

THE *DuPont* MAGAZINE



Holiday Number, 1935



RECIPE FOR A MERRY CHRISTMAS

TAKE one crisp December day, a liberal portion of sunshine—and mix thoroughly. Flavor the clear air with the smell of wood fires burning, and the spicy tang of fresh evergreen. Add a sprig of mistletoe, a carol of Christmas chimes, and the bubbling laughter of little children. Then the supreme touch that makes Christmas what it is—the gracious spirit of giving!

SPECIAL NOTE: To provide extra thrills for everyone on Christmas day, glorify all gifts with

sparkling Cellophane. This exciting touch of Christmas glamour is found on countless choice presents in stores—or you easily may add it yourself.

Cellophane

TRADE MARK

"Cellophane" is the registered trade-mark of the DuPont Cellophane Co., Inc.

350—5th Avenue, New York



THE DU PONT MAGAZINE

VOL. XXIX

HOLIDAY NUMBER, 1935

NO. 12

Finger-Nails and Fashions

The spirit of the feminine as revealed in one of its many aspects

By EDWARD SAMPSON

THE twentieth century, with its moving pictures, abbreviated bathing suits and comfortable summer clothes, has done more to establish a wholesome idea of personal attractiveness than the class of mincing prudes will allow. Unquestionably, definite gains have been made in hygiene, beauty and comfort through common sense and taste in selecting clothes, toilet articles and cosmetics.

When Grandmother stepped out in voluminous dresses reinforced with multiple petticoats from which her feet "like little mice stole in and out," her face often suffered from over-emphasis. She lacked the sleek hosiery—or the opportunity to show it—the line-flattering clothes in a wide range of distinctive colors and fabrics, the freedom from form-distorting corsets, the aid of cosmetics to finish the occasional rough work of nature, nail polish and lotions to accentuate the beauty of her hands, and usually the fine taste and skill of coiffeurs. After all, a face is only a rather convenient part of one's anatomy for eating, seeing, smelling and speaking. To force it to supply all the attraction was to place upon it a burden that some faces could not gracefully carry.

Beauty and Business

Today, the extent of the diversification of appeal is obvious to everyone. It has been and will continue to be of great importance. This revolution in fashion has had its effect on almost every field of human endeavor from the

laboratories through industry and merchandising to law. Although it would be impossible to evaluate even approximately its total effect—it is much too large a subject for discussion in a short article—the part that business has played is both significant and revealing, particularly so in relation to beauty preparations.

The story of cosmetics can be gleaned from available figures and records. This business, as was recently stated by Mr. Northam Warren, president of the Northam Warren Corporation, manufacturer of Cutex and other toilet preparations, has an annual turnover of about a quarter of a billion dollars.

But it, too, has many phases and a complicated history.

The nail polish, Cutex, offers a typical and fascinating example of a fashion development. In its story we can watch from behind the scenes and ponder the old question, "Are styles spontaneous or are they the result of skillful promotion and engineering?"

Finger-Nails in History

For centuries finger-nails have played their part in the field of fashions. The earliest records concern the Orientals, among whom the color, shape, luster and length of nails were marks of distinction. Dyes were com-



● The art of manieuring gained a fresh impetus with the successful introduction of Cutex.

monly used for coloring purposes, black, gold, red and purple being the favorites. Length of nails, particularly among men, was a sign of aristocracy—not that the Orientals had any perverted idea that they were attractive when long—it was merely symbolic of the fact that the wearer did not have to work for a living. Sheaths were worn to protect the nails, and when the owner removed them he implied that he was in the presence of his equals. Even today, many wealthy Chinese in New York and San Francisco wear finger-nails as long as two inches.

The scribes, or wise men of Mongolia, found a practical use for long nails. They allowed the thumb-nail to grow several inches and then sharpened it to a point for use as a pen in writing.

For many centuries preceding our own time, finger-nails were kept as unobtrusive as possible. The practice of having them manicured by simply removing the dead flesh of the cuticle and by filing and buffing has long been a service rendered to the few who cared to pay for the luxury. A quarter of a century ago—and it is of course true today—the average woman took care of her own nails. Then it was simply a matter of clipping them with a pair of scissors and of perhaps touching them up with a file. But now finger-nails demand much of the time a woman spends on her toilet.

A study made in 1933 revealed that seventy-six per cent of American women manicured their own nails and used a tinted polish; that forty per cent employed at least one dark shade and many used more than one to suit the color of the costume being worn at the time. Now contrast this with the situation seventeen years before. In 1916, when liquid polish was first introduced, only twenty-five per cent of the American women used any manicure preparations at all, and tinting was only an idea.

The major force behind this revolutionary change has been Mr. Northam Warren, who has dominated the stage of the cosmetic industry.

For fourteen years he was a top-notch salesman for a large pharmaceutical supply house. In 1910, dissatisfied with his prospects, he started business on his own account in New York City as a broker and commission merchant of drugs and cosmetics. In 1911, he began manufacturing Cutex, which was then simply a good preparation for removing cuticle, and four years later the business was incorporated. Lack of capital restricted him at first to the employment of two salesmen who covered only the New York City market. For five years the business did fairly well, but did not build up a fortune.

Having carefully studied his product, its merchandising possibilities and its appeal, he decided with typical

courage to develop a wider market. In 1917, he spent \$40,000 in magazine advertising, an insignificant sum in comparison with his present appropriation, but it represented a large part of the capital he was able to raise at that time.

Marketing Cutex

There were many obstacles to be overcome: In merchandising the product he met with the resistance of the retail trade to an uncultivated market; he had to devise some means of increasing the unit of sale without raising the selling cost disproportionately; the advertising appeal had to be determined; the established manicuring trade opposed him; and final success depended upon anticipating accurately the public taste. Having carefully analyzed these problems, he set to work to solve them.

He quickly won the confidence of



● Among traveling accessories for women, the fine-appearing set shown here, containing selected Cutex products and implements for their use, makes a strong appeal to feminine fancies.



● A few other well-known products of the Northam Warren Corporation.

his salesmen and dealers with his courage and daring. He spent large amounts of money on advertising, depending almost solely upon it to sell his product, and using his salesmen primarily as service men to help the dealers in retailing. At one time, in order to get dealers to take on new materials, he bought all the old stocks and placed new ones on their shelves. Such encouraging tactics quickly overcame dealers' sales resistance and inspired their confidence.

To increase the unit of sale without raising the selling cost, he added new products in order to offer a complete line. He purchased Elcaya Cream in 1925, and Odo-ro-no and Glazo in 1928. Today, the line consists of scores of items, a selected number of which are offered in combination sets and purchased together. A typical cosmetics

line includes face powder, beauty cream, skin tonics and fresheners, lipstick, rouge, deodorant, eye cosmetics and manicure preparations. Thus it became easy and inexpensive for a woman to buy these preparations and use them in her home, which was the practice that beauty specialists at first frowned upon.

The established manicurists were alarmed at the thought that their business would be destroyed. It was only after their trade had actually improved because of his effective educational work that their attitude changed and became more friendly.

Mr. Warren did not try to sell Cutex directly. His advertisements were almost wholly educational, with the product subordinated at all times. This was found to be necessary because his offering was new, there was

no appreciable demand for it and there were no major competitors in the field. Cutex removed cuticle, but he based its advertising and sales appeal on the sound psychology of the idea that well-manicured hands add greatly to the attractiveness of one's personal appearance. Since then he has applied the same key theme in merchandising scores of other products.

Growth of a Fashion

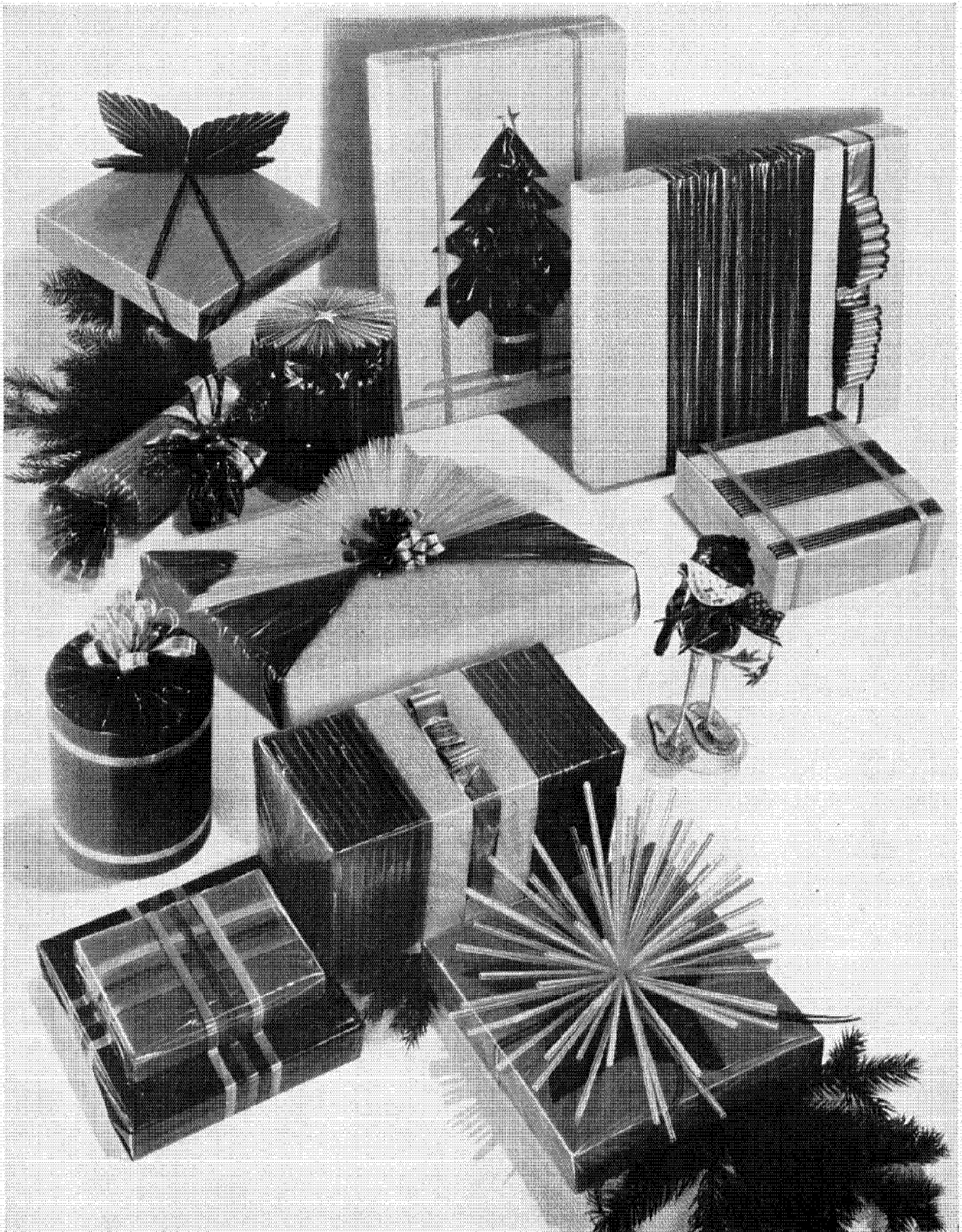
Whether he created the fashion of tinted nails or merely anticipated the public taste, as he modestly claims, is another question. But it is significant that for the past two decades about ninety per cent of the advertising of all manicure preparations has been done by the Northam Warren Corporation; and this has been a contributing factor in setting the fashion. A brief review of Mr. Warren's promotion technique is interesting.

When he started his extensive advertising of tinted polish in 1917, he was appealing to a public that was—with the exception of that class that will try anything merely because it is new—uninterested for the most part and positively opposed for the rest. His problem then was to convince the American woman that brightly colored nails are attractive and likewise in good taste.

In 1925 he began to stress the fashion note. A year later a deep rose nail polish was introduced and the famous copy featuring Anna Pavlova appeared with the statement, "My hands, too, must dance." Beauty editors of many publications throughout the world were quoted.

Additional shades appeared rapidly while Mr. Warren in his advertising banished the thought that tinted nails are not in good taste. Full-page color advertisements in *Cosmopolitan*, *Ladies' Home Journal*, *McCall's Magazine*, *True Story*, *Vogue* and *Woman's Home Companion* presented women of the upper social strata and the wives of college professors to convince the American woman that the élite and conservative were wearing colored nails. Husbands, too, gave their approval.

(Continued on page 23)



Capturing Christmas with "Cellophane"

A few new twists in gift wrapping for the entire family

By CARL J. NICKEL

WHAT would Christmas be without Christmas trees, Santa Claus, holly, bells, carols—and gifts? And what would gifts be without gay wrappings, dazzling ribbons and the urge to make each new package more enticing than the last?

Out of these "stage props" comes much of the excitement of Christmas, the glamour, the suspense, the joy. And so again the important question is, What's new in gift wrapping?

Again this year "Cellophane" cellulose film is perhaps the biggest factor in gift wrapping, not only because of its transparency, brilliant luster and vivid colors, but also because of the many exciting new forms and turns it has taken.

"Crystal Crinkling"

For example, "crystal crinkling" is a smart, new touch to the transparent sheet. It is a development from crinkle-craft; one simply crushes the uncolored sheet of "Cellophane" firmly in the hand. It is then opened and applied over a white box and the effect is icy frost. A navy-blue, shiny ribbon printed in white or silver completes the creation.

Perhaps the most remarkable development of the year is the use of transparent drinking straws—Glassips—rightly tied into sprays for package decoration or made into unconventional Christmas trees.

A couple of new bows made with "Cellophane" are also receiving much attention: One transparent bow resembles the spread wings of a butterfly. It is made in a few minutes merely by folding a square sheet of "Cellophane" diagonally into quarter-inch accordion folds and tying it in position on the package. Equally interesting is the crystal fan—a rectangular sheet, accordion folded—which is opened on the package like a fan. The appeal of both

these bows probably lies in the fortunate combination of form, brilliance and gossamer transparency, to all of which color may be added.

In the same fashion that one would gather curtain material, women are gathering or shirring "Cellophane" and placing it taut on the gift package. The result is a series of crisp shafts of light that serve to give "movement" to the design.

Smart indeed is the trend toward transparent gift wrapping, right over the gift itself. A good example is the bath towel of colorful border design rolled into cylindrical shape and wrapped direct in an uncolored sheet of "Cellophane," without box or paper, and topped with a spray of Glassips or a ribbon pompon. The transparent "direct-wrap" is popular for so many gifts—hosiery, linens, cookies, candies, jars of jelly, jugs of all kinds, leather goods, shirts, neckties, bottles, cosmetics and so on. The skillful placement of bright ribbon usually completes such a package.

Ribbon, as the experienced gift wrapper has observed, is more than a device to hold a gift package together. The ribbon may "steal the show" through its color dominance or through the size, shape and position of the bow. On the other hand, ribbon may serve as a quiet border or to form a design of lines.

A NEW BOOKLET FOR YOU

Just off the press, the 1935 edition of "33 Secrets of Gift Wrapping" is an authentic manual and complete guide. It is printed in natural vivid colors and may be had for a three-cent stamp sent to Department 4, Du Pont Cellophane Company, Inc., Empire State Building, New York City.

The new patterns in ribbons of "Cellophane" are for the most part gayer and in greater variety than before. Strictly new is the "silver-center" opaque ribbon, completely covered with "Cellophane," clear or colored in red, blue, green, yellow and silver. And all colors in this ribbon have a fascinating opalescence.

A New Sealing Aid

The new colored Scotch cellulose tape is another practical item for sealing and decorating packages. It is fastened down simply by pressing, and, in case of a mistake, can be removed without damage to the wrapping. Attractive monograms or other appliquéd decorations can be made in gold, silver or other colors. Both the inexperienced and the deft will find these aids valuable in doing up gifts.

There is always something new in "Cellophane." But even so, the old favorites get stronger every year . . . the plain white box wrapped in clear "Cellophane" and tied with a transparent red ribbon . . . the red wrap with dark blue or black ribbon . . . the printed transparent sheet with the clear transparent silver edge or the black wrap with silver ribbon.

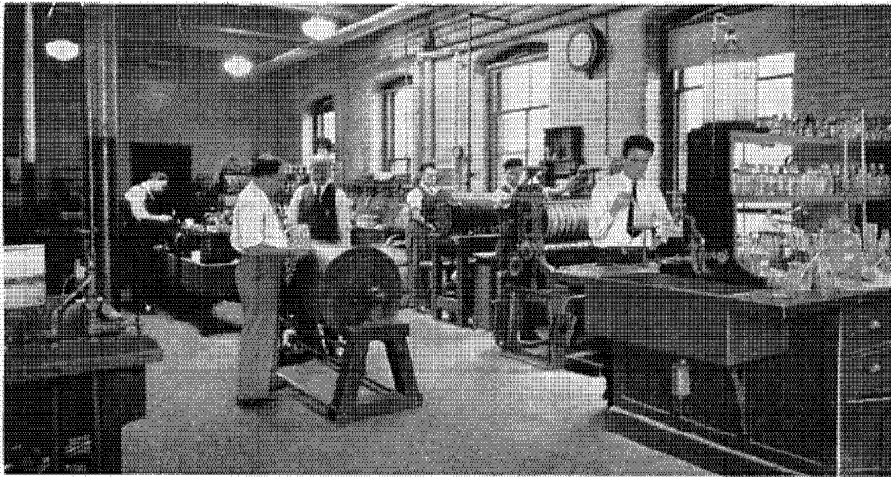
All gift-wrapping supplies made of the "Cellophane" brand of cellulose film are always identified in the retail store with the red-and-blue label showing the du Pont trade-mark. The products mentioned here are for sale at leading department stores, also at "Five-and-Ten-Cent" stores, stationery, gift and art stores.

The illustration on the opposite page shows a few of the attractive effects that can be easily obtained. They suggest the unlimited possibilities for decoration in novel forms and smart color combinations.

Fine Finishes Make Fine Fabrics . . .

Briefly reviewing the development of a cotton-rayon-mohair fabric that has the appearance of fine wool

By ANSCO C. BRUINIER, JR.



● The U. S. Finishing Company's laboratory, Providence, Rhode Island, where Casuelle cloth was developed. Note the experimental printing machines.

Nothing is so perfect that it cannot be improved is a fact that has always furnished a stimulus toward the creation of better things. It has been the inspiration for some of the world's greatest discoveries and inventions in all fields of science and engineering. We shall attempt here only to point out what an important part man's will and ingenuity to improve things have played in connection with the great textile industry, and how some most remarkable developments have followed.

The realization that wearing apparel was a vital human necessity brought about the establishment of textile plants throughout the civilized world, and from that time progress in this specialized field has been rapid. This is, of course, due to several factors, notably the growth in population creating an increase in demand, and personal vanity with its urge to wear something different as often as the purse would permit.

Nature, too, did her share in helping the industry along by her seasonal changes, making the production of various-weight fabrics a requisite for human comfort. She also furnished the

basic materials such as cotton, silk and wool for the weaver's use.

Today, textiles represent one of the world's most important industries, from which thousands of men and women obtain their livelihood, while innumerable others are indirectly dependent upon it. Dyestuffs, chemicals and textiles are closely allied, and there is a very definite interdependence between them.

Less than a century ago, the only fibers available for textile purposes were either of animal or vegetable origin. They were made into various types of material for wearing apparel and seemed to fulfill existing requirements. The art of weaving, processing, dyeing and printing had even then attained a high degree of perfection. Cottons, wools and silks were being spun and woven into both intricate and beautiful patterns, exquisitely colored with synthetic or coal-tar dyes, far exceeding the natural ones in case of application, color and permanency.

But improvements were constantly being made in manufacturing processes. Many changes had occurred since the days when old spinning-wheels deftly

wove the serviceable homespun. Inventors and engineers brought forth their marvelously efficient textile machines to do the same work and also paved the way for more varied constructions. With the introduction of rayon yarns, it was possible to produce still more novel and distinctive fabric weaves. Consequently, dress fabrics became more complex, new fiber combinations were attempted resulting in the production of multi-fiber fabrics. These were totally different from their prototypes in construction and physical properties, and in their production new technical problems arose. Time-honored processing formulae could not be used. Only by intensive research work could one learn how to produce finished fabrics possessing the necessary qualities of style, color, wearability and beauty.

The U. S. Finishing Company, with headquarters at Providence, Rhode Island, is one of our leading American textile organizations which has a long record of success in its field, because the management has always kept abreast of the times and alert in planning for the future. In order to help solve the various problems mentioned, some time ago a new fabrics development department was organized, the purpose of which was to assist converters with new constructions. It was manned by a staff of technicians whose training and experience especially fitted them to cope with the intricacies of manufacturing, coloring and finishing. Their efforts have resulted in the production of fashion's latest and most merchantable fabrics, which are composed of natural and man-made fibers skillfully blended

and dyed. The fact is, many of the novelty fabrics you have recently seen worn or used were originally developed by experts in the laboratory of the U. S. Finishing Company.

To give you some idea of the amount of minute application and careful research required in the creation of a new textile, suppose we trace the evolution of one outstanding and currently-successful fabric blend. The idea for it originated in the mind of one of these men. He knew the material would have to be in a class by itself, something entirely different, possessing style appeal and color charm. And it must not be too expensive.

The basic fiber at his disposal was cotton, to be transformed into the likeness of a distinctive wool-type fabric. Using cotton alone, his first efforts were fruitless; something was lacking. He tried to improve it through dyeing and various finishing operations, but it still looked like cotton. Meanwhile, a new development came to light in the rayon industry; du Pont introduced the yarn known as spun rayon, which possessed a fine "lofty" feel and in appearance resembled wool. Furthermore, it was exceedingly soft and would wash well. As all of these properties seemed favorable to the technician, he procured some of this rayon, blended it with cotton and added a small percentage of mohair to impart a hairy appearance to his experimental fabric. The result was definitely better, but many combinations were tried before arriving at the correct proportion of each fiber. Eventually, he built a fabric that met his original specification.

Color was the next big problem. The technique of applying color to vegetable, animal and other fibers is a most involved and highly scientific art. There are, as you may know, numerous classes of dyes, each possessing its own individual characteristics and limitations. Some are suitable

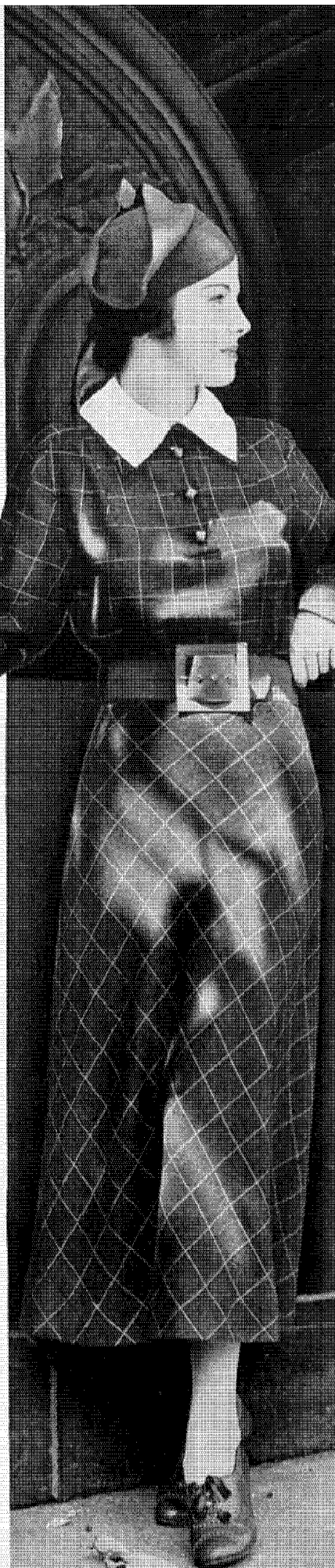
for use on one fiber; others, on several. A series of experiments was made to determine which would be the most advantageous on this new multi-fiber fabric from the standpoint of application, appearance and resistance to color-destroying influences. It was easy to obtain single shades, but when it came to securing combination effects upon a solid ground, that was another story. The material had to be printed, by no means an easy task, and particularly so on woolly or hairy fabrics. The problem was finally solved by using selected vat dyestuffs, which met all the requirements and gave the best results. And they should, because the vat dyes, as a class, are the finest that chemical science has so far been able to produce. Not only did they work well, but they also withstood all fastness tests when printed on this triple-fiber blend.

The next important operation is what is known as finishing. The object of this process is to impart an attractive appearance and fine "handle" to the cloth, and ordinarily comprises seven different treatments. However, in this instance, numerous methods were tried out and finally a process was evolved that gave the fabric blend all of the beautiful qualities, with the appearance and feel of a fine wool. Finishing requires the use of different chemicals coupled with repeated washing and heat treatments, and not all dyes are able to withstand the rigors of these operations. It is a gratifying fact that through the use of vat dyes none of the shades faded or were in any way impaired.

The fabric, now completed and perfect, was submitted to the Ameritex Division of Cohn-Hall-Marx Company, one of our nation's leading converters, for merchandising. Sales possibilities of the material were at once apparent; it looked like wool, felt like wool, sewed, cut and draped

(Continued on page 24)

● A smart afternoon dress of printed Casuelle cloth featured by the Ameritex Division of Cohn-Hall-Marx Company, New York City. It is a cotton-rayon-mohair fabric, even though it appears to be a fine wool.



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E. R. MANCHESTER *Editor*

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VOL. XXIX HOLIDAY NUMBER, 1935 No. 12

Progress

IN what some one has termed man's tiny niche amid immensities, research and development activities are proceeding at a rapid pace and more extensively than ever before. Thanks to scientists and inventors ways have been found to explore and study intimately the earth and its enveloping atmosphere.

The use of chemical refrigerants now enables gold miners to work several thousands of feet underground and at new low levels.

It seems only a short time ago that Dr. William Beebe's voice came to us from the famous bathysphere in which he was studying marine life nearly a half mile under the sea.

Just a few weeks ago Captains Orville A. Anderson and Albert W. Stevens described over the radio how it feels to be suspended in a balloon while delicate instruments were recording facts about the stratosphere nearly fourteen miles above the earth.

And astronomers are preparing to look into vast realms of the universe never before seen by human eyes. Larger telescopes, more powerful lenses are expected to disclose facts about a larger world than was known a generation ago.

In research laboratories, too, scientists are studying tiny things—

inorganic and organic substances—under high-power microscopes and developing facts as a basis for creative work. Chemists are building from elemental structures a variety of commercial products — materials better fitted for man's use than those of Nature's own making; and the improvement of natural products continues to engage the attentions of research workers in many fields.

Some of these achievements have been visualized recently at the Exposition of Chemical Industries in New York City. These shows are held every two years. In 1933 more than 40,000 people viewed the extensive exhibits which included a selected group of chemical products referred to as "Children of the Depression." This year great crowds had the thrill of seeing another impressive collection styled the "Children of Recovery," including a number of new du Pont products that have been developed during the past two years. Some of these materials are destined for use in industrial plants where they will lose their identity in manufacturing processes. The nature of others presupposes that they will serve in more direct and observable ways, and we hope you have had an opportunity to see them.

National expositions of this kind furnish continuing evidence that chemical research workers are gaining more and more knowledge and that they are applying it usefully to speed the wheels of progress. Industry needs the stimulation of well-directed work in creating and developing "better things for better living—through chemistry." Industry, like Youth, must be served. Science points the way to greater service in a broader field.

An Omission

PHOTOGRAPHS used to illustrate the "Fort Peck Dam" article in the October number were supplied through the courtesy of Elliot Photo Service, Glasgow, Montana. We wish to note the fact for, through inadvertence, the usual credit line did not appear.

The Insert

ONE of the high spots of the Fifteenth National Chemical Exposition of Chemical Industries, held recently in New York City, was the formal presentation of the 1935 award for chemical engineering achievement to the Organic Chemicals Department of E. I. du Pont de Nemours & Company, Inc.

Chemical & Metallurgical Engineering, sponsor of this award, has graciously permitted us to reprint its own insert featuring an illuminating article by Sidney D. Kirkpatrick, editor of that publication. In it he reviews some of the du Pont contributions that the Committee of Award adjudged to be of outstanding merit, among them the synthetic rubber which is sold under the trade-mark "DuPrene," synthetic camphor and various other organic chemical products. We commend this article to you for careful reading.

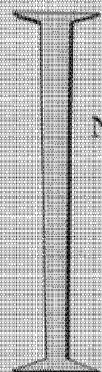
The Cover Picture

CHRISTMAS time each year encourages the custom of gift giving, which is the reason we have chosen to introduce this Holiday Number with a colorful subject keyed at least by implication to that theme.

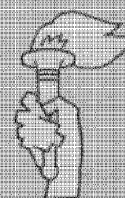
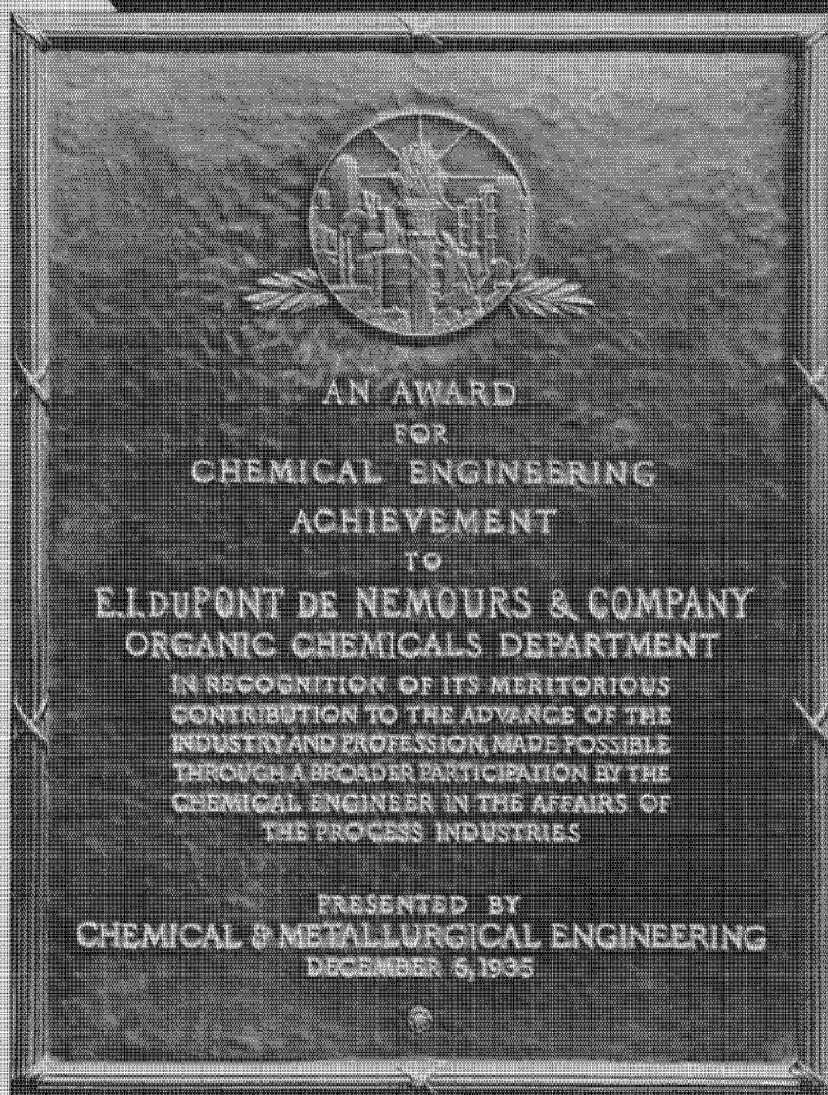
Our interpretation of the background events preceding the arrival of the cameraman is that the little Miss wrote to Santa Claus asking him to bring her lots of nice things and "most of all a dog—a really, truly live one."

Christmas morning, with tingling delight, she examined the contents of a well-filled stocking, and all the gifts under the tree downstairs, but the climax came after breakfast when Daddy went over to a neighbor's house in response to a telephone call, and came back carrying in his arms another present—her dog. Was she pleased? The picture tells the story.

The reproduction will perhaps bring back a flood of happy recollections of your own youth. In presenting it, we are extending best wishes to you all for a Merry Christmas and a Happy, Prosperous New Year.



INDIVIDUAL EFFORT and accomplishment of outstanding merit in chemical industry has long been recognized by a multiplicity of medals, awards and personal honors. But no comparable recognition of group effort had been made prior to the establishment in 1933 by *Chemical & Metallurgical Engineering* of this Award for Chemical Engineering Achievement. Its primary purpose has been to stimulate a broader participation of chemical engineers in the affairs of industry by honoring that company which, in the opinion of a representative Committee of Award, has contributed most to the advance of chemical industry and of the chemical engineering profession. Of industrial achievements in this field which have come to fruition during the past two years, that of the Organic Chemicals Department of E. I. duPont de Nemours & Co. has been judged the most meritorious. As described in the following article, this is a major accomplishment of which the chemical engineering profession is justly proud.



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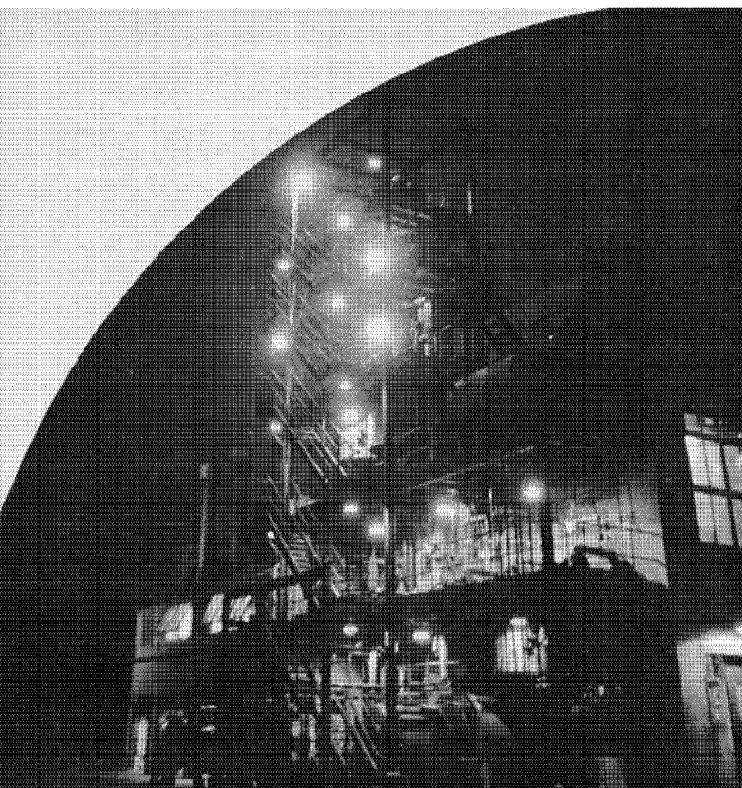
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TOWER OF LIGHT SIGNALIZING CONTINUOUS PRODUCTION OF DUPRENE

WHAT RESEARCH

In the opinion of the distinguished committee of award, the outstanding chemical engineering achievement to reach fruition during the past two years has been the successful industrial development of the synthetic rubber, DuPrene, of synthetic camphor and of certain other important organic chemicals and dyestuffs. Back of these more recent and specific accomplishments lies the major achievement of the past two decades in building a great organic chemicals industry. The importance of that development from the standpoint of national security, economic independence, and the public welfare needs no repetition to the readers of these pages. But let us here consider these ventures from the practical points of view of the chemical engineer and business man. Unless industrial development can be organized and carried on at a profit that will assure an eventual return to those who have furnished the capital to make such ventures possible, nothing of lasting value can be achieved. The development of DuPrene is a case in point.

Research on synthetic rubber was started in the Organic Chemical Department of the duPont company about ten years ago, because the duPont management had faith in the ability of its chemists to produce a synthetic rubber that would be at least equal to the natural product, if given sufficient time and the necessary financial support. This faith they held in spite of the fact that years of intensive research by many of the world's most distinguished chemists had so far failed to show that the chemical laboratory could equal Nature as a rubber producer.

Acetylene seemed to be the most desirable raw material because of its reactivity and its potential availability in unlimited quantities. The first step appeared to be to cause two molecules of acetylene to react so as to produce an unsaturated compound having four carbon atoms in a straight chain. This was accomplished but the process proved to be a difficult one and the yields were disappointingly low. At this point the duPont chemists learned of the work of Father J. A. Nieuwland of the University of Notre Dame, who had found a catalyst consisting essentially of a satur-

ACHIEVEMENT as the result of group effort on the part of a corporate organization is the basis for this story. It is a remarkable record of cooperation and teamwork in a great program of industrial development that affects the lives and work of millions of Americans. In short, it is the creation in this country of a vital industry that supplies essential organic chemicals on which nearly every other industry of the world is becoming increasingly dependent. "Better things, for better living, through chemistry" is something more than a catchy slogan of E. I. duPont de Nemours & Co. It is a business creed that has molded and guided the work of thousands of chemists, engineers and industrialists.

To assign major credit for the duPont achievement to any individual or groups within the entire organization would be patently unfair. Each and all—research, engineering, production, sales, management, and administration—have contributed. But because chemical engineering and chemical engineers have participated so broadly and effectively throughout all of the affairs of the Organic Chemicals Department of the duPont company, it is appropriate that this article should be concerned primarily with that contribution. It is one that stirs the imagination and pride of the entire chemical engineering profession.

by SIDNEY D. KIRKPATRICK

EDITOR, *Chemical & Metallurgical Engineering*

CREATES

CHEMICAL ENGINEERING ACHIEVES

ated solution of cuprous chloride and ammonium chloride and water, with which it was possible to polymerize acetylene to divinylacetylene, an unsaturated compound having six carbon atoms in a straight chain.

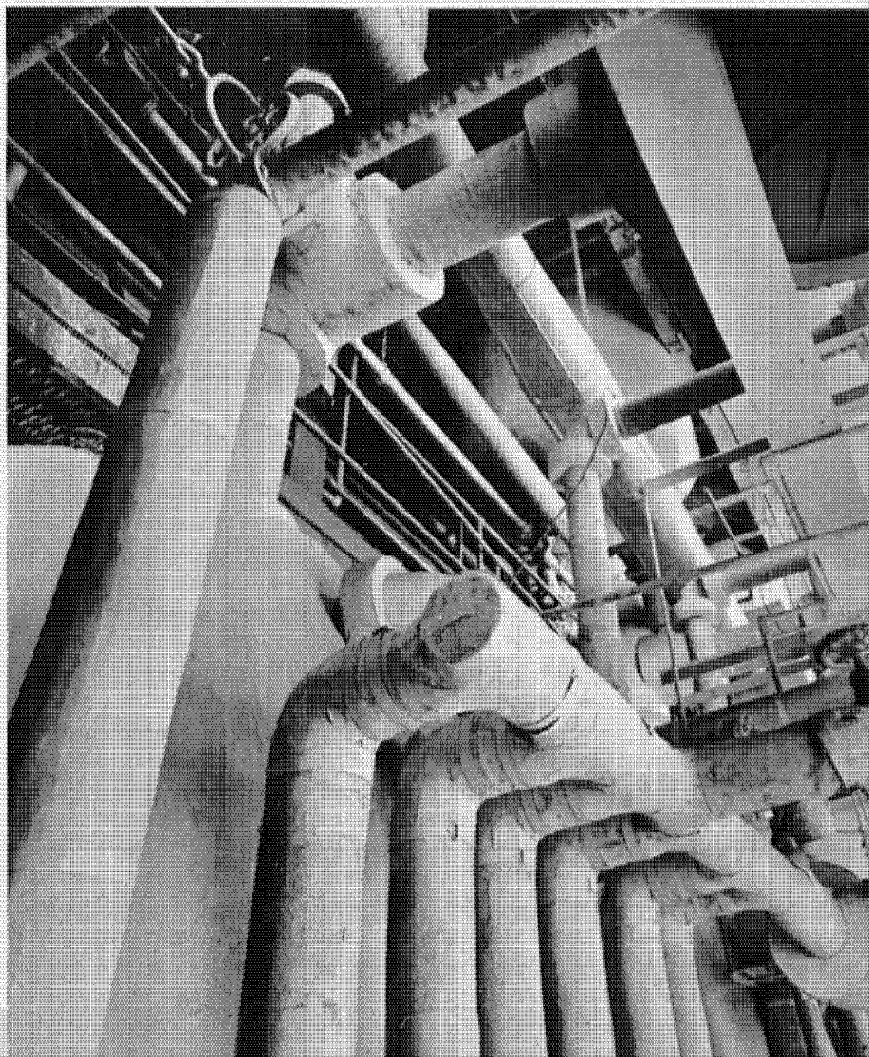
It was found that the partial polymerization of this hydrocarbon produced a synthetic drying oil, "S.D.O." which, when applied on wood, metals or concrete, quickly hardens to produce a surface film that is highly resistant to practically all chemicals and solvents. Many uses for "S.D.O." have been found in the chemical and other industries, where equipment must be protected against corrosive liquids and vapors which ordinary paints, varnishes and lacquers will not resist.

Attempts to produce a satisfactory synthetic rubber by polymerizing divinylacetylene were unsuccessful, but it was soon learned that the conditions under which acetylene is exposed to the catalyst could be modified so as to produce chiefly monovinylacetylene. It did not prove to be possible to make a synthetic rubber of high quality by polymerizing monovinylacetylene but duPont research chemists further discovered that monovinylacetylene could be converted to chloroprene (chloro-2-butadiene-1, 3) by treating it with hydrogen chloride in the presence of a catalyst and that chloroprene polymerized readily to produce a synthetic rubber of very high quality.

On the promising basis of this laboratory research, the decision was made for further experimental development. This decision was of more than usual importance for a number of reasons of primary

interest to the chemical engineer and industrialist. Ordinarily the process would have next been tried out in small-scale or semi-works equipment, before finally expanding it to plant scale operation. However, these acetylene reactions required the handling of gaseous raw materials, of relatively large volume per unit of weight, which made it necessary to install large-sized equipment in order to produce even experimental quantities.

In the operation of the catalytic process for converting acetylene to monovinylacetylene, it is



THROUGH THIS MAZE OF PIPING,
ACETYLENE FINDS ITS WAY
TOWARDS SYNTHETIC RUBBER

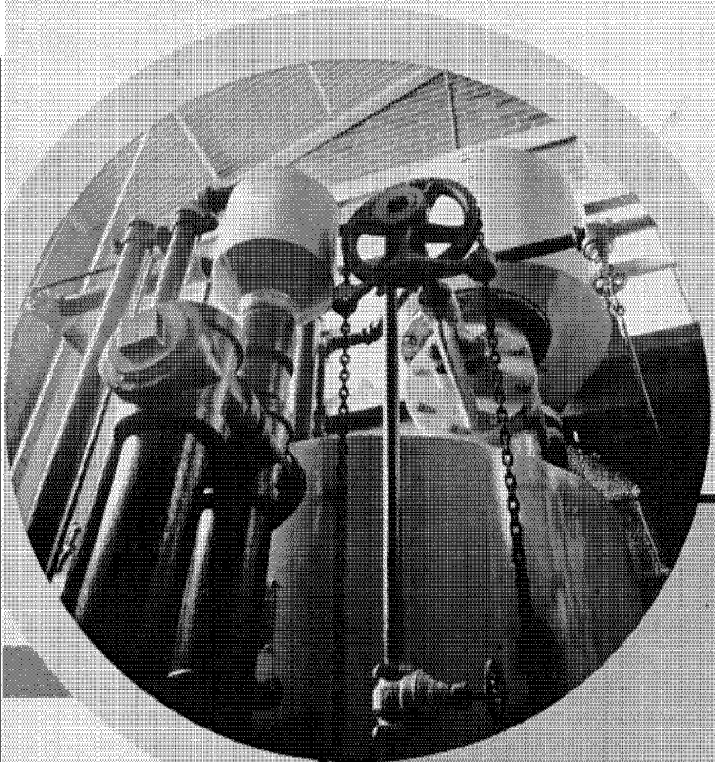
necessary that the latter product be removed from the catalyst as soon as it is formed; otherwise, the reaction will continue with the production of divinylacetylene. Accordingly, the gas is rapidly swept through the catalyst and, through condensation and fractional distillation, the monovinylacetylene is separated from the unconverted acetylene and from the divinylacetylene and other byproducts which are formed in substantial quantities, even under the most favorable operating conditions. This separation requires cooling the gas stream to about 70 degrees below zero Centigrade, which necessitated the design of a refrigeration system for which there was no precedent. Again, it was apparent that conclusive data for equipment design could only be obtained from an installation approximating large-scale production.

In the conversion of monovinylacetylene to chloroprene similar conditions were encountered, because chloroprene, which is formed by the addition of hydrogen chloride to monovinylacetylene, reacts readily with a second mol of HCl to

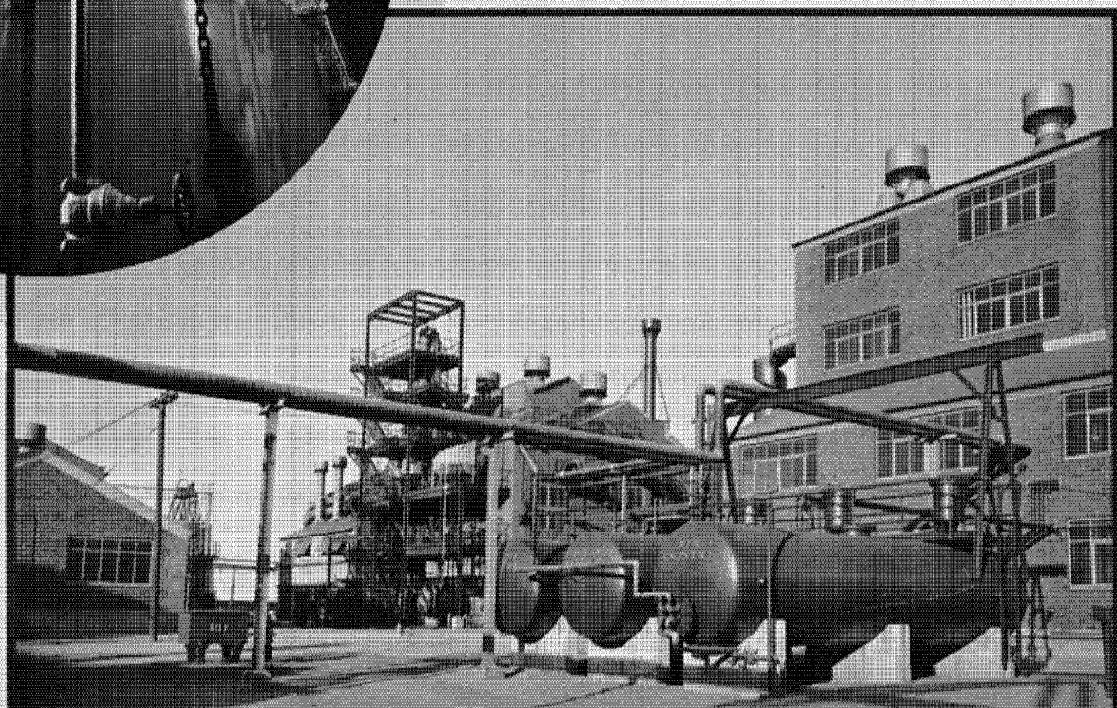
form dichlorobutene. So again it was necessary to sweep the gases rapidly through the catalyst and promptly separate the reaction products. Moreover, chloroprene begins to polymerize as soon as it is formed. The polymer that accumulates in the processing equipment and pipe lines not only represents a loss of yield but makes it necessary to design the equipment so that the polymer can be removed and destroyed.

Facing these facts during the depressing days of 1931, a less courageous management might have hesitated to plunge almost directly into such a large-scale operation. Yet good chemical engineering judgment dictated that course and the pilot plant was erected. In the first three years it has served its purpose extremely well. It has been the scene of almost constant change in design and construction as many pressing problems have had to be solved through chemical research and chemical engineering development. The commercial production of synthetic rubber from acetylene would never have been possible if these problems had not been met and solved on the spot. Likewise, it is a tribute to modern chemical engineering that this production would have been impossible had it not been for the comparatively recent development of new corrosion-resistant alloys and superior glass-lined equipment.

This large-scale pilot plant served another useful purpose in that its output over a three-year period of almost a half million pounds of DuPrene has provided rubber manufacturers with sufficient material to permit them to carry on large-scale experimentation in its many interesting uses. As a matter of fact, a number of important commercial applications were soon found and their growing requirements for DuPrene very soon overtaxed the capacity of the original plant. Accordingly, the decision was made in 1934 to build a new



FROM AUTOMATIC CARBIDE GENERATORS, ABOVE, HOUSED IN BUILDING AT LEFT, COMES THE CHIEF RAW MATERIAL, ACETYLENE. THE OTHERS ARE CHLORINE, CAUSTIC SODA, ALCOHOL AND WATER

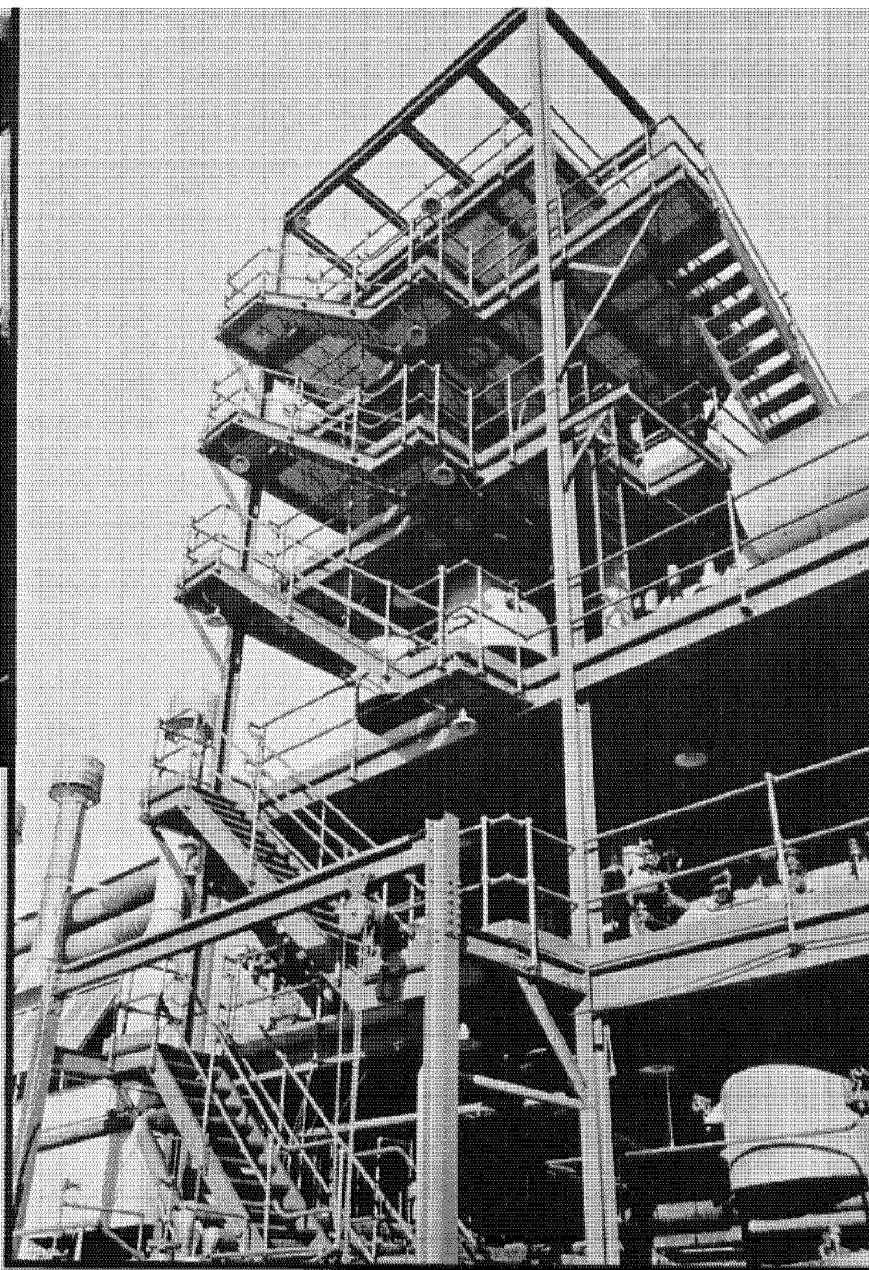




plant, which is now in commercial production. This new plant is now producing at the rate of approximately 1,000,000 pounds per year of synthetic rubber.

The value of this outstanding achievement can best be measured by comparing the properties of DuPrene with those of natural rubber. Of all the differences between DuPrene and natural rubber, the one that is most striking to the layman is its greatly improved resistance to the deteriorating effect of crude oil, refined petroleum products, coal-tar solvents, animal and vegetable oils and the other oily materials which cause natural rubber to swell and disintegrate. As a result of its oil resistance, the new product has found important applications in the manufacture of gaskets, packings, valve diaphragms, pump pistons and sealing rings. For the same reasons it is used as the lining of hose for conveying all types of oils and solvents used in the industries.

Although the oil resistance of DuPrene may be its most striking property from a layman's point of view, the fact that it withstands heat better than natural rubber appears to be of greater commercial importance. Because of this property, it is used in power transmission belts, steam packing, spinning discs for glass blowing, and many other articles which require a tough, resilient rubbery material that is less affected by heat and less in-



TO MAKE ALMOST A HUNDRED THOUSAND POUNDS A MONTH OF SOLID RUBBER REQUIRES THE HANDLING OF VAST QUANTITIES OF GASEOUS RAW MATERIALS OF RELATIVELY LARGE VOLUME PER UNIT OF WEIGHT

flammable than is the case with the natural product.

Every one knows that rubber tends to check or develop cracks when exposed to sunlight or when repeatedly flexed, even in the absence of sunlight. The synthetic product is greatly superior to rubber in these respects, which again opens many uses to it. Likewise, its resistance to acids and alkalis makes it useful in the construction of chemical equipment and for the manufacture of gloves and aprons to protect workmen who must handle chemicals that are destructive to rubber and

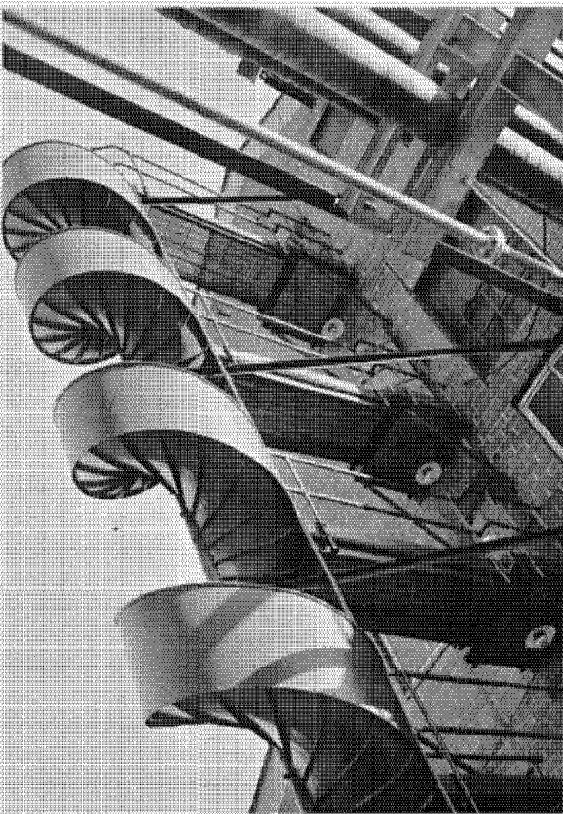
to the human skin. Many other applications could be cited but these are more than sufficient to prove the point, namely, that if research and chemical engineering development can create a new and superior material, there is a preferential market waiting for it, even at a higher price.

SYNTHETIC CAMPHOR FROM TURPENTINE

Behind synthetic camphor is an even more interesting story of years of research and development, finally culminating in successful large-scale production from American turpentine. Few industrial fields have proved more attractive for organic chemical research. Raw material has always been available in abundance. The largest market in the world for the finished product is within our borders. The only source of supply of the natural product is the island of Formosa. It is not surprising, therefore, that there should have been a number of attempts to synthesize camphor in this country. The surprise is that it has not been done successfully prior to the duPont achievement.

As much as \$3,000,000 had probably been spent by various American companies in research and large scale development on synthetic camphor prior to the building of the present plant. European processes have been tried out in this country, but without success, presumably because they were dependent upon a large amount of labor and manual control. The fundamental chemistry of synthetic camphor from pinene had been fairly well worked out over the past three decades, but again the problem lay in translating laboratory processes into manufacturing methods adapted to American conditions.

In 1918 and 1920, at a time when the price of natural camphor had risen from 40 cents to \$1.36 a pound, the duPont company was encouraged to enter the manufacture of a synthetic product. A plant was built at the Deepwater (N.J.) dye works to apply a process not greatly different from that used today. As first worked out, that process had some shortcomings both in the high cost of operation and the impure quality of finished products. These might well have been overcome, however, but the price of imported natural camphor fell from \$1.36 a pound in 1920 to \$0.59 in 1921 so that the immediate manufacturing effort was abandoned. But in 1931, with the acquisition of the chemical interests of the Newport Company, came an opportunity to reappraise the situation because the chemists and chemical engineers of that group had worked out an improved process that promised much greater economy of operation and at the same time gave a product of excellent purity.



UNIQUE IN CONSTRUCTION,
OUTSIDE AS WITHIN, IS THIS
ULTRA-MODERN EXAMPLE OF
THE EFFICIENT APPLICATION
OF CHEMICAL ENGINEERING

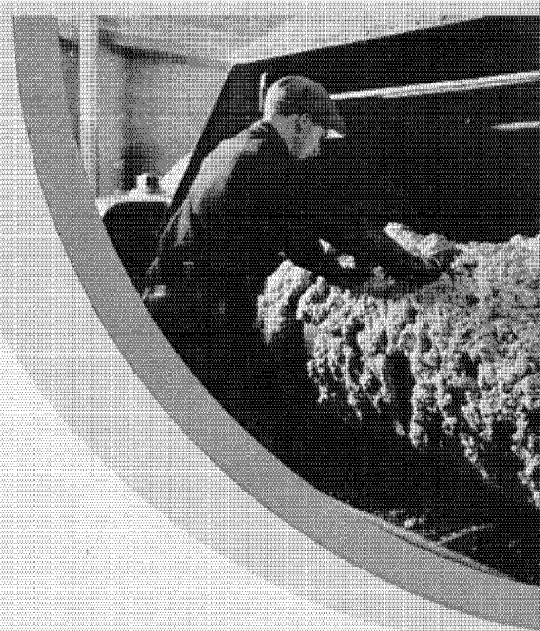
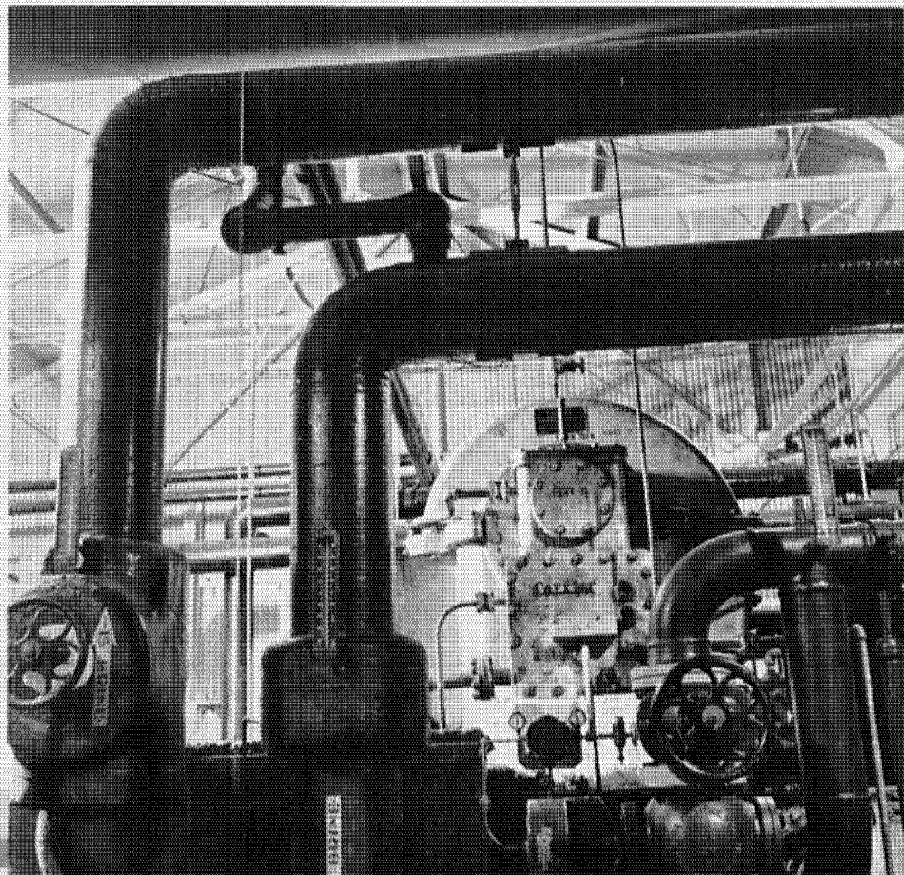


So in 1932, again in the trough of the depression, and in spite of the fact that by this time the price of crude camphor had been reduced to \$.285, it was decided to go ahead with the construction of a large new plant at Deepwater, N. J. When completed, and in successful operation early in 1934, this new plant had an annual capacity of 1,500,000 pounds.

American synthetic camphor is a highly refined product, definitely superior to the synthetic material imported from abroad. The extent to which it has been accepted by American industry and is replacing the natural camphor in the manufacture of pyroxylin plastics, films, and safety glass, is now a matter of official record in Washington.

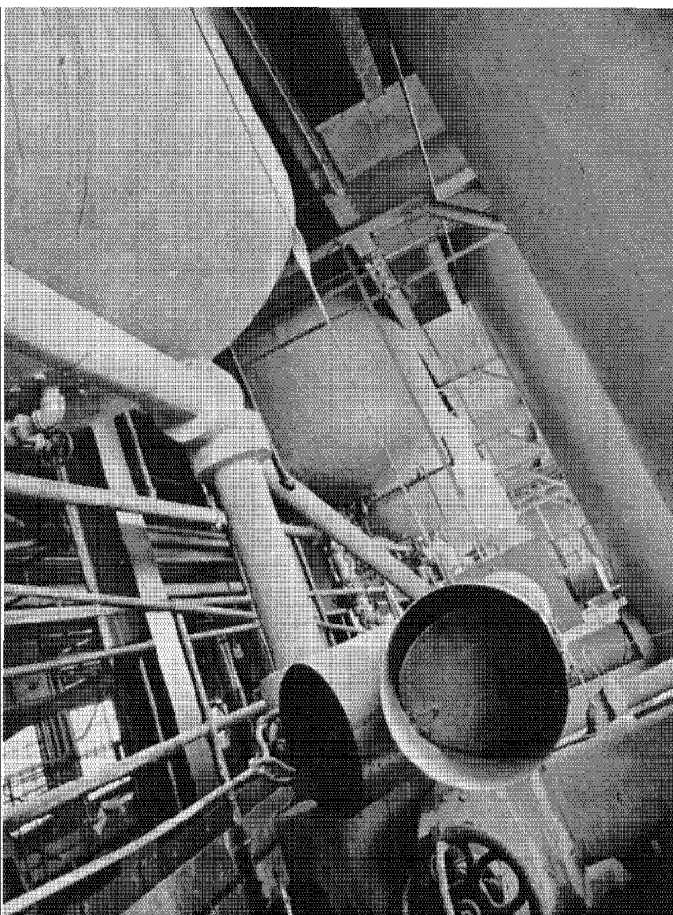
DYESTUFFS... PARENT INDUSTRY

Although DuPrene and synthetic camphor well serve to dramatize the recent achievements of this resourceful and productive group, they are but typical of what has been accomplished by the Organic Chemicals Department during the past twenty years. They are in a sense the natural results of the building up of a vast fund of knowledge and experience in the solving of complicated chemical and chemical engineering problems. Today this is probably the greatest asset of the industry and the one that holds most promise for the future. It is the common bond that ties together such apparently unrelated activities as the manufacture of tetraethyl lead and dyestuffs, fluorine derivatives for refrigerants and anti-oxidants for rubber, gum inhibitors for gasoline and or-



TWO STEPS IN THE FINAL STAGES OF WASHING AND MILLING SYNTHETIC RUBBER ARE SHOWN DIRECTLY ABOVE

NOWHERE WAS THERE A PRECEDENT ON WHICH TO BASE THE DESIGN OF THIS HUGE REFRIGERATING UNIT THAT MUST DELIVER BRINE AT A SERIES OF TEMPERATURES RANGING FROM 15 TO 70 DEGREES BELOW 0 CENTIGRADE



FROM DOMESTIC TURPENTINE,
AMERICAN CHEMICAL ENGINEERING
PRODUCES . . .

ganic mercurials for seed disinfection and the preservation of lumber. It is worth while, therefore, to look back to the origin of the parent development and briefly to trace its progress during the past twenty years of steady growth.

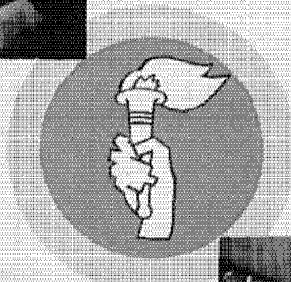
As long ago as 1907 the duPont company had been engaged in the manufacture of organic chemicals. Nitrocellulose, nitroglycerine, dinitrotoluol and later, trinitrotoluol, were well established products of the high explosives industry long before the World War. Diphenylamine, used as a stabilizer for smokeless powder, was among the first synthetic organic chemicals to be made by this industry. With the beginning of the World War, picric acid assumed greater importance and duPont chemists turned their attention to other chlorbenzol derivatives. From this work came the production of sulphur black, the first dyestuff to be made at Deepwater Point almost exactly twenty years ago.

The German blockade shortly thereafter resulted in urgent demands that led to the formation in 1917 of the Dyestuffs Department of the duPont company. With the acquisition of the chemical business of the Newport Company in August, 1931, the name was changed to the Organic Chemicals Department and it now includes the duPont interests in the Bayer-Semesan Com-

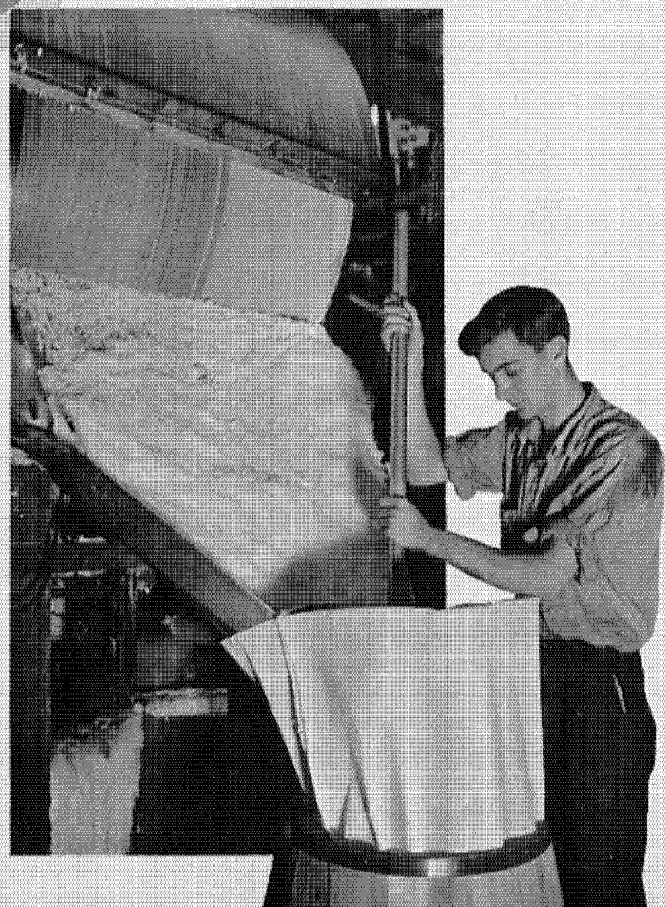
pany, organized in 1928, the Kinetic Chemicals, Inc., organized in 1930 and the Eastern Alcohol Company which was merged into the department in 1934.

To trace the history of the hundreds of chemical products that have come from this department during the past two decades is obviously impossible here. Dyestuffs have grown in greatest profusion but the pattern in that growth is now becoming more and more apparent. There have been improvements in quality and fastness of color as the demand has come for better methods of textile finishing. From a chemical engineering viewpoint, it is significant that in the past 15 years the average sales price of dyestuffs of domestic production has gradually declined from over \$1 a pound in 1920 to a level of about 45 cents in 1935.

Anti-oxidants and accelerators for rubber, gum inhibitors, stabilizers, and oil-soluble dyes for petroleum, solvents for lacquers and plastics, plasticizers, newer textile chemicals, wetting-out agents, and the newer "soapless detergents" (long-chain alkyl sulphates)—all these and many more materials are part of the daily production of the Organic Chemicals Department of E. I. duPont de Nemours & Co. It may be truthfully said that no other industry contributes such a variety of essential products that enter into the daily life and work of the entire nation.



. . . HIGHLY REFINED SYN-
THETIC CAMPHOR WHICH IS FAST
REPLACING THE FOREIGN PRODUCT



That House at Wanamaker's

It is of pre-fabricated construction and is fully equipped, finished and furnished down to the last detail, including a beautiful set of "Pyralin" boudoir accessories

By MAX ROSEDALE

THE United States marches on to better times and a higher standard of living, thanks to new mechanical and industrial developments. A generation or two ago the automobile ushered in a new era in transportation. Radio, airplanes and other inventions followed, and now new facilities for home building seem destined to start a new forward surge.

The pre-fabricated steel-framed Motohome has definitely arrived. You can buy one with all modern improvements installed. The manufacturer will deliver the materials on your lot, will supervise their assembly and the installation of the most up-to-date equipment, and in two or three weeks' time will turn over to you a completely finished home ready for occupancy with even food in the refrigerator.

One of these modern homes, beautifully finished and furnished, has been on exhibit at John Wanamaker's Store in New York City since early last spring, when President Roosevelt's mother dedicated it "to the women of America," and helped to remove the "Cellophane" cellulose film with which the house was covered for that ceremony. Incidentally, the name Motohome is derived from the "moto-unit" or mechanical core that contains all the plumbing, heating, air-conditioning and other service equipment. The house is built around this core.

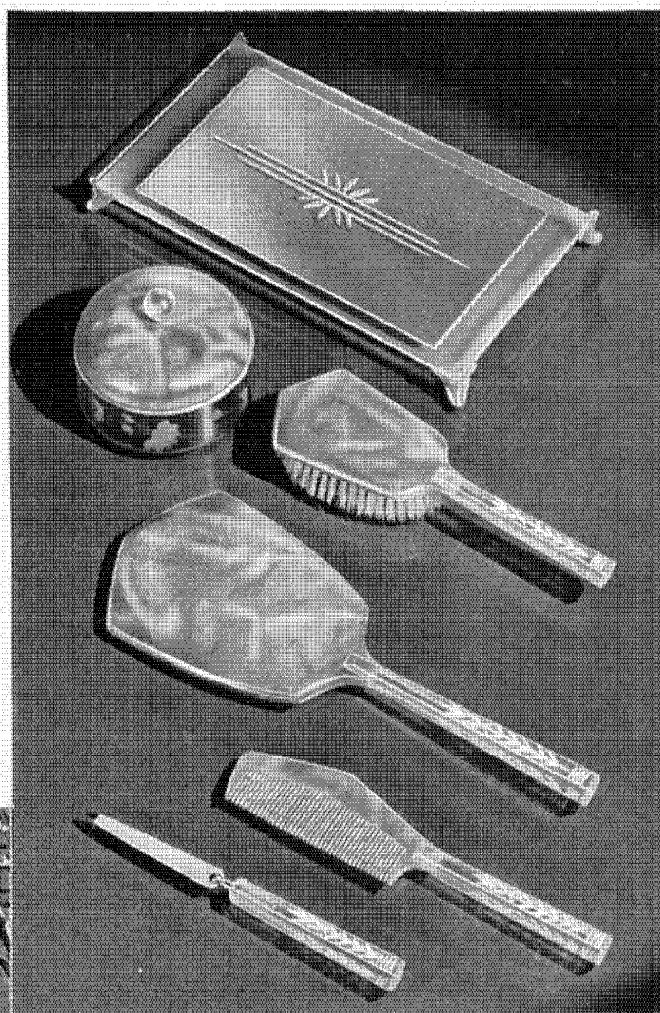
Everybody realizes that the relatively low price of the modern automobile has been achieved largely through mass-production methods. American Houses, Inc., which is affiliated with the General Electric Company, has already gone far to demonstrate that pre-fabrication of homes by similar methods will result in increased production economies and better values for the new home-owner's dollar.

If the Motohome is new in construction, the New York exhibit is no less so in the character and quality of appointments that make it so attractive to visitors. Even in the detail of boudoir accessories, the set of "Pyralin" on the dressing table in the master bedroom was selected because

of its modern design and special adaptability to the setting.

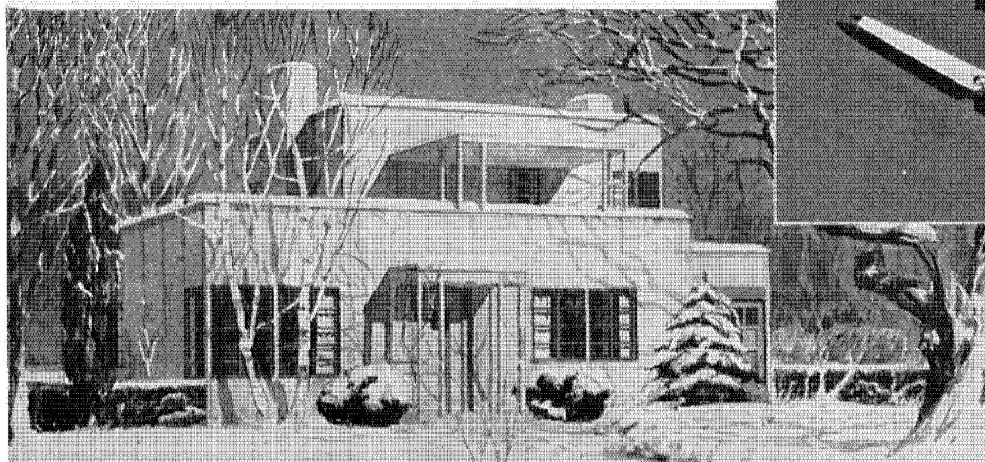
Howard Ketcham, color expert, applied the same principles in his creative work on "Pyralin" sets that the designers of the Motohome followed in their planning. Research in each case was the starting point. Mr. Ketcham first made a study of milady's color preferences and the trend of colors in the modern boudoir. Then with the facts assembled, he created three new patterns in "Pyralin"

(Continued on page 22)



● Above—The set of "Pyralin" exhibited in the boudoir of the Motohome at Wanamaker's store. The pattern is known as Celestial.

● Left—One of the several Motohome models, from an architectural drawing. Demonstration houses have been erected in various parts of the country.



Improved Wood Preservation . . .

The use of Grasselli Chromated Zinc Chloride effectively stops the attacks of rot-producing fungi and termites

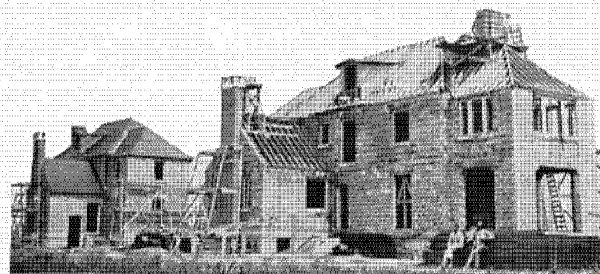
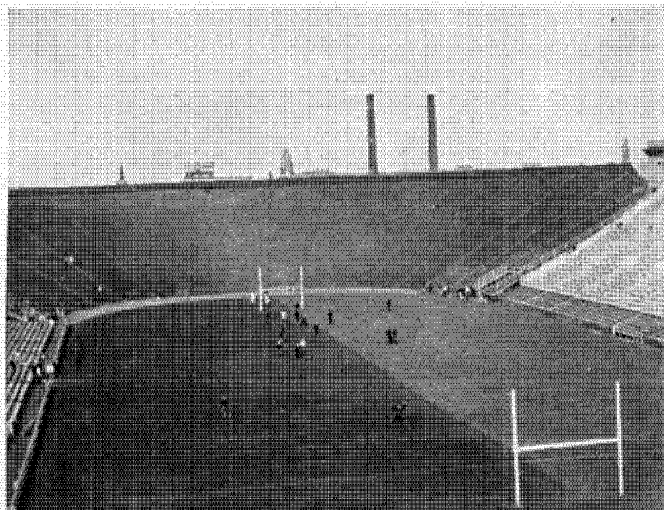
By E. H. RIEMAN

A DISCUSSION of the benefits accredited to chemical wood preservation is incomplete without acknowledgment to the railroads and to the U. S. Forest Products Laboratory for the impetus given this resourceful industry. Foresight impelled by safety and economic necessity caused them to recognize the need and utility of wood preservation decades ago and patiently and coöperatively to lend their efforts toward its continued improvement.

Wood is usually accepted as an article of commerce available in perpetuity—an assumption not literally true. Despite the practice of preservation and reforestation, our national timber requirements are already in excess of replacements, meanwhile existing forests of the naturally durable virgin species are rapidly becoming depleted, and second-growth or substitute material is encroaching in its field. Statistics show that the present widespread use of preservatives by the railroads and utilities has already averted complete exhaustion of our domestic timber supply.

Decay in wood is caused by living organisms known as fungi, low parasitic forms of plant life. These spores, when lodged in crevices of wood, under favorable conditions, germinate rapidly, emitting destructive filaments that ultimately penetrate wood throughout its entire structure. For growth and propagation rot-producing fungi require air, favorable temperatures and food which consists of the cellulose or wood fiber and moisture. Removal of any of these requirements inhibits fungous development and establishes immunity to decay. Conditions affecting air, temperature or moisture are difficult to control, but complete impregnation of the wood fiber with suitable chemicals which are toxic to complex growths of fungi renders the cellulose unfit as food and makes further attack uninviting.

● Harvard Stadium, Cambridge, Massachusetts, the scene of many a hard game. Zinc chloride treated lumber was used for the steps, risers, foot-boards and wind-breaks as a protection to the woodwork.



● An officer's residence at one of the U. S. Army Posts takes form, and all the structural wood used in it has been treated with zinc chloride for protection.

Chemical wood preservation stands out as an industry built upon authentic service records and basic facts. From new theories to highly developed practice, progress has been marked by a conservative recognition of actual accomplishment. During this transition period innumerable treating reagents have been sponsored. Many were found to be of little value in service. Others involved high initial cost, difficulty of application, or the use of constituents harmful to the human system.

General Specifications

It is axiomatic that a good wood preservative must possess several inter-related properties including high initial toxicity to wood-destroying fungi, physical permanence of the preservative in the wood, and retention of toxicity by the preserving material.

As compatible measures, the treating reagent must not reduce the strength or depreciate the physical characteristics of the treated wood; and it must not contain ingredients capable of causing contamination or contribute health hazards to those subject to its exposure. It must also be economical and, of course, readily available without limiting restrictions to the entire wood-treating industry.

Preservatives in Commercial Use

Of the many wood-preserving reagents sponsored from time to time, only the zinc chloride formulations and coal-tar creosote oil have gained extended use. Their efficacy and subsequent acceptance are predicated entirely upon service records embracing periods of time which actually antedate the compilation of such records. In deference to this performance they have become the only established "standard" reagents of the American Wood Preservers' Association, the American Railway Engineers' Association and other leading organizations of this character. Standard specifications and methods of recommended practice govern their use. The zinc chloride formulations and creosote oil both command their sphere of usefulness. In trade parlance,

zinc chloride is known as a "white" treatment and is preferred where paintability or fire repellence is necessary and where the color or odor of creosote oil is objectionable.

The toxicity of zinc chloride to wood-destroying fungi was recognized nearly a century ago. Extended use in this country began with domestic production by The Grasselli Chemical Company nearly fifty years ago. It would be difficult to estimate the total volume of wood treated with zinc chloride since then, but statistics compiled for the past seven years reveal a total of 184,000,000 cubic feet—the equivalent of 2,200,000,000 b. m. f.—of "salt"-treated lumber and timber. Of this production, approximately ninety-three per cent represented zinc chloride impregnation.

An Improved Product

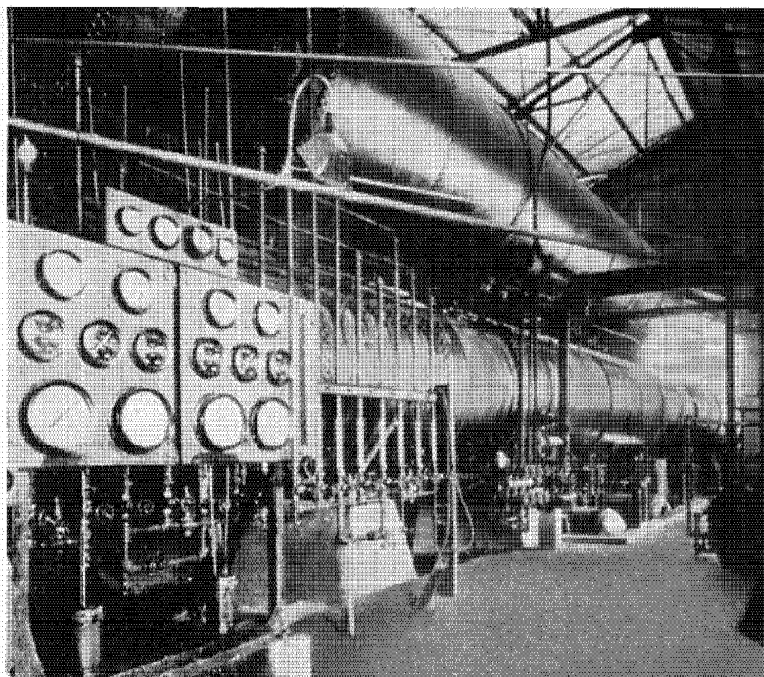
While past performance is pleasant enough to review, progress demands a constant search for improvement. Grasselli engineers in collaboration with the wood-treating industry undertook a broad, unbiased study of all outstanding commodities said to possess preservative value. They included both organic and inorganic compounds, irrespective of their origin. Each was evaluated by itself and in compatible formulations with a view toward developing a fundamentally sound new reagent or amplifying the existing properties of known commodities. From this extended research, a distinctly superior non-proprietary reagent has been developed, the first major improvement to commercial zinc chloride. This formulation, which is basically zinc chloride, retains the attributes of its predecessor and is now identified as Grasselli Chromated Zinc Chloride.

It consists of commercial zinc chloride meeting A.W. P. A. specifications and sodium dichromate of an approved quality. Both are combined in a manner peculiar to their individual properties. The initial toxicities of these components have long been established by the Forest Products Laboratory and require no comment. In a combined state this formulation is exhibiting a preservative value relationship that compares favorably with heavy retentions of creosote oil and is far better than unaltered zinc chloride which ranks next in order. The physical permanence of the preservative and its retention of toxicity are substantiated by laboratory exposures of leached specimens and by actual outdoor service tests. Detailed data concerning these exposures will be gladly supplied upon request.

Some Advantages

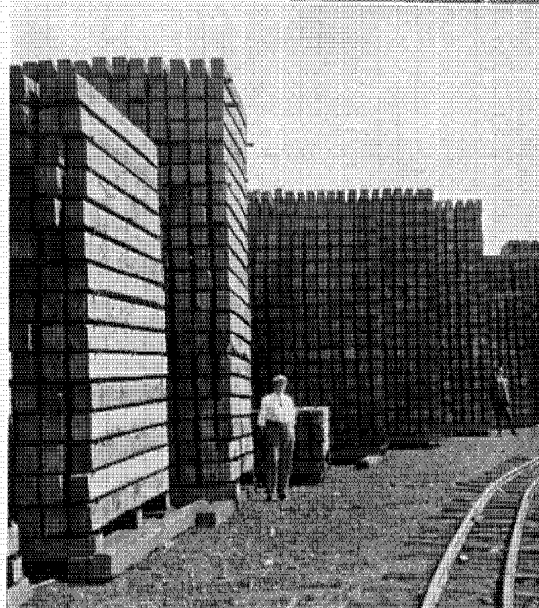
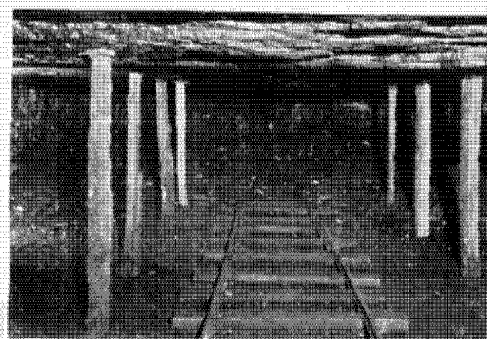
From an operating standpoint, chromated zinc chloride may be used interchangeably with unaltered zinc chloride. Any plant that is equipped to render "vacuum-pressure" impregnation can employ this reagent.

Chromated zinc chloride is free from arsenicals, mercurials, fluorides, phenolic compounds and other toxic volatile organic chemicals capable of imposing health hazards on those who treat or handle the wood or on those who are exposed to the finished product. Consequently, wood so treated may safely be used in buildings intended for human habitation or in those designed for the storage of foodstuffs.



● This will give you some idea of the extensive equipment within a wood-preserving plant. Trainloads of timber are pushed into the huge cylinder, center, where the preservatives are applied under pressure, with all conditions carefully controlled. Note at the extreme left the group of thermometers, pressure gauges and other recording instruments.

● Untreated timber deteriorates rapidly in underground workings, where conditions favor the growth of rot-producing fungi. The mine ties shown here were treated with zinc chloride. They are approximately ten years old and are now in re-use for the fourth time.



COURTESY, WOOD PRESERVING CORPORATION

● All treated, stacked and ready for shipment. And a thorough impregnation of chromated zinc chloride will add years of service life to this wood because it will be free from fungi infestations and termite attacks, aside from the fact that it will be considerably more resistant to fire.

Lumber treated with chromated zinc chloride is substantially improved in its physical properties. It will be fire repellent to a substantial degree and will possess increased surface hardness. It will also remain paintable, odorless and practically colorless. The presence of the treating reagent will not interfere with staining, varnishing or gluing. In point of appearance and workability, it will remain interchangeable with untreated lumber.



● The Termite Test House at Barro Colorado Island, Panama Canal Zone, stands on creosoted timbers, but the building itself was built of wood pressure treated with zinc chloride. After nine years' exposure it is still in a perfect state of preservation.

Protection Against Termites

Termite infestation offers another need for the protection chromated zinc chloride gives. Contrary to popular opinion, termites are neither new nor are they rapacious insects imported from the tropics; they have been present in the forest areas of this country for many centuries. Deprived of their natural habitats, they seek other sources of food and shelter and, in consequence, are becoming more noticeable wherever wooden construction is abundant. In some sections builders are required by law to use treated lumber for sills, joists and sub-floors as a safeguard against this form of attack.

Anticipating the need for protection, the Termite Test House illustrated on this page was built about nine years ago by the American Wood Preservers' Association in cooperation with the U. S. Bureau of Entomology. It stands in a heavily infested section of the Panama Canal Zone where untreated wood is completely destroyed within one year. Climatic conditions are also conducive to rapid decay. The 1935 inspection of this project revealed the building to be in a perfect state of preservation. No one ventures to predict its ultimate life, but since the conditions of exposure in the Canal Zone are far more severe than any met in the United States, it seems safe to assume that under our conditions protection beyond the obsolescence period may be anticipated. This project is probably the most publicized termite test now in progress and is predicated the recommendations of many who are scientifically interested in termite eradication.

Virgin Timber vs. Second-Growth

Second-growth timber represents a major part of our present requirements. Growing rapidly, it does not acquire the dense formation identifying comparable species of virgin growth and, consequently, it is frequently adjudged non-durable. But the fact is, the work of the U. S. Forest Products Laboratory on wood utilization, with respect to the various species, has demonstrated that where mechanical strength alone is the governing factor, there is no need for discrimination, although second-growth timber, with its high sapwood content, is admittedly less resistant to decay and to insect attack.

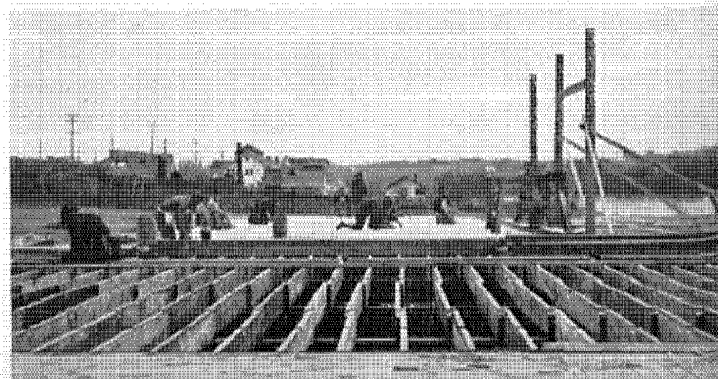
As a balancing factor, however, second-growth species lend themselves to treatment and when properly impregnated with an approved preservative will outlive by many years untreated specimens of those alleged to be more durable. Preservation is not confined to second-growth or to the less durable varieties of timber, but mention is made merely to emphasize the growing need for treatment as their use becomes increasingly common. The ease with which they respond to treatment makes them particularly desirable for service requiring treated lumber; in fact, engineers are encouraged to waive heartwood restrictions when preparing specifications for treated lumber.

We strive to build for permanency, yet no construction material is actually perfect. Concrete disintegrates under usage; steel deteriorates from corrosion; wood—inherently the most versatile—is subject to rot-producing fungi and insect attack. Despite these obvious shortcomings, wood possesses most of the sought-for properties. Resiliency, strength, low heat conductivity, ease of fabrication and maintenance, availability and low initial cost are accepted attributes. Through the use of chromated zinc chloride treatment its flammability can be greatly reduced and its destructive agents economically overcome. Moreover, engineers can design their structures for the loads and stresses involved and eliminate any need for oversized dimensions in anticipation of weaknesses resulting from decay.

Wood Preservation Pays

Railroads, the principal consumers of forest products, present convincing evidence to support a broader justification for chemical preservation. Compilations of actual records reveal that the service life of untreated cross-ties

● Wood treated with zinc chloride is protected against decay and is also fire resistant. This view shows carpenters using it in the construction of a recreation pier.

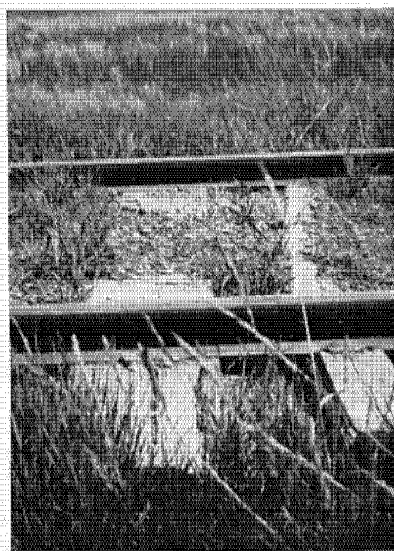


varies from less than three years to seldom more than eight years with an average of only about six. Size, species, climate and traffic all influence their period of usefulness, but considering all these variables, it is well established that properly treated ties outlive at least three untreated installations. It is authoritatively estimated that wood preservation is now saving American railroads approximately \$150,000 daily in reduced maintenance charges.

Other Applications

Chromated zinc chloride can be used advantageously for every application to which zinc chloride or other "salt"-treated wood is now used or contemplated. For residential construction it is useful for sills, joists, floors, porch material and other exposed members subject to premature decay or termite infestation. Industrial uses include mill roofs, general construction beams, warehouses and other forms of timber construction. Railroad uses include cross-ties, switch ties, car and depot lumber, buildings, signs, posts, platforms and the like. In mines it is suited to exposures both above and below ground, including main haulageway ties, cribbing, lagging, shaft timbers, aircourse timbers, frame timbers, posts, props, tipples, homes and commissaries. It meets the needs of highway builders for bridge decking and superstructures, guard rails and posts, signs and many other items. Many miscellaneous uses are also found for it in billboards, fences, stadium seats, boardwalks, farm buildings, dock superstructures, recreational structures; in fact, in nearly every form of construction involving the use of lumber.

Industries requiring wood utilization are rapidly capitalizing upon the experience of the railroads and utilities. More frequently than not, their timber-installation costs



● Railroad companies are large consumers of chemical wood preservatives. The cross-ties shown here, treated with zinc chloride, have been in service for twenty-five years in one of the roadbeds of a western line.

exceed the initial outlay. As an example, the cost of replacing a mine tie is several times its intrinsic value. Decay progresses rapidly in a mine and since a treated installation is expected to outlive five or six untreated replacements, some indication of the ultimate saving is readily visualized.

Paper and textile mill roofs have a normal life expectancy of less than seven years, because of the high humidity inside such plants. Yet with little added expense, replacements with treated material can be made to yield a life expectancy of more than twenty years. Labor cost and interference to operations alone more than overbalance the treating charge. Sills, joints, sub-floors, and the like involve costly replacement charges. The slightly increased cost of using treated material is rapidly repaid. Broadly speaking, the

treatment extends the life of timber from three to ten times, depending upon the species selected and exposure involved. And timber saved is money saved for the small home owner as well as the largest industry.

Chromated zinc chloride is intended primarily for complete pressure impregnation in standard treating equipment. Superficial brush or spray treatment, sometimes advocated, may offer some degree of protection, but, to obtain the maximum utility of any preservative, thorough impregnation must be had. Wood-treating facilities are generally available and many responsible operators and distributors are prepared to render prompt service. The treatment with chromated zinc chloride does not impair the utility of wood in any way but merely makes its inherent properties useful and available for an extended period of time.

Descriptive literature and detailed information about this reagent and how to use it will be furnished promptly upon request to The Grasselli Chemical Company, Inc., 629 Euclid Avenue, Cleveland, Ohio.

Urea Manufacture Commenced by du Pont

UREA, an important chemical and fertilizer material, heretofore obtainable only from Germany and other European sources now is being produced by E. I. du Pont de Nemours & Company, Ammonia Department, at Belle, near Charleston, West Virginia. The product will be known to the trade as "Du Pont Crystal Urea."

Urea manufacture by du Pont is an extension of the Company's synthetic ammonia manufacture, which was initiated at the Belle plant in 1926, and of the subsequent manufacture of "Urea-Ammonia Liquor," a crude solution of urea widely used for super-phosphate ammoniation. The capacity of the

new plant is more than sufficient to meet present demands for urea, thus putting the United States on a self-sustained basis with respect to another major chemical and fertilizer material.

Urea is a thoroughly proved fertilizer for all crops, both for use in mixed fertilizers and as a top dressing. It is favored particularly by growers of tobacco, citrus fruits and truck crops. Urea enters into a variety of industrial chemical operations, principally in making urea-formaldehyde resin, which is the basis for an important class of plastics; and to a lesser extent in special glues and pharmaceutical products.

That House at Wanamaker's

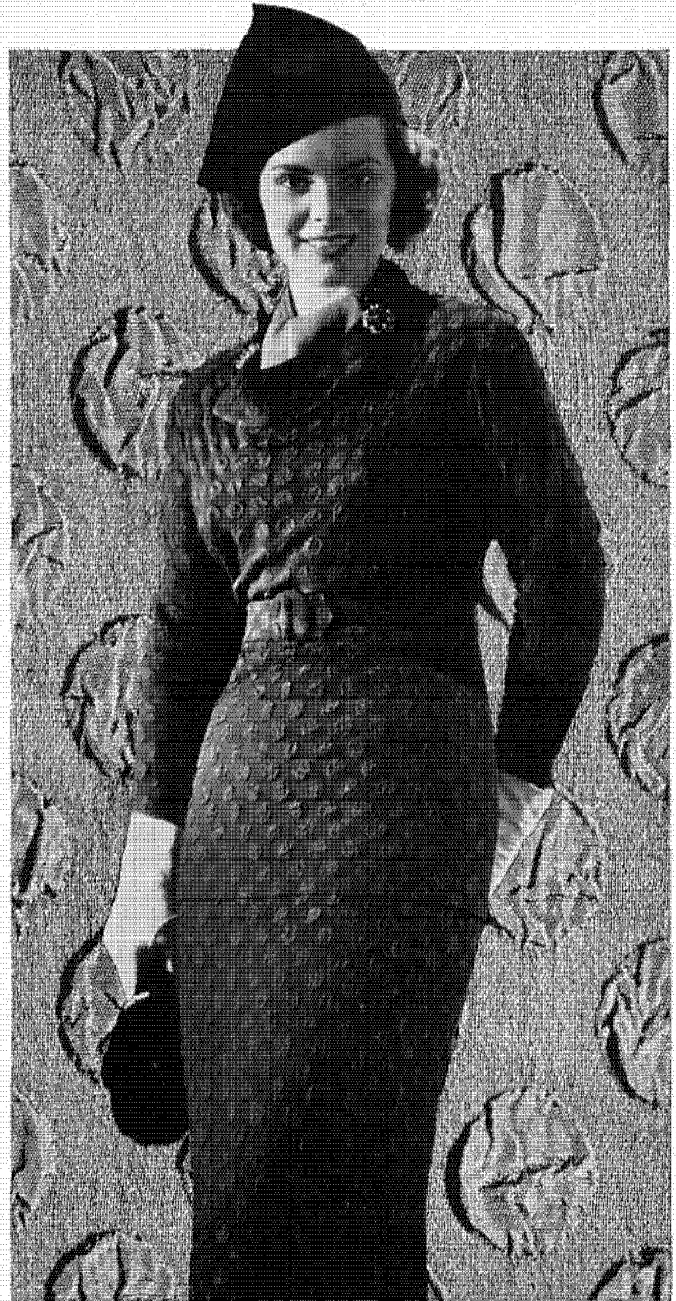
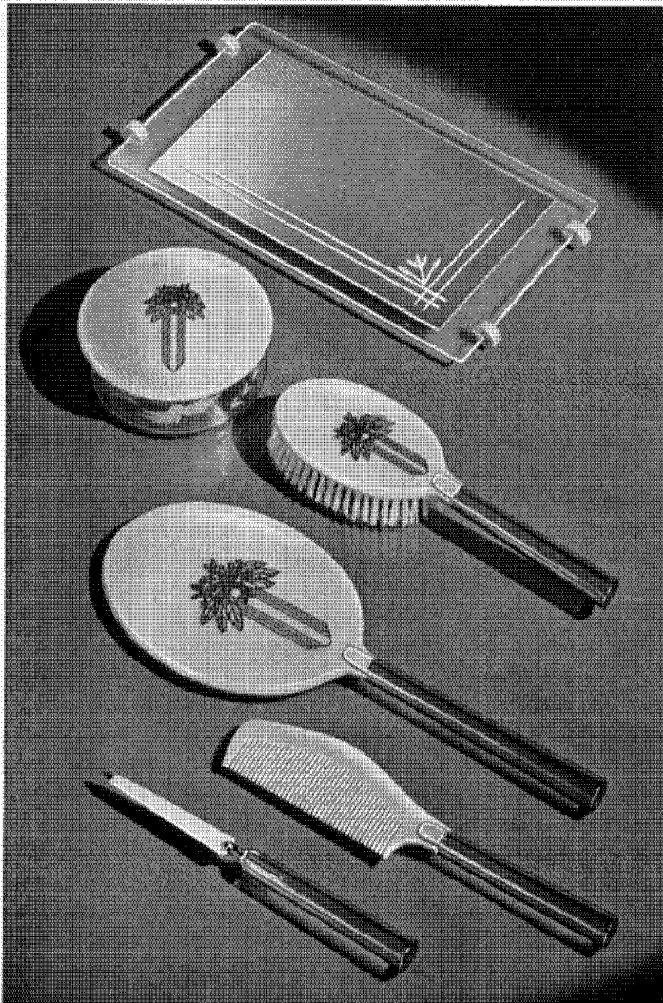
(Continued from page 17)

plastic—Celestial, the one chosen for the Motohome bedroom; Palette, shown below, and Regency Period, which was described in the October number of this magazine.

In the Celestial sets the delicate coloring of the plastic suggests drifting, swirling clouds in various hues: Cloud Bank, a gray-white color; Temple-of-Heaven Blue, like the effect achieved in the famous Chinese temple at Peiping; Thundermist, a delicate reddish purple, and Dusk Rose.

Palette sets are expressive of elegance in solid colors, such as Gold, Coral, Lilac and Mediterranean Turquoise.

There is point in directing attention to these and other "Pyralin" sets at this time, with Christmas approaching. A Motohome would be a truly fine present for the family, but if prudent financing calls for less expensive items, you will find in leading department stores, gift shops and other retail stores, a great variety of Du Pont "Pyralin" boudoir accessories in sets that will be sure to please. "Pyralin" Utilikits, for travelers' use, will also be appreciated. If your needs cannot be met locally for any reason, write to the Du Pont Viscoloid Company, Inc., 350 Fifth Avenue, New York City.



Puff-Up Crepe

SHOWN here is a new puffed type of matelasse fabric made of "Acele" acetate yarn which is being used in style merchandise for the fall and winter seasons. It is manufactured by H. R. Mallinson & Company, who has used this yarn and Du Pont Rayon in both warp and filling.

In the accompanying illustration of the fabric, the "puffs" are shown in actual size, and the inset picture will indicate how important a part this fabric plays in the smartness of the finished dress.

Both the frock and the fabric are on sale at Lord & Taylor, Fifth Avenue, New York City. The dress is priced at \$35, and the fabric at \$3.00 per yard.

Finger-Nails and Fashions

(Continued from page 3)

Selection of Shades

Once the demand had been created and a wide variety of colors put on the market, Mr. Warren ran into the same difficulty manufacturers of face powder and rouge had encountered before him. He had to safeguard against an astonishingly high percentage of improper color selections on the part of women.

But he was fortunate in being able to benefit from the experiences of others. One does not have to be very old to remember when there were only three shades of face powder—white, flesh and rachel. If a woman's personal coloring fitted one of the three shades—well and good. Otherwise, she looked like a flurried pastry cook or a ghost. Under kind, soft lights, they were not bad, but in the revealing glare of daylight the effects were often ridiculous and sometimes grotesque.

Nor did a wide range of shades clear up all the difficulties in the choice of face powders. Many women showed themselves strangely inept in their selection. Too many what-not-to-do advertisements on the streets discouraged a general use. It was only with the aid of advice that the average woman was led to a proper selection. Practically all department stores now have their charts and a competent staff of blending experts to insure choice of the right powder.

The story of rouge and lipstick would be only a repetition. But these experiences saved Mr. Warren many headaches and a great deal of money in the end.

When repeat orders for his darkly tinted polishes remained small, he began to study that situation. Soft coral tints, cherry hues and the crimson of holly berries tempted many women to buy, and the glamorous jewel and metallic shades of pearl, ruby, jade, opal, sapphire and onyx to match evening costumes and gems induced many to try these tinted polishes for the first time. But it was obvious that a color had to match hair, complexion, lipstick and clothes.

What glorified a brunette often turned a blonde into a scarecrow. A color that looked perfectly all right against a background of white became something quite different on a finger-nail; however alluring it was in its bottle, it was often garish and cheap in actual use, and very few women came back for more.

Educating the Women

Once again Mr. Warren assumed the task of teaching women how and when to use deep shades of polish.

Salesgirls at the department store toilet-goods counters were shown the importance of guiding women in their selection and use of nail polish shades. Fashion writers and beauty editors published thousands of words on the same subject. Color charts were provided to simplify the selection of shades to wear with costumes of various colors. Toilet-goods departments were equipped with ingenious color selectors that enabled the customer to see just how the available shades of polish would actually look on her finger-tips.

This educational effort was generally effective. Women began to appreciate the limitations as well as the possibilities of nail polish as a smart accent to their costume ensembles. Those who a year before had raised their eyebrows at the mere suggestion of dark-hued finger-tips now adopted

the vogue with enthusiasm. Moreover, one shade seldom satisfied them. There must be coral and rose for sports or office activities . . . cardinal or ruby for informal evening occasions . . . pearl and metallic shades to rival the glitter and glamour of jewels.

Lipstick and Nail Polish

The rising tide of colored nails finally reached the point of being a major factor in the art of make-up. And a new problem presented itself for solution. Women were appearing with yellow-red finger-tips and purple-red lips. Beauty authorities, alarmed over these flagrant clashes in color, came to Northam Warren and asked for lipsticks that would harmonize with the popular Cutex shades. They felt it was incumbent upon him, as the largest manufacturer of nail polish, to provide harmonizing lipsticks. This newest aid to feminine beauty was soon forthcoming, and promptly won approval.

The Northam Warren Corporation has grown by leaps and bounds since 1917. In 1931 an English company was formed and there are factories and refilling stations in France, Germany, Australia, Brazil, Argentina, Mexico and in twenty-eight other countries. Nearly a million dollars a year is spent in advertising the products of the corporation.

Mr. Warren feels that the demand for cosmetics is so firmly established now that in case of excessive taxation and the resulting higher prices to consumers, bootlegging would quickly follow. He cited the case of Russia where such luxuries are banned by law. Yet great quantities of cosmetics are smuggled into that country from Poland, where the Northam Warren Corporation has a thriving business.

Cutex is another of the many products made from a pyroxylin base supplied by the du Pont Company, which also furnishes many of the dyes used in tinting the polish. In order to insure an hermetic seal for the contents of the Cutex bottle, a du Pont "Cel-O-Seal" band is used between the closure and the cap.



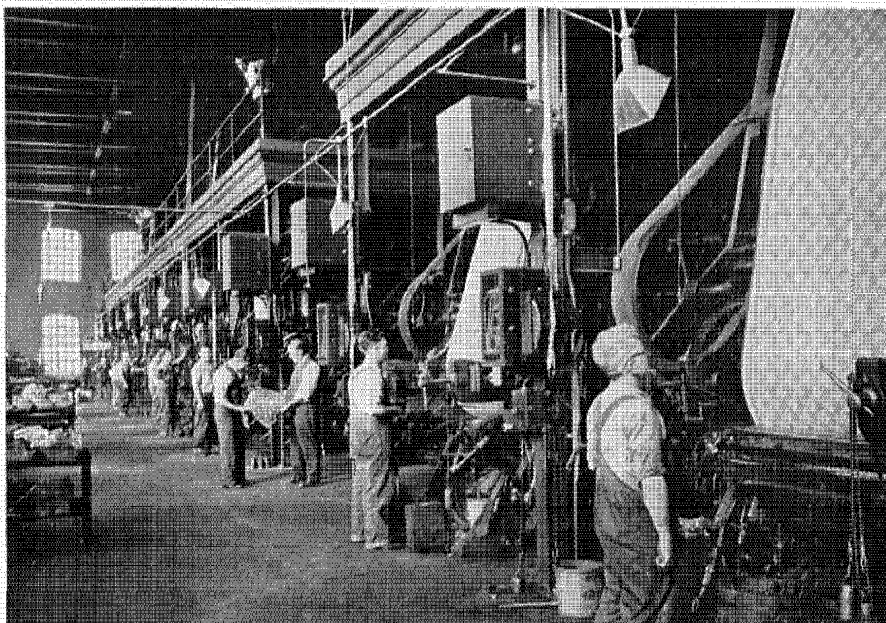
● A helpful device at the point of sale.

Fine Finishes Make Fine Fabrics

(Continued from page 7)

like wool, yet it was neither wool, nor cotton, but an outright specialty. As such it was placed on the market under the name of Casuella and sold by department stores and specialty shops all over the country. Because of its textural value, it has many uses in wearing apparel and accessories—shirt-waist blouses, sports frocks, scarfs, gloves, pocketbooks, children's dresses, college-girl frocks, men's ties, bathrobes, and the like. Incidentally, some very striking effects are created when the fabric is made up as a sport cloth for wear at the shore.

Several factors were directly responsible for the success of this particular fabric. It was an entirely new development from the standpoint of construction and finish. It was a distinctive technical achievement, the production of a wool-type fabric by a manufacturer who had heretofore specialized in cottons. It combined fine appearance with wearability, could be washed and dry cleaned without losing its woolly character. It was comfortable to wear, non-irritating to the skin and possessed the desirable qualities of wool without its weight. And it could be made up in a great diversity of patterns and colors. A crease and



● One of the several print rooms of the U. S. Finishing Company at Providence, Rhode Island. The machines are capable of achieving marvelous results in color, printing numerous different shades in perfect register in one continuous operation.

● The "put-up" and inspection department of one of the mills. Textiles made of acetate yarns, all-rayon fabrics and others of mixed fiber construction are very carefully scrutinized by a trained staff of men and women. And not a single bolt of cloth can be released for shipment until the material in it is fully up to the high standard which is maintained by the management of the company.

wrinkle-proof treatment has been incorporated in it.

The foregoing is indicative of some of the remarkable results achieved by textile organizations in producing novel fabrics, in creating new fabric utilities and in overcoming technical obstacles connected with their manufacture. There are greater possibilities for appealing color effects and combinations on these new fiber blends than was possible when natural fibers were used alone. The du Pont dyestuffs organization is cooperating with textile manufacturers in producing new dyes specially adapted for use on fabric mixtures and is rendering valuable technical service to facilitate color application. The constant demand of fashion for things new and different, the changing trend of styles and the vogue for colors all promote the need for both scientific and merchandising research. The future will undoubtedly see many fabric innovations, and in their development, organic chemistry will play an important part.

Information about Casuella cloth can be obtained from Cohn-Hall-Marx Company, Ameritex Division, New York City. Details about this fabric and other constructions can also be had by corresponding with the U. S. Finishing Company, 40 Worth Street, in the same city.



The Choice Gift for Christmas



Brushes have the finest bristles, mirrors contain the best glass, etc., in fact all "Pyralin" Sets are made of the best materials obtainable.



Every piece bears the famous Du Pont Oval, a guarantee of perfect craftsmanship and your assurance of correct toiletware.

The gift that is everlastingly useful, beautiful, and that lends charm to milady's boudoir — a "Pyralin" Dresser Set. Leading Department Stores, Gift Shops, Drug and Jewelry Stores will display a large selection of "Pyralin" Sets as choice gifts for Christmas. "Pyralin" Sets are authentic in color and styled to harmonize with the vogue in color and decoration of the modern Boudoir, and their prices are easily within reach of every purse.

Lucite
REG. U.S. PAT. OFF.



Pyralin
REG. U.S. PAT. OFF.



Arlton
REG. U.S. PAT. OFF.

BOUDOIR SETS HAVE *Enduring Beauty AND Everlasting Utility*



Billy Bounce is a tough guy

IT'S TRUE that he spills his orange juice, which is a very bad thing to do—even if he is a rubber doll. But toughness is a virtue when you have to pal around with a two-fisted fellow like Bobbie (the chap with the curls).

There was a time when a rubber doll just couldn't take it—but today rubber dolls (and other rubber things from tires to hot water bottles) are made more sturdy and stout-hearted by chemicals developed by chemists of the rubber industry, aided by Du Pont research.

Curiously enough, the very orange juice that Bobbie himself drinks so nicely, comes from golden fruit the orange grower protected with Du Pont Plant Spray.

And Bobbie's wash-suit, which is a joy to his mother because it stays so bright and blue, can thank a Du Pont fast dye for its color.

At almost any moment in the daily life of the average person—young or old—modern chemistry is contributing useful service of one sort or another.

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