored for women.

Stripes are among the leading style trends, flaunting multicolors in irregular designs on knitted outdoor fabrics. Shantung is offered with precise shirting stripes in yarn-dyed colors.

In weave, design and color, rayon fabrics for women in the warmer climes will as usual have an important influence on what will be worn throughout the country during the summer of 1942. At least that has been observed in the sequence of events in past years. Under present conditions, one cannot predict with certainty the restrictions that a national defense economy may impose. The fabric picture presented shows only the trend as it is revealed at the present time.

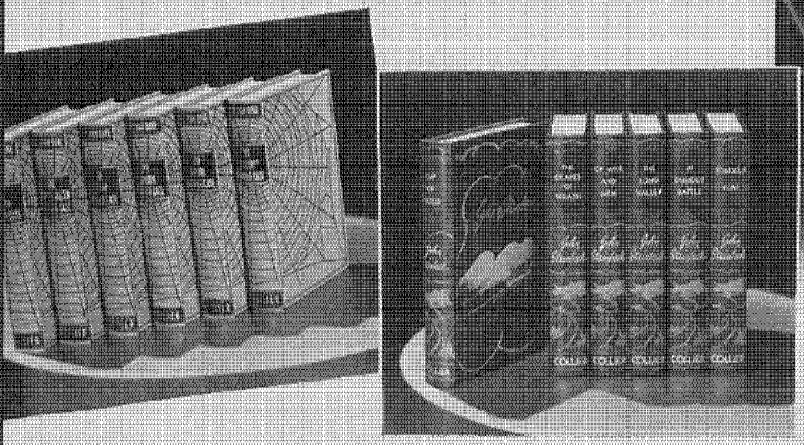
FOR A PRACTICAL YULETIDE



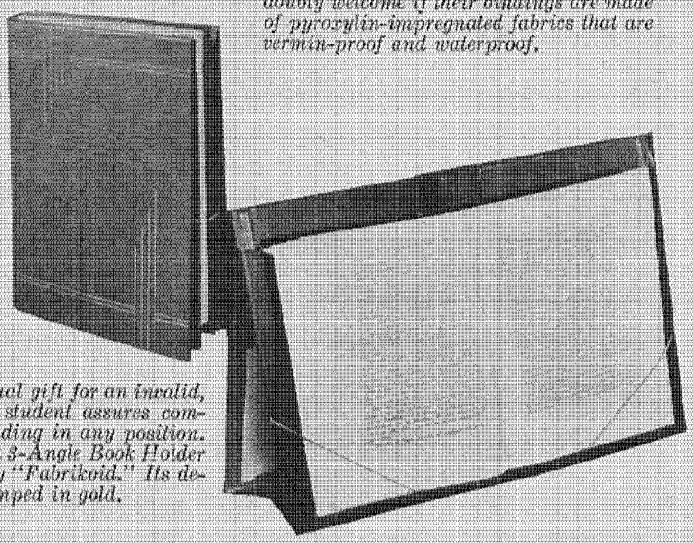
Perhaps you are wondering what to give the young schoolgirl on your list. Why not an attractive handbag made of "Fabrikoid" in beautiful grains resembling fine leather? She will receive it with real delight.



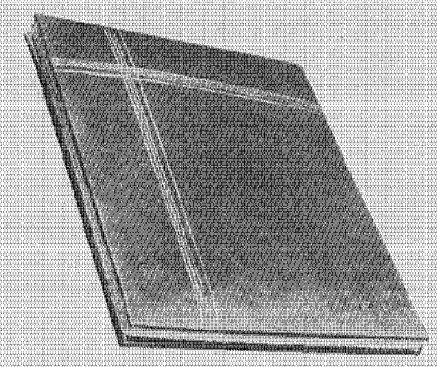
The man who travels by plane will appreciate one of these Simpak light-weight travel cases in brown or black jaguar-grain "Fabrikoid." It holds two suits and has compartments for shoes and accessories.



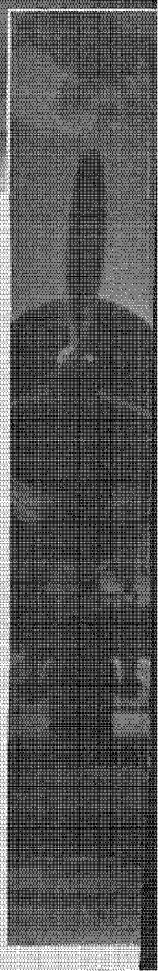
Books appeal to varied tastes and will be doubly welcome if their bindings are made of pyroxylin-impregnated fabrics that are vermin-proof and waterproof.



This unusual gift for an invalid, traveler or student assures comfortable reading in any position. The Barrett 3-Angle Book Holder is of sturdy "Fabrikoid." Its design is stamped in gold.



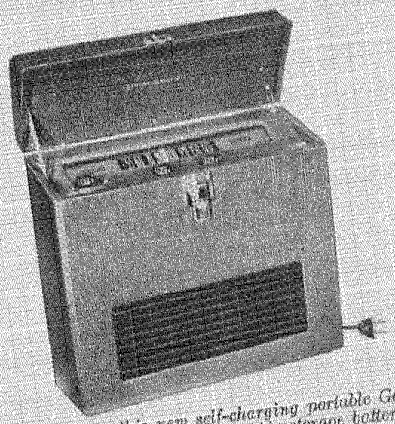
For collectors of photographs—the modern loose-leaf album, Build-a-Book. Frame-like inserts are obtainable to accommodate prints in eleven different sizes. Padded covers of "Fabrikoid" come in various colors and grains.



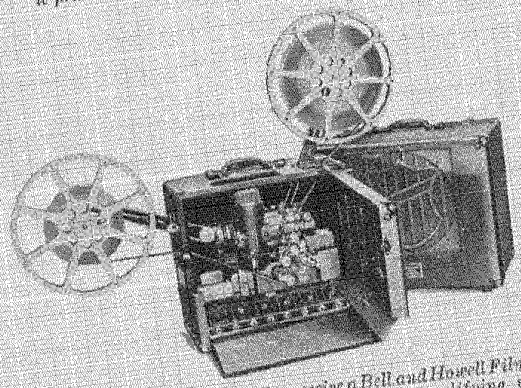
"Fabrikoid"

pyroxylin-coated fabrics fashion a profusion of memorable gifts!

ALL year round is gift-giving time for one or another of us, for there is always someone we know having a birthday, graduating, marrying or just going traveling. But when year's end draws near and the Christmas spirit is in the air, it is gift-giving time for almost everyone. You may have begun a modest list, back in early November, with mother, dad, brother Bob at college, Mary Ellen at boarding-school and baby Jean. Now it suddenly swells to surprising proportions as you recall Aunt Agatha, who gave you such lovely mittens last winter; Uncle Bill, who always takes you duck-hunting, and all the numerous relatives and friends. While you add their names to the growing list, you are filled with the warm glow the spirit of generosity always inspires. But if that is followed by perplexity over what to give each of the cherished ones on your list, here are a few suggestions in attractive "Fabrikoid" pyroxylin-coated fabrics that are bound to reflect the discriminating taste of the giver.



Who wouldn't enjoy this new self-charging portable General Electric radio, with built-in, non-spillable storage battery and charger? Its attractive cover of pyroxylin-coated fabric makes it practical even for camping trips and other outdoor uses.



Wouldn't Dad be proud to receive a Bell and Howell Filmosound Master motion-picture projector and amplifying speaker? Both machines are protected by cases covered with "Fabrikoid" pyroxylin-impregnated fabric.



Ladies who fly will enjoy this feather-weight Simpak travel case in washable snake or jaguar-grain "Fabrikoid." It holds six dresses and has room for accessories.



For housewives, young and old—General Electric's coffee-maker, iron and toaster come packed in a Wheary-built case covered with rich, leather-grain "Fabrikoid." Later, it can be used for week-end traveling.



This fine Bulova watch is a gift of distinction. Especially designed for army men, the case is covered with tan and brown pyroxylin-coated fabric to resist unusually hard wear.

Modern Refrigerator Finishing...

Improved spray-painting technique helps manufacturers to lower consumer prices



By JOHN W. NESTOR

TEN years ago the manufacturer's average square-foot cost of enameling a refrigerator was approximately four cents. Today, a far superior finish can be applied, and more efficiently, for only about one cent.

Last year alone, this reduction resulted in a saving to the refrigerator industry of more than five million dollars, a large part of which was passed along to consumers. In addition to lower finishing costs, other production economies resulting from improved design and operation have made it possible for home owners to purchase better values at lower prices. As an example, in 1920, the average retail price for a household refrigerator was $600. It had been reduced to $275 in 1930, and was only $154 in 1940. Moreover, the cabinet of today offers exceedingly greater protection against food spoilage, costs much less to operate and is far better-looking than the models of even a few years ago.

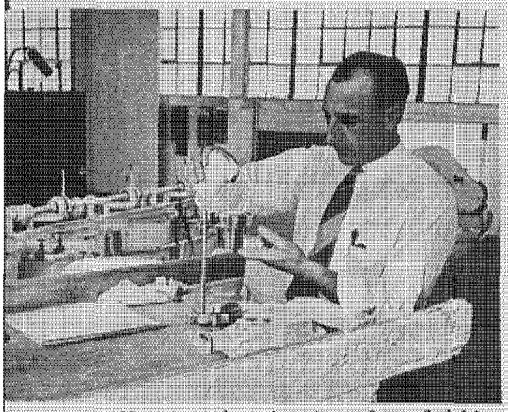
In so far as reductions in finishing costs are concerned, there have been several contributing factors: the development of new finishes, lower prices per gallon, cooperative efforts of manufacturers, and the assistance of Du Pont service engineers in helping manufacturers make improvements in their finishing systems.

In 1932, lacquer was the only organic refrigerator finish available. Material costs then averaged somewhat in excess of four cents per square foot. In 1934, with the introduction of "Dulux" enamel, the unit price dropped to two-and-a-half cents for a three-coat finishing system. Later, as a result of further product developments and improvements, a two-coat system was introduced, and, in 1936, costs dropped again, this time to one-and-eight-tenths cents. Lower per-gallon prices and improvements in technique of application have followed progressively so that now the average cost closely approaches one cent per square foot in many refrigerator plants.

While the decreases of recent years have not been so large as those of the 'thirties, they are still substantial; in fact, they have averaged about ten per cent per year. Research to improve existing products and systems and to create new ones will continue, but as the well-diggers say, "The deeper the hole, the harder the rock." This industry has now reached the "hard-rock" stage and must look to modern equipment and improved technique for further immediate cost reductions.

To this end, the Finishes Division is continuing its cooperation by means of a new educational program. This consists of demonstrations by Du Pont service engineers and a motion picture, "Hidden Gold," which is designed to set forth recommendations and correct procedures for viscosity and temperature of materials, application technique, fluid and air-operating pressures, and thickness of film.

While the details of finishing primarily concern refrigerator manufacturers, the technical improvements outlined may be of interest to home owners who, in the end, are the real



Checking the viscosity of a finishing material to ascertain whether or not it conforms to the specifications required for best spraying properties.

beneficiaries. Consider, first, the viscosity or flowing property of the materials used in finishing a refrigerator cabinet. In order to provide more uniform working conditions for the spraymen and to insure utmost efficiency, standard viscosity tables have been set up. Then, by applying controlled tests, each batch of material is reduced in the circulating system with a thinner to an established consistency which gives best results for the intended purpose. Since temperature affects viscosity, it also is carefully controlled. Otherwise, all subsequent precautions will be of no avail, for the material will not be uniform, batch after batch, and the finished results will vary greatly.

Next, the finish must be applied with an air-operated spray gun. Here, again, uniformity is important. If the spray pattern—the mist discharged from the gun like perfume from an atomizer—is not properly controlled, as much as ninety per cent of the material may be wasted in thin air, and the finish will not be uniformly thick on all surface parts. Demonstrations of correct and incorrect patterns for painting specific parts of the cabinet show how these pitfalls can be avoided.

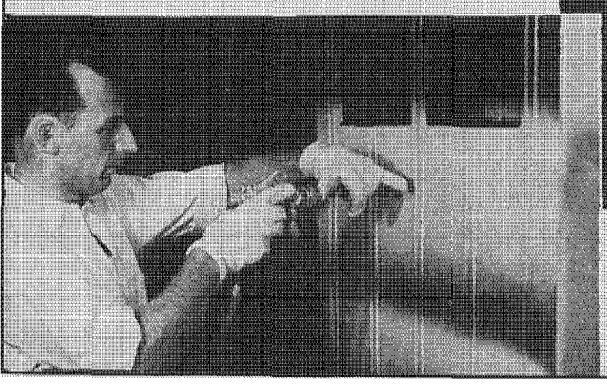
Correct air pressure is another essential. Too much air results in waste. For example, in finishing flat surfaces, fifteen per cent more material is dusted away when the gun is operated at ninety pounds pressure instead of sixty pounds, which is adequate for most purposes.

Another important economy factor is the correct operation of the spray gun, including its position, manipulation of the trigger, and distance of the gun from the surface to be finished. All of these factors, by reducing overspray—the amount of the atomized enamel that is allowed to fall beyond the points for which it is intended—*contribute to a better* finish and at less cost.

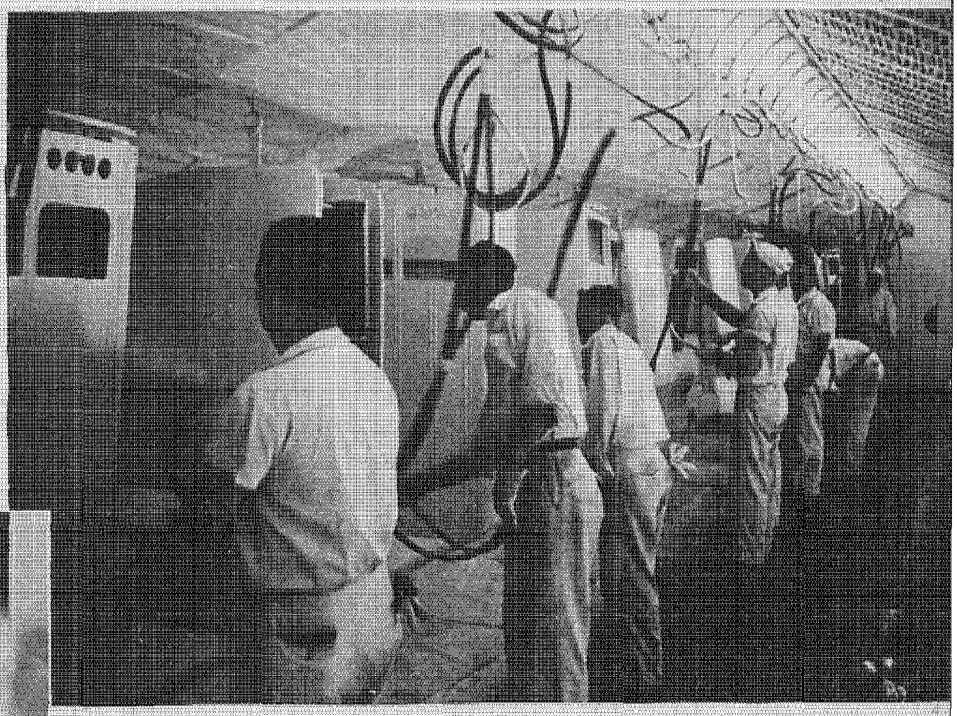
Careful control of film thickness is also in the interest of economy. It is wasteful, for example, to apply a coating having a thickness of three or four thousandths of an inch, when a film two thousandths of an inch is normally adequate, both for protection and appearance. Recommendations call for check-test measurements of the film at least twice during each work shift.

Cleanliness in the finishing process is stressed as a means of improving operating efficiency. All finishers are instructed to wear clean, lint-free cotton gloves when handling unfinished parts. The reason for this lies in the fact that the oils from perspiring hands, no matter how clean they may be, are deposited on the bare metal, causing film failure later on. In many plants, operators also spray both gloves and clothing with a mist coat of "Dulux" so that loose lint will not mar the smoothness of the finish.

Thanks to improvements made in finishes and to a better understanding of how to apply them, manufacturers can save as much as fifty per cent in materials alone, in comparison with the quantities required five years ago. Under existing conditions when all industry must make the best possible use of available supplies, such a saving takes on added significance, and operating practices become increasingly important to insure dependable, high-speed production. The Du Pont Company and its service engineers are helping manufacturers and spraymen to obtain best results from their present equipment and to improve painting technique to approach as closely as possible maximum efficiency.



BELOW: *A Du Pont service engineer demonstrates proper spraying technique. "Hold the gun away from the surface at a distance approximating the span of a normal hand between the tips of the thumb and the little finger, when fully extended."*



Spraying "Dulux" enamel on refrigerator cabinets as the overhead conveyor moves them through the finishing booth. Note that the operators are wearing white gloves.

THE DU PONT MAGAZINE

PUBLISHED AND COPYRIGHT 1941 BY

E. I. DU PONT DE NEMOURS & CO.
Incorporated

WILMINGTON, DELAWARE, U. S. A.

Subscription $1.00 the year

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Vol. XXXV Holiday Number, 1941 No. 12

Holiday Greetings

BEFORE the next number of this magazine goes to press, the Yuletide festivities of 1941 will be only a memory and another year will be speeding on its way. So we are extending now the hearty old-time greeting, "A Merry Christmas and a Happy New Year," even though it may be a bit incongruous to accent the joyous note, considering present-day conditions in this sorry old world.

Angels' voices singing "on earth peace, good will to men," seem very far away this year. One wonders whether they will be heard at all amid the din of battles on many a fighting front overseas. Of this we may be sure: never before in human history has there been so great a need for a manifestation of the real Christmas spirit as now.

We Americans can be, and are, grateful that the freedoms we cherish are still intact; that there has been no invasion of foreign armies on our shores; that our nation has not yet lost its soul. We shall observe Christmas by honoring both its sacred and secular traditions in full faith that humanity's high hopes for a better, peace-loving world will eventually be realized. God speed the day!

"The Day Before Christmas"

THE cover illustration this month reproduces the work of one of America's most famous landscape artists, Edward Willis Redfield, who painted it during a blinding snowstorm on the day before Christmas a few years ago. The setting, in Pennsylvania's New Hope district along the Delaware River, is typical of the early-American character of the section. This painting is now the property of the Philadelphia Museum of Art and is reproduced through the courtesy of Mr. Fiske Kimball, the director.

We have selected this subject because it portrays a Yuletide tradition in a typically-rural American community where Christmas is observed each year simply and peacefully in the company of one's family and friends. We reproduce it as our greeting card, with the hope that you will find inspiration in the theme.

Much to the Point

CANADIAN INDUSTRIES LIMITED, the chemical manufacturing organization that serves the provinces to the north with many of the same products that Du Pont makes in the United States, recently staged an exhibit at Montreal in the Pavilion of Industrial Chemistry to show what part it is playing in peace and war. Under crossed flags and the C-I-L oval, a bronze wall panel carried this statement in clean-cut, bold-face letters:

"In the great fight for freedom, justice and civilization, the industrial chemist has added to his peacetime task of helping to build a better world, the task of cooperating with all branches of industry in protecting the right to live in such a world."

An Open Letter to American Industry

MANY manufacturers are confronted with serious problems arising out of the present national emergency. Overnight, whole plants must be geared for efficient, high-speed production of unfamiliar parts. Shorter methods and processes must be worked out quickly—new chemicals must be found to replace those not readily obtainable.

To manufacturers faced with these and other problems which involve chemicals or the application of chemicals, Du Pont offers the assistance of its Technical Service staff.

With our background of experience and research, we may be able to suggest possibilities you have not yet considered. Perhaps we can supply technical information to help you find suitable new materials or methods. The results of research in unrelated fields may have an unexpected bearing on your specific problem.

Naturally, there are situations where little or nothing can be done at present. When in our opinion such a condition exists, we will frankly tell you so.

And when this period of unusual stress is past, the skill and competence acquired during 139 years of Du Pont chemical research will still be available to assist you in the task of readjusting your program to normal requirements.

. . . Joy Unconfined

AS THIS is written, great crowds of football fans are shouting for the home team to make another touchdown. Not so long ago, the baseball enthusiasts were excitedly following the fortunes of the Yankee-Dodgers World Series championship. Elation and gloom, cheers and jeers, sometimes in rapid sequence, are to be expected whenever these games are played. Traditionally, American sport devotees respond to strong emotional urges.

As an instance in point, a baseball fan in a New England city was sitting beside his radio listening to a play-by-play description of the Brooklyn-Boston game that was to decide the National League pennant race. The climax did not come until the end of the ninth inning. As the last out was announced, the Dodger fan literally jumped for joy, but with sorry consequences, according to the news report. For when he landed, a rug slipped out from under him and he crashed headlong against a radiator. A doctor treated him for a fractured nose, a gash in his forehead requiring three stitches, and two black eyes.

We mention this incident not to counsel any repressions of joy, but to sound a warning about those unconfined rugs that are so hazardous in your home. Better insure against their slipping with "Rug Anchor" sponge rubber underlay, now that the basket-ball and ice-hockey seasons are well under way.

WHAT'S NEW

CONSTRUCTION of a new Du Pont plant for the manufacture of chlorinated hydrocarbon solvents has been started on a recently-acquired twenty-three-acre site at Wyandotte, Michigan. The R. & H. Chemicals Department will operate this new unit which is scheduled for completion next summer. Production at Wyandotte will supplement that of the plant at Niagara Falls, New York, and industries participating in the national defense program will use most of the solvents to be manufactured there.

A NEW two-story brick laboratory building at Arlington, New Jersey, has been opened and dedicated to the memory of Dr. Allan F. Odell, who directed activities at the Du Pont Company's plastic research center from 1929 until his death in 1937. The new structure adds approximately one-third more laboratory and research space for expanded study and development of plastics useful in defense and for the development of new materials. Within this structure is housed an enlarged molding powder laboratory, an industrial expansion laboratory containing "semi-works" equipment; also staff office and conference rooms, a large library, a cellulose research laboratory and a physical testing laboratory with a constant temperature and humidity room.

SULFAMIC ACID is now being produced commercially by the Grasselli Chemicals Department of the Du Pont Company at Grasselli, New Jersey, where a new plant is now in operation. Heretofore, only limited supplies of this acid have been manufactured in a small pilot plant at Cleveland, Ohio. The new manufacturing facilities are adequate for large-scale operations. Already, price reductions have been announced. Sulfamic acid, which is a white crystalline solid, is used in tanning leather, in the manufacture of dyestuffs and in chemical processing. Ammonium sulfamate, a derivative product, is useful both as a fire retardant for textiles, paper and insulating materials, and as a weed killer.

NYLON YARN in limited quantities is now being produced in the new Du Pont plant which has been under construction at Martinsville, Virginia, for the past eleven months. When it is in full operation, the combined output from Seaford and Martinsville will be about twice as large as at present. The initial output of 30-denier weight yarn will be used for making women's stockings. New spinning units will be installed and put into service as rapidly as possible. It is hoped that full-scale operations at Martinsville may be reached next summer.

THE fourth edition of the "Krebs Handbook of White Pigments" has been published by the Krebs Pigment & Color Corporation, Wilmington, Delaware. This new brochure contains a complete compilation of facts and data on all Krebs white pigments, including titanium dioxide, extended titanium pigments and lithopones. Physical and chemical characteristics and recommended fields of use are described, as is also the inter-relationship of the various grades of pigments, which may facilitate the simplification of formulas. The handbook is available to manufacturers of paint, linoleum, paper, ink, textiles, leather goods, shoe-dressing, and rubber products.

"INDUSTRIAL BRUSH BRISTLES MADE OF DU PONT NYLON" is the title of a new sixteen-page illustrated booklet issued by the Plastics Department. The text presents a short history of nylon and its advantages as a bristling material for brushes of various types used in the brewery, textile, dry-cleaning, dairy, electroplating and other industries. One page is devoted to a listing of the general physical and chemical properties of nylon for this use. On another is displayed a sample of the bristles. This booklet is for executives and business men who will use their letterheads in writing for copies. Requests should be addressed to the Arlington, New Jersey, office of the Du Pont Company.

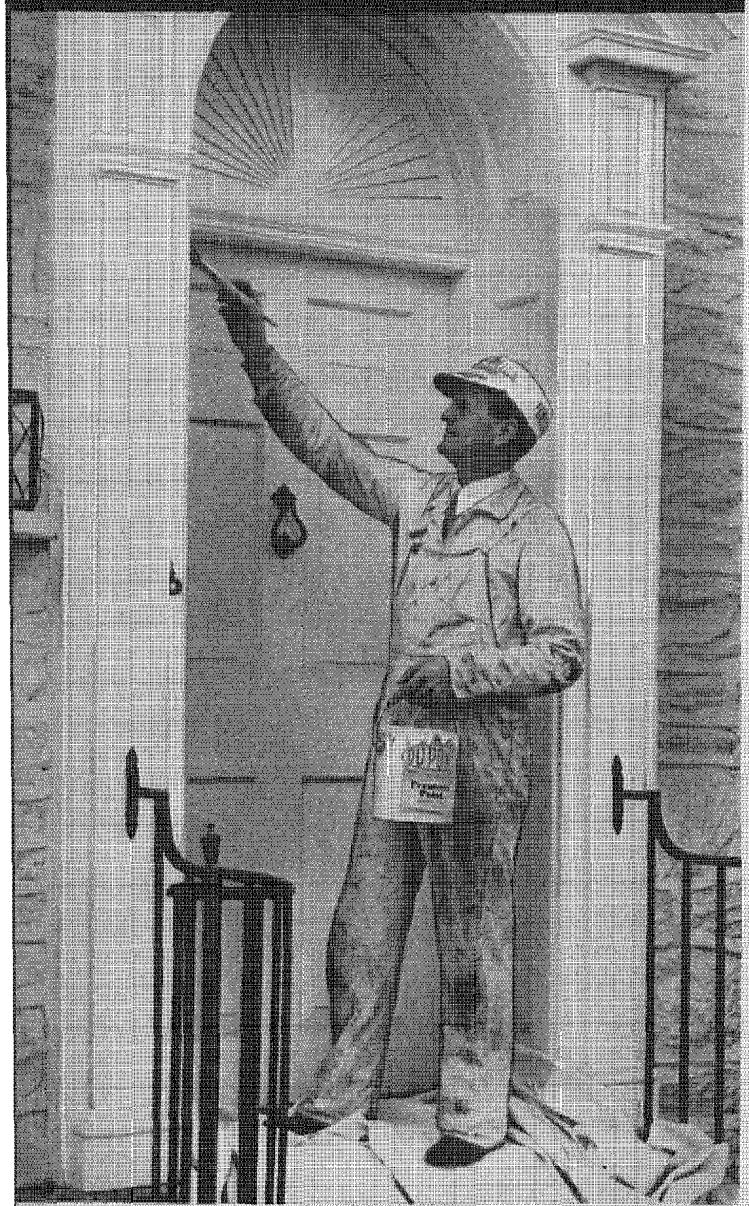
PLASTICS in shoe-lace tips will this year release an estimated half-million pounds of metals, principally tin, as a result of the adoption of "Pyralin" cellulose nitrate and other plastics. One pound of plastic releases more than three pounds of metal. The limited supply of this type of plastic will probably permit making more than half-a-billion laces of all types, from infants' shoes to cavalry leggings. Manufacturers say these tips are stronger, more compact and will outlast metal tips. They are also credited with eliminating danger of cuts or scratches when laces are yanked through heavy footwear.

THREE new dyestuffs for textile use have been added to the range of colors offered by the Du Pont Company under the following trademarks: "Pontachrome" Fast Yellow R Conc., a shading color for the production of olive drab shades, khaki, tan and brown shades on wool; "Polyform" Bordeaux RF, a formaldehyde after-treated direct color that serves as a ground shade for colored discharge work both on viscose process rayon and cotton, yielding a deep bluish shade of red, and "Pontamine" Black BCN, a direct color for use on cotton materials. Additional particulars may be obtained from the Du Pont Company's Dyestuffs Division, Wilmington, Delaware.

"THREE-DIMENSIONAL SEEING," a booklet that describes how the correct combination of color and light can improve plant conditions, increase production, reduce accident hazards, provide better working conditions and improve labor relations, has just been issued by the Finishes Division of the Du Pont Company at Wilmington, Delaware. Copies are available to manufacturers, illuminating engineers, production superintendents, maintenance men, and industrial painters.

For the American Home..

Chemistry constantly scouts for better materials at lower prices



When protected with the recently-developed self-cleaning paint, which contains titanium, one of the whitest pigments known to science, this home will have a coat of pure white which will be kept clean by rain.

About 100 new towns, with a population upwards of five million persons, are mushrooming throughout the United States. Over 300,000 housing units for defense workers alone, under priority assistance, are under way. Thousands of other residential projects, as well as tens of thousands of home reconstructions, have been begun. It is a building activity unseen since the well-remembered "boom" of earlier days.

To make full use of living space is the urgent need confronting Americans wherever workers are being drawn by defense activity. It comes at a time when labor and materials are increasingly scarce. Enforced economies of design and conservation of critical materials are therefore introducing new improvements and economies of method. This comes in a period when science, by making synthetic products available, has already gone far to aid the building industry.

Contributions of research to the maintenance of that bulwark of our strength and unity, the home, have been far-reaching in their social implications. Shelter has become our leading budget item, taking twenty-seven-and-a-half per cent of the total. We spend more on the home than for sustenance. To satisfy the two major wants, food and shelter, the American expends more than half his income.

For this, today, he gets a better value than before. His typical urban dwelling is a wooden, two-story structure of five or six rooms. It is in fairly good condition, but needs minor repairs. Equipped with running water, a bath and private flush-toilet, it also has gas, electricity and heat. This home costs less to build than it did twenty years ago.

Today's Problem

But it has not been reduced in price to the same extent as the automobile. The problem today is to build and furnish a home for less money, without sacrificing any present standards of health, comfort and safety and without losing its individuality. Builders are gradually learning how to accomplish this by utilizing new and improved materials that science has made available—materials that give promise of better houses tomorrow.

Chemistry, by improving materials from roof to foundation, has brought better living conditions in the modern home. The manufactured products include fireproof shingles; glass bricks and blocks; synthetic stone; non-inflammable, non-warping plastic decorative paneling; resin tile; acoustic plaster; insulating materials; window-glass and plastics that transmit ultra-violet rays; paints that last longer. Even in the case of natural building materials the chemist has developed finishes that retard the disintegration of stone and wood.

The lumber industry has been the beneficiary of the chemist's work. For example, ordinary wood acquires unusual properties when soaked in a solution of urea, an inexpensive chemical product. After heating, the lumber can be bent, twisted, compressed, molded and, when dry and cool, it is said to be as strong as mild steel. Even sawdust is now utilized. For this wood-waste, when soaked in urea, can be worked like dough and made into molded products. Lumber used to warp, crack and split in seasoning. To reduce this waste the green wood is



The sunken top of this new juicer is so designed that the grooved part comes between the rind and the fruit pulp, thus extracting more juice. Made of colored "Lucite," it will not rust nor stain.

There are standard scuff and flex tests for most coated fabrics at the factory. Here is one test that proves durable "Fabrikoid" is desirable for upholstery use in the home.

Sink-and-drainboard mats made of neoprene, a synthetic rubber, resist deterioration from grease, hot water and cleaning agents.

The high frictional resistance of the "Rug Anchor" will prevent this rug from slipping and will form a cushion that will actually lengthen the life of the rug as well as give it that resilient "feel."

Products of chemistry are used in manufacturing almost everything in a modern home. Pictured above are plated ware, rayon curtains, plastic lampshade, coated upholstery fabrics, paints and varnishes, ceramic colors in glass and china, and dues in linoleum.

To make a tasty cup of coffee, it is of course important to use a clean container. Long-lasting, nylon-bristled brushes fill this requirement in many households today.



Glareless light is an appreciated reading comfort that has been made possible by translucent "Tontine" shade cloth.

"dunked" in a urea solution that keeps the outer shell moist and free from strain while the moisture diffuses from the core. The wood is thus dried from the inside out. "Lignasan" fungicide is also being used to keep fresh-sawn lumber bright by controlling sap-stain.

All houses must be protected. Frame buildings, particularly, must be safeguarded against dry-rot and termites, chiefly the former. Premature decay of wood once resulted in losses second only to its destruction by forest fires. Now one of the most effective clean-lumber treatments involves the use of chromated zinc chloride under heat and pressure, in commercial wood-preserving plants. It has proved its value in a test-house located in the most heavily termite-infested area in North America, the Barro Colorado Island in Panama. There untreated

Paint protection is important, too. High-grade wood, kept well painted from the beginning, will last indefinitely. It costs more not to paint than to paint. Finishes keep out moisture and preserve the wood. Certain types of paint minimize, if not completely eliminate, mildew.

Paints and varnishes are, of course, not new. They have been used for centuries. Until 1921 there were few radical improvements in them. Then came "Duco" quick-drying enamel which cut finishing time from days to hours. More recently the chemist has contributed another, a synthetic resin type of quick-drying finish; and a still more recent development is a self-cleaning house paint. Containing titanium, one of the whitest pigments known to science, it is pure white at the start and stays so. With every rain, accumulated dirt washes away, leaving the surface clean and white. Because today's paints preserve property, help prevent disease, reflect light and make homes more cheerful, they contribute definitely to our present high standard of living.

Inside the Home

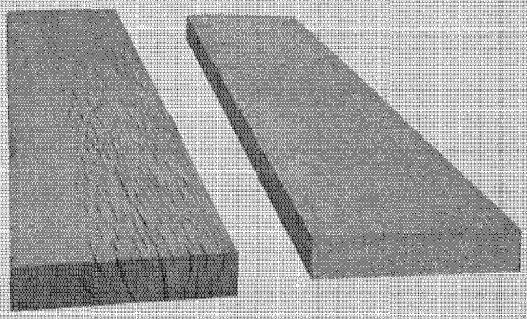
The men in the laboratory have provided other materials to safeguard the home and its furnishings. The chemist's fire retardants are fine, white, granular mixtures that are chiefly used for flame-proofing insulating materials and curtains and draperies.

A potential danger in every home are the rugs that slip and skid, creep and crawl all over the floor. They are a real but no longer a necessary danger, for they can be held firmly in place by means of a "Rug Anchor" rug underlay. This sponge rubber cushion actually lengthens the life of rugs and gives them a resilient "feel" when one walks on them.

Chemists have also produced a special type of emulsified pyroxylin solution to impregnate the back of a rug so that it locks the tufts into the fabric. It also forms a binding surface that allows the rug to be "seamed" without sewing. And a Du Pont plant at Buffalo is now producing Fiber D, a wonderful new form of viscose rayon which promises moth-proof rugs and carpets. It makes these floor coverings better wearing and lower in cost. Moreover, that now-famous fiber, nylon, under tests, indicates that some day it may prove to be a satisfactory replacement material for carpet wools, all of which are imported.

A great contribution to floor coverings, of course, is color. Dyes make possible rugs and linoleums of heretofore unattainable color varieties and fastnesses. Lacquers and enamels have also contributed importantly to the widening usefulness of linoleums.

Incidentally, home economists no longer condone



The effectiveness of urea for wood-seasoning is shown by these pieces of air-dried oak. The cracked board, left, was untreated.

the practice of scrubbing linoleum. "Duco" linoleum finish not only makes it possible to clean the surface easily but also protects the pattern underneath. Used for old and new linoleum, this finish seals the pores against dust and dirt and prolongs its life.

Consider next the coated fabrics. In some cases they are replacing nature's materials in the home. Both "Cavalon" rubber-coated fabric and "Fabrikoid" pyroxylin-coated fabric are used extensively for upholstery. These products are noted for their resistance to scuffing, flexing, peeling and cracking. Chemists have made them attractive, durable and washable and in a wide range of colors and leather-like grains. "Cavalon," it may be noted, is especially suitable for furniture upholstery that is exposed to unusually hard wear.

Years ago, chemists set out to develop a window-shade cloth that could be scrubbed with soap and water, and eventually "Tontine" pyroxylin-impregnated window-shade cloth, a water- and weather-resistant product, was developed. The pyroxylin composition driven into the weave of the base fabric not only makes it washable, but resistant to cracking, fraying and pinholing as well. Rain won't hurt it. Repeated washings will not harm it.

Another home-furnishing item from the laboratory is the lacquered-fabric tablecloth that can be cleaned easily with a damp sponge and also has a smooth-napped back that protects the table-top finish.

Some Accessory Items

Chemically-made plastics are finding an ever-widening range of applications in the home. Furniture and fixtures made of crystal-clear "Lucite" methyl methacrylate resin have made their appearance within recent years. Numerous smaller articles are available, such as reflecting house numbers and letters which are visible at long distances and at wide angles; tumblers, salad sets and decorative figures, and even a kitchen knife which is all-plastic, including the blade.

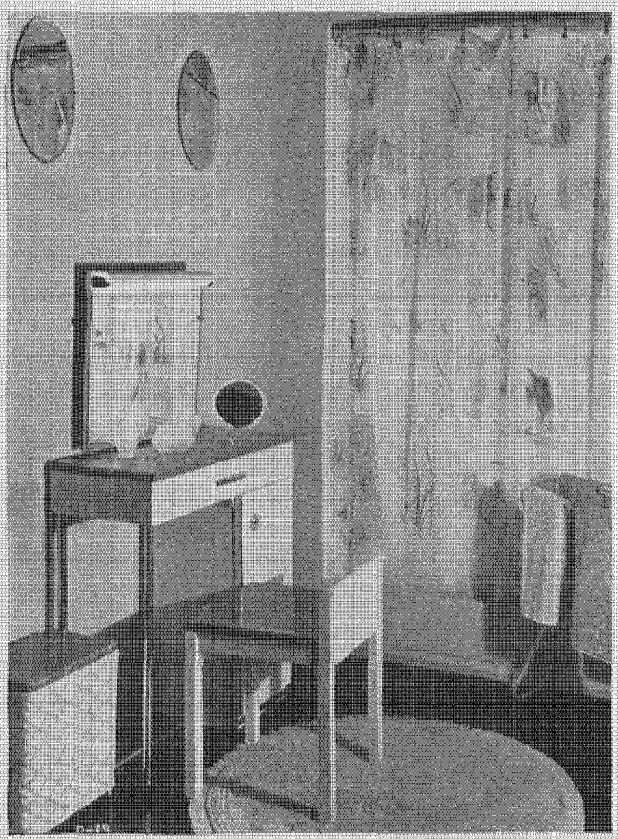
Fine china and glassware that once graced only the tables of the wealthy are now made inexpensively by mass-production methods. New colors have been created for both. With mineral oxides, earths and precious metals, the chemist has perfected color control to a point that permits, in an almost unlimited range, shades in fine gradation of tone and high or shaded brilliance. For a new type of glass dinnerware that looks like china, super-resistant colors are being used to withstand the extra service not required of the usual colored glassware. The development of transparent colors on glassware is another comparatively recent achievement of the chemist—colors that resist alkalis, household acids and strong cleansing agents. Excellence of decorated dinnerware, made in America, is giving this country a new standing in the field of ceramics.

In other ways, too, the chemist has added to the convenience of our everyday living. One small but significant item is the durable cellulose sponge, which is in many respects superior to the natural product, since it floats, is uniform in size and weight, and is free from gritty substances. It absorbs twenty times its weight in water and is extremely soft and pliable when wet. Yet it may be used like a chamois when squeezed dry.

Some of the interesting and varied uses of nylon in the home are shower curtains, green-foods storage bags and bowl-covers, and pillow-cases for persons who are allergic to feathers.

Nylon may some day bar insects from American homes. Recently in discussing metal shortages, someone raised the question: Can chemistry provide a new material for window screens? Yes. For the spinnerets that form nylon for surgical sutures and toothbrush bristles can also give us monofilaments which can be woven into non-corrosive screens that will shed water and dirt and will be so light and fine as to be almost invisible. These screens may eventually replace ordinary metal screens.

(Continued on Page Twenty-Four



"Pyralin," in colors to match, enhances the chair seat and hamper and table tops in this bathroom. The towel-rack and small mirror frame are made of crystal-clear "Lucite" plastic.

Sanitation... Public Health... and Packaging!

By H. B. PUTNEY

FEW indeed are the families that do not depend on a physician to treat some afflicted member of the household. The medical doctor's work brings him into many homes daily, with the result that everyone knows him and the service he renders.

Working hand-in-hand with physicians for the public well-being is another group of men whose work is perhaps less recognized, less well known. They are the men who are applying the proverbial ounce of prevention that is worth the pound of cure. They are the nation's public-health officers, the majority of whom are M. D.'s too.

Constantly striving for the healthiest possible conditions in their towns and municipalities, these men have jurisdiction over a wide range of activities—from inspecting public buildings, hotels and schools, to regulating garbage removal. Their departments issue permits to barber shops and eating places; they see that milk and water supplies are safeguarded. Their responsibilities are varied. But they have one great motivating interest—guardianship of the public health.

One of their chief duties is the checking of sanitary conditions in factories where foods are manufactured and in the stores in which they are sold. It is largely through their efforts that health ordinances regulating the manufacture, transportation, sale and display of foods have been introduced, and through these that food merchandising is so far advanced in sanitary methods over those of yesteryear. Those who remember the cracker-barrel era will testify that the constant educational campaign to improve conditions has borne fruit.

To get a clearer picture of the advances made in food display during the past few decades a survey was made among public-health officers in American cities with a population of 100,000 or over. It was a nation-wide study, representative of typical municipalities.

Of course, there are regulations of greater or lesser strictness, but it is significant that in all but one of the cities cooperating in the survey, ordinances require foods on display to be protected against flies, dust, dirt and other contaminating agencies, provided the foods are not pared, cooked or otherwise prepared before eating. This is a revolutionary improvement when it is remembered that not so many years ago lugs, bins and barrels, open to hand, flies and dust, were a common sight.

Still more significant, thirty-five per cent of the cities go so far as to require specifically the use of wraps on individual packages, baked goods, and in two places it is law that candy must be packaged too. Undreamed-of in days gone by, here is a development that proves the sanitation value which is placed on sealed protective wrappings. One public-health officer reported that "in a bacteriological study of unprotected foods, dust was clearly demonstrated to be very contaminating." Small wonder that packaging is gaining greater acceptance daily.

What do public-health officers think of the progress made in providing greater sanitary protection for foods on display? The survey shows that ninety-eight per cent of the officers feel that much has been done in this direction and that the trend is continually toward more healthful conditions. This, too, is a hopeful sign.

And what of the public itself? Are shoppers becoming more sanitation-conscious? There was a sixty-nine per cent affirmative response. These same guardians of public health felt very definitely that when it comes to buying food the American public is greatly concerned with sanitary conditions in stores.

One official wrote: "The fact that the public often reports food-handling places where conditions are unsanitary indicates that it is becoming more sanitation-conscious."

The credo of another: "I believe the public has reached the point where many foods, if not protected from handling, dust and flies, would not be bought."

"Several instances have come to our attention where people have refused to purchase food that is on display uncovered," writes a third.

Still another: "The public's demand has instigated the trend toward greater sanitation in food stores."

And, concludes one officer: "The development of sanitary, original packages of foodstuffs has met a need that the public appreciates."

Cooperating with health officers through the years have been the public-spirited food manufacturers who have taken all precautions to assure clean products; the storekeepers who have gone even beyond the letter of the law, and the makers of packaging materials who have labored to supply convenient and sanitary units for food distributors to use.

The Du Pont Company in developing "Cellophane" cellulose film has contributed a packaging material now in wide use to protect foodstuffs, yet it does not defeat the age-old appeal of visibility.



"Cellophane" hoods for milk bottles effectively keep dust and dirt from milk and the pouring lip.



MANY of the products packaged in glass today are protected by "Cel-O-Seal" cellulose bands. The little seals firmly hold the closure—the cap, lid or cork—to the bottle or jar, preventing any loosening, which would let air *in* and flavor or aroma *out*; and they keep bottle mouths free of dirt accumulations that otherwise might occur in transit from factory to store. In a word, they assure the ultimate consumer that the product purchased is as pure and flavorful as when it was originally packed by the manufacturer.

Thus do "Cel-O-Seal" bands, developed through Du Pont chemical research, protect products that enter your home—food, drugs, cosmetics, wines and many other items, even toothbrushes.

Seals of a special type—trademarked "Wind-O-Band"—protect distilled spirits packages. These afford protection of United States tax stamps. Moreover, sealed packages cannot be duplicated by bootleggers. "Wind-O-Band" seals are available in a variety of colors, and may be so imprinted in other colors as to produce a three-color effect.

Modern Sulfur Mining

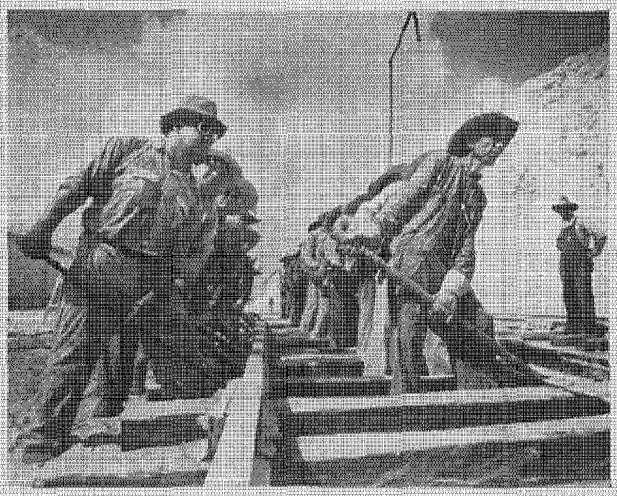
(Continued from Page Nine)

and the developments growing out of them have had an important influence on our nation's economic history.

Today, sulfur and its derivative products are essential not only in the chemical manufacturing field but also in the fertilizer, pulp and paper, rubber, steel and explosives industries, as well as in agriculture, to mention only a few market outlets. In fact this basic material now serves mankind in so many different ways that it has been called "the yardstick of a nation's industrial stature."

By trainloads and boatloads sulfur from the Gulf Coast moves daily to the consuming industries. Stock piles, openly exposed to the sun and rain, may be seen in the vicinity of many chemical establishments. For example, northbound travelers on the Pennsylvania Railroad as they approach Philadelphia frequently look across the Schuylkill River toward the Du Pont plant at Gray's Ferry. Two luminous spots on the landscape seldom fail to attract their attention—the piles of yellow sulfur awaiting conversion into sulfuric acid at the Grasselli Chemicals Department plant nearby. The setting is typical and also historic, for in this same works area the descendants of John Harrison produced sulfuric acid for many years.

It is a comforting thought that American stock piles of sulfur are no longer dependent upon mining operations abroad for replenishment. Domestic production by the more efficient hot-water method can be counted upon to keep pace with our nation's industrial needs.



"Heave ho!" Loading operations have been completed after a blast, and now the tracks must be moved closer to the face of the vat.

For the American Home . . .

(Continued from Page Twenty-One)

All these are typical products of chemistry. Many more are still in the development stage. Eventually some of them may fit into the home environment of tomorrow. It is, of course, pure speculation to consider them here, but let's see what may be developed.



When the smooth, glossy surface of a lacquered-fabric tablecloth becomes soiled, it is easily cleaned by a rub or two with a damp sponge.

Cotton roofs? Roof shingles with an open-mesh, cotton-fabric reinforcement are already being produced experimentally.

Already commercially available is a new wall-panel material, made of cotton-backed wood, which is so pliable that it can be rolled around a lead pencil.

Another possibility is a shelf-and-closet paper with a plastic coating bonded to its surface to make it greaseproof and waterproof.

Chemists look ahead to faster-drying finishes that will last longer and be still lower in price; interior finishes that will be relatively free from odor; more one-coat paints; exterior finishes that will retain their original color during a longer service life; household appliance finishes of still greater durability than at present.

A much wider use is predicted for "one-way" glass for window-panes.

Year-round air-conditioning will be found in more homes. The cooling phase is expected to be accomplished with safe, odorless "Freon" fluorine refrigerants.

Whether it be for the construction of the home, its maintenance, decorations, furnishings, or appliances, the scientific research workers continue constantly to seek ways to improve present materials or to bring about cost reductions in them. It is this never-ending search of the chemists and other scientists that has been largely responsible for our present-day standard of living.



Auntie Freez

sez:

I ONCET KNEW A MAN WITH A HEART AS COLD AS A FROZE RADIATOR. HE WUZ SO DANG MEAN HE WOULDN'T GIVE HIS WIFE THE LITTLE BIT OF MONEY IT TAKES TO BUY ***FIVE STAR*** *ANTI-FREEZE FOR LOW-COST, ALL-WINTER PROTECTION!*

DU PONT

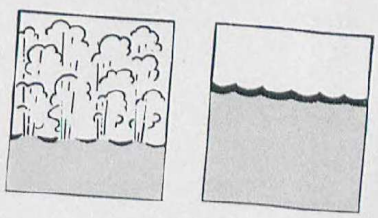
REG. U.S. PAT. OFF.

FIVE STAR anti-freeze

25¢ A QUART

Low-Cost— All-Winter Protection

Broken line shows how broken film of ordinary retardants allows anti-freeze solution to evaporate freely.

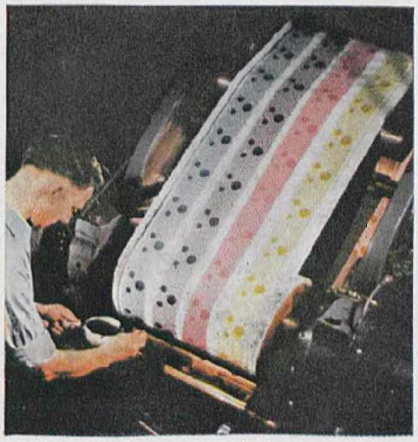


Heavy unbroken line shows how unbroken film, produced by the exclusive dual retardant in Du Pont "Five Star" Anti-Freeze, holds evaporation to a minimum.



RESEARCH IN DYES . . .

Contributes to "Better Living"



TOP—Converting water-soluble dyes in the Du Pont Technical Laboratory into insoluble pigments, called "lakes," for ink, paint, wallpaper and other uses.

ABOVE—Testing dyes for suitability to textile printing. This machine duplicates mill operation, and permits working out application problems right in the laboratory.

IT was not until 1917 that Du Pont first undertook the manufacture of dyes. Today, Du Pont is supplying dyes to practically every industry that uses color—textiles, paper, leather, paint, rubber and dozens of others. These industries no longer depend upon foreign supplies—and are today using more color than ever before.

Research opened the way to this tremendous progress.

The dye industry has served as the basis for the whole field of organic chemistry. Research in dyes has led to the development and manufacture of many highly-important products other than dyes—neoprene, synthetic camphor, aromatics, refrigerants and water repellents, to name a few.

But the test tube is not the last stage in research. It takes never-ending study to improve and control quality, cut costs. And to help users of dyes in their problems, Du Pont maintains a staff of more than 250.

Research has developed many new and better dyes that are extremely complex in nature. These dyes provide in highest degree the serviceability feature of fastness. Whether in your bath towel or in Junior's playsuit, they last the life of the article itself.

DU PONT DYESTUFFS
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