THE DU PONT MAGAZINE

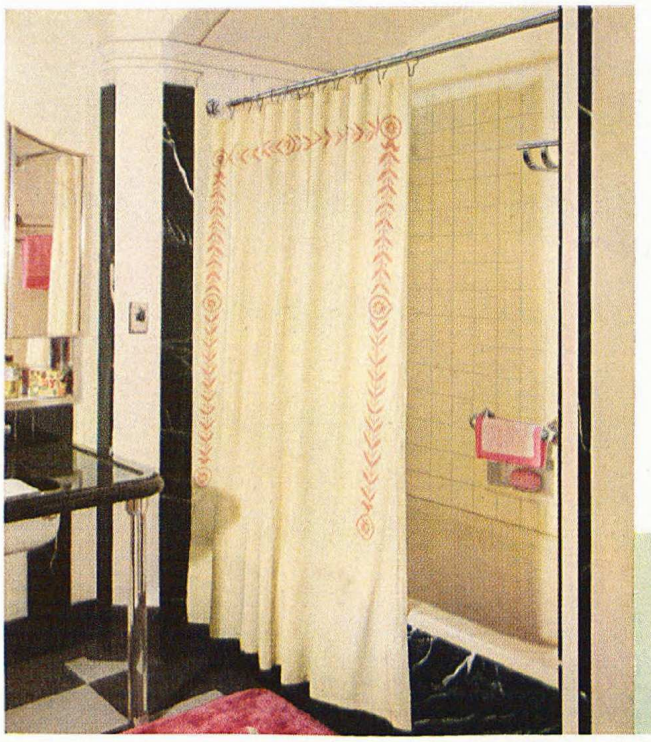


30,000
yards of
Cord de Rae
Prints
by
Witcombe McGeachin
for
draperies and screens
alone



W & J SLOANE *chose prints of* Du PONT RAYON *for The* WALDORF-ASTORIA

DUPONT RAYON
REG. U.S. PAT. OFF.



WHAT a job of curtaining that was! New York's most elegant hotel is completely period, yet completely practical. Each of five distinguished decorative schemes is correctly matched in Cord de Rae prints. Witcombe McGeachin created this handsome faille. It has the elegance of heavy taffeta . . . yet it's washable . . . and the chintz lustre is permanent. *Water-repellent shower curtains from Para Manufacturing Company are invisibly treated . . . luxuriously new!

DU PONT RAYON COMPANY

Empire State Building, 350 Fifth Avenue, New York

*1,700 Shower Curtains
with Window Curtains to Match
from Para Manufacturing Company

THE DU PONT MAGAZINE

VOL. XXV HOLIDAY NUMBER, 1931 No. 12

INTRODUCING DU PRENE— THE NEW SYNTHETIC RUBBER

Starting with coal, limestone, salt and water, du Pont chemists have created a product that rivals natural rubber

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BY E. R. BRIDGWATER

THE rubber industry depends for its primary raw material upon the milky liquid that exudes from certain tropical plants when a shallow incision is made in the bark. The best grades of rubber and over 90 per cent of the total production come from the species known to botanists as *Hevea Brasiliensis*, a tree that requires a hot, moist climate and is preferably grown within fifty miles of the equator. Nearly all of our rubber is produced in Malay, Sumatra and Ceylon, and from this distant source comes the only raw material from which it has been possible to make automobile tires and thousands of other rubber articles that have become essential to our modern civilization.

The latex-bearing cells occur in a layer that lies between the bark and the sap cells and, so far as is known, the latex does not contribute to the growth or nourishment of the tree, but has apparently been provided by Nature for the purpose of preventing insects from boring into the sap cells. Chemists have long thought it would be a strange coincidence, if no one should ever be able to find a better material for producing automobile tires and other articles made of rubber than the sticky liquid which Nature provided to protect certain tropical trees against injury and the attacks of insects.

Those responsible for the du Pont Company's research activities have felt so confident that natural rubber could be improved upon that they have for many years been engaged in an attempt to produce from common and abundant raw materials a product which would be better than rubber for certain industrial purposes. These efforts led at first only to failure and disappointment but, finally, to a new synthetic rubber, which is the equal of natural rubber in most respects and has some valuable properties that natural rubber lacks.

This new synthetic rubber has been christened Du Prene, and a plant is now being constructed for its manufacture. The primary raw material for Du Prene is acetylene which requires for its production only coal and limestone. The only other raw materials are salt and water which, like coal and limestone, are available within the United States in unlimited quantities.

One of the most interesting features of Du Prene is that it is vulcanized by the application of heat alone, whereas it is necessary to add sulfur in order to vulcanize natural rubber. Because it contains no sulfur, Du Prene does not tarnish metals. Perhaps its most valuable property is the fact that it is much more resistant than natural rubber to the swelling action of gasoline, kerosene and other solvents that are notoriously harmful to rubber. It is also much more resistant to oxygen, ozone and many chemicals that attack rubber.

Although natural rubber is commonly thought of as being waterproof, it does absorb considerable quantities of water, due to the fact that it contains some water-attracting impurities. These impurities are absent from Du Prene and it therefore absorbs less water. Air, hydrogen, helium and other gases diffuse more slowly through Du Prene than through ordinary rubber.

Du Prene may be emulsified in water, producing a milk-like liquid which is readily absorbed by porous materials and, after evaporation of the water, leaves a uniform deposit of vulcanized rubber.

In spite of its many advantages, Du Prene has not yet been developed to a stage where it possesses all the desirable properties of natural rubber, and it is not expected to replace the natural product for all purposes. The cost of production of Du Prene will be many times greater than the present market price of natural rubber; nevertheless, it is believed that many commercial uses will be found for it because of its unique properties.



LITHOPONE EXTERIOR PAINTS

These modern products are more durable and of better appearance than their prototypes

●

By DR. H. H. MORRIS
Manager, Technical Service
Krebs Pigment & Color Corporation

Tradition influences mankind profoundly. Industrial practices, social customs and daily activities are affected by it in no small degree. The instructions of the master workman to the apprentice are in effect traditions which are too often rigidly adhered to throughout the career of an apprentice, journeyman or master workman.

In those lines of activity where experimental evidence cannot be used to verify truths, traditions may well serve as a guide. But, where science disproves long-accepted ideas, tradition may, and often does, restrain progress. Consider, for example, the choice of paints for exterior use. White lead in oil has been used for centuries because some one long ago discovered this combination of pigment and vehicle yielded a protective film of greater durability and of better appearance than anything else then known. Later, when the deficiencies of this simple mixture were more clearly recognized, it was found that the addition of zinc oxide to white lead and oil resulted in an improved product.

This composition was accepted so many years that painters readily believed that it was impossible to produce a better exterior paint. They regarded with suspicion newer combinations which were from time to time suggested.

The average painter is not in a position to carry on extensive research work on exterior paints. Naturally, he uses those which previous generations have reported to be the best. It has remained for the producers of pigments to study these paint products intensively and to develop the facts about pigment and vehicle combinations, particularly with regard to their durability and appearance.

Twentieth century progress is largely the result of careful scientific investigation, the outgrowth of experiments made by men who are not influenced by hearsay evidence and tradition. They know what paint ingredients are of value and why.

One of the most stable white pigments is lithopone. During the first years of its manufacture it had the disadvantage of darkening in sunlight. This, of course, rendered it unsuitable as the prime pigment for exterior paint. About ten years ago, however, that fault was corrected, and since then all high-grade domestic lithopones have been light stable.

With this improved product at hand, there was reason to believe it could be combined with properly chosen vehicles, pigments and inerts to make durable exterior paints. The idea proved to be correct. Beautiful and durable lithopone exterior paints are now in extensive use.

When the question of painting confronts a house owner today he naturally expects a better quality of product than was obtainable a generation or two ago. However, if he is bound by tradition and demands the same paint his father used, he can get it—and the same results.

A satisfactory exterior paint must be easy to apply and must have high hiding power to cover perfectly the surface. During its life it should not be discolored by fumes and industrial gases so common in many localities.

It should be self-cleaning, so that dirt and dust will not soon render it dingy and unsightly. It should give protection to the house for the maximum length of time and finally leave a surface that will be easy to repaint without scraping and burning.

Perfectly formulated lithopone paints possess these characteristics to a marked degree. Lithopone gives the highest hiding power per dollar of any white pigment and, when properly combined, the result is a paint that works freely and insures a finished job of outstanding appearance.

The newer lithopone paints are not discolored by sulphurous gases as the older types were. In addition, they retain their appearance by self-cleaning. A mild chalking frees the dirt tending to accumulate on the surface and permits its removal by rain and weather. This also prevents checking and cracking. A paint that does not chalk is likely to check and crack and thus permit water to enter and attack the surface underneath and leave an undesirable surface for repainting.

Comparative tests have shown that *lithopone exterior paints, properly* formulated, will outwear older types of paint by a wide margin.

The foregoing information is the result of most extensive investigations made with several thousand test panels on fences in various parts of the country. Included in these tests were approximately 400 lithopone paint formulations, 200 of lead and zinc composition and 125 others of miscellaneous character, such as studies of driers and so on. The panels of white and yellow pine were arranged to give both 45 degree and vertical exposures. The formulations which gave promising results were subsequently subjected to house painting tests which doubly confirmed their value.

In developing these lithopone paint formulations the effect of altering the quantity of each ingredient was separately investigated. It was found that lithopone and oil alone do not yield a satisfactory exterior paint. Zinc oxide is needed to give the film hardness and greater opacity to the active rays of sunlight, and it also prevents the formation of mildew.

One of the most important facts disclosed by these tests is that 35 per cent leaded zinc oxide gives lithopone paints exceptional durability and better appearance in comparison with formulations containing American Process zinc oxide.

The use of the leaded product permits the addition of adequate amounts of zinc oxide to give the paint opacity to the active rays of sunlight without forming sufficient zinc soaps to make the film hard, brittle and subject to failure by checking and cracking.

These tests revealed that it is important to control not only the volume of pigment, but also its weight. Even slight changes in pigment volume showed marked effects on paint durability. The best results, with respect to appearance and durability, were obtained with paints having pigment volumes between 28 and 29 per cent of the total volume of non-volatile vehicle, plus the volume of the pigments. Finally, the pigment content of the paint should be 62 to 64 per cent by weight.

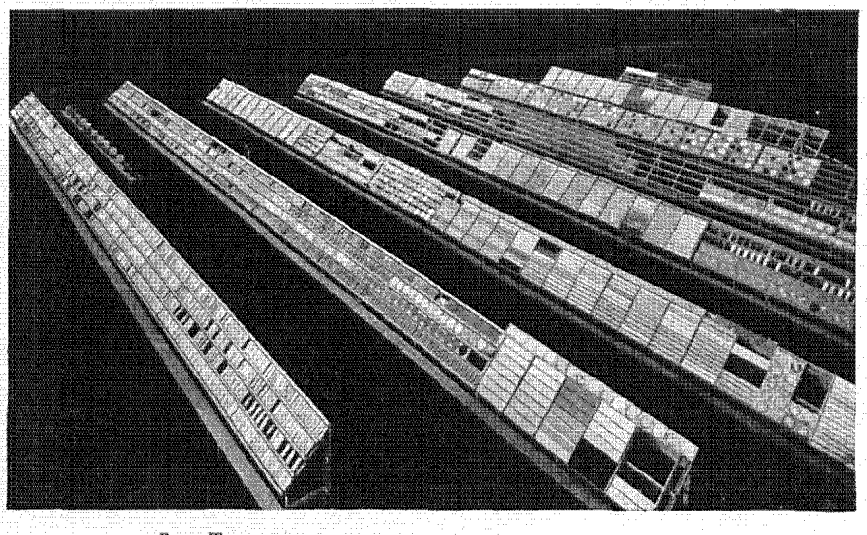
Paints of this kind should be thinned only with turpentine or mineral spirits, for the use of volatile material has no effect on the pigment volume of the paint. Thinning with oil, however, decreases its volume and also injures the paint film.

As a matter of fact, oil is not the most durable part of the paint. It is the film-forming ingredient and is required to hold the pigment particles in place and to give adhesion to the surfaces painted. The presence of the pigment in the film is required not only to give the paint hiding power but also to protect the oil film from the action of the ultra-violet light and the ravages of the weather. In other words, there must be enough pigment present to protect the oil film. And there must be enough oil to bind the pigment particles firmly into a protective coating.

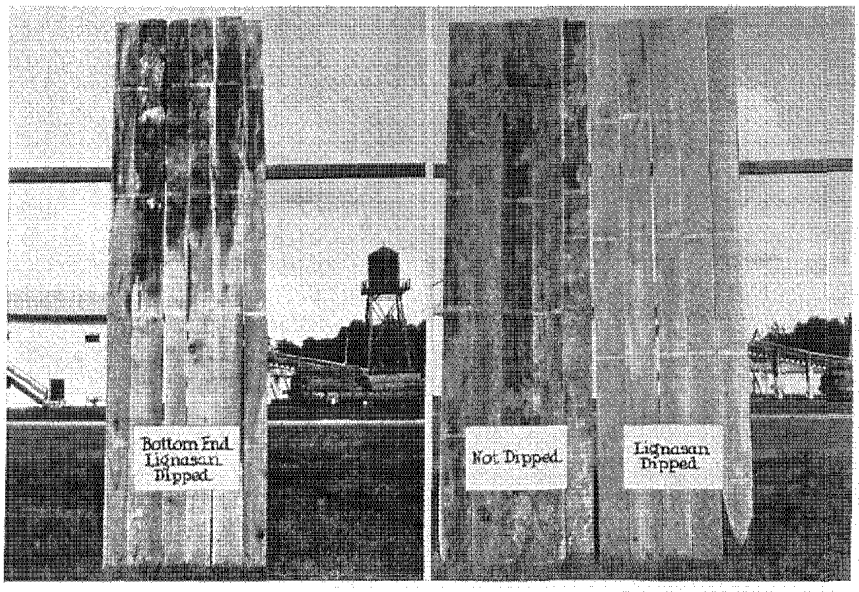
For several years there has been a remarkable increase in the manufacture and use of properly formulated lithopone exterior paints. Practical experience has confirmed the results of original tests showing that these paints not only have fine appearance, but also exceptional durability.

Painters have repeatedly commented on the ease of working and the high hiding power of these paints, while manufacturers have noted a steady growth in the demand for them. In fact, lithopone exterior paints made on approved formulations must now be classified among the most durable, most economical and finest-appearing paints of their kind now available.

Readers who desire further details about these paint products can obtain an interesting booklet on the subject by addressing the Krebs Pigment & Color Corporation, 256 Vanderpool Street, Newark, New Jersey.



All du Pont paint products are rigorously tested for durability. Here you see a section of one of the Company's "paint farms", with thousands of panels exposed to the sun



These reproductions, from untouched photographs, tell the story of Lignasan's effectiveness in preventing stains in sap gum at a Southern lumber mill. All of these boards were taken out of the same seasoning pile

LIGNASAN TREATMENT KEEPS LUMBER BRIGHT

Some notes about a new du Pont product that has already demonstrated its value to an important industry

By C. E. GRAVES

The development of du Pont Lignasan for the control of sap-stains is considered by many leading pine and hardwood sawmill operators to be the greatest contribution to the lumber industry in recent years. Lignasan makes possible bright, air-dried lumber, and that is more of an achievement than you might think.

For almost fifty years blue-stain and other discolorations caused by the growth of dark-colored fungi in the sapwood, have been recognized as degrading factors. Billions of board feet of pine, sap gum and other hardwoods, which otherwise would have graded B or better, have been placed in the common grades because sap-stains have depreciated their value. Actual losses from this cause in the United States, according to Dr. E. E. Hubert of the University of Idaho, amount to more than $10,000,000 annually.

Appearance means much in marketing any product. Bright lumber has always been in good demand; so it is not surprising that large lumber consumers—and particularly those who manufacture articles for sale—are more concerned than ever before about the kind and condition of wood that is supplied for their use.

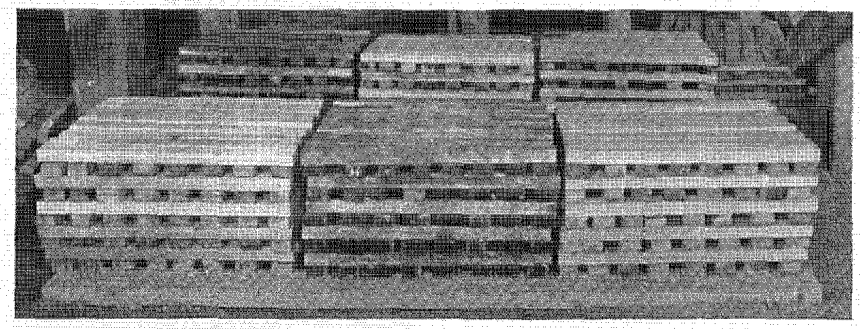
Discriminating builders insist upon bright lumber for use in houses they expect to sell. For the prospective buyer usually examines critically the studding, joists, rafters and other woodwork, and when a defect as obvious as sap-stain is noticed, he usually suspects decay. And he may be justified in this, because the warm, moist conditions conducive to the development of sap-stains are also favorable for infection by numerous decay-producing organisms.

Three years were spent in research and development work before Lignasan was produced commercially. It was introduced during the past year, and has met with an enthusiastic reception by both pine and hardwood mills. Already more than 500,000,000 board feet of lumber and timber have been dipped or sprayed with Lignasan solution. Many retail lumber dealers and lumber importers in other countries now specify "Lignasan-treated" stock when they place their orders.

The use of chemical dips or sprays to prevent infection by stain-producing fungi has long been believed to be the solution to the problem. As early as 1888 lumber manufacturers tried to prevent sap-stain in seasoning yards by sprinkling lime on boards as well as under and around the lumber piles. However, this practice was soon abandoned, because it was not particularly effective against stain, and it was claimed that the lime rapidly dulled the planer knives when the lumber was dressed.

A few years later it was found that alkali solutions, such as bicarbonate of soda, sodium carbonate or mixtures of the two, partially controlled sap-stain in pine lumber. Generally freshly-sawn lumber was treated with a five to ten per cent solution which was heated to a temperature of 140° to 160° F. However, the soda treatment had certain disadvantages. The solution had to be applied hot. Workmen claimed that it injured their hands and damaged their clothing. The results were not uniformly good on pine, and soda is of little value on hardwoods, which are also attacked. Moreover, it caused "yellowing" of the lumber itself. A more satisfactory sap-stain preventive was needed, and during the past thirty years many unsuccessful attempts have been made to find it.

In 1928, just forty years after lime was first used experimentally for this purpose, it was decided that a special effort should be made to solve this expensive problem. The American



Typical small-scale test piles of gum lumber. In the front row, right, Lignasan-treated; center, untreated; left, treated with du Pont Disinfectant No. 961. Jasper Lumber Company, Jasper, Texas

Pitch Pine Export Company, of New Orleans, Louisiana, in coöperation with the forest pathologists of the U. S. Department of Agriculture, outlined a project looking to the development of a satisfactory method for the control of the troublesome fungi.

Mr. R. M. Lindgren, of the Plant Pathology Department of the University of Minnesota, was employed to take charge of the work. Realizing that he might have to try out a large number of compounds before finding a satisfactory one by a process of elimination, Mr. Lindgren's first problem was to devise a practical method for making small-scale tests. In this connection, he developed a technique that has been of great assistance in determining quickly the comparative value of various compounds.

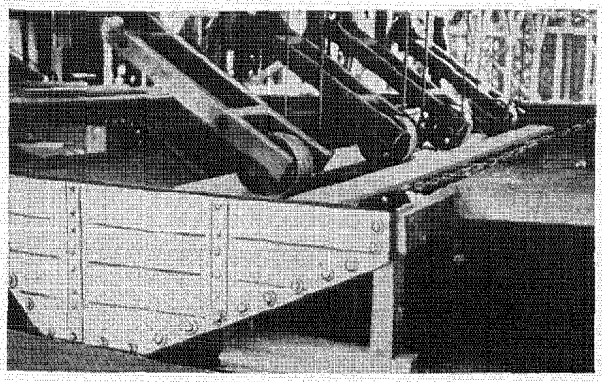
In these tests he used small pieces (1" x 2" x 2') of 100 per cent sapwood, which he treated and arranged in piles beside others not treated. These miniature stacks simulated standard seasoning piles, but they were set up in damp places, under buildings and tramways, where conditions were ideal for the growth and development of stain-producing fungi. Each compound was thus subjected to very severe exposures. Often the untreated pieces would show more than 75 per cent of the lumber stained.

By the summer of 1930 sixty-eight compounds had been tested, and only five of them had yielded sufficiently promising results to warrant further tests on a commercial scale. Of these, two were compounds submitted by the du Pont Company. While these experiments were in progress they were known as du Pont disinfectants, Nos. 673 and 745. Incidentally, they were the only chemicals tested by Mr. Lindgren that had successfully controlled stains on both pine and hardwoods, which is a rather important feature, too, considering that many mills cut both kinds of wood, and that it is advantageous to dip all of the lumber in the same vat.

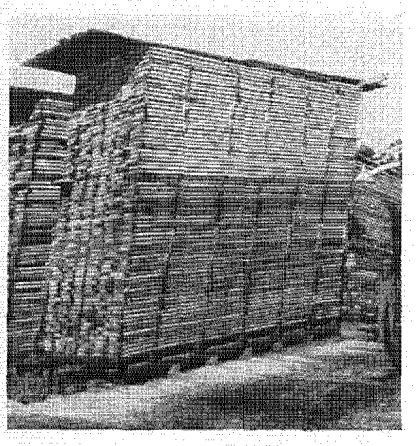
In June and July, 1930, large-scale tests were conducted at five mills located in Florida, Alabama, Mississippi and Louisiana. In September, the seasoning piles were dismantled and records taken. The results showed that the two du Pont compounds were the most effective on both pine and hardwoods, with No. 745 a trifle better than No. 673. This sap-stain preventive led all the rest and earned its right to a name. One was chosen and it is now known as Lignasan, which means healthy wood.

Significantly, even before the Department of Agriculture published the test results, lumber manufacturers began ordering trial shipments. Many of them were eye-witnesses when the records were taken and were greatly impressed by what they saw. Lignasan-treated pine had scored an average of 97.4 per cent bright lumber; the untreated, only 33 per cent. On sap gum, a bad staining wood, the Lignasan-treated lumber was 99.2 per cent bright, while the untreated was only 69 per cent bright.

Aside from its effective control of sap-stains caused by fungi, Lignasan is easily and economically applied. It is a powerful disinfectant. Only one pound is required for fifty gallons of water, and it is applied cold. With the soda treatment it was necessary to use twenty-one pounds for fifty gallons of water to prepare even a five per cent solution, and then it required heating. The average cost of Lignasan is about twelve cents per thousand board feet of lumber. Practically no extra labor is involved at the larger mills, for a dipping vat is built into the sorting table and the conveyor chain carries the lumber through the dipping solution. Thus, the use of Lignasan is economical and profitable. It keeps lumber bright.



Left—Vat built in sorting table for dipping lumber automatically in Lignasan solution. Good Pine Lumber Company, Good Pine, Louisiana



Right—Pile of red oak in the seasoning yard of the W. T. Smith Lumber Company, Chapman, Alabama. Arrow shows where the first Lignasan-treated stock was added to the pile. From an unretouched photo taken after four months' air-drying

MODERN PIPE LINE CONSTRUCTION

High explosives are indispensable in constructing trenches quickly and economically

By A. L. NIXON

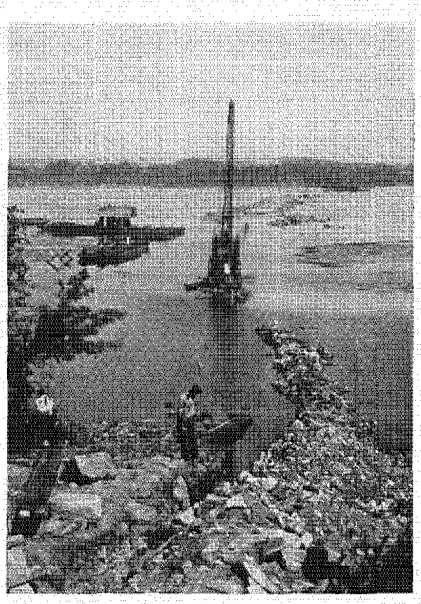
During the past twelve months more than 15,000 miles of pipe lines were laid in the United States to convey water, oil, natural gas and gasoline. Considering that these pipes varied in diameter from four to thirty-six inches and that they were buried underground from two to six feet deep, you can readily understand that these construction companies have removed and replaced an immense tonnage of earth and rock.

They have found that it is much cheaper to lay out rights of way direct to a destination than to detour around mountains, swamps and rivers, and that is why explosives have played an increasingly important part in their work.

Dynamite has been used to blast out stumps and level rocky surfaces along rights of way before moving up the heavy construction equipment. These areas range from twenty to thirty feet in width and in many cases, when the gang has completed its clearing work, the right of way is as serviceable as a country road.

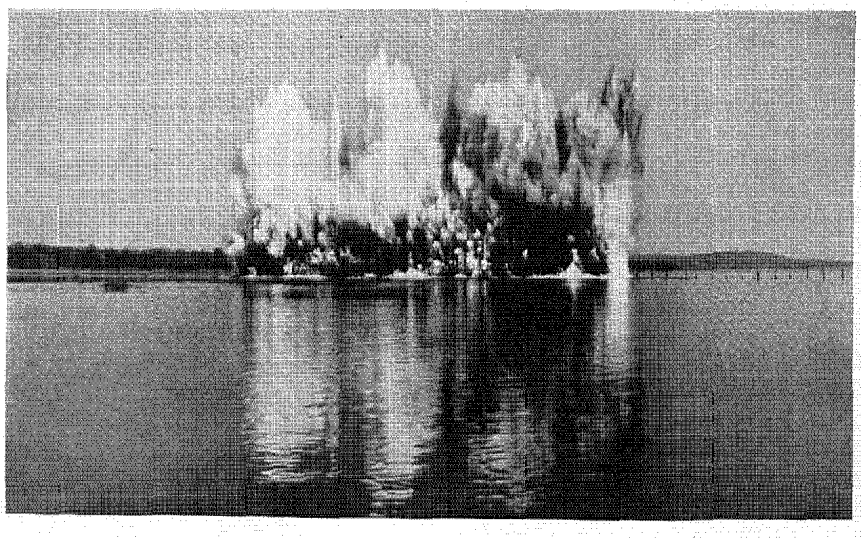
Where streams or rivers controlled by the Government have to be crossed, the pipes must be buried from two to five feet below the natural river bed. Most concerns know from experience that if this is not done, debris floating downstream is likely to attach itself to the pipe with disastrous consequences. In some instances pipe lines have been carried away. So it has been a common practice to use dredges and other equipment to make trenches across river beds and to lay the pipes in them. Then the sediment in the river gradually fills up the excavation, forming a natural protection. But dredging is expensive and is attended with many difficulties.

On this account pipe line companies were keen to accept a du Pont representative's suggestion that this work could be done more quickly and economically by blasting these trenches with dynamite. Since then more than fifty river crossings, ranging from 50 to 3,600 feet in length, have been made with explosives, which have been put to work under water sometimes as deep as twenty feet. Each crossing has presented its own problems and in solving them several kinds of dynamite and some unique blasting practices have been employed.



Drilling holes in the rocky bed of the Susquehanna River near Harrisburg, Pa., preparatory to blasting a pipe line trench 3,600 feet long across this waterway

Probably the most unusual case was the job of laying pipe lines across the Trinity River in Texas. This waterway, which has been crossed seven times by pipe line crews, is less than 200 feet wide, but, in some places, it is more than thirty feet deep and the water is so discolored that one cannot see the river bottom. Before attempting to use dynamite, the men had to know what materials would be encountered. They probed the bottom along the entire right of way and found hundreds of "deadheads" and snags deeply imbedded in the mud, as well as rocks and other obstructions. First, these rocks were drilled and shot. Then bombs, made up of bundles of dynamite, were placed and shot to dislodge the water-soaked stumps and logs; and finally came the task of shooting the trench. A special plan was developed to meet these



Dynamite goes to work on a 350-foot section. This spectacular shot resulted in a trench three feet deep, which met the requirements of the Keystone Pipe Line Co.

deep-water conditions. For lack of a better name it has been called the "string-shot" method.

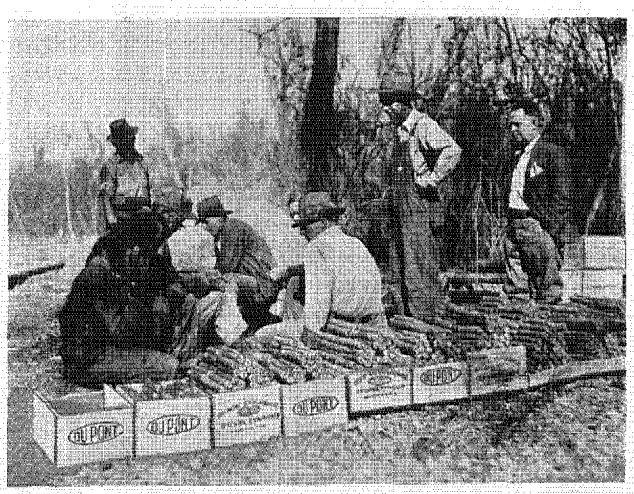
Briefly, this involves stretching a cable across the river directly over the line of the proposed trench. To this cable bundles of dynamite are attached, end to end; and at intervals of every few feet small boulders are also tied on for additional weight, so that when the "string of dynamite" is prepared, it can be lowered straight down to the desired position in the river bed, without being deflected by the current. This accomplished, the shot is fired with the result that a trench of sufficient size is excavated and the pipe is easily and quickly placed in it by means of a tractor and cable.

Incidental to river-crossing work is the task of making trenches through high river banks, so that the pipes can be laid on a gradual slope down to the water's edge. Cutting through such banks by hand or with horse-drawn tools is both laborious and time consuming. Now, pipe line crews use dynamite instead, because they can accomplish more in a few hours than could be done in several days by old-time methods.

But such barriers to progress are as nothing compared to those found in swampy regions where it is almost impossible to dig trenches by hand, and other equipment is very expensive to use. In many cases attempts have been made to lay pipe lines through such areas by ordinary methods, but slow progress has delayed the entire operation.

A most helpful service was rendered to the pipe line companies when it was demonstrated that du Pont ditching dynamite could blast trenches through swampy land, quickly and economically. Briefly, the method consists of clearing the right of way and then, along the proposed ditch line, punching and loading the holes in a long row. One charge is primed with an electric blasting cap and when it is set off, all the others are likewise detonated with almost instantaneous effect. Water, muck, fragments of logs and stumps are thrown hundreds of feet into the air where the material spreads and falls on both sides of the finished ditch. Little or no work is required before the pipe can be placed in it.

Sometimes it is desirable to prepare a shot so that some material will be left for back filling. A slightly modified system of loading will permit of replacing seventy-five per cent, if necessary. While the du Pont Company has not published any special pamphlets on pipe line work, considerable information pertinent to the subject may be found in the booklets, "Ditching with Dynamite" and "Agritol for Field Clearing." Copies may be obtained from the Advertising Department at Wilmington, Del.



Below—A completed trench which was blasted to facilitate laying a pipe line across a small Southern river

Left—Bundling dynamite to prepare a "string shot"

Below—Placing the cable in the river. Note the small boulder attached to it



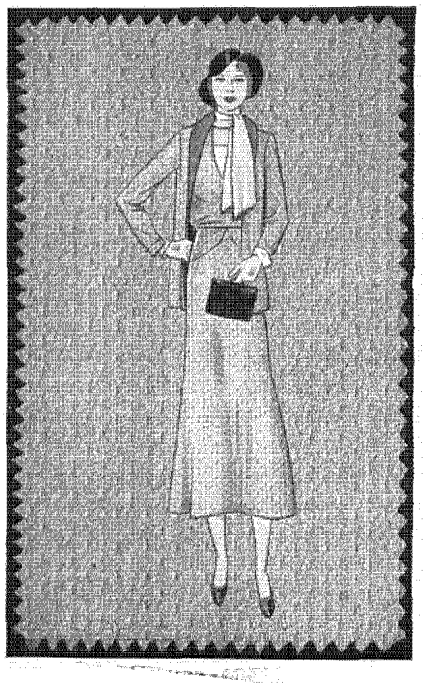


LUXURIOUS WOOLENS FOR SPRING FASHIONS

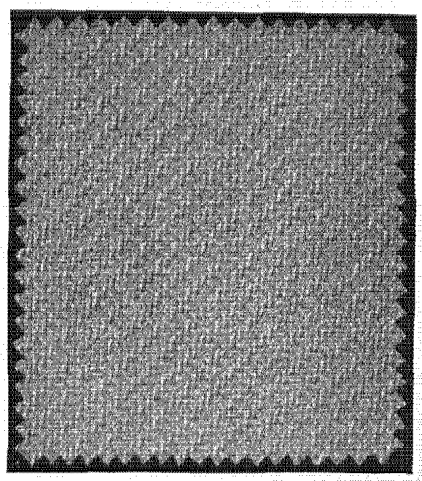
The Hamilton Woolen Company recently announced its new line of colorful and well-styled fabrics

By G. B. DUGAN

This is a woolen year. Today, this fabric holds the spotlight on the world's stage of fashion. It was the sensation of the past season. So spontaneous was its acceptance, both in this country and abroad, that it seemed almost as if an entirely new material had been offered to the public. But the fact remains that it has been used for ages. Our grandmothers and mothers made frocks of woolen cloth, but the fabrics they had at their disposal were stiff, heavy and in uninteresting surfaces. These old-fashioned materials were so staid and conventional that dresses made from them were worn primarily as a protection against damp and wintry weather. The question of appearance was not considered to be nearly so important as it is today.



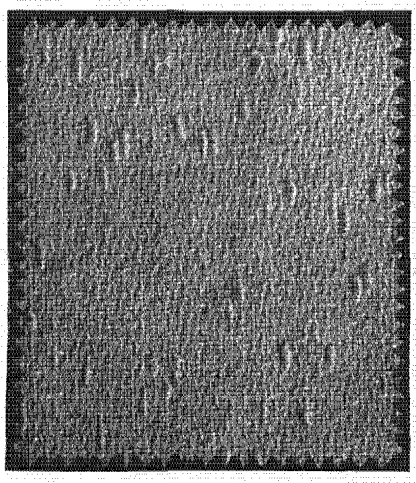
Times have changed. Woolens have been modernized, and that is the secret of their popularity. Instead of unfigured weaves of the past, meshy porous crepes are now the mode.



The Hamilton Woolen Company was one of the first concerns in the industry to realize that if woolens were ever to be popular and universally used, they would have to be styled properly. Upon reaching this conclusion, its officers promptly discarded old, time-worn theories and practices and set to work designing woolens of distinctive texture and colors.

When Hamilton's new line of fabrics was first introduced, leading garment makers immediately realized its importance. They said in effect,

"Pointilla," a sheer dress wool which is a new version in the crepe family. It has a pointed motif and seems destined to become one of the season's best sellers



"Marsetta"—A very effective coating material, random dotted with twisted cocoon-like nubs

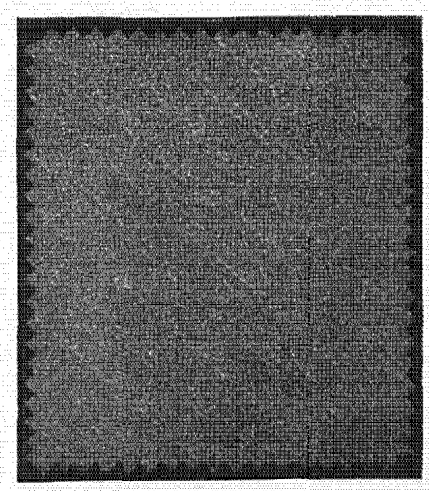
This coating fabric, which is called "Vernalia," is a smart diagonal with a new ribbed effect

"Now we have woolens that will certainly attract milady's fancy." Their prediction was correct, for it was not long until the wardrobe of every smartly-dressed woman contained several gowns made of this fascinating material.

To keep its line constantly up to date the Hamilton Company has kept closely in touch with all advancements in the textile field. It foresaw the unusual demand for crepes this fall and prepared a most attractive selection of them in the season's smartest colors and weaves.

It has now anticipated the use of woolens for the coming season and recently announced a new and extensive line of mid-season and spring crepes. This stock contains twenty-five new designs that represent the highest art in fine cloth making. All of them have a natural richness of texture, color and quality that will be in keeping with the 1932 vogue. They are soft, easy to manipulate and are sold at surprisingly low prices.

The so-called diagonal group in this line is worthy of particular attention, for textiles of this weave will be in strong demand during the next few months. Diagonals that empha-



"Sevalla." This fabric reveals soft high lights and makes the most out of a diagonal weave

"Mesa" is a crepe constructed in a honeycombed design and is dyed in a number of interesting flat colors

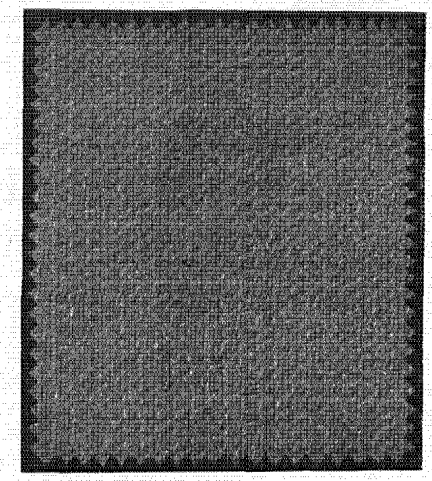
size weave and pattern and that cleverly bring out interesting nubbed and ribbed effects are the features that make this group so outstanding for spring apparel.

There are also many new versions in the crepe family. Interesting twills, flat checks, pin-dot patterns, plain cloth with tiny woven figures are a few of the new favorites. These modern woolens are rough, coarse and loose-woven; but they are beautiful fabrics, and one noteworthy feature about them is that they are never stiff. They are so entirely different; so luxurious that they will delight every feminine heart. A dotted surface with cocoon-like nubs is one of the smartest. Pebble grains that are fabricated to give extra softness will again be popular. A new dress fabric with a pointed motif seems sure to become one of the season's best sellers. If smooth surfaces are preferred, they can of course be obtained, for Hamilton's spring stock includes all types of weaves and patterns.

Alert producers of wool dresses, suits, coats and ensembles are paying particular attention to this new and comprehensive collection of spring materials. Cutters who insist upon rare values, but who demand style in the woolens they purchase, have been impressed by these new creations. Women everywhere will soon be able to procure these fabrics by the yard from their leading department stores and ready-made dresses of these materials from their favorite shops.

To be assured that they had a suitable fashion formula for their spring line, Hamilton officials coöperated with leading style authorities and gave considerable study to the weaves of all fabrics and the variations of color trends.

One of the important factors which greatly contributes to the salability of these new fabrics is that each of the twenty-five different weaves can be obtained in four dozen colors.



Authentic tile shades; soft, delicate pastels; monotones, bright, solid colors; dark ones, and many other tones are available in Hamilton woolens, which are dyed exclusively with du Pont dyestuffs.

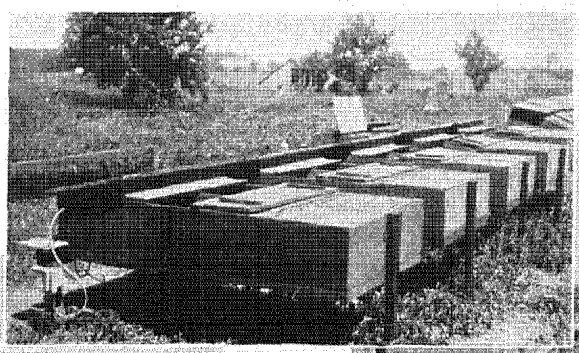
The Hamilton organization has closely adhered to the following objectives: First, to produce fabrics of a quality that can be used by the American creators of exclusive fashions, as well as by volume producers of popular-priced dresses, suits and ensembles. Second, to style fabrics that are authentically correct, not imitations of other manufacturers' weaves or any other material on the market. Third, to dye its entire line in a complete range of the most popular Parisian colors.

"Ribena"—This dress fabric is a corded diagonal with an unusual softness for this type of weave. It strikes a new note for cords

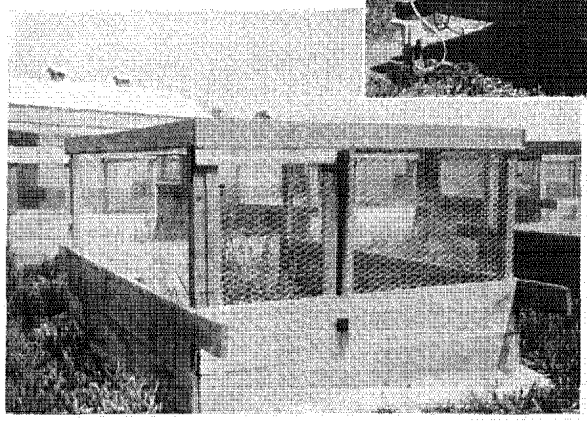
Woolens will again be popular this spring. It has been said that as New York goes in fashion matters, so goes the nation. And as all Fifth Avenue shops are proclaiming the merits of woolens for suits, coats and dresses, this material is the vogue. It is worn by smart women everywhere for all occasions. Famous Parisian couturiers and leading American creators considered it so captivating that they employed it in designing their autumn and winter styles. Never before have woolens had such authoritative backing, and now these same fashion experts have placed their stamp of approval on these materials for mid-season and spring apparel.

To give you some idea of how attractive Hamilton's new designs really are, we have reproduced on these pages a few samples that were selected at random. While it is, of course, impossible to duplicate in a black and white print the charm of color possessed by the originals, perhaps these illustrations will reveal the interesting texture of these materials. For further information regarding these fabrics, write to the Hamilton Woolen Company, 261 Fifth Avenue, New York City.

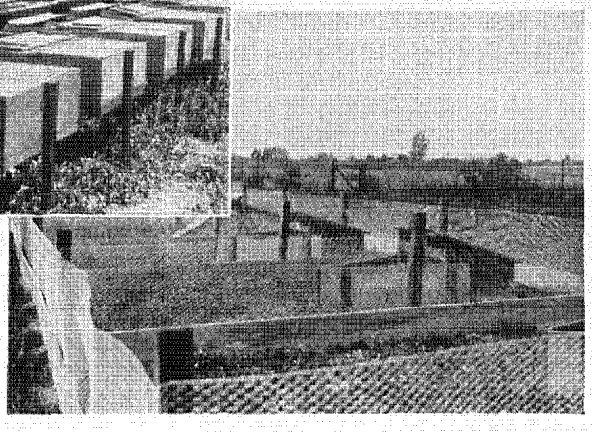




Below—One of the portable breeding pens for Bob-white quail. Each pen contains two small shelters, one for nesting material and the other for feeding equipment



Electric quail brooders at the du Pont Experimental Game Farm, Carney's Point, N. J.



Here are some of the pens for starting quail chicks with bantams. The young birds remain here about one month and then they are transferred to covered pens

SPEAKING OF BOB-WHITE QUAIL

The question is, how best to propagate these game birds? Some results of experimental work are set forth here

By C. M. PALMER, Jr.

The species of quail known as "Bob-white" is perhaps our best-known and best-beloved game bird. His soft, musical call is familiar to almost everybody, for he is found in nearly every state in the Union, except in the arid Southwest.

"Bob" has had his ups and downs since white folks took over the country. When pioneer farming was practiced, there were wood-lots and fields, hedges and brier patches, and this was greatly to his liking. He thrived and lived abundantly in such localities. Later came intensive farming methods. The hedgerows were cut down. Rail fences were replaced by others made of wire. Fields were burned over in the spring, and all this was destructive to his natural environment. Today, quail are becoming scarce, especially in the Northern states. Meanwhile, the ring-neck pheasant, a more adaptable bird, has been brought in as a replacement.

However, Bob-white has many staunch and true friends who have no intention of seeing their beloved "pa'r'idge" put out of the running by a gaudy exotic. So they have been prying into the affairs of this bird by studying his life history, habits, enemies, the ideal environment for his habitation, and how best to create or re-establish it. Seven or eight years ago a group of these friends got together and, with the coöperation of the U. S. Biological Survey, Herbert L. Stoddard started a four-year study. The results of this work have just been published in a voluminous book by Scribner's. This is unquestionably the most exhaustive study ever made of any single bird species in this country. Mr. Stoddard not only attempted to lay bare the life history of quail, but he has also recommended various methods of creating and re-establishing the most desirable environment for them.

To prove these methods, a series of demonstrations has been started in the Southern quail belt to develop ways and means of increasing and holding the Bob-white population.

Likewise, in Wisconsin, at the western end of his range, Messrs. Leopold and Errington are working on the same problem.

Meanwhile, another phase of quail study has been in progress—the artificial propagation of these birds. It was introduced in Virginia by W. B. Coleman, who first developed a satisfactory method for raising quail in large numbers by utilizing bantam hens for incubation and breeding purposes. This method was followed at the State Game Farm at Boulevard, Virginia, where for several years past thousands of birds have been produced each year. Then, after more experimentation, the White Oak Quail Farm was started with not a single bantam on the place. Buckeye incubators were used, and brooding was accomplished by electricity, another Coleman innovation. So successful were the results that similar equipment has been adopted by at least two states and by various sporting organizations and individuals.

At the du Pont Experimental Game

Farm we have attempted to make a study of these methods. We found that there was no information available on the rate of evaporation of quail eggs under incubation. So we have developed it. Bantams were used along with the Buckeye incubator and the results were checked, one against the other.

During the 1930 season most of the time was spent in adjusting our machine to obtain results comparable to Mr. Coleman's and to those secured by the use of bantam hens. He hatched approximately 80 per cent of the eggs set, and his machine was operated under the conditions recommended by the manufacturer. However, at Carney's Point, due perhaps to the lower elevation and greater humidity, less satisfactory results were obtained.

Beginning the 1931 season, we operated the incubator at a temperature of 99½° to 99¾° F., as recommended by the makers of the machine, but we reduced the humidity in the egg chambers from 86° to 83°. Of every weekly lot of eggs set, 100 were placed in a separate tray and weighed at that time and every fourth day thereafter. Thirteen lots were handled in this manner, and the average "dry-down" figures from this particular test are shown in the following tabulation beside corresponding data for eggs set under bantam hens:

AVERAGE WEIGHT LOSS IN POUNDS FOR 100 EGGS

Machine Incubation		Natural Incubation
Weight when set	2.03	1.99
Fourth day	1.98	1.92
Eighth day	1.92	1.87
Twelfth day	1.87	1.80
Sixteenth day	1.82	1.70
Twentieth day	1.76	1.69

Machine-incubated eggs lost 13.3 per cent of the initial weight. Those set under ten bantam hens lost 15 per cent.

Approximately 84 per cent of the eggs, in both cases, were fertile. But from the standpoint of incubation efficiency, the "infertiles" must be deducted, although in a rating of breeding and farm-management efficiency they are properly included. However, we are considering here incubation alone.

Of the 3,634 eggs set in the machine, 22 were broken during incubation, and 586 were infertile, leaving 3,026 eggs theoretically capable of hatching. Of this number 2,834, or 93.6 per cent, were hatched.

In the case of eggs set under bantams—334 in all—10 were broken during incubation and 53 were infertile. Of the 271 remaining, 260 were hatched. Thus 95.9 per cent of the fertile eggs were productive, as against 93.6 per cent for the incubator. From this it would appear that the artificial method is 2.3 per cent less efficient than Nature's own.

Crippled chicks? There were a few in each case, but so few that we considered them inconsequential.

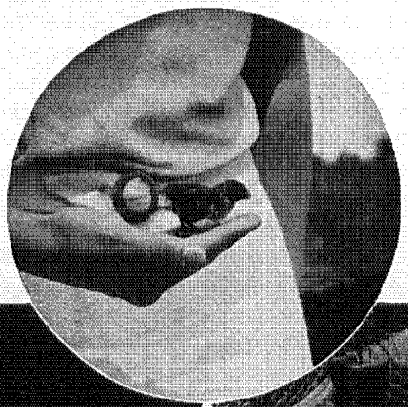
One other point deserves mention. When a chick starts "pipping" the shell, a greatly increased amount of moisture seems desirable. This is apparently necessary to keep the shell—and particularly its membrane—soft enough for the chick to make proper exit. For this purpose we used a small, inexpensive electric incubator in which we could build up almost any degree of humidity. Instead of allowing a hatch to string out two or three days, the work was done in one day or even less. It would appear that a separate hatcher machine is of considerable assistance to the quail breeder.

We feel that we are making some progress with this problem. But there is need of more data, from more investigators, for comparison and study. Additional research is strongly urged, especially on the part of those who are most capable of making it, the state agricultural colleges.

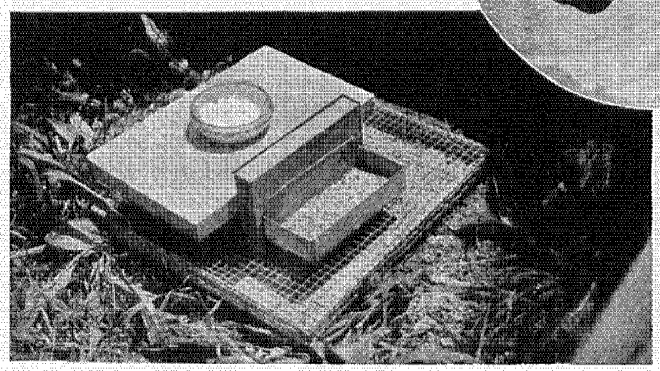
The methods outlined have proved successful in the section in which Mr. Stoddard made his investigation. Other projects are now in preparation, to apply them to the entire area included in the Southern quail belt. This work will be done under the supervision of the U. S. Biological Survey, with Mr. Stoddard as consultant.

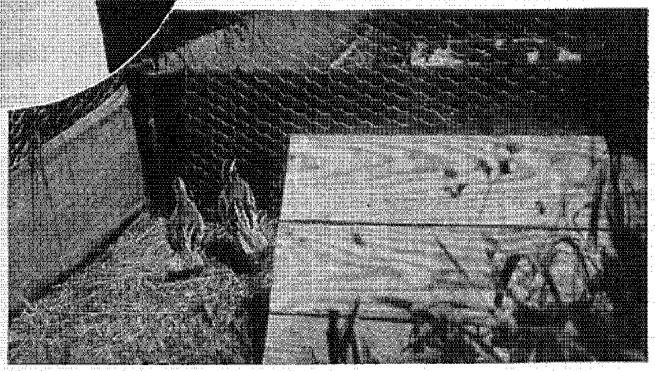
Right—A day-old quail chick looks at the wide, wide world

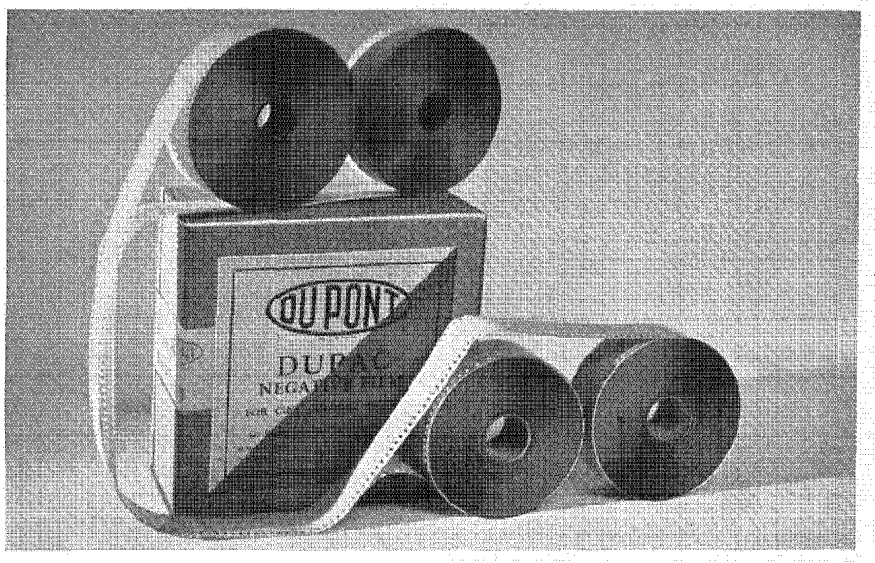
Below—This sanitary feeding device is provided for each pair of breeding quail



Below—Mr. and Mrs. Bob-white do not have elaborate living quarters, but they seem quite contented in this picture which shows one of the breeding pens







DuPac consists of two rolls of film designed for simultaneous use in a standard motion picture camera to achieve color effects

TWO NEW DU PONT FILM PRODUCTS

Here is some information about DuPac for color photography and Telefilm for aerial use

By V. B. SEASE

The light-sensitive silver salts used in photography cannot record and reproduce scenes in their natural colors. They are capable of giving only gray tones corresponding to the brightness of the objects regardless of whether the objects themselves are gray or colored.

All practical schemes for reproducing a scene in color resolve the scene first of all into a number of color component images. For example, three successive exposures of a given scene may be made on three panchromatic films in an ordinary camera, the first with a blue filter, the second with a green filter, and the third with a red filter, over the camera lens. Since the blue filter passes only the blue rays of light and excludes the green and red, the first film will record only the blue objects in the scene. Similarly, the films behind the green and red filters will record respectively only the green and red objects. These three color-separation records are negatives which, upon development and superimposition, will give a composite negative equivalent to that obtained with a single exposure on panchromatic film without a filter.

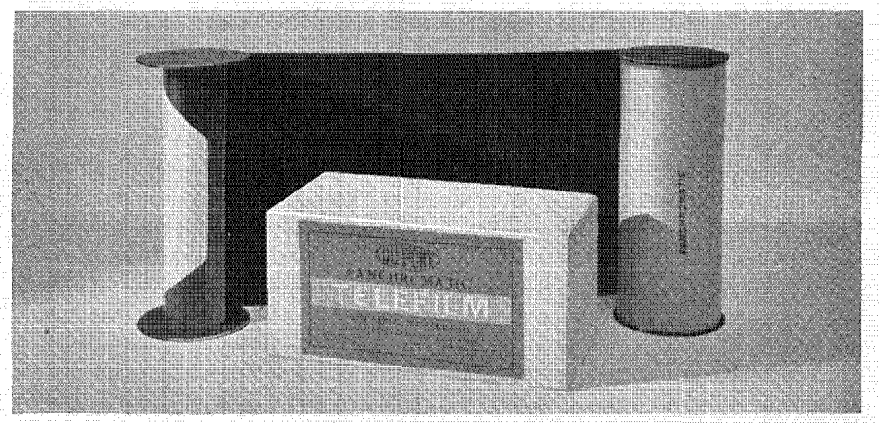
With these three color-separation negatives, a number of things become possible. Three prints may be made upon transparent supports, and projected simultaneously in superimposition upon a screen through the corresponding taking filters, whereupon the scene will appear in natural colors. Or, the prints may be suitably dyed, superimposed, and mounted as an ordinary photograph for the production of a color print.

Such a scheme is termed a three-color process. Through the use of filters corresponding to the three primary colors, all the secondary colors may be recorded and reproduced. For example, yellow objects in a scene will be recorded, partly on the red separation negative, and partly on the green. The appearance of yellow, when projected as described above, is due to the combination of green and red light from two of the prints.

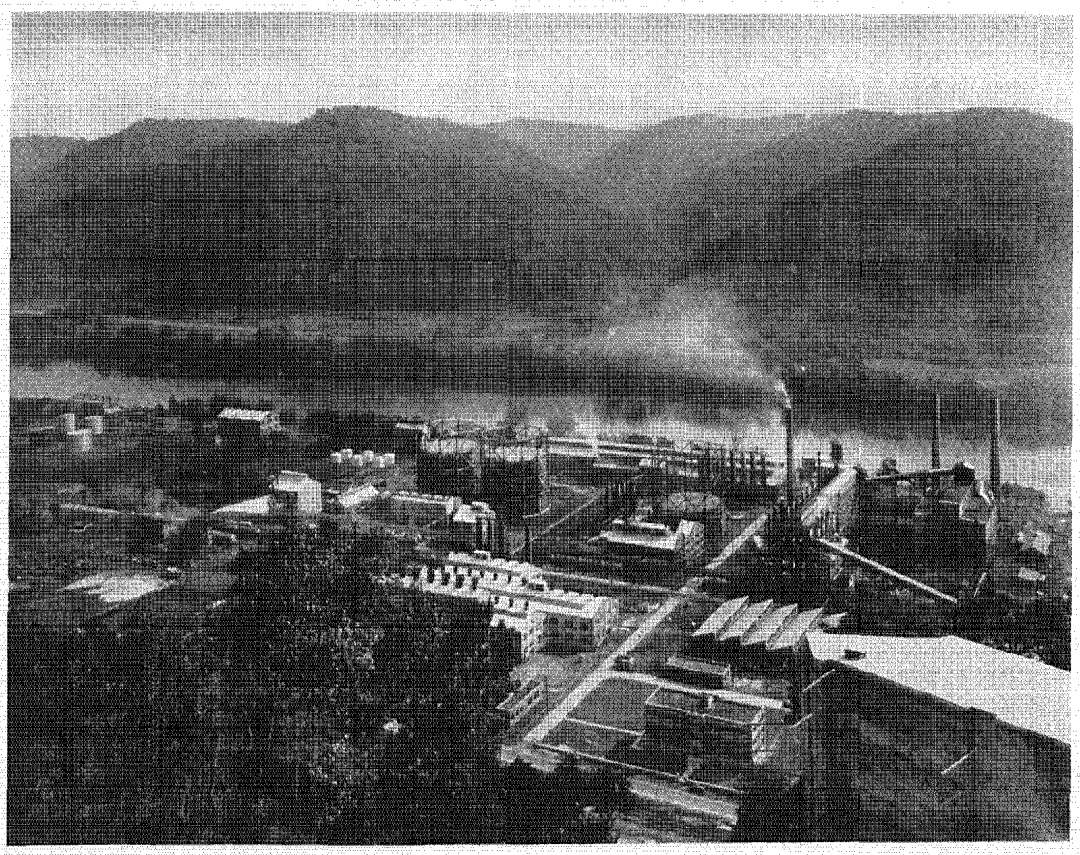
It is necessary to expose all three color-separation negatives simultaneously in scenes involving action. This may be done with a special camera which directs the optical image into three paths through blue, green and red filters to three separate films.

Obviously, such a system for the production of the large number of prints required in the motion picture industry, involving three films and special apparatus, would be expensive and cumbersome to operate. Many schemes have been proposed for simplifying color photography for this

(Continued on page 24)



A spool of Telefilm is 9½ inches wide and 75 feet long. This product is especially suitable for aerial survey work



A scenic view of the du Pont Company's synthetic ammonia plant at Belle, West Virginia. Note the Kanawha River and the interesting mountain range in the background

NEW APPLICATIONS OF AMMONIA*

This heavy chemical is serving industry to a greater extent than ever before

By M. H. MERRISS

In 1926, Lazote, Inc.—formerly a subsidiary but now a department of E. I. du Pont de Nemours and Company, Inc.—erected a large synthetic ammonia plant at Belle, near Charleston, West Virginia. In the United States today seven plants of this kind are in operation and two more are under construction. The production of synthetic ammonia has therefore increased rapidly, as will be noted from the following tabulation showing the approximate output for the past three years:

1928	33,000 tons
1929	102,000 tons
1930	140,000 tons

*Adapted from a paper presented at the 18th Annual Meeting of the Compressed Gas Manufacturers Association

For 1931 the total capacity of American synthetic ammonia plants is estimated at 330,000 tons of NH_3, or about 900 tons per day, which is a considerable quantity.

Two years ago the United States was ninth among the nations as a producer of synthetic nitrogen; this year it will be second.

The total investment in synthetic ammonia plants in the United States is now estimated at $70,000,000.

So much for the strides by which ammonia production has advanced, and for the speed with which this nation has attained its high rank among fixed nitrogen producers.

Consumption

It is natural to wonder who is going to use all this ammonia. The increased consumption will result from the normal expansion of the country, from a progressive development of new uses for the chemical, and principally from the increasing use of domestic nitrogen for the manufacture of fertilizers—especially synthetic sodium nitrate—and for the ammoniation of superphosphate.

The explosives and refrigeration industries may be expected to continue to expand steadily but slowly; it is, however, in the other fields, such as fertilizers, chemicals, acids, and miscellaneous uses, that the present producer of ammonia must concentrate his efforts to find outlets for excess production.

Rapid decrease in ammonia prices, as shown in the accompanying graph, together with present availability of anhydrous ammonia in tank-car lots at prevailing low prices, is materially widening the field for the chemical use of this product.

The purpose of this article is to point out some of the new uses, with special reference to the production of hydrogen by dissociation or "cracking" of ammonia. The best way to do this is to list a few of the numerous fields which are now being rapidly exploited. Ammonia is revealed as a many-sided chemical, for the accompanying tabulation mentions its use as an alkali, a fuel, a reducing agent, a source of an acid, a fertilizer material; also as a means of preparing foods, treating rubber and purifying drinking water. The great variety of applications is at once apparent. Present interest lies chiefly in the last two groups which have accordingly been sub-divided.

Ammonia-Chlorine Treatment of Water

The use of ammonia and chlorine for water treatment is growing rapidly. Less than a year ago there were five groups employing this treatment; today, more than one hundred are in existence and the number is rapidly increasing. Apparently, the combination of these two gases constitutes not only an ideal sterilizing agent for drinking and swimming water, but it serves also as an effective means of eliminating tastes and odors. Medicinal and chlorinous tastes, as well as the irritant action of the chlorine in swimming pools, are absent when pre-ammoniation of the water is practiced.

The ammonia-chlorine treatment is showing wide industrial application in preventing algal and slime growths not only in swimming pools and city water mains, but also in condenser waters for power plants. The prevention of the slime-coating of the surfaces exposed to the cooling waters allows the condensers to operate with improved efficiency for longer periods of time and reduces the frequency of shut-downs for cleaning.

This treatment is finding application in wash waters which are employed in the preparation and packaging of foods and in the cleaning of food containers, such as milk bottles and cans. It is also being used to prevent slime growth in pulp and ground-wood manufacture, where the ammonia-chlorine, by sterilizing the "white" water in closed systems, makes possible the production of a whiter news-print paper, and prevents other operating difficulties.

As a Source of Hydrogen and Nitrogen

Conversion or cracking of ammonia to its constituent gases is a new industrial development that has become important in a remarkably short period of time.

When ammonia is passed over suitable heated catalysts—developed by E. I. du Pont de Nemours and Company, Inc. — it is dissociated or "cracked" into a gas containing exactly 75 per cent hydrogen and 25 per cent nitrogen by volume. One hundred pounds of anhydrous liquid ammonia, the contents of one standard cylinder, yield 4,500 cubic feet of gas containing 3,400 cubic feet of hydrogen, the equivalent of that contained in seventeen cylinders of hydrogen. This "cracked" gas can be burned in a properly designed combustion furnace with the required amount of air to yield nitrogen. One hundred pounds of ammonia, thus dissociated and burned, will yield 7,800 cubic feet of nitrogen, the equivalent of that contained in thirty-nine cylinders of nitrogen.

Some Uses of Ammonia

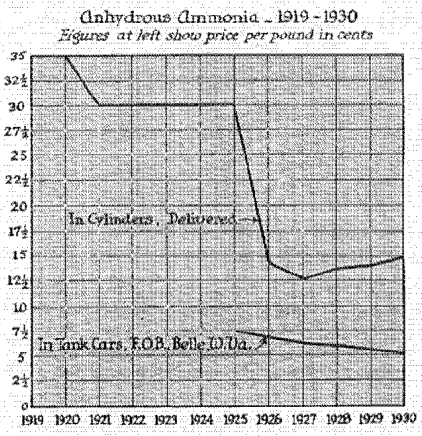
A. The ammoniation of superphosphate
B. Production of nitric acid
C. Nitriding
D. Vulcanization of rubber
E. Anti-corrosion agent in oil refining
F. Leaching of metallurgical residues
G. Ammonia-chlorine treatment of water for:
  (a) municipal supplies
  (b) swimming pools
  (c) washing of foods and food containers
  (d) slime removal in paper-pulping
  (e) condenser water in power systems
  (f) sterilizing purposes—hospital uses
H. Source of hydrogen and nitrogen for:
  (a) welding { torch / atomic arc / shielded arc }
  (b) cutting
  (c) bright annealing
  (d) lead burning
  (e) hydrogenation
  (f) lighter-than-air craft
  (g) reducing agent for molybdenum and tungsten production
  (h) glass and quartz working
  (i) brazing furnaces
  (j) cooling of electric generators and condensers
  (k) melting and working of platinum
  (l) sulphur removal from coke
  (m) inert atmosphere for chemical reactions
  (n) nitrogen atmosphere employed in food canning

The apparatus for dissociating or "cracking" ammonia, which has been developed in the research laboratories of the du Pont Company, is compact, inexpensive, portable, automatic, and operates at low cost. No special technique or training is required in its operation. There are no moving parts involved, and the entire apparatus is quite small.

The original cost is very low—about $600 for a dissociator of a capacity of 450 cubic feet per hour, complete with control instruments, such as regulating valves, controlling pyrometer, contactor, et cetera. Three hundred and forty cubic feet of hydrogen per hour, or say, fourteen cylinders per eight-hour day, represents quite a hydrogen account, but a user of this amount or less, for about $600, can now produce his own requirements. Many a manufacturer who would hesitate before attempting to design and construct an electrolytic gas manufacturing apparatus, will seriously consider setting up such a cheap and effective means of producing his own hydrogen or nitrogen.

Why It Is Economical

It may at first appear paradoxical that low-cost hydrogen can be obtained through the circuitous route of synthesizing ammonia from manufactured hydrogen and then dissociating this ammonia to obtain the hydrogen. The cost of hydrogen manufactured for use in the large-scale production of synthetic ammonia is extremely low compared to the cost of commercial hydrogen supplied in cylinders. Ammonia is transported as a liquid which contains a high concentration of available hydrogen. Whereas in the case of hydrogen about one pound of commodity is transported in 130 pounds of cylinder, in the case of ammonia 100 pounds (17.6 pounds hydrogen) is transported in 165 pounds of cylinder. Transporting liquefied or "stored" hydrogen therefore presents a method for obtaining the gas at a material reduction in cost



Increased domestic production of ammonia has made this product relatively inexpensive. Note the difference between prices on tank-car and cylinder lots

compared to the present cost of commercial hydrogen. It is obvious that cracking by the industrial user eliminates all cylinder costs and high compression charges, as well as shipping, handling, storage and distribution items.

Some Price Comparisons

The present average domestic price of liquid anhydrous ammonia in standard-size tank cars and cylinders is respectively about 6 cents and 16 cents per pound, delivered. The cost of operation of the dissociator is low. A liberal estimate of all charges upon the equipment and its operation is about one cent per pound of ammonia dissociated. On this basis the actual cost of the hydrogen present is about $2 per thousand cubic feet, using tank-car ammonia, and $5 per thousand cubic feet when using cylinder ammonia. Against this, the present average cost of commercial hydrogen in cylinders is around $10 per thousand cubic feet. In other words, the use of ammonia from cylinders, as a source of hydrogen, results in a saving of about 50 per cent as compared with the cost of commercial hydrogen obtained in cylinders, and a saving of about 80 per cent is realized when the ammonia is purchased in tank cars.

Where a semi-inert atmosphere is desired, and the cracked ammonia, or "mixed-gas," can be substituted directly for hydrogen, these savings are increased to about 60 per cent for cylinder ammonia and 85 per cent for tank-car ammonia. To these savings should be added the economies incident to materially lower handling and labor charges. Considering hydrogen content alone—the most unfavorable basis for comparison with ammonia—the awkward manipulation of cylinders through the user's factory is eliminated, together with the work of connecting them to pipe lines, disconnecting, handling of empties, and so forth.

The cost of nitrogen, allowing for the expense of dissociation and burning, is about $2 per thousand cubic feet, based on the price of ammonia in cylinders, and $1 per thousand cubic feet, based on tank-car quantities of ammonia.

The present average cost of a cylinder of nitrogen is about $2.20. This is equivalent to about $11 per thousand cubic feet. The use of nitrogen derived from ammonia by the foregoing method will result in an 80 per cent reduction in the present cost of nitrogen, based on cylinder ammonia prices and 90 per cent on tank-car prices. The economies which will result from 97 per cent reduction of cylinder-handling charges by the substitution of one cylinder of ammonia for thirty-nine cylinders of nitrogen are obviously very large.

The question one immediately asks is, "Can dissociated ammonia be substituted for hydrogen in all applications?"

The answer is yes, in a large majority of uses. In many instances it has a definite technical advantage over hydrogen, while in some cases hydrogen is superior.

Metallurgical Applications

Investigations on the use of cracked ammonia for welding aluminum have shown that thinner sheets can be welded with the oxy-cracked ammonia than is practicable with oxyhydrogen. On thick aluminum stock the two gases are equally effective.

Dissociated ammonia is being used extensively for the bright annealing of steels and copper, and in other furnace operations where a reducing or an inert atmosphere is desired.

Lead burning, atomic and shielded electric arc-welding, brazing, and reduction of rare metal oxides are processes for which cracked ammonia has been found particularly applicable.

Oil Hydrogenation

Hydrogen is now almost universally used for the hydrogenation of edible oils and fats. Recent laboratory and plant-scale tests have proved that the quality and degree of hydrogenation with dissociated ammonia are the same as with hydrogen. Control of the reaction, flexibility of gas handling and production, and high purity of the gas, as related to catalyst life, are some of the technical advantages incident to the substitution of dissociated ammonia for hydrogen. In oil hydrogenation plants where bottled or electrolytic hydrogen is employed, considerable saving in gas costs is to be effected through employing dissociated ammonia. Only minor changes in equipment are required, and the investment in the complete plant-scale unit to produce this ammonia is exceptionally low.



The dissociator is a compact, inexpensive unit used to crack ammonia into its constituent gases, nitrogen and hydrogen. It was developed in the laboratories of the du Pont Company

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VOL. XXV HOLIDAY NUMBER NO. 12

THE YULETIDE

ONE does not have to consult the calendar to know that Christmas is coming. Streets thronged with people carrying packages; stores ablaze with colored lights and more gaily decorated than at any other time of the year; choirs rehearsing carols and anthems in the churches; whispered conversations between parents, and less suppressed chatter among children in the home; red-garbed Santas stationed along Main Street and vendors of evergreen trees, holly wreaths and branches of mistletoe at every turn—all these are harbingers of the holiday season.

The Yuletide is a period when people are more socially minded than usual, when business cares are pushed aside for a time and a festival spirit makes the whole world kin. Friends and relatives gather together around the fireside to exchange reminiscences and revive old memories of their childhood joys. There is feasting and frivolity, gift-giving, greetings and other evidences of good will. Sentiment is a beautiful quality of life, and the Christmas spirit fosters it. We shall all do well to yield ourselves to its magic influence.

It is just a little early, perhaps, to extend the season's greetings, but at least soon they will be timely. And so to every one who may chance to read these lines we say, "May yours be a Merry Christmas, and may the New Year come deep-laden with all the good things that can bring you health, happiness and prosperity."

THIS HOLIDAY NUMBER

THE rush of getting ready for Christmas and the troublesome task of straightening out affairs afterward usually take so much of one's time that little leisure is left for reading. And so, to be helpful, we are combining in this holiday number a condensed ration of information that normally would be laid before you in two separate issues. The next number published will carry a February date line.

As you scan through the pages of this one, perhaps you will note that the subjects discussed are more varied than usual. For example, you may learn something about Du Prene, the new synthetic rubber developed by the du Pont Company; about lithopone exterior paints and their serviceable properties; how du Pont Lignasan keeps lumber bright; how dynamite is used to blast trenches for pipe lines through swamps and across rivers. There is a page or two about woolen fabrics for spring fashions; some notes on Bob-white quail breeding; the facts about two new film products—Du Pac and Telefilm—of special interest to cameramen, and then you will learn about a comparatively inexpensive piece of apparatus that "cracks" ammonia into its constituent gases.

For the holiday flavor, note carefully the pages following this one. First, a bit of philosophy to put you in a proper mood, and then a section devoted to Christmas suggestions. If you are worried about that shopping list—and who is not?—maybe we can help. At any rate that's the intention.

THE OLD HOME TOWN

FOR this number we had in mind some cover illustration that would be seasonable and not commonplace. After considering and vetoing several ideas, we decided to let some artist wrestle with the problem.

Lyle Justis, one of Philadelphia's talented illustrators, thought the subject reproduced would meet the requirements, and so we present his conception of a holiday scene in the old home town of happy memory.

EXPLOSIVES IN AGRICULTURE

UNDER this title the Institute of Makers of Explosives has recently published a book which is expected to be definitely helpful to farmers and others who are interested in land development problems. It embodies blasting practices developed during more than twenty years by experts of leading manufacturers of explosives in this country. In its 87 pages of text and illustrations it covers in a concise and practical manner every essential phase of land clearing, drainage and other uses of explosives for the physical improvement of farms.

Besides a general discussion of the properties and uses of explosives, along with descriptions of blasting accessories, separate sections are devoted to stump blasting, ditching and trenching, and the removal of boulders and field stones. A supplementary section covers a diversity of the occasional uses of explosives and, under various subject headings, gives directions to be followed in loosening frozen gravel, blasting ice in streams, demolishing old foundations, excavating and other work which can be done quickly and at little cost.

Obviously, the effective methods of removing stumps and rocks from farm fields will also apply to clearing rights of way for pipe lines and new highways. Contractors, as well as farmers, can take advantage of the improvements in the technique of ditch blasting, which are fully explained in this book. Requests for copies should be addressed to the Institute of Makers of Explosives, 103 Park Avenue, New York City.

A CORRECTION

IN the article, "Of Interest to Motorists," on page twenty-two of the October number, we erroneously stated that the speed limit in Tennessee was twenty miles an hour on the open country roads. We have since learned that there are now no speed restrictions on the highways of that state, although penalties are imposed for reckless driving.



PHOTO. COURTESY OF D. D. TUTTLE

SUNNY MEADOWS FARM PHILOSOPHY

By THOMAS DREIER
Melvin Village, New Hampshire

Christmas Is Also the Receiving Time

We speak of Christmas as the giving time of the year. It is more than that. It is also the receiving time. We could give nothing if there were no people willing to receive. The receivers are as important as the givers.

That is true not only at Christmas but all through the year. A professional counselor, for example, may find himself giving two or three times as much to some of his clients as he gives to others. It is not because he wants to hold back ideas from those others. The truth is, he works hard trying to persuade them to accept what he offers.

Those whose minds are open, who receive gladly, who show their appreciation by making use of what is given them—those are the people who win our hearts. They make all the days we spend with them like a Christmas morning in childhood. They compel us to grow. We work and study and adventure because we want to find still finer gifts for them.

May Santa Claus, when he comes to us this Christmas, bring us that intangible something which will make all of us better receivers. May that gift make better listeners of us. May we be opened to what is so freely offered us in this marvelous world. There is an unlimited supply of all that we need for the carrying through of our plans. Let us be given the gift of that wisdom on Christmas morning that will open our eyes, our ears, our minds, and our hearts to what the world holds out to us.

Our hope is that this will be a rich Christmas for you and that the coming year will be filled with the happiness which springs from knowing how to give generously and to receive in the same spirit.

Lady Lenox's Acorns

Years ago, in England, a certain courtly Lady Lenox, a member of the Duke of Richmond's family, reached the age of ninety. She was such a great lover of trees that a few days before her death she expressed a desire to plant some acorns.

Ten flower-pots were brought to her bedside. Into each she pressed an acorn. A footman held a little wine to her lips so that she would have the strength to speak, and she said:

"It is a small matter to plant an acorn. But a hundred years hence it will be a mighty oak, the best of all trees. Time and Nature and God will make something miraculous and blessed out of these tiny acorns."

Those small trees were distributed among relatives and friends and planted where they would receive attention. What a fine spirit the old lady must have had! She, even at the point of death, used her strength to create beauty for people yet unborn.

We need in our own country more women, and men, too, who will make the planting of trees part of their life-work.

Inclination or Duty?

From where I am sitting at my desk here at our farm in New Hampshire, I can see a pile of old sawdust in front of the ice-house. It doesn't belong there. It ought to be thrown into a hole near the old chicken coop. But should I get the wheelbarrow right now or stay here at my desk and do what, in a commercial sense, is more profitable work? Here on the farm, time spent writing seems to be time wasted. Instead, one ought to be cutting wood, clearing the pine grove, trimming apple trees, hauling rock, repairing the stone walls, cutting brush that is crowding in upon the meadow, or just tramping in the hills with the dog.

Make Your Own Home a Magnet

If you really are interested in making your town or city attractive to visitors, the greatest contribution you can possibly make is to create beauty where you live. If your house is beautifully designed, if your garden is made a paradise of flowers, if the whole place suggests cleanliness and order, people will stop and pay tribute. And if all the citizens of your community do the same, your town will draw people from far and near.

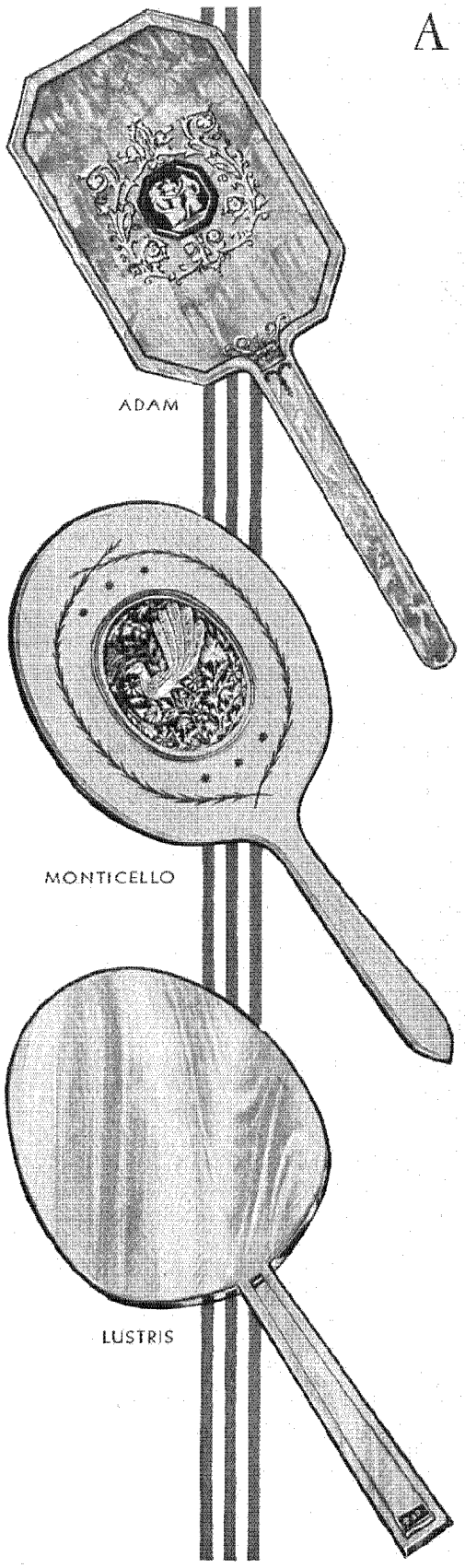
It is individual enterprise that gives a town its position. One exquisite house in an otherwise ugly village has proved to be a magnet powerful enough to draw people who otherwise would have passed the town by.

A MESSAGE FROM DU PONT

TODAY, women are more style conscious than ever before. In their home furnishings, particularly in accessories for the boudoir, they demand the newest and smartest colors and fashions. That is why Pyralin toiletware occupies a distinguished place in the minds of women of good taste, who love to surround their intimate lives with beauty.

Thousands of women every year add charm and distinction to their boudoirs with du Pont toiletware. They admire its smartness, its beauty of design and color. They fit it easily and perfectly into their modern interior decorative treatments. These fastidious individuals know they are getting the best in toiletware, for each piece is stamped with the familiar du Pont oval. There is no substitute for this distinctive mark in correct toiletware.

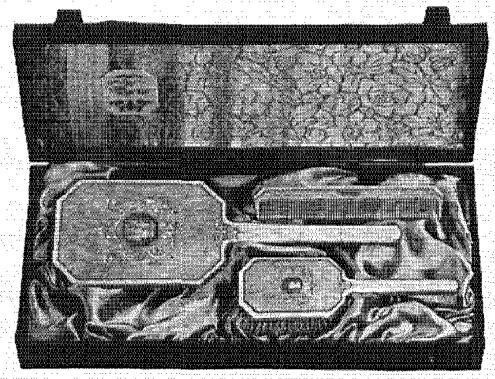
The sets illustrated on these pages are only a few of the most popular patterns and designs.



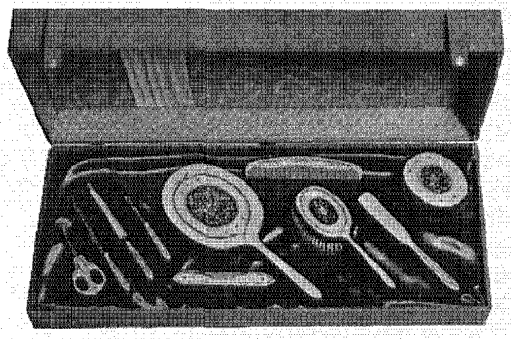
ADAM

MONTICELLO

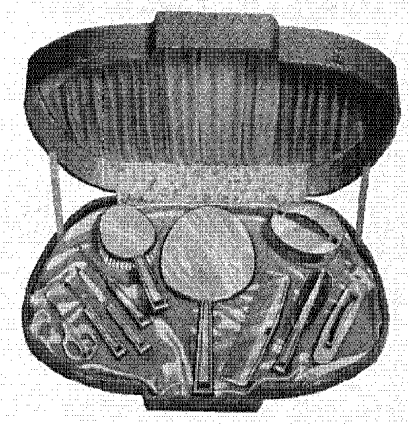
LUSTRIS



The graceful decorative motifs, which are always found in designs by the famous English artists, James and Robert Adam, can be clearly seen in the simplicity and dignity of this Lucite pattern which bears their name. The color combination, blue and cream, is also thoroughly characteristic of these old masters. "Adam" is truly a lovely pattern; a set of it would charm any woman



This pattern of luxurious toiletware is named after the famous old home of Thomas Jefferson—Monticello; and its design is characteristic of the Early American period. The treatment of the individual pieces is one of the outstanding features of this pattern. It is executed in this manner to give variety to the set and to relieve the tiring uniformity usually found in boudoir ensembles



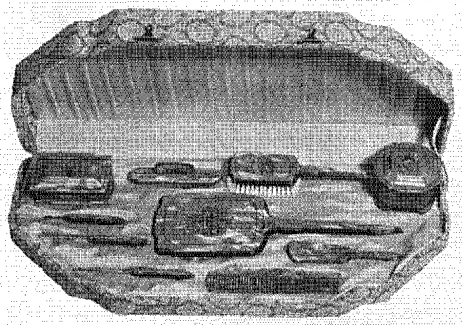
Picture, if you can, a beautiful pond covered with water-lilies in full bloom, the shimmer of the sunlight on the surface of a still pond, or the exquisite sheen of a satin gown and you will sense the inspiration that led to the creation of this Lustris pattern. It is one of the loveliest pieces of toiletware ever produced. When you actually see it we know that you will share our enthusiasm

ABOUT ITS TOILETWARE

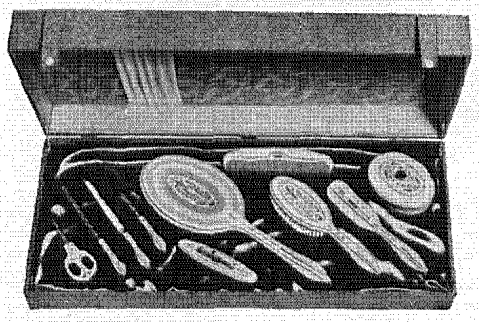
THE merchandise shown on these pages will answer for you that old, time-worn question, "What to give for Christmas?" For there is no gift more popular and enduring than an ensemble of boudoir accessories. There is no line more beautiful, more acceptable than that created and styled by du Pont, the only company that has consistently and nationally advertised pyroxylin plastic toiletware.

Each set contains the finest materials . . . selected glass mirrors, imported brush bristles, and tempered steel manicure implements. The designs are authentic for they were created by leading stylists to blend with every scheme of bedroom decoration. Every detail confirms correctness and exceptional beauty. Luxurious? Yes, in beauty, but not in price, for these sets are within the range of every pocketbook.

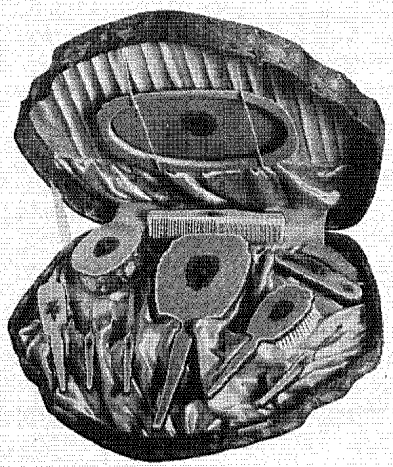
Leading department, drug and jewelry stores usually carry a complete line of du Pont Pyralin.



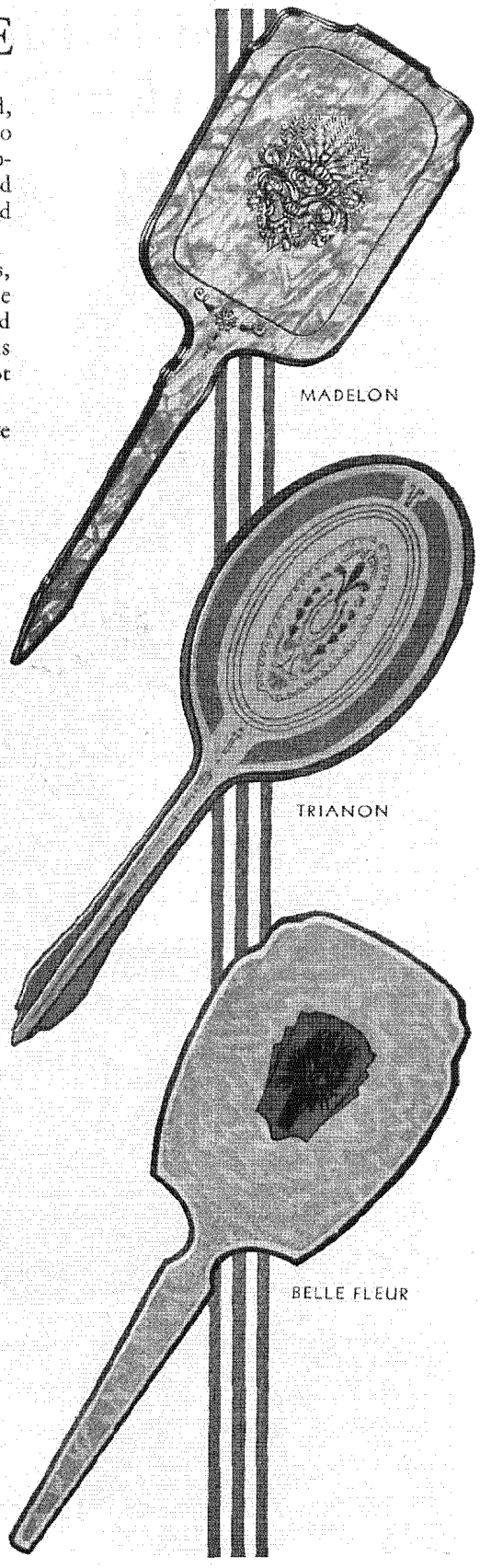
You can quickly solve your problem if you are in a quandary as to what to select this Christmas for mother, sister, or that special "girl friend", for a set of du Pont Pyralin makes an ideal gift. Madelon is one of the outstanding patterns of this line, for it features a new triple bevel. It is obtainable in a number of beautiful colors, and retails at a most attractive price



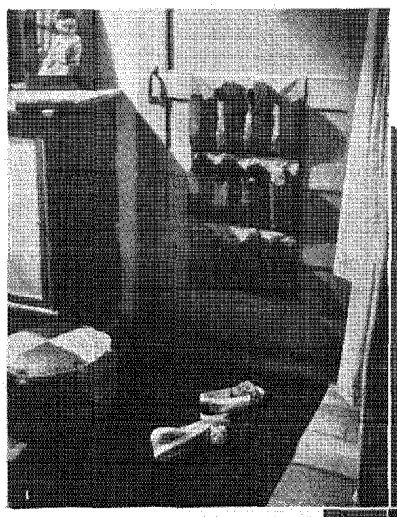
With its long graceful mirror, its lovely clear pastel colors and its lacy design, the Trianon pattern is particularly feminine. French in form, color and design, Trianon is of utmost grace and stateliness, with gradations of tooling on the edges that lend a fine delicacy to its design and shapeliness. The gold-plated manicure steels, an entirely new feature, give an added note of luxury to this set

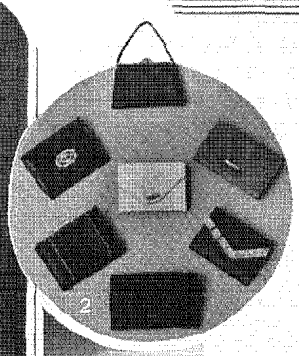


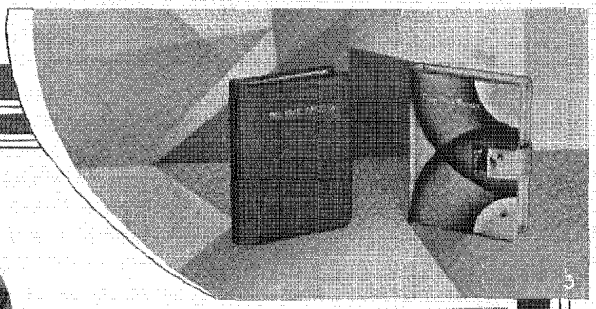
Belle Fleur is the latest du Pont toiletware creation. It was styled by a famous designer and has that dainty and gracious feeling so essential for articles for feminine use. This pattern features a distinct new type of moiré surface effect on a translucent Lucite base. Sets are obtainable in the pastel shades of jade, tan, rose and blue. The main decoration on the back of each piece is a bouquet of Iris



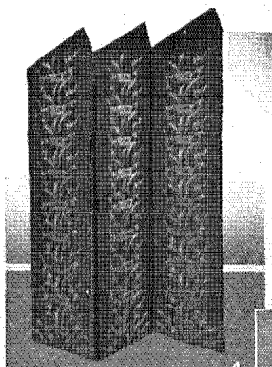
THESE IDEAL CHRISTMAS GIFTS ARE GAILY COVERED

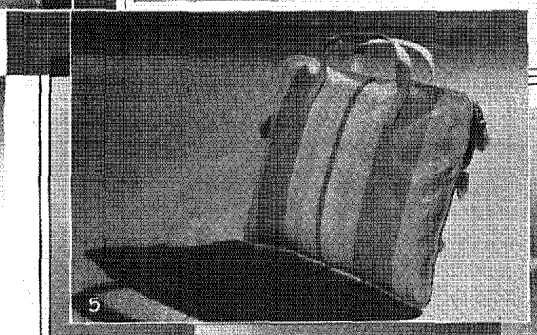


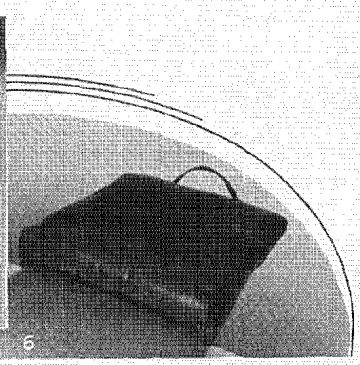




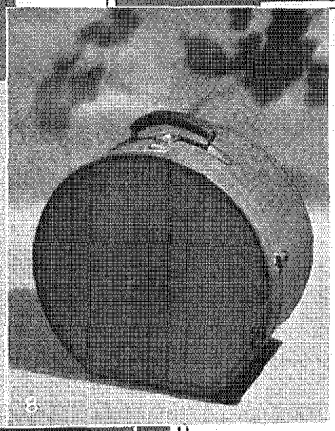
The articles shown on these pages are covered with genuine, washable du Pont Fabrikoid. All of them are practical and highly useful gifts.

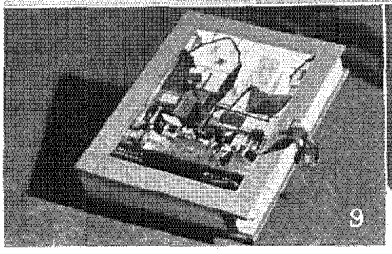












1. This group picture, of a corner in the sales-promotion showroom of the Fabrikoid Division, offers a number of different suggestions—drapes, hassock, shoe bag, slippers, as well as a picture frame and book

2. Many leading department stores carry a wide range of pocketbooks made of du Pont Fabrikoid. They are smart, serviceable and retail at reasonable prices

3. Although these attractive books have a variety of titles, you will probably recognize an old standby, the diary. Either one of the two shown here would make a delightful gift

4. There is swank to a stenciled Fabrikoid screen like this one, which may be used for many purposes in the home

5. Here is one of those "Why-didn't-I-think-of-it?" articles—a combination handbag and cushion. It is a great comfort when your grandstand seat is damp and cold

6. For the motorist—a pillow to put behind the driver's back. It can be carried conveniently and will serve also on picnics or outings at the summer cottage

7. A bee would have to be sharp-sighted to determine whether these flowers are artificial or not. They are made of special lustrous Fabrikoid, from Nature's original masterpieces

8. All leading luggage manufacturers use Fabrikoid, which has long been a favorite because of its good looks and innate toughness. Department stores and luggage shops carry bags such as this one

9. Here is something for the efficient housewife—an indexed portfolio to help keep her bills straight

WITH BEAUTIFUL, PRACTICAL DU PONT FABRIKOID



Each item reproduced here is long-lasting, and will remain beautiful during its period of service. You can buy this merchandise through local merchants.

10. Diaries always make acceptable gifts, and this particular line is easy to find; it is on sale everywhere in the United States

11. A traveling case, opened up to show you the equipment in place. What man wouldn't like to have one for his overnight or week-end trips?

12. Books bound in Fabrikoid are invariably appreciated. The binding adds much to the appearance of the book and assures the permanency of the gift. The Bookhouse for Children will make Christmas memorable for many young folks this year

13. Here is something else any man would like, even though his longest trip is into town on the 8.15. It's a handsome, compact toilet case with a waterproof lining

14. A box that can be used for a hundred and one different things—sewing, jewelry, correspondence, or what have you? The beautiful design is lithographed on the Fabrikoid

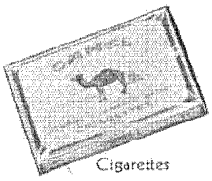
15. Do you know any golfer who wouldn't like a new golf bag for Christmas? The one illustrated here is good looking, yet not too expensive

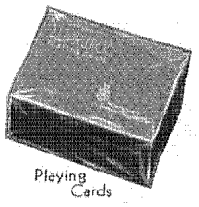
16. One of the most popular innovations in years—the closet box. It comes in lovely pastel shades and fits into any bedroom closet

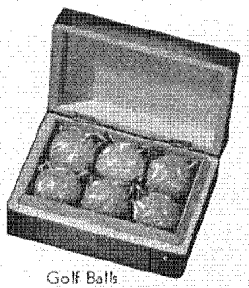
17. The same new processed Fabrikoid employed in making the artificial flowers has been used in fabricating these belts, which are very much the vogue

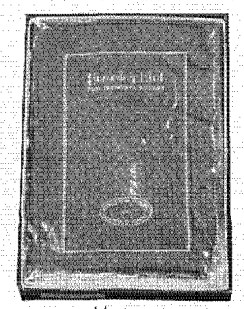
18. Bedroom slippers are probably the most popular of all Christmas gifts, for they are used by all members of the family. Those reproduced here are made of Fabrikoid and are found in department and shoe stores

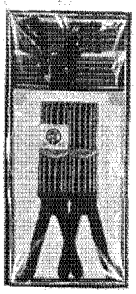
OTHER PRACTICAL GIFT SUGGESTIONS

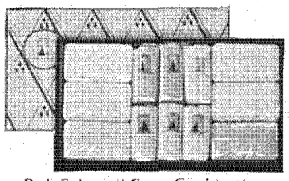

Cigarettes


Playing Cards

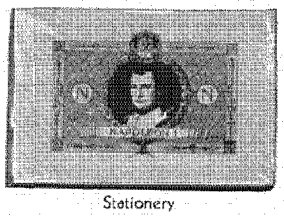

Golf Balls

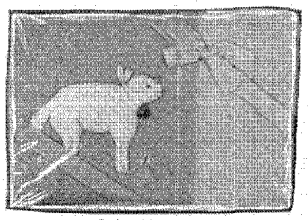

Hosiery

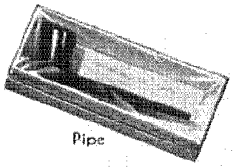

Garter and Suspender Combination

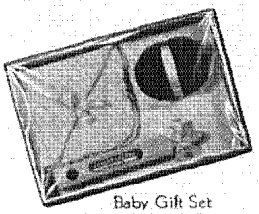

Bath Salts and Soap Combination


Gloves


Stationery


Baby Blankets


Pipe

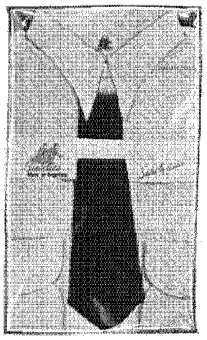

Baby Gift Set

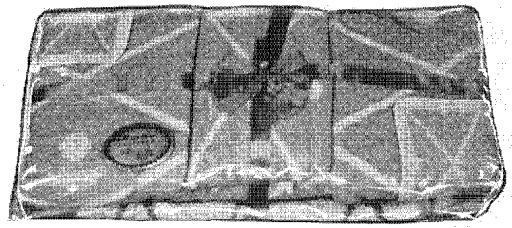


Cigars



Candy


Shirt and Tie Combination


Towel Ensemble Set

AMONG your presents on Christmas day you will probably find certain packages dressed up for inspection in a sparkling red or green wrap of Cellophane.

The popularity of this material as a holiday gift wrap has steadily grown each year. Cigar manufacturers were among the first to see its value and to realize that each "box of smokes" is more appreciated when presented in a seasonable garb.

Yes, more cigars will be packaged in Cellophane this year than ever before. Hundreds of other products, too—everything from golf balls to towel sets—are factory wrapped in this material. Some of these popular items are illustrated here. In the group perhaps you will find some articles to answer your own gift problems.

Women know how to make gifts attractive with Cellophane, and to meet their requirements, rolls for household use have been put up in gay holiday colors—red, green, amber, blue and pink. They can be obtained from the Dennison Manufacturing Company, Framingham, Massachusetts

GIFTS FOR CAPTIVATING LOUNGERS

Munsingwear's Slim Princess Back

The Pajama Gift for Gifted Loungers! It looks like an ensemble . . . a pretend bolero gives that effect. But its Princess Back is one piece. Feminine souls go into ecstasy at its sweeping grace . . . while masculine eyes openly admire its intriguing slimness. This pajama is every bit luxurious Du Pont Rayon.



Good shops everywhere sell Du Pont Rayon underthings by Van Raalte and Munsingwear



Meshette Pajamas by Van Raalte

So devastating . . . we can't begin to tell you about them! Their fabric is the fascinating mesh used in Meshette panties. (At the left is a snip of Meshette slightly enlarged.) This mesh is clear and small . . . not a bit bold . . . yet quite designing in the way it snugs at the waist and flares at the ankles. Du Pont Rayon yarns give Meshette its famous texture.

TWO NEW DU PONT FILM PRODUCTS

(Continued from page 12)

industry. It seems imperative that three-color photography be used for general exterior work, since the eye readily recognizes unfaithful reproduction of blue sky, green foliage or flesh tints. But in many interior scenes where foliage and sky are absent, two-color processes have given very satisfactory results. Technicolor achieved considerable success with a two-color process making two-color separation negatives in a special camera, which recorded blue and green on one film and yellow and red on the other.

DuPac is du Pont's development of the bi-pack idea proposed many years ago for producing two-color separation negatives. It consists of two rolls of film, matched as to perforation dimensions, and designed to be run through the standard motion picture camera with only slight adjustments. The two films are threaded in the camera with the emulsion surfaces in contact. The front film, the one nearest the lens, is sensitive only to blue and green rays, and has an orange filter associated with its emulsion coating. The rear film is panchromatic, that is, sensitive to all wave lengths of light. When an exposure is made, the blue and green objects are recorded in the front film and the orange and red objects in the rear film. This is possible, since the front film is insensitive to yellow and red, but is quite transparent to those rays, so that they pass through the sensitive coating as well as the orange filter, and effectively record the yellow and red objects on the rear film. The orange filter provides a clean separation by preventing the passage of any blue or green rays to the rear film.

Prints can be made from DuPac negatives in several ways. The method most commonly used is to print one negative on one side of double-coated positive film, and the other in register with it on the other side. The images are then suitably dyed or colored by separate treatment of the sides.

While DuPac has limitations regarding natural color reproduction, very pleasing and practical results have been obtained by those who have worked with a knowledge of its limitations. A number of leading companies have used it in making color sequences. The North Polar and Latin-American expeditions and the Vanderbilt cruise carried large quantities of DuPac when they set out recently.

Telefilm

Under the name Telefilm, du Pont has recently put out a giant spool of roll film—9½ inches wide and 75 feet long—for use in aerial photography. Large quantities of such film are used for aerial surveying, both by the United States Government and by private concerns. This film is panchromatic, special attention having been paid to its red sensitivity. Since the red rays penetrate fog and haze more satisfactorily than the blue wave lengths, considerable advantage is obtained by use of a highly red-sensitive product. The film can be used at a greater height than others, and also gives better definition and detail of objects on the ground.

DU PONT

E. I. DU PONT DE NEMOURS & CO., Inc.

General Executive Offices, WILMINGTON, DELAWARE

All Inquiries Regarding du Pont Products Should Be Addressed to the Nearest Office

ACIDS, HEAVY CHEMICALS AND SPRAY PRODUCTS

Grasselli Chemical Company, Inc.

Chemicals for leather, textile, paper, paint, rubber, battery, glass, sheet, tin plate, steel and petroleum manufacturers. Chemically pure acids, electrolyte, filter alum, spray products for fruit trees, vegetables and flowers, silicate of soda, soldering fluxes, zinc, zinc chloride.

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Cleveland, Ohio, 629 Euclid Avenue
Detroit, Mich., 1530 E. Hancock Avenue
Los Angeles, Calif., 363 New High Street
Milwaukee, Wis., 1503 W. Canal Street
New Haven, Conn., 46 River Street
New Orleans, La., 1140 S. Robertson Avenue
New York, N. Y.
District Sales Office, Empire State Building
Export Office, Empire State Building
Paterson, N. J., 6 Waite Street
Philadelphia, Pa., 3500 Gray's Ferry Road
Pittsburgh, Pa., 307 Fifth Avenue
Rensselaer, N. Y., 34 Riverside Avenue
San Francisco, Calif., 576 Mission Street
St. Louis, Mo., 408 Pine Street
St. Paul, Minn., 2303 Hampden Avenue

LITHOPONE, TITANIUM PIGMENT, ZINC OXIDE AND DRY COLORS

Krebs Pigment & Color Corporation
Boston, Mass., Everett Station
Chicago, Ill., 2101 Canalport Avenue
Cleveland, Ohio, 629 Euclid Avenue
Los Angeles, Calif., 2034 Bay Street
Newark, N. J., 256 Vanderpool Street
Philadelphia, Pa., 3500 Gray's Ferry Road
San Francisco, Calif., 274 Brannan Street

ANHYDROUS AMMONIA, ANTI-FREEZE METHANOL AND METHANOL

Methanol and anhydrous ammonia in tank cars. Anti-Freeze Methanol in tank cars and drums.

Wilmington, Del., Du Pont Building

AQUA AND ANHYDROUS AMMONIA

National Ammonia Company, Inc.

Anhydrous ammonia in cylinders. Aqua ammonia in drums and tank cars.

Chicago, Ill., 332 S. Michigan Boulevard
Los Angeles, Calif., 316 Commercial Street
New York, N. Y., Empire State Building
Philadelphia, Pa., Frankford P. O.
San Francisco, Calif., 77 Minna Street
St. Louis, Mo., 3600 N. Broadway

SPECIAL CHEMICALS

The Roessler & Hasslacher Chemical Company, Inc.

Manufacturers of sodium, cyanides, peroxides, chlorine, heat-treating salts, formaldehyde, hexamethylenetetramine, gold, silver and platinum preparations, colors, oxides and opacifiers for the ceramic industry (pottery, glass and enameling), refrigerants, non-inflammable solvents, rubber accelerators and other chemicals for all industries.

Baltimore, Md., 301 O. T. National Bank Building
Boston, Mass., 40 Central Street
Chicago, Ill., 230 E. Ohio Street
Cleveland, Ohio, 607 Hanna Building
East Liverpool, Ohio, 314 Smith Street
Kansas City, Mo., 2018 Guinotte Avenue
Newark, N. J., 1060 Broad Street
New Orleans, La., 502 Louisiana Building
New York, N. Y., Empire State Building
Philadelphia, Pa., 860 Drexel Building
Pittsburgh, Pa., 935 Fulton Building
San Francisco, Calif., 625 Market Street
Toronto, Canada, 372 Bay Street
Mexico, D-F., Cia. Mexicana de Productos Químicos Roessler & Hasslacher, Cinco de Mayo No. 10, Apartado 2115

CELLOPHANE

Du Pont Cellophane Company, Inc.

Cellophane—Sheets and rolls.
Cellulose caps and bands (formerly Capes-Viscose, Inc.).
Transparent seamless tubing.

New York, N. Y.
Executive and General Sales Offices
Empire State Building
New York District Sales Office
145 Hudson Street
Eastern District Sales Office
Empire State Building
Boston, Mass., Little Building
80 Boylston Street
Chicago, Ill., Conway Building
111 W. Washington Street
Philadelphia, Pa., Liberty Trust Building
Broad and Arch Streets
San Francisco, Calif., 351 California Street

DYESTUFFS

Dyestuffs and dyestuff intermediates.
Rubber chemicals.

Boston, Mass., 140 Federal Street
Charlotte, N. C., 302 W. First Street
Chicago, Ill., 7 S. Dearborn Street
New York, N. Y., 61 Thomas Street
Philadelphia, Pa., 126 S. Front Street
Providence, R. I., 709 Hospital Trust Bldg.
San Francisco, Calif., 351 California Street

EXPLOSIVES

Explosives for all industrial, agricultural and sporting uses.

Birmingham, Ala., 601 Brown-Marx Bldg.
Bluefield, W. Va., 607 Commercial Bank Bldg.
Boston, Mass., 140 Federal Street
Chicago, Ill., 1814 McCormick Building
Denver, Colo., Midland Savings Building
17th and Glenarm Streets
Duluth, Minn., Hartley Building
742 E. Superior Street
Huntington, W. Va., Suite 1004 Union Bank Building
Joplin, Mo., 816 Joplin Nat'l Bank Building
Juneau, Alaska, Room 503 Goldstein Building
Kansas City, Mo., 902 Midland Building
New York, N. Y., Empire State Building
Pittsburgh, Pa., Clark Building
Seventh Street and Liberty Avenue
Portland, Ore., American Bank Building
Pottsville, Pa., 516 Schuylkill Trust Company Building
St. Louis, Mo., 1182 Arcade Building
San Francisco, Calif., 351 California Street
Seattle, Wash., Hoge Building
2d Avenue and Cherry Street
Scranton, Pa., 701 First Nat'l Bank Bldg.
207 Wyoming Avenue
Spokane, Wash., 721–22 Old Nat'l Bank Bldg.
Riverside Avenue and Stevens Street
Springfield, Ill., 716 Reisch Building
Wilkes-Barre, Pa., Brooks Building

FABRIKOID AND RUBBER PRODUCTS

Fabrikoid for auto and furniture upholstery; auto topping, bookbinding, luggage, novelties, etc. Tontine Washable Window Shade Cloth. Everbright Pontop for closed car decks. Teal for sport cars. Rug Anchor. Ventube for mine ventilation. Fabrics for raincoats and rough wear. All types of rubberized fabrics.

Chicago, Ill.
Fabrikoid Office, 2100 Elston Avenue
Montana Street Station
Tontine Office, 1411 S. Michigan Avenue
Detroit, Mich., 5–236 General Motors Bldg.
Newburgh, N. Y.
New York, N. Y., Empire State Building
San Francisco, Calif., 351 California Street

AUTOMOTIVE FINISHES

Duco and a complete line of finishing materials for all automotive purposes.

No. 7 Duco Polish, No. 7 Auto Top Finish, No. 7 Nickel Polish, No. 7 Touch-Up Black, No. 7 Super-Lustre Cream, No. 7 Radiator Cleaner.

Chicago, Ill., 2100 Elston Avenue
Detroit, Mich., General Motors Building
Flint, Mich.
Parlin, N. J.
San Francisco, Calif., 351 California Street

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Duco, Dulux, Duco Household Cement, bronze powders, collodion, leather belting cements, leather finishes, nitrocellulose and cellulose acetate and their solutions, Dulux synthetic resins, pyroxylin preparations and solvents and a complete line of finishing materials for all industrial purposes.

Boston, Mass., Everett Station 49
Chicago, Ill., 2100 Elston Avenue
New York, N. Y., Empire State Building
Parlin, N. J.
San Francisco, Calif., 351 California Street

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A complete line of military and sporting smokeless powders; also military explosives and black sporting powders.

Wilmington, Del., Du Pont Building

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New York, N. Y., 105 Hudson Street

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Du Pont Film Manufacturing Corp.
New York City, 35 W. 45th Street
Hollywood, Calif., 6656 Santa Monica Blvd.

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Brooklyn, N. Y.
Building No. 26, Bush Terminal
Chicago, Ill., 2100 Elston Avenue
Cleveland, Ohio, 791 Union Trust Bldg.
New York, N. Y., Empire State Building
Philadelphia, Pa., 1616 Walnut Street
San Francisco, Calif., 351 California Street

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Lucite, Pyralin and Arlton Boudoir Accessories. Toys, rattles, combs, gift articles, infants' sets, manicure sets, hair ornaments. Novelty and transparent sheeting, rods, tubes and beading Also cleanable collars.

Factories at Arlington, N. J., and Leominster, Mass.

Du Pont Viscoloid Company, Inc.
New York, N. Y., Empire State Building
Chicago, Ill., North American Building
San Francisco, Calif., 351 California Street

RAYON

Du Pont Rayon Company, Inc.
Viscose Process Department
New York, N. Y., Empire State Building
Charlotte, N. C., 611 Johnston Bldg.
Chattanooga, Tenn., 609–611 Provident Bldg.
Philadelphia, Pa., 1503 Land Title Building
Providence, R. I., 938 Hospital Trust Bldg.
San Francisco, Calif., 351 California Street

Acele Department
New York, N. Y., Empire State Building
Also 40 Worth Street
Waynesboro, Va.

FOREIGN OFFICES

(To which inquiries about du Pont products may be addressed.)

Buenos Aires, Argentine Republic
Foreign Trade Development Office
Av. Roque Sáenz Peña 616 (Casilla 490)
Hankow, China, No. 23 Tung Ting Road
Havana, Cuba, 548 Edificio Manzana de Gomez
Kobe, Japan, No. 83 Kyomachi
(P. O. Box No. 384)
London, W. C. 2, England, Bush House, Aldwych
Mexico City, Mexico, Edificio Cidosa
Avenida Uruguay 55 (*Office of Du Pont Rayon Company of Mexico, S. A.*)
Paris, France, Paris Development Office,
6 Rue Christophe-Colomb
Shanghai, China, Robert Dollar Building
3 Canton Road (P. O. Box No. 393)
Tientsin, China, 52 Taku Road

I. F. C. LINES

International Freighting Corporation, Inc.
Chicago, Ill., 1824 McCormick Building
New York, N. Y., 17 Battery Place
Buenos Aires, Argentine Republic, Avenida Roque Sáenz Peña 616

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Monticello
Continental Blue, Buff and Gold, Colonial Rose and Silver effects.

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A Satin Lustre on Jade, Maize or Rose.

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Lucite REG. U.S. PAT. OFF. *Pyralin* REG. U. S. PAT. OFF. *Arlton* REG. U.S. PAT. OFF.

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