THE DU PONT MAGAZINE

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E. I. DU PONT DE NEMOURS & CO., INC.
Sporting Powder Division Wilmington, Delaware

THE DU PONT MAGAZINE

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Taxes and Business . . . . *Some excerpts from President Lammot du Pont's Annual Report to the Stockholders for the year 1935*

"TAXATION is a much discussed subject today and is one of the most disturbing problems with which industry is confronted. During the year 1935 the du Pont Company has paid or accrued some forty different kinds of taxes which in the aggregate approximate $10,000,000 and represent ninety cents a share on the outstanding common stock.

"If the spending programs of our governmental bodies continue at the present unprecedented levels, they will in turn require, to avoid fiscal bankruptcy, the assessment and collection of progressively increasing taxes from everyone including this company and its stockholders. These governmental expenditures may be grouped into three general classes:

"(1) Those required for maintenance of the normal functions of governments;

"(2) Those required for relief of the distressed occasioned by unemployment; and

"(3) Those demanded or required for what may be called social experiments.

"The objectives sought in the assessment of taxes have also been several; some have been levied for the purpose of producing revenue, whereas others have apparently been intended to bring about far-reaching innovations in our social structure.

"The raising of funds with which to defray the costs of the normal functions of government efficiently administered and to provide adequately for the relief of that distress which private resources cannot be induced to shoulder is a necessary burden on our people even during prolonged depressed periods. This 'necessary burden' of providing *adequately* for relief is one which few nations, now or at any time in history, have assumed. To call upon the people for still further funds seems an unnecessary drag upon their endeavors during such trying periods; and it is particularly discouraging to the recuperative efforts if such additional exactions are made to finance huge expenditures for untimely experimental projects which might well await at least a more healthy condition of business and the public treasury.

"If additional taxes are imposed to enable the government to launch enterprises sheltered from bankruptcy by funds from the federal treasury in competition with existing or projected private undertakings, such government projects must certainly arrest the return of that enterprise and initiative to which both the government and the people have been looking to employ those unfortunate unemployed people who must always be the victims of taxes, if excessive.

"It is doubly unfortunate that in levying new taxes in these times our authorities have endeavored by those very taxes to effect and precipitate revolutionary changes in many of our ideals, institutions and customs, honored by years of usage and respect. Such efforts have quite naturally created disturbance and disorganization on the part of the taxed, and thus have further weakened their ability to bear increasing burdens.

"The endeavor to earn and to save, and to provide for one's old age and one's dependents, has heretofore been regarded as virtues to be commended. Such savings, too, have served as the sinews of enterprise, have furnished the resources with which our transportation, agricultural and industrial enterprises have been created and developed. These savings are now scheduled for dissipation and dilution by reason of unprecedently high estate taxes and inflationary measures.

"Corporations have for decades been encouraged, and by many states required to operate through subsidiary corporations, in the interest of convenience and economy or in order to conform to the statutes. Almost overnight the feeling has arisen in some quarters that in some unexplained way such organizations have a sinister object, and an effort has been made to destroy them by means of a multiple tax upon operations conducted through subsidiary corporations. This tax takes the form of an added tax on the earnings of such subsidiary companies when received by the parent company as dividends.

"A further distrust of bigness in business has been fostered, and to placate this fear higher rates of taxes have been levied upon companies with large earnings than upon companies with small earnings. This tax recognizes no relationship between the profits earned and the amount of capital

employed, nor does it differentiate between large earnings accruing to a few individuals and an equal or lesser rate of earnings accruing to a great number of small stockholders. Such taxes may impose a disproportionate burden upon some corporations as compared with others, and certainly must burden unfairly the millions who have invested their small savings in large corporations.

"Large corporations have played a vital part in the development of the general welfare of the nation as evidenced by the progress made in recent years in several of the more important major industries, such as the automobile, electrical and chemical industries. Such industries have been built up to their present efficiency chiefly as the result of large-scale operations which have made possible the continued expenditure of large sums for research and development work without which their products could not have been brought to the present state of high quality and relatively low cost to the consumer.

"What would the selling prices of the automobile, the electric refrigerator, the radio and 'Cellophane' be today if the operating and technical organizations and the financial resources of large corporations had not been available for their development and continued improvement?

"Such products as these are rapidly coming to be considered real necessities of life rather than luxuries, but they would be luxuries today were it not that their cost to the consumer has been so greatly reduced during the past few years that they have been made available in one form or another to practically everybody.

"The situation in the du Pont Company is typical of that in many other large corporations. Two outstanding examples are the development and expansion of—

"(a) The organic chemicals industry, which now includes dyestuffs, rubber chemicals, 'DuPrene' and synthetic camphor, which required an investment of approximately $40,000,000 and an intensive development effort of over seven years before a cent was earned, and

"(b) The high-pressure synthetic chemical industry, producing ammonia, methanol, higher alcohols, urea, and a number of other products. This industry also required the investment of many millions of dollars and about eight years of development work and effort before it yielded any financial return for the stockholders.

A FEW BRIEFS

The volume of business of the du Pont Company and its wholly-owned subsidiaries amounted to approximately $220,000,000 for the year 1935, an increase of about 19 per cent over 1934.

Increased tonnage volume accounted for practically the entire increase in dollar volume.

In recent years, with general wholesale commodity prices and living costs advancing to higher levels, the du Pont sales price index has actually declined.

Earnings applicable to the common stock for 1935 were equal to $5.04 a share.

Dividend payments for the past five years, 1931-1935 inclusive, have been equal to 92.59 per cent of the earnings.

Approximately $23,400,000 was expended during 1935 in extending and modernizing the company's manufacturing facilities.

"In addition to the large expenditures that have been necessary to develop new industries such as those just mentioned, other millions of dollars have been expended in the past few years for research work from which no new industry or new product has yet resulted.

"The fact that the du Pont Company has followed the sound policy of conserving its resources and has employed them for these new long-time developments involving preliminary expenditures of many millions of dollars has made it possible to bring such new products into commercial use and by constant improvement to sell them at continually lower prices, thus improving the living standards of our people and increasing employment.

"In this connection, it is particularly interesting to note what has happened to the selling prices of du Pont products over the past seven years, as compared with the general wholesale price level and as compared with the cost of clothing, foodstuffs and rent, which make up the bulk of the cost of living of the average individual.

"Figures published by the U. S. Bureau of Labor Statistics show that the weighted average wholesale price of 784 commodities used in the official government index fell 38.2 per cent from the 1928 average to the low point reached at the end of February, 1933. During the same period, the weighted average selling price of du Pont products, as nearly as can be estimated, fell 34.1 per cent. Since this date, however, the general wholesale price level had advanced 34.5 per cent to the end of 1935, whereas the du Pont sales price index has actually declined 3.6 per cent further. At present, therefore, general wholesale prices are down scarcely 17 per cent from 1928 average, while on the average du Pont prices are down 36.5 per cent from the 1928 base, having reached their lowest point at the end of 1935.

"Likewise, the cost of living as estimated by the National Industrial Conference Board had, in November, 1935, advanced about 18 per cent from the low point reached in April, 1933: retail food prices (according to government estimates) were up 37.4 per cent; clothing was up 22.7 per cent; and rent had gained 16.5 per cent. However, during this same period the du Pont sales price index actually showed a *small decline*, notwithstanding the increased cost of raw materials, labor and taxes. As previously suggested, this marked difference in trend in the average selling prices of the du Pont Company has been due in no small measure to the continual development of new and improved processes.

"It must be obvious that a continuation of the recent trends in taxation by our various federal, state and municipal governmental bodies is likely to cause serious, if not irreparable, damage to industry and to those institutions that were founded upon sound principles of thrift and enterprise, and have prospered under such principles. It is hoped that the governmental

(Continued on page 16)

Dredging with Dynamite

When other means failed, blasters developed a technique that made the task easy. Details of the method employed are set forth here

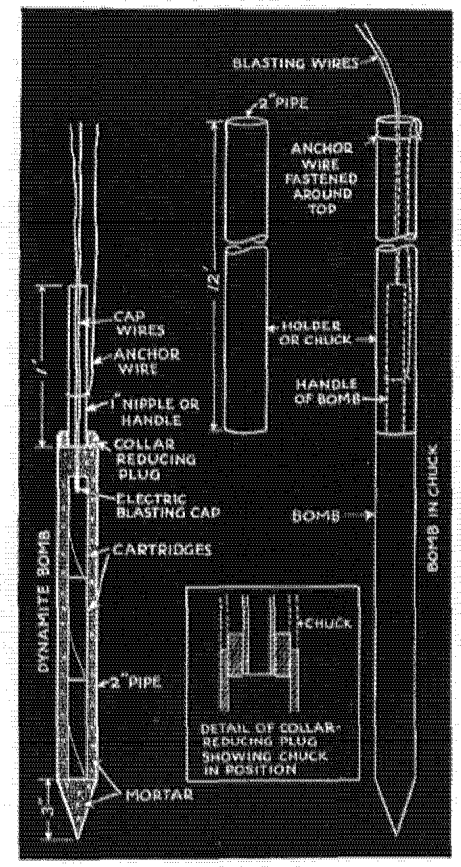
By F. B. COZZENS

UNDER-WATER excavating with modern equipment is no longer considered a serious problem, but for every major project thus managed, there are a dozen smaller jobs in shallow streams where dredges and power shovels cannot be used. A typical case was the building of the Short Route Highway through a section of Athens County, Ohio, where it was necessary at three points to deepen the channel of Wolf Creek for a total distance of one and three-tenth miles. This stream is winding and rocky. The average width is fifty feet, with irregular fluctuations in depth of from three to eight feet. The channel bed is of shale and sandstone composition, too rocky for efficient dredging and too irregular for ordinary ditching.

Specifications called for a uniform channel eight feet in depth, and after three different contractors had abandoned the project because of inefficient equipment, the Johnson Company, of Trimble, Ohio, accomplished the task in record time by the use of dynamite bombs. The actual excavating was done in 140 working hours, using 1,700 pounds of nitroglycerin dynamite, 600 electric blasting caps, 6,000 feet of copper wire and 1,500 feet of two-inch iron pipe.

The bombs were made in advance, using thirty-inch sections of the pipe, the bottom ends of which were welded to a point after cutting out four gores. Next, concrete mortar was poured in to a depth of about three inches and permitted to harden. Then, in each shell was loaded, end to end, the required number of cartridges, and the last one inserted carried an electric blasting cap with insulated copper connecting wires. To seal the charge, more concrete was poured in, and then a one-inch reducing plug was screwed into the collar of the pipe. Above that, similarly attached, was the nipple or "handle" extending about one foot, and through the hole along the axis of this piece, the cap wires referred to were threaded, thus completing the assembly. These details are more clearly shown below.

When the blasters were ready to start work, a supply of these bombs was stored in a rowboat which was anchored at the desired location in the middle of the creek. A bomb was placed in a chuck or holder — a section of two-inch pipe ten to twelve feet long—through which the leading wires were drawn up and left free. Next, the bomb was secured in the holder by means of a wire between the bomb handle and the top of the chuck. These preliminaries completed, the outfit was pushed down into the bed of the stream. The holding wire was cut and the chuck used to drive the bomb to the required depth.



The chuck was then carefully withdrawn, leaving the bomb planted in the bed. One of the workmen next attached the free end of the cap wires to a piece of wood floating at the surface, and the planting process was resumed and continued until ten or more bombs were set. This work completed, the cap wires were connected in series, then taped securely and joined to the leading wires which extended from the boat to the terminals of the blasting machine, a safe distance away on the shore. When everything was in readiness, all the charges were shot together.

The bombs were spaced eight to twelve feet apart, usually in the center of the channel, and side shots were used only where jutting rock ledges made them necessary. The channel shots loosened the stone and silt so thoroughly that much of the material was quickly carried away by the swift current. Large blocks of broken rock were maneuvered to the shore by man power, and the remaining burden was removed by scrapers.

The use of bombs eliminated the drilling of holes, at a substantial saving in labor and time. A crew of three men, operating in shifts on the boat, did all the necessary planting, while a fourth man handled the blasting machine. And a crew with barge and scraper completed the job.

The good results obtained on this project established the fact that bombs of the type described are effective in solving the problems of excavating channels in shallow fast-water streams. The bombs may be loaded to any strength desired. They are easily constructed and conveyed to the job, and can be used successfully in locations where it is not possible to employ other methods.

● "It was silly of me to fall on the rug; I knew it was apt to skid, but I don't want 'Rug Anchor' "

ILLUSTRATIONS BY NATHALIE SARGENT

Concerning Women— and "Rug Anchor"

By PAUL SAMPSON

THE American woman's house is a reflection of cultivated tastes. Her gardens are admirably planned, and draw every scintilla of beauty a grudging climate and reluctant soil yield. Her kitchen is the envy of the world, and her clothes have moved visiting firemen to remark that the best-dressed women of the world are American. Moreover, she has refused to regard the home as her castle, her scepter a dish cloth, and scuttles about from activity to activity with the speed of a stretch-running stake horse. In the end she has covered so much ground that she is better posted on a large number of things than her husband.

But, with all her admirable haste and elasticity, in some small ways she has laid herself open to criticism. Nothing serious, mind you. And if Her Majesty is reading this, please understand it is intended to be more constructive than carping. It is prompted by the fact that the Red Cross, the National Safety Council and affiliated bodies are now conducting a most vigorous safety drive.

Every business man who is responsible for the maintenance of plants, offices or public buildings knows that one of his most acute problems is the control and reduction of hazards which might cause accidents. Over a period of years, good American business men, through close attention to mighty trifles, have cut down tremendously the number of industrial accidents that occur annually. Nothing is ever put into an office without first carefully considering its possibilities of causing an injury to some worker.

Now let us focus our attention on the home, which, unfortunately, still remains one of the most dangerous places in which to spend your time. Aside from the regrettable fact that people still die in beds, far too many others are removed from the scene of their triumphs because of slippery surfaces in the bathroom, rickety step-ladders, and last, and perhaps most important, because of unsecured rugs.

These treacherous, decorative tidbits have been thrown around and, as figures accumulated by the National Safety Council and various accident companies have incontrovertibly proved, they are almost as deadly as a tiger trap or a pit filled with King Cobras. And yet, this very day women will be putting these rugs into place by the hundreds with a totally unwarranted blithesomeness.

Du Pont makes a product that qualified experts have called the finest material ever made to prevent accidents from skidding rugs. Women over a period of years have bought it almost reluctantly, and after a great expenditure of energy on our part. Because we regard the problem of selling women "Rug Anchor" as a challenge, we shall willingly and gladly continue our efforts to make American homes safe for human occupancy.

But we know that no amassing of statistics, no urgent pleas will sway the feminine mind to safety. Men in a factory environment are much more easily persuaded. One of our dealers reports that one of his best customers was inactive for some time due to a fall on one of her own small throw rugs. When she was up and about, he called at her home and attempted to sell her "Rug Anchor," demonstrating its positive virtues. "No," she said, "it was silly of me to fall on the rug; I knew it was apt to skid, but I don't want 'Rug Anchor.' " This naive confession fills us with a lust for battle.

Mr. Lawson Robertson, one-time champion sprinter and at present head coach of the American Olympic Team, fell on a skidding rug and broke his leg while visiting in Brooklyn. We cite this regrettable incident only to stress a point. While you may have some right to jeopardize your own life and limbs, there should be a law to protect those belonging to visiting relatives and friends.

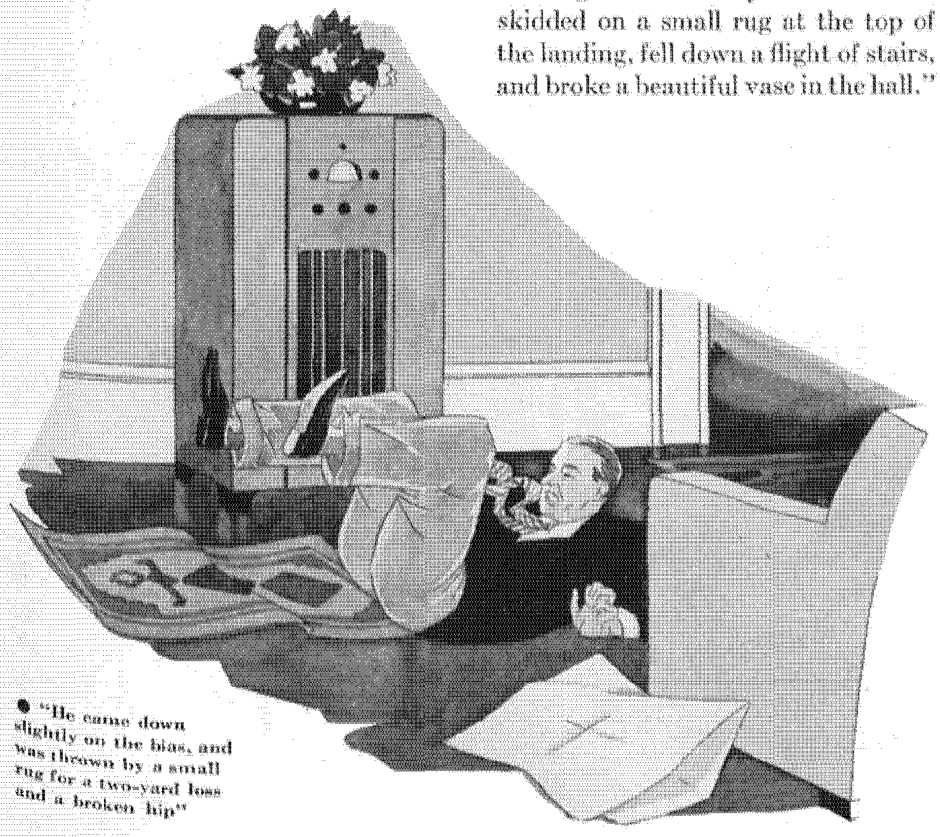
When Notre Dame overwhelmed Ohio State in the final quarter, a gridiron enthusiast in one far-distant city, listening to the broadcast, leaped to his feet in sheer exuberance and with a windmill motion of his arms peculiar to football fans, further propelled himself into the air. He came down slightly on the bias, and was thrown by a small rug for a two-yard loss and a broken hip. The injury was sustained in his home. His wife had, no doubt, placed the rug there, so it is conceivable that we may render a service by bringing this incident out into the open.

Our laudable and courageous efforts to secure the small rug with "Rug Anchor" have led us into some interesting psychological bypaths.

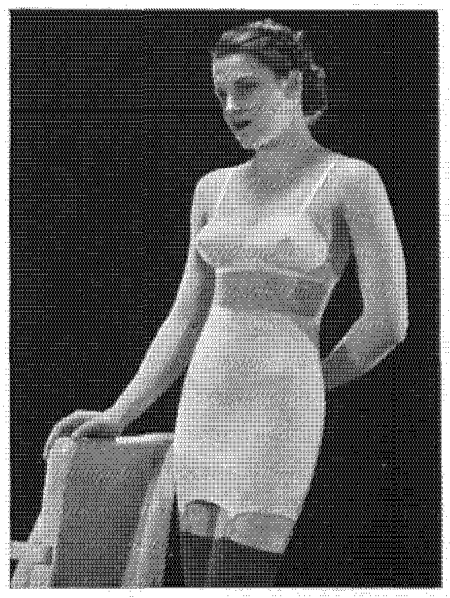
At one time we ran in the columns of the *New York Herald Tribune* and in the magazine section of the *Sunday Times* a series of small advertisements intended to help make the homes of Greater New York safe. We offered to send a small sample of "Rug Anchor" to interested inquirers so they could test it. Although the sales message appeared on the woman's page, it developed that approximately fifty per cent of all the inquiries came from men. Whenever we hear a woman launch a diatribe on men in general, we smile, almost smugly, and remember this incident as one of the points in men's favor. Either he is a humanitarian, or he has the imagination to visualize exactly what a compound fracture of the fibula looks like.

This little article is part of our program. No doubt many will read it and many will pass it by. Those who are interested in the product can get from us a sample of Sponge "Rug Anchor," the finest . . .

Eventually, we shall catch up with the others. Most any day those who read, remembered, but did nothing, will call up and say "Send me a roll of 'Rug Anchor.' My mother-in-law skidded on a small rug at the top of the landing, fell down a flight of stairs, and broke a beautiful vase in the hall."



● "He came down slightly on the bias, and was thrown by a small rug for a two-yard loss and a broken hip"



"Dulux" Goes Feminine

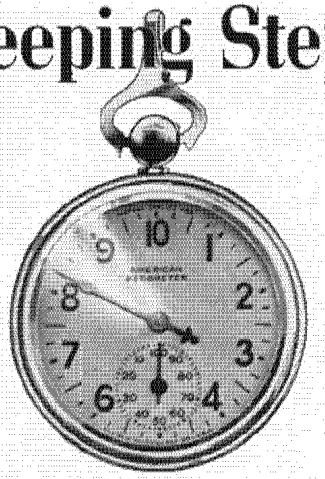
A LITTLE over two years ago there was introduced a garter that answered all the problems of keeping a stocking up with the minimum of strain and no unsightly bulges. This new garter, manufactured by the Inviz-A-Grip Company, Hollywood, California, could be quickly adjusted, and was invisible under any garment.

In the laundry it passed through a clothes wringer without injury to either the fastener or the machine. The device seemed wholly satisfactory in design, but actual wear disclosed a weakness. Women claimed that the enamel flaked off and that the resulting rough surface was irritating to the skin. So many complaints were reported that the makers at one time considered eliminating enamel altogether.

A du Pont technician was called in for a conference on finishes. After studying the problem, he recommended that "Dulux" be used. He then gave special instructions for applying the finish, baking it at a high temperature to insure durability, and scheduling production and inspection.

The results were excellent. Now, if one of these fasteners receives abusive treatment in the laundry or elsewhere, there are no flaking troubles to cause worry, and the finish retains permanently its luster and beauty.

Keeping Step With Time . . . *For over half a century the New Haven Clock Company has maintained the pace set by an ingenious Yankee*



By E. A. SAMPSON

How much of the present tempo of our life is dependent upon the accurate measurement of time can be easily realized by imagining the terrific snarl into which transportation, industrial production, business, radio and other human activities would be plunged, if all timepieces suddenly stopped. The effect would be more startling and immediate than that of the failure of the sun to rise.

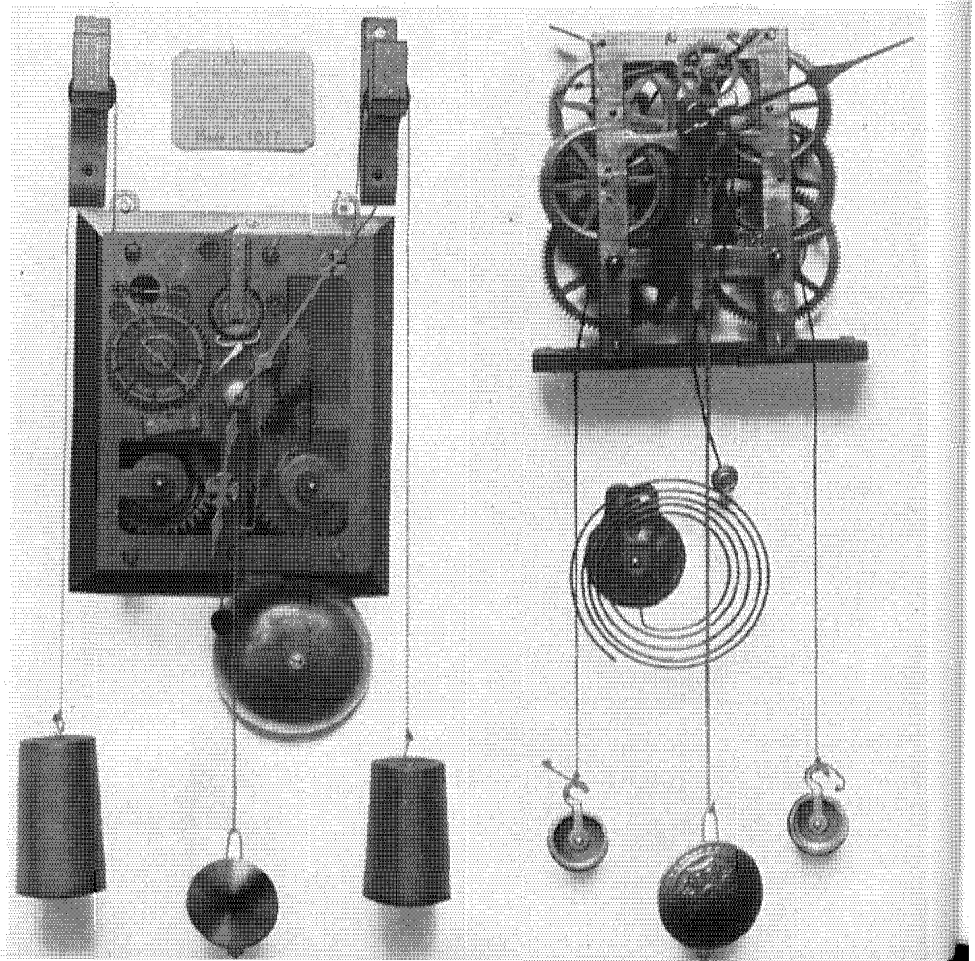
During the past one hundred years ingenious Yankees have brought about many changes in the size, cost and accuracy of timepieces through technological advances and the introduction of mass production methods. In the forefront of this advance has been the New Haven Clock Company, makers of wrist and pocket watches, and automobile, mahogany mantel, office and banjo clocks, stop-watches, pedometers and time switches.

The plant covers the greater part of two city blocks, employs fifteen hundred workers and produces over three million timepieces each year, mostly for the popular-price field. Modern precision machinery and a force of expert workers assemble and adjust parts whose accuracy is measured in ten-thousandths of an inch. Today's routine operations would seem truly miraculous to the workers who slowly fashioned by hand the gears used in our early wooden clocks.

The New Haven Clock Company is the successor to the Jerome Clock Company, founded in Plymouth, Connecticut, by that grand pioneer clock maker, Chauncey Jerome. It was his practice during the winter months to carve the wheels from wood and then travel by wagon and ship from Maine to North Carolina in the summer to sell his clocks. In those days, the average man considered the purchase of a clock an event comparable to buying an automobile today. Aside from keeping time, a clock had to be attractive and pretentious enough to justify the expenditure of forty dollars or more. Even then payment was usually tendered in goods rather than in cash, so that Jerome and other clock makers had to be expert traders before they could get what they needed.

In 1837, Jerome gave a tremendous impetus to clock making by inventing brass movements to replace those of wood. Whereas a one-day wooden timepiece had formerly sold for twelve dollars, Jerome was able to market an eight-day metal clock for one-third that sum. His business grew rapidly both at home and abroad.

The great reduction in price caused a rather amusing incident in 1842, when Jerome made the first shipments of brass clocks to England. The revenue laws of that country permitted the government to seize any imported goods by paying the shipper the invoice price plus ten per cent, the purpose being to force merchants to name the full value of their goods. The price Jerome's representatives placed upon the clocks, however, was



● Right—A one-day wooden clock, made in 1817, with front plate removed to show the wheels and pinions, hand-sawed and filed. Extreme right—An eight-day time, weight and strike brass movement, made in 1860

so low that the officers suspected an attempt to evade import duties. So they decided to teach the clock maker a lesson, and seized two consignments. Jerome, pleased with the neat profit, hopefully sent another lot. But the third proved too much for the officers; they let the Yankee sell his clocks.

In 1844 Jerome established his plant in New Haven because of its shipping facilities. Although a mechanical genius, he was a poor business man. The company sought to expand too rapidly on small capital and was reorganized in 1853 under the present name.

Jerome made and lost a number of fortunes. But late in life, as superintendent of a large watch factory, he could look with pride upon the results of his own work and genius.

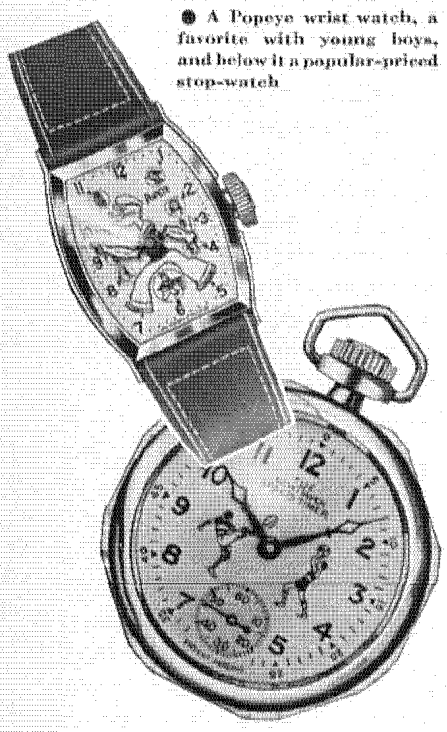
In 1885, the company began the manufacture of inexpensive watches. With the quickened tempo of life and new conditions, workers of all kinds had to know the time in order to follow production schedules, catch trains and keep appointments. Interchangeability of parts and standardized production made possible the "dollar" watches, although the first offerings commanded a somewhat higher price.

● Chauncey Jerome, pioneer clock maker, inventor of brass clock works and founder of the New Haven Clock Company

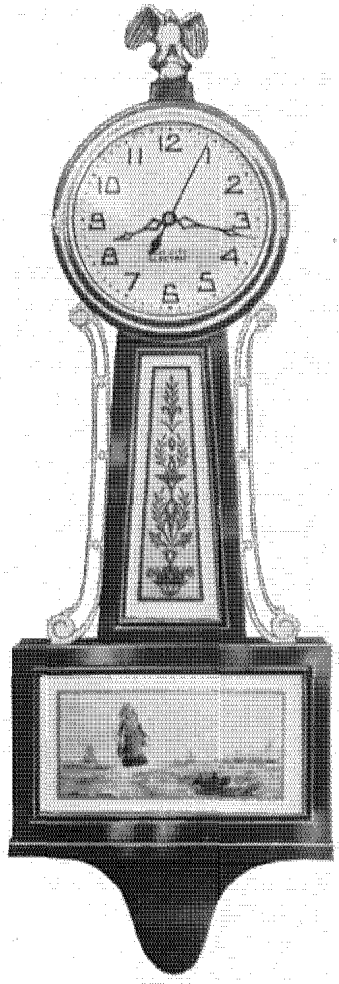
Since 1917, the New Haven Clock Company has been improving its wrist watches, which sprang into popularity during the World War, until now they compare favorably with those in the higher-price levels. Seven-jeweled models have been added this year to supplant the non-jeweled ones.

In 1929 the company introduced synchronous electric clocks, building small motors which ran at a constant speed in response to magnetic cycles received from electric light lines. These excellent time-keepers are now furnished in all types of striking, chiming and time-switch models.

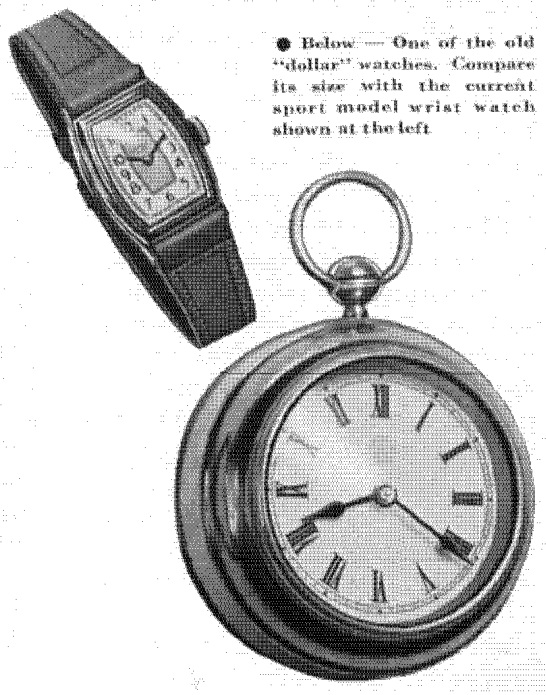
But it has been necessary to be progressive and up-to-date not only along mechanical lines, but also in styles. In response to the new interest in designs largely inspired by the new architecture and furnishings exhibited at the World's Fair, have come new styles in clocks. The company is offering a new group of chiming and striking clocks with modern two-tone metal index dials, gold-plated hands and raised, gold-plated, applied hour indicators. The cases are made from selected Honduras mahogany, carefully inspected for grain and quality, finished in lacquer and hand-rubbed to reveal the fine wood texture. In finishing both the dials and the cases, du Pont finishes are employed. Even the popularity of the comic strips has been recognized in designing wrist watches for children with pictures of Mickey Mouse, Orphan Annie, Popeye and Dick Tracy on the dials.



● A Popeye wrist watch, a favorite with young boys, and below it a popular-priced stop-watch



● Center — Attractive electric banjo clock with hour and half-hour strike. The New Haven Clock Company uses "Dulux," a du Pont finishing material, extensively



● Below — One of the old "dollar" watches. Compare its size with the current sport model wrist watch shown at the left

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E. R. MANCHESTER . . . . . *Editor*

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VOL. XXX MARCH, 1936 NO. 3

The Man and the Hoe

OBVIOUSLY, that might be accepted as a title for the front cover illustration this month. It is reminiscent of Jean Francois Millet's painting of the same name and of Edwin Markham's equally famous poem wherein the farmer was described as "stolid and stunned . . . the emptiness of the ages upon his face." Both are interpretations of French peasant life in the nineteenth century.

But they do not well portray the American farmer of today. He faces many problems, but his outlook is still hopeful. And that is the interpretation we give to the photograph by H. W. Fechner, a reproduction of which appears on the cover page. Warm winds and sunshine have hardly begun to disperse the gloomy clouds of winter, but the farmer is going afield, early in the morning, to work. This year, fortune favoring, he may raise and sell profitable crops.

The nature of his calling gives him a measure of independence, even if it involves accepting more than an average share of risks; for Nature, his partner, is not always kind. Floods, droughts, dust and wind storms, seed and plant diseases and insect pests may cause serious losses; and if he succeeds in harvesting a bumper crop, can he find a satisfactory market for it? That has been at least one of the major problems of great concern to him, particularly in recent years.

We are reminded frequently that agriculture and industry are interdependent; that only as there is an exchange of farm and factory products on mutually advantageous terms can there be prosperity for all. The point may be illustrated by citing the chemical industry which supplies the farmer with commercial fertilizers; with seed disinfectants, germicides, insecticides and other chemicals to combat pests of many kinds; with explosives for farm development work and paints and varnishes for maintenance needs. And in return, the chemical industry looks to agriculture for a great variety of raw materials used in processing work, as will be brought to notice in the accompanying article entitled The Kinship of Du Pont Products.

Foodstuffs for human consumption and other natural products for factory and plant use constitute the chief market outlets for agricultural products. The fact that the chemical industry is already a good customer, with the prospect of becoming a better one in the years to come, must be encouraging to farmers everywhere.

In the Air Service

FOLLOWING extensive experiments conducted for more than a year, the U. S. Army Air Corps has adopted "DuPrene," a du Pont chemically-made rubber, as standard for lining gas- and fuel-line connections and for radiator connections on water-cooled airplane motors. Specifications recently issued require the use of "DuPrene" for these connections instead of natural rubber, which has a tendency to deteriorate.

These connections are used to prevent motor vibration from breaking the fuel and oil lines through crystallization of the metal tubing. In the experiments, "DuPrene" was found to resist deterioration by oil and grease and to be unaffected by anti-freeze solutions in water-cooled motors.

Line connections of this kind have been used by the Bureau of Navy Aeronautics for about a year.

The Little Mississippi

SIXTY feet long, twenty inches wide, twenty-seven inches deep—these are the dimensions of a piece of equipment Professor Straub has installed in the hydraulic laboratory of the University of Minnesota. There are pumps and gates to regulate the flow of water through the glass-lined model, and the forces at work can be observed from all angles. Knowing how the Little Mississippi behaves at low-water, normal and flood stages will doubtless point the way to a solution of many complex engineering problems related to the control of the "Father of Waters" himself.

Modern Perfumes

JUST as a trained musical artist can pick out and hear at will each separate instrument in the orchestra, so the skilled perfumer can distinguish the various odors which go to make up a popular perfume. One of these perfumes may contain fifty to one hundred ingredients. The general pattern upon which they are blended is the one found by thousands of years of experience to be pleasing to humans.

The essential constituents of the perfumes mentioned in the classics and in the Bible are still the mainstay of the perfumers' art. But as interesting new organic chemicals of perfume value are discovered, new varieties appear and have their vogue. *Quelques Fleurs* is said to have signalized the first use of a new synthetic.

BY NO means are all of the really fine perfumes extracted from flowers. The fact is, many chemically-made products yield odors that rival nature's own and even excel them. One of the most striking examples is a du Pont chemical named hydroxycitronellal. This compound, when first discovered, was kept a secret by the inventor, who enhanced the properties of a flower extract by adding the chemical to it. None could imitate or equal this sophisticated extract until eventually the secret was discovered.

The Kinship of Du Pont Products . . .

BETTER THINGS *for* BETTER LIVING . . . THROUGH CHEMISTRY

DU PONT

REG. U. S. PAT. OFF.

Producers of Chemical Products since 1802

A-6523△

PRINTED IN U. S. A.

PREFACE

So many colleges and universities have expressed a desire to have a diagrammatic chart showing The Kinship of Du Pont Products that one has been prepared especially for class-room use, and a reproduction of it has been included in this book.

Space limitations have precluded specific reference to all of the company's products or to the processes employed. And for the sake of simplicity of design and legibility we have of necessity omitted mentioning some of the relationships. But the chart will enable students to visualize the more direct ties that bind these products together into closely integrated groups, some of which can be traced back to the use of a single raw material, such as cellulose. Others during the process stages are subjected to the same or essentially the same chemical treatments, and thus become related in that way. Still others are closely related in use as will be pointed out in the accompanying article.

It is hoped that the information set forth graphically and in the text will be helpful to students of chemistry and to those who handle or use du Pont products.

The Kinship of Du Pont Products

Our country has assumed world leadership in industrial development during the past seventy-five years because of the diversity of its products and the efficiency with which they are manufactured. Nature endowed our nation with a varied and abundant supply of raw materials, but industry must be credited with adapting them to the needs of our every-day life. Our chemical industry occupies an important position because of the great diversity of its products and because many of them are necessary raw materials for other industries.

The accompanying chart indicates graphically the methods employed in processing a few raw materials in order to obtain the intermediate products which define the major lines of the company's activities. The steps involved may generally be classified as, first, the preparation of the chemicals necessary for the manufacture of the intermediate products from raw materials; second, the production of materials which are formed simultaneously in the efficient production of the major intermediate compounds; and third, the conversion of these materials into finished products.

The central portion of the chart, starting at the left, contains a diagrammatic display indicating the conversion of raw materials into intermediate products. These, in turn, are further processed into various classes of finished products which are shown at the right. The illustrations in the panels adjoining the chart give more detailed information about the various processes, types of products and their uses, and the outer panels show under group headings their names.

For the sake of simplicity we have had to omit many of the interesting relationships existing between these products. But in one way or another some of the ties of kinship will be disclosed as we follow the chart and see in more detail how they are developed.

Saltpeter—Sulfur—Charcoal

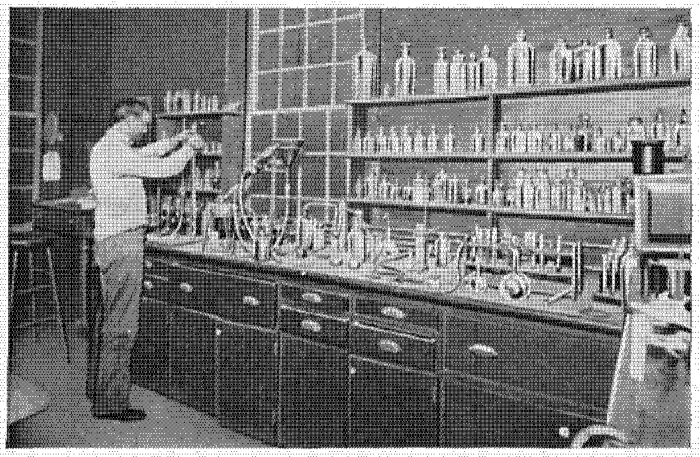
Note first the ingredients used in the manufacture of black powder. For many years this product was the only explosive used in ammunition and blasting; it still serves in many useful ways. However, the advent of nitrated products—for example, the nitroglycerin employed in dynamite, and nitrocellulose in smokeless powder—not only marked an advance in the field of explosives by making possible more adaptable types for mining, construction and agricultural needs, but also gave us other products with a broad range of applications. At the same time this stimulated the development of efficient processes for the manufacture of nitration chemicals, that is, nitric and sulfuric acids.

Air—Water—Coal

Let us study for a moment the modern process for making nitric acid because it is one of our best examples of the efficient utilization of raw materials. Air, water and coal supply the nitrogen and hydrogen which are chemically combined to form ammonia and the oxygen, hydrogen and carbon from which alcohols are made. These consist of methanol and higher-molecular-weight alcohols, the former being used as an anti-freeze and for the preparation of formaldehyde, while the higher alcohols are used in racing fuels for outboard motors, as denaturants for alcohol and as solvents and plasticizers.

The fixation of atmospheric nitrogen with hydrogen to form ammonia is the preliminary reaction in the nitric acid synthesis which is accomplished by the oxidation of ammonia. Ammonia synthesis, however, is of great importance, not so much because it makes us independent of foreign nitrates as a source of nitric acid, but rather because ammonia itself is made available in unlimited quantities for use as a refriger-

● Du Pont chemists work on many problems connected with the development of new products, the improvement of old ones and the control of plant processes. This view was taken in one of the laboratories of the Fabrics and Finishes Department



● Interior of the Repauno Laboratory, from a photograph made in 1895. The du Pont Company conducted some of its first research work in this building

ant and in the fertilizer and other chemical industries.

Urea is synthesized by chemically combining ammonia and carbon dioxide, thus giving us another form of nitrogen for use in fertilizers, and, along with formaldehyde, in resins and plastics of the type used in manufacturing unbreakable dishes. The panel entitled Ammonia indicates the various steps in the nitrogen fixation process.

We mentioned previously the importance of the nitration reaction in the chemical industry. Now we find that the nitration of glycerin and the neutralization of ammonia —to yield nitroglycerin and ammonium nitrate, respectively—furnish two important ingredients of dynamite. These and others are shown in one of the panels. This explosive in agricultural, construction and mining work requires, in addition to expert technical service, such accessories as detonators, fuses and blasting machines. There are more than a dozen different types of dynamite, and a variety of grades and sizes available to the consuming industries. Merely to mention coal and metal mining, tunneling, quarrying, dam building, ditch blasting, deepening rivers and harbors and settling highway fills is to suggest that the product must be adapted to meet a wide range of special requirements.

It should be pointed out that since the chart was prepared, a new blasting agent, based on ammonium nitrate, has been developed by our Explosives Department. This product, named "Nitramon," represents an important advance, for it can be handled and shipped with perfect safety. In fact, it is so insensitive to shock that it cannot be set off directly by a dynamite cap. Under actual conditions of use it is detonated by a special "Nitramon" primer.

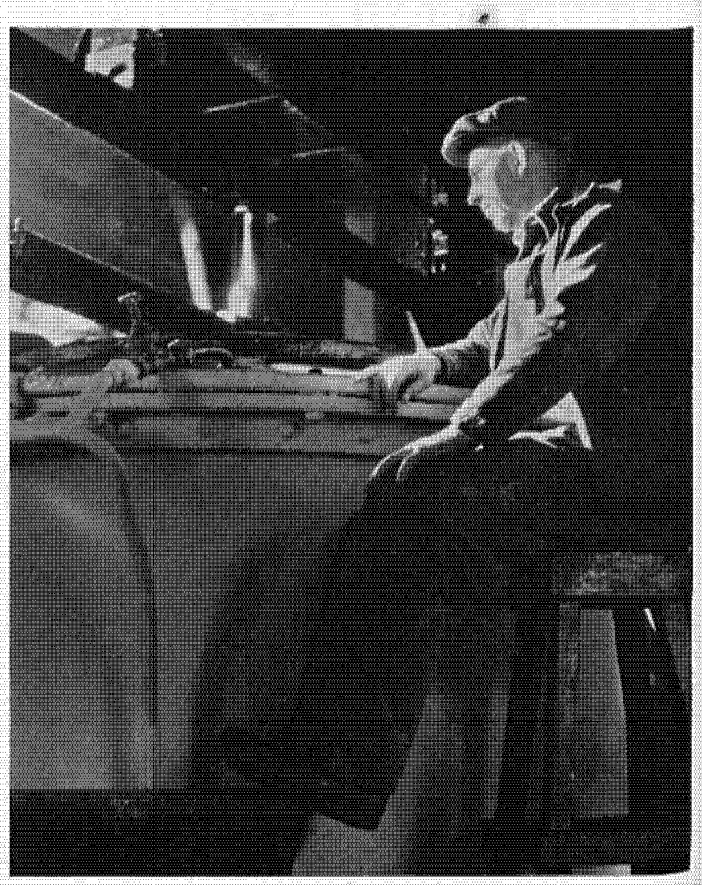
Additional nitration products dependent upon nitric acid are indicated on the chart as T.N.T., dye intermediates—which will be discussed later—and nitrocellulose. It must be remembered that the nitration process also requires the use of sulfuric acid, and this relationship should be kept in mind.

● Nitration is a key process in many du Pont plants. Here the operator is making nitroglycerin. Through a glass window he watches and controls with extreme care the reaction between glycerin and mixed nitric and sulfuric acids

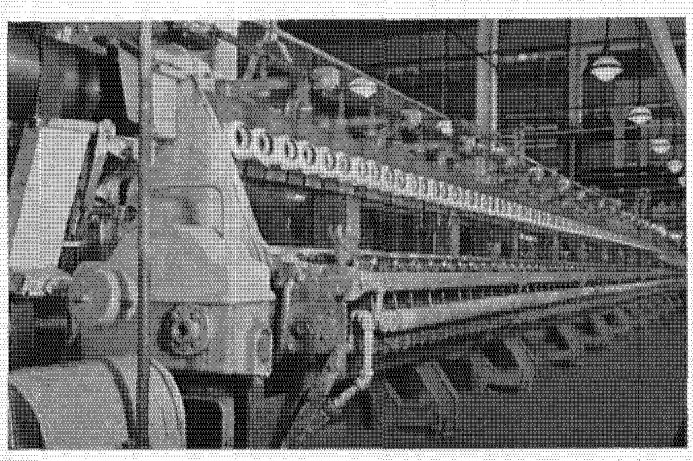
Cellulose—Wood and Cotton

Nitrocellulose

The next raw material to be considered is cellulose, the base for a number of important chemical products, one of the most interesting and valuable of which is nitrocellulose. From this one product several allied industries have sprung up. Nitrocellulose has been manufactured for many years as an essential ingredient of smokeless powder. More recently, systematic research and development proved that it had important uses in many other fields; for example, in "Pyralin" plastics—toiletware, safety glass, fountain pens, non-scuffable shoe heels; "Fabrikoid" coated fabrics; cements for household and industrial uses; films for use in X-rays, moving pictures and photographs; and as the base of "Duco" finishes. In each field it has been necessary to develop new or special materials in order best to adapt the nitrocellulose to its particular use. The "Pyralin" panel indicates the method of manufacture and shows various uses of nitrocellulose as a plastic. Two ingredients of "Pyralin"—camphor and dyestuffs—are of special importance, the first in manufac-



● Within these sturdy-looking machines an amazing transformation takes place. Through tiny holes in a spinneret the syrupy fluid, viscose, is forced into an acid bath and in a twinkling the liquid is changed to solid filaments of rayon



turing the product; the second, in adding the charm of color to it, but more about that later.

The applications of smokeless powder are suggested graphically in the panel, showing shells, cartridges, target equipment, such as clay pigeons and traps, rifles and shotguns of various types—all of them definitely related products, meeting the demands of people who enjoy hunting, trapshooting, Skeet, Gofort and other sports. But the point to be remembered is that smokeless powder belongs to the nitrocellulose group of products.

The panel entitled Pyroxylin-Coated Fabrics shows the application of nitrocellulose in the coated-fabric field, and indicates that such materials as softeners—some of which are vegetable oils—and pigments are necessary ingredients of "Fabrikoid." The panel beside it, Rubber-Coated Fabrics, illustrates another type of coated material, which better fulfills certain specific needs such as for raincoats, hospital sheeting and the like. And in this connection, the use of rubber chemicals such as accelerators and antioxidants, should also be remembered; they will be discussed later.

The application of nitrocellulose in "Duco" finishes is shown on another panel entitled Protective Coatings. Years before the development of "Duco" there had been finishes such as paints, enamels and varnishes, each requiring its special ingredients from the classes of drying oils, resins, pigments, solvents and the like. "Dulux" finishes, which will be discussed later, and "Duco" are used extensively on automobiles. The Du Pont "No. 7" Chemical Specialties line includes cleaners, polishes and waxes to preserve and maintain the beauty of the original finish.

Cellulose Acetate

Another important and related group of products is formed by the action of an acid upon cellulose, in this case acetic acid and acetic anhydride. Cellulose acetate readily adapts itself to use as a plastic, "Plastacele," for combs and lampshades; in safety glass and in photographic film, Du Pont Safety Film for use in home "movies." Cellulose acetate is a particularly useful textile material when spun into "Acele" yarn, which is fabricated into high-grade women's garments, linings for suits, and upholstery materials.

Coating screen wire with a cellulose acetate solution yields still another finished product named "Cel-O-Glass," which is more transparent to solar ultra-violet light than ordinary window glass. It finds application in the construction of hospital porches, poultry houses, hot-houses and cold frames. How the various cellulose-acetate products are produced is indicated in the panel entitled "Acele" and "Plastacele."

Cellulose Xanthate

The third important development in which cellulose is the raw material is shown as Viscose. The treatment of cellulose with sodium hydroxide obtained from salt, and carbon disulfide synthesized from coke and sulfur, converts the cellulose into cellulose xanthate, a caustic solution of which is termed viscose. Following its extrusion through a suitable orifice, the cellulose is regenerated, by an acid bath, in the form of either "Cellophane" cellulose film, caps and bands for bottles—"Cel-O-Seal"—or the filaments we know as rayon. The diagram referring to these processes and to some of the uses of these materials is shown in the panel entitled "Cellophane" and Rayon.

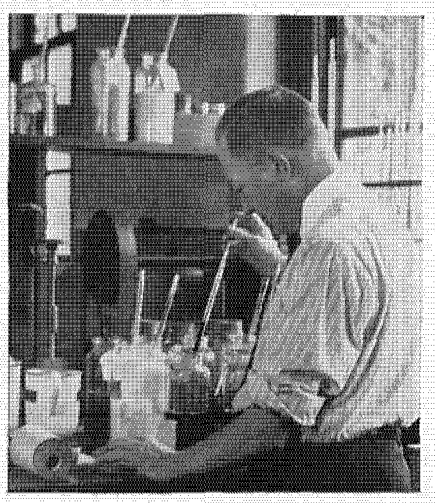
Salt

From salt as a raw material has come some of the most interesting and important chemical developments of recent years. The four chief products obtained from it are sodium hydroxide, elemental sodium, hydrochloric acid and chlorine. The importance of the first one named in the viscose process has been shown. It is one of the heavy chemicals with many and far-reaching uses. Elemental sodium until recent years had few industrial applications, but now it has assumed an important place in the chemical industry. As indicated on the chart, sodium cyanide furnishes the plant disinfectant, hydrocyanic acid; this and other cyanides supply various industries with electroplating and case-hardening compounds. The oxidation of sodium yields sodium peroxide, an important bleaching and oxidizing agent which, in turn, leads to sodium perborate, an important ingredient of dentifrices.

You will also note that an alloy of sodium and lead reacts with ethyl chloride to form lead tetraethyl, which is added to gasoline to prevent "knocking." As a matter of fact, ethyl gasoline has made it possible to attain the high compressions now used in our present automobile engines. Ethyl chloride is prepared from hydrochloric acid and alcohol which has its origin in molasses. The use of salt and molasses to improve gasoline appears

strange, but the relationship of these raw materials to anti-knock gasoline is made clear by the above facts. Other chemicals to improve the performance and quality of gasoline naturally followed the development of lead tetraethyl, and these products are shown in the Gasoline Chemicals panel.

Returning to salt and hydrochloric acid on the chart, we find that from polymerized acetylene and hydrochloric acid we obtain a truly chemically-made rubber, "DuPrene." Space does not permit telling the complete story of this triumph in research and chemical engineering. We can only say that "DuPrene" is a material for which the essential constituents are derived from coal, limestone and salt. The first two furnish the calcium carbide from which the acetylene is generated. "DuPrene" equals the product of the rubber tree and in many ways excels it. Applications of "DuPrene" are shown in the panel under that name.



● Dyestuffs are indispensable in the textile industry. Their manufacture calls for the services of many trained chemists. In this picture you see one of them at work testing dyes in a du Pont laboratory at Deepwater Point, New Jersey

Salt supplies us with another important industrial chemical, chlorine, which reacts with acetylene and other hydrocarbons to give chlorinated hydrocarbons. These include the refrigerants, methyl chloride, trade-marked "Artic" and ethyl chloride; also dry-cleaning solvents trade-marked "Tri-Clene" and "Per-Clene." The former, trichlorethylene, is used for degreasing metal surfaces. Others are shown in two panels at the right side.

Molasses

We have already referred to molasses as the source of alcohol. In the chemical industry and in the synthesis of solvents for lacquers and other organic materials, alcohol finds many uses. Lactic acid, another product obtained from molasses, is used in the preparation of various foodstuffs, and also in synthesizing lacquer solvents.

Vegetable Oils

We have mentioned the development of protective coatings in connection with "Duco" finishes. Now let us consider another class of raw materials, vegetable oils, from which is derived glycerin, an important chemical intermediate. Its relationship to dynamite has already been noted. Glycerin and phthalic anhydride react to form a resinous substance, glyceryl phthalate. A study of this substance in combinations with linseed oil and other vegetable oils has opened up a new field of synthetic resins —"Dulux"—in which great advances have been made in recent years. The older types of paints, enamels and varnishes have a common bond with "Dulux" finishes through vegetable oils.

One recent development in the utilization of vegetable and animal oils was made possible by the hydrogenation of the fatty acids in them to yield high-molecular-weight alcohols. These so-called fatty alcohols are converted into acid alkyl sulfates, the sodium salts of which—the "Gardinols" and "Avirols"—together with alkylated aromatic sulfonic acids—"Alkanols"—have found wide application in the textile industry. The "Gardinols" are excellent detergents replacing ordinary soaps, and they are particularly desirable for use in hard water. The "Avirols" are used as softeners in the finishing of fabrics, while the "Alkanols" serve as wetting agents. Representative products of this type are indicated on the chart under Textile Specialties.

Coal Tar—Petroleum—Vegetable Raw Materials

Next, let us consider some raw materials of mineral origin—coal tar and petroleum—and others of vegetable origin. From them are produced a great variety of compounds which, for the sake of brevity, we have arranged into two general classes—Miscellaneous Organic Intermediates, and Dyestuffs Intermediates. In the first class we find the fatty alcohols, essential oils and esters yielding perfume bases; also, esters and hydrogenated coal-tar compounds yielding solvents and plasticizers which you will recall are employed in the manufacture of cellulose products.

Further, the manufacture of synthetic camphor from turpentine is one of the outstanding chemical developments in recent years. Previously, camphor for pharmaceutical and industrial uses was distilled from the wood of camphor trees growing in the Orient. Now, most of the camphor consumed in this country is made from turpentine produced in the South.

Another derivative in the group of miscellaneous organic intermediates under discussion is ergosterol, and from this compound is derived vitamin D, which is used for the treatment and prevention of the disease called rickets.

The second class, dyestuffs intermediates, is so closely identified with the development of the chemical industry during the past twenty years that it warrants separate consideration. Our present independence from foreign supplies has been gained within that period, despite the fact that European competition was based on some eighty years of experience in developing dyestuffs. Intensive work by the du Pont Company and others in this field has

resulted in an American industry that is now supplying a large percentage of the dyes consumed in this country. And along with their development other important applications have been found for dyestuffs intermediates, some of which are indicated in the border panels under Photographic Chemicals and Rubber Chemicals. One panel shows a few of the intermediates used in the manufacture of dyes that find application in textiles, paper, leather, plastics, rubber, inks and protective coatings. The dyestuffs industry carries on intensive research to meet the demand for new colors for products of all kinds, both old and new.

To illustrate the importance of rubber chemicals, we need only to mention that the life of automobile tires has been greatly prolonged in spite of the fact that service conditions have become increasingly severe. In the early days no motorist expected, or obtained, more than 3000 or 4000 miles out of a tire; nowadays, 18,000 miles is probably a fair average for tires on pleasure cars. This improvement in the quality of rubber products has come about largely through research in the field of rubber chemicals and rubber compounding.

Sulfur—Air—Water

Sulfuric acid was mentioned briefly in connection with nitration processes, but this chemical is employed so extensively that we have given it a special place on the chart. Following the lines extended from the heading, the reader may grasp at least some idea of the industrial importance of this product. It has been said truly that the civilization of a nation may be gauged by the amount of sulfuric acid it consumes. One illustrated panel indicates the steps in the manufacture of this acid by the contact process.

Miscellaneous Ores—Inorganic Raw Materials

The diagram that starts with this caption shows the diversity of fields that are served by chemical products having as their origin a comparatively small number of inorganic raw materials. These are converted into intermediate compounds, as indicated, and then developed into products whose names and uses are shown at the right. The relationship of pigments to other products will be recalled in the fields of plastics, coated fabrics and protective coatings, while the insecticides, ceramic materials, plating compounds and the like will suggest the wide range of industrial needs that have been met as a result of chemically processing such materials. Salt and fluorspar, as such, have little in common, although both are found in nature; but, as the chart shows, they have been chemically transformed, the first, into chlorinated hydrocarbons and the second into halogenated hydrocarbons containing chlorine and fluorine, and the result is, two types of refrigerants. Here, again, is an instance of kinship that finally becomes apparent. Examples of various products mentioned in the chart will be found under their proper headings in the border panels.

You have seen how the du Pont organization, through chemical research and engineering, has developed from relatively few basic raw materials a large number of commercial products. Because they are so diverse in form, appearance, properties and uses, people think of them as wholly unrelated. But the fact is, the ties of kinship between them are much closer than they seem to be. You have observed that many of these products are made from essentially the same raw materials and that others are produced by following the same or nearly the same chemical technique. It is also true that the knowledge and experience gained in manufacturing one group of products has been applied cumulatively in the development of others logically within the scope of the company's activities.

If a study of this chart has clarified your understanding of the relationships existing between du Pont products, it has fulfilled one objective. We hope it has also given you

● A view in the packing room of the camphor plant at Deepwater Point, N. J. The finished product, chemically made from turpentine, is packed in barrels for shipment as shown here

a more complete picture of the service this organization renders in converting raw materials of nature into some 4,000 chemical products which are consumed by more than 100 different branches of American industry.

The arrow-heads on this chart point only one way. Another interesting chart might be shown, if space permitted, with indicators pointing back to sources of raw materials. It would reveal the du Pont organization as a large consumer of products mined in the earth and of others grown on farms. In this connection we call your attention to the following tabulation:

Agricultural Commodities Used in the Manufacture of Du Pont Products

COTTON—16,500,000 pounds of cotton, representing the yield of 100,000 acres, are used annually for the manufacture of such products as "Fabrikoid" coated fabrics for book bindings, pocketbooks, tablecloths, upholstery materials, and luggage; also rubber-coated fabrics including raincoat materials, hospital sheeting, "Rug Anchor" and "Ventube" mine-ventilation tubing.

COTTONSEED OIL—700,000 pounds of cottonseed oil, representing the oil yield of 18,000 acres of cotton, are used annually in manufacturing various du Pont chemical products, notably those belonging to the fabrics and finishes classifications.

COTTON LINTERS—36,000,000 pounds of cotton linters, representing the linter yield of 2,175,000 acres of cotton, are used annually in the manufacture of such products as "Pyralin" and "Plastacele," which are employed in the manufacture of safety glass, toiletware, lampshades, scuffless heels, fountain pens and other items; "Cel-O-Glass," used in poultry houses and cold frames; smokeless powders for shotgun, rifle and pistol ammunition made by Remington, Peters and other well-known manufacturers; "Acele" yarn for high-grade dress fabrics, finished garments; men's and women's suit linings, and other uses; "Duco" Household Cement; commercial motion picture film; X-ray film; "Duco" and "Fabrikoid."

CORN PRODUCTS—From 36,000,000 bushels of corn, representing the yield of 1,400,000 acres. These products are used annually in the manufacture of such commodities as explosives for construction, mining, and agriculture; and solvents for paints, varnishes and other finishes.

WOOD PULP—38,000 tons of pulp from thousands of acres of timber are used in the manufacture of such products as rayon yarn for dress fabrics, finished garments, upholstery fabrics; and "Cellophane" cellulose film, widely used as a wrapping material and for drapes, homecraft articles, lampshades, handbags, hats and the like.

MOLASSES—40,000,000 gallons of molasses, representing the yield of 200,000 acres of sugar cane, are used annually in the manufacture of alcohol, a solvent with many industrial uses; Du Pont Denatured Anti-Freeze Alcohol, and Du Pont "Five Star" Anti-Freeze.

VEGETABLE OILS—23,000,000 pounds of oil extracted from flax-seed, soya beans and tung nuts representing the annual yield of 136,000 acres of land. These oils are used in manufacturing such products as "Dulux" finishes for refrigerators, automobiles and boats, the maintenance of plant machinery and building interiors, and for "Duco" finishes.

TURPENTINE AND ROSIN—6,500,000 pounds, representing the yield from thousands of acres of Southern pine trees and stumps. Turpentine is used extensively in the manufacture of synthetic camphor, which is employed in making combs, handbags, hair ornaments, motion picture film and other products. Both turpentine and rosin are used in making paints and varnishes.

The foregoing data show that the du Pont organization is a good customer of the farmer. Meanwhile, du Pont contributions to the business of farming are explosives for development operations; seed disinfectants of various kinds; insecticides, fungicides and fertilizer ingredients; paints, varnishes, lacquers and an extended list of other materials, many of which the farmer never knows by name, for their identity is lost in the processes of manufacturing things that he uses daily.

In a word, the kinship of du Pont products has its parallel in the close relationship existing between the chemical industry and other industries. They are all contributors to and beneficiaries of the work and services performed. And the ties that bind each to the other are helping to achieve the objective expressed in the phrase, "Better things for better living . . . through Chemistry."

DU PONT

REG. U.S. PAT. OFF.

E. I. DU PONT DE NEMOURS & COMPANY, INC.

WILMINGTON, DELAWARE

Makers of Chemical Products Since 1802

THE PUBLISHING PARADE

Books are like people; becomingly dressed, they command favorable attention

For years, du Pont "Fabrikoid" has been the standard binding for sets of books, and has long been the favorite for school texts. More recently this pyroxylin-coated fabric and its close relative du Pont "PX" Cloth have, as you may have noticed on some of your cherished purchases, also earned secure places on "trade books"—novels, biographies, essays and the like.

It was to be expected that these materials on such volumes should come into use later than on sets and educational books; this, because in buying the collected works of an author, one considers the investment for some time, in relation to appearance and wearing values. In the case of school text-books, the factors of durability and cleanliness are of great importance. With a current book, however, the subject matter receives so much attention that one is apt to overlook its physical makeup. Of late, however, those who buy the general run of books have become more discriminating critics of typography, paper, binding and design. Publishers have responded to this trend by making the formats of their offerings more pleasing and by giving more attention to tasteful designing.

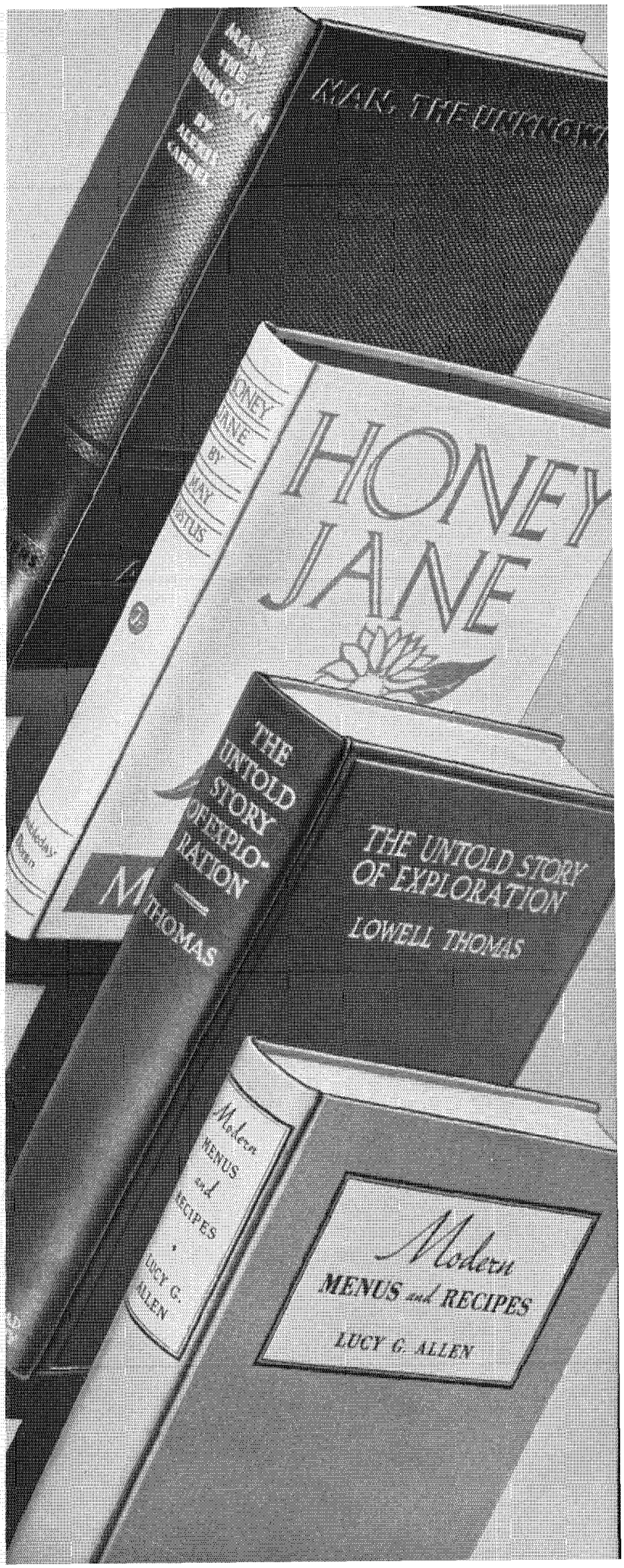
Not so long ago, most publishers of trade books were exploiting flamboyant paper jackets. Human interest and drama were played up in lurid colors to bring quick sales. Now, because of the change in buying habits, the jacket has been restored to its original function as a dust wrapper, and the binding is made a thing of beauty.

It must be admitted that contemporary books are bought mainly because they are "of the hour," yet very few of them are intentionally destroyed after reading; they are kept to add color to the home.

Among the chief appeals of a trade book are significance, worth, quality. If bindings with character and distinction are employed on such volumes, these impressions are intensified when the purchaser first sees the book and they continue as long as it remains in his library.

Quoting Frank Spur, of the Columbia University Press, whose work has added much to the fine appearance of many a book-shelf: "My selection of binding cloths is, in addition to considerations of color and grain suitability, made on the basis of constant wear and tear. I consider pyroxylin-coated fabrics as a step in the right direction, since they are water-, moisture- and vermin-proof."

The books shown on this page are bound in either du Pont "PX" Cloth or "Fabrikoid," both attractive materials that are tough, washable and adaptable to the aims of the designer, and to the service needs of book lovers everywhere.



How Safe Is a Bed?

Here is the story of two men who knew the answer and decided to do something about it

PERHAPS if we rode to work in our beds, we would be more particular about them, but in the status they have held through the ages they have been looked upon as necessary evils, to be avoided as long as possible. Improvements to beds, despite their importance, have come slowly.

On ancient Egyptian monuments can be found depicted beds used long before Christ. They were strikingly similar to our own—raised wooden frames upon which rested wickerwork of palm fibers supporting fabric-coated mattresses of dried rushes. Since then some refinements, such as metal springs and softer fabrics, have come, but the hazards of fire, vermin and infection remained unchallenged until recently when the *Sleepsafe* mattress appeared.

This revolutionary product was originally proposed several years ago by two veterans in the bedding field—Joseph Ewing and Howard Barker, of New York City. They planned a mattress of fine quality and comfort that would be fire-resistant, sterilized and vermin-repellent — three important factors of sanitation and health.

Fireproofing would eliminate thousands of catastrophes each year in homes, hotels, institutions and on board ships. Dwelling-house fires account for the loss of nearly 7,000 lives annually, in this country alone. And of these, 1,800 are lost directly or indirectly through fires that start in bedrooms. A sure way for a person to endanger his life and provide material for a gruesome news story has been to retire with a lighted cigarette or cigar in his mouth.

The importance of making a mattress vermin-repellent is obvious. Sterilization is a safeguard against any contagious diseases that might be carried by the materials in a mattress.

After studying the methods of a number of manufacturers, Messrs. Ewing and Barker enlisted the aid of The Grasselli Chemical Company, Inc., of Cleveland, Ohio. The main problem was to find some means of rendering the fabrics fireproof without injury to or stiffening of the fibers. The cotton felt was the most troublesome, for all known treatments left it brittle and unworkable. Finally, after scores of experiments, the chemists and manufacturers announced a process unlike any other previously developed.

By this new method, the cotton felt, ticking, tape and all other materials are rendered strongly fire-resistant, vermin-repellent and clean without material change of sheen, luster, strength, life or elasticity. The formula contains a flexing agent that prevents brittleness in the cotton, which is treated by the F. Burkart Manufacturing Company, at St. Louis, Missouri. Also present is a chemical that definitely repels vermin, although it cannot be detected by the human senses. The fabrics are treated by immersion in water at more than 200 degrees Fahrenheit and by the drying process, which employs a high temperature.

Neither a lighted cigarette nor a flaming blow-torch will set the materials afire after their chemical bath. Of course, one does not ordinarily play around beds with a gasoline torch, but burning cigarettes, cigars, pipes and matches are quite plausible. Curling- and pressing-irons also have started many a disastrous fire.

In addition to the exclusive features previously mentioned, the *Sleepsafe* mattress offers fine quality, comfort and styling. Each is of innerspring construction that assures sound, restful sleep. All materials are of high grade, and 600 vents in the prebuilt border provide thorough air vitalization. Some of the most popular styles are in green, rose, orchid or blue tickings woven of Du Pont Rayon yarn.

This is another instance of rayon being chosen for its beauty, strength and fast color. Its use in the home for drapes, tapestries and lace curtains has long been familiar to all. For mattresses, rayon fabrics are desirable because, in addition to their strength, they are rich to the touch and their texture lends an atmosphere of luxury.

Of interest to hospitals and other institutions is the fact that this mattress can be placed in steam sterilizers repeatedly without affecting its original vermin- or fire-repellent properties.

To market their product, Ewing and Barker have formed the Sleepsafe Industries, Inc., 101 Park Avenue, New York City.

● Philadelphia fire officials test the *Sleepsafe* at Gimbel's. Left to right: Chief Dixon, Hugo Listener, of Gimbel's, Joseph Ewing and Commissioner Mulhern.

The "Voice of Safety"

. . . . an effective means of keeping drivers and pedestrians aware of their responsibilities

By THOMAS J. WOLFE, Director of Public Safety, Jersey City, New Jersey

BEFORE the "head" of the second annual parade of the Jersey City Police Department Safety League on June 10 last year came around the curve into Journal Square, to the ears of the expectant crowds assembled along the curbs of the Boulevard was borne a resonant voice, amplified thousands of times.

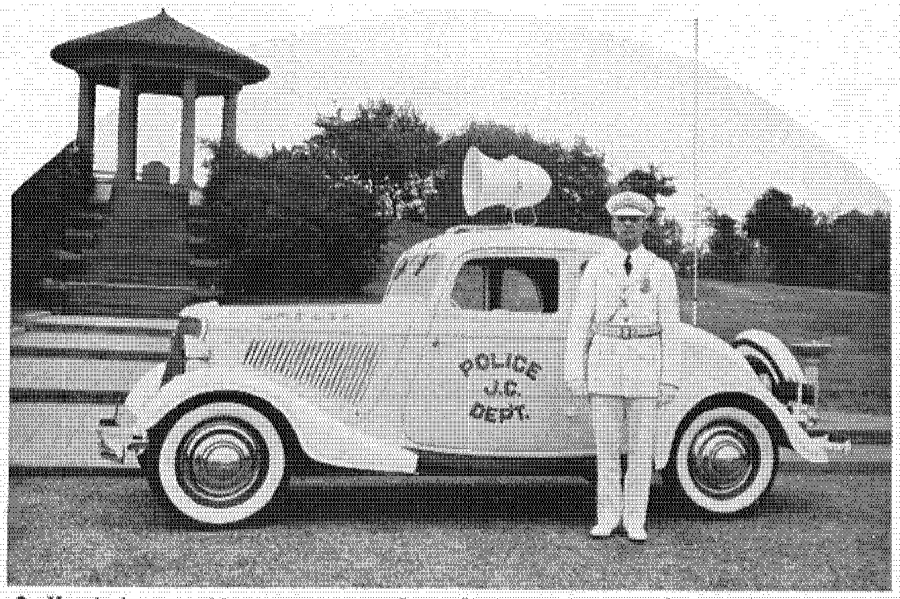
A few moments later, a rather splendid, small, white car appeared, and, as it passed the reviewing stand, the spectators saw on each side of the hood, in large and glittering letters, the inscription, "Voice of Safety." From a gaping amplifier on the roof came vivid phrases describing the dangers of careless driving and the hazards of "jay walking."

In this parade, which marked the end of the second year of an intensive drive on motor-vehicle accidents by the Jersey City Police Department, the "Voice of Safety" made its first official public appearance.

Up to within a month of its début, the little car, then painted in conventional police green, carried two radio patrolmen on regular posts, ready for action whether they received emergency calls or routine messages from headquarters or the various precincts.

Then, one day it was sent to the repair shop with suggestions from the writer. Several weeks later it rolled out—completely changed. The green had given way to dazzling Du Pont "Dulux" White; red and gold letters had been added; the antenna and all metal accessories and fixtures had been chromium-plated, and even the wheels were cushioned with white tires. Red leather had replaced the saffron-hued upholstery and an amplifier had been mounted on the roof.

The "Voice of Safety" is equipped with two-way police radio, has two microphones and its amplifier will carry the human voice a distance of three blocks or more. The operator may remain silent, but, by turning a switch, he can relay messages from the transmitting station at police headquarters. All power for the apparatus is self-contained and is derived from batteries carried in the car.



● Here is the car and its natty operator—Jersey City's contribution to the intensive campaign to reduce the number of automobile accidents as a result of carelessness.

This mobile unit is an impressive-looking vehicle, but the splendor of the car is equaled by that of its human occupant. The policeman assigned to operate it, selected for his intelligence and clear speech, is appareled in a uniform of pure white, with buttons of shining brass, golden chevrons and immaculate white Sam Browne belt, puttees and shoes.

Since the parade, the little car has been constantly on the streets of Jersey City, spreading the gospel of safety. Many thoughtless motorists and "jay-walking" pedestrians have been startled by a stentorian warning not to do any of the thousand-and-one things which are responsible for so many deaths and serious injuries in the United States each year.

While some individuals, no doubt, have felt embarrassed to have their infractions announced so publicly, the reaction has been generally wholesome and remarkably free from any lasting resentment. Without question, the possible presence of the "Voice of Safety" in any part of the city has made motorists and pedestrians think twice before doing anything that would imperil human lives.

The car has been of inestimable value in the campaign for highway safety. It is often parked at points in the city notorious for the frequency of accidents, with the result that great improvements have been made. During the luncheon hour, talks are given to hundreds of workers at industrial plants and commercial houses.

This car helps to supplement the work of the Safety League, which holds monthly meetings in the city schools. It also serves, between meetings, as a reminder that everyone must be vigilant and careful, if the ghastly toll of motor-car fatalities each year is to be reduced.

● Crisping in the oven improves their flavor

They're Reaching For Rolls

Delicious kinds, packaged in "Cellophane" cellulose film, are now sold at almost every grocery store

By M. C. POLLOCK

"WOULD you like rolls or bread, please?" the waitress asks.

Answers show that a surprisingly large number of people prefer rolls with their meals—that is, when dining out to vary the routine of life.

Until recently, however, it was a different story at home. There, they were not served nearly as often. A recent consumer survey conducted in the eastern part of the country showed that only forty-nine per cent of the people interviewed were in the habit of serving rolls frequently.

More and more bakers now recognize that people do like rolls and have therefore been striving to make these products just as tasty and delicious as those baked in the home or in our finest restaurants.

Now Mrs. Housewife can buy delicious rolls right in the grocery store where she obtains most of her other foods for the family table.

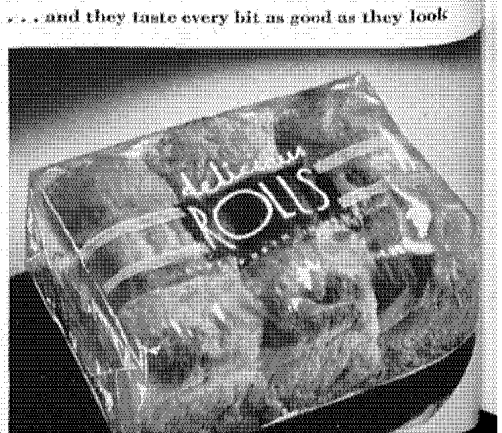
And what a variety there is to select from! Frankfurt rolls made famous by the "hot dog" and now used both with and without the frankfurter; Parker House rolls, which originated many years ago in the famous Boston hotel of that name; White House rolls developed by a cook employed by one of our Presidents; Clover-leaf rolls, French rolls, raisin rolls and wholewheat rolls—in short, a type for almost every palate.

The flavor of rolls is usually enhanced considerably by crisping them in a slow oven for a few minutes before serving; and a dish of jelly, jam or marmalade on the table is almost sure to tempt even those members of the family who ordinarily do not eat bread or rolls at all.

Most rolls are made from white flour and, therefore, have the same high energy value of white bread which medical authorities state is non-fattening.

If you are one of the fifty-one per cent who seldom eat rolls, why not ask your wife to try them for dinner some evening? We think you will be agreeably surprised to find how delicious they are. The problem of freshness, which used to bother the baker, no longer exists, since most of these rolls are protected by moistureproof "Cellophane" from the time they leave the oven until they are eaten.

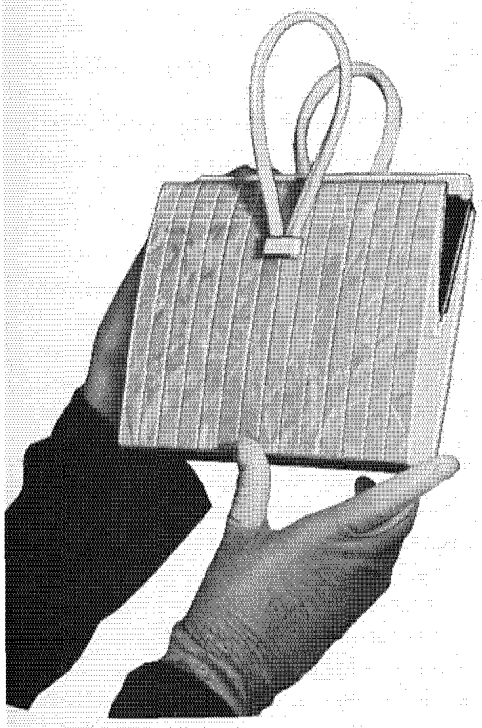
. . . and they taste every bit as good as they look



Those Handsome Handbags

Previewing a few styles made of "Pyralin" plastic in new patterns, colors and finishes

By R. T. ELLIS



● A style leader in Southern resorts is this bag made of Pearl "Pyralin"

LAST spring and summer, women everywhere carried Du Pont "Pyralin" handbags, and this year will find them more popular than ever before. The reason for this continued vogue is, among other things, the ease of keeping these washable creations immaculate at all times. Another reason—and one that clearly demonstrates the resourcefulness and ingenuity of Du Pont chemists—is the variety of new patterns, colors and finishes now available in the material that manufacturers of handbags can use in their factories.

Unique scorings of patterns feature this year's offerings. Striking models of the pouch, vanity and under-arm types will be seen in a wide range of beautiful pastel shades, including blue, jade, maize and pink; also solid colors of black, brown, red and navy. The bags have all been produced from Du Pont "Pyralin" plastic, and they are roomy enough to hold the usual collection of things that women like to carry in their pocketbooks.

One exceptionally attractive handbag made of Pearl "Pyralin" has been introduced at Miami Beach, Florida, and other Southern resorts. This snowy white creation, with a smooth, gleaming surface, sparkles as the light rays strike the pearl finish. If sales to date from the showing already made are any indication of consumer acceptance, this model, according to the manufacturer, will be the leader in his line.

● Above—A Shirley Temple bag; note the scored pattern, a feature of this year's offerings

● One of the fine things about "Pyralin" bags is that they are easy to keep clean with soap and water

Shirley Temple bags for children are also being featured in five different styles and patterns.

Handbags made of this plastic are noted for their beauty and practical utility. A bag of this type seldom, if ever, wears out, and when one becomes soiled with dirt, dust or grease, its original white surface can be quickly restored with a little soap and water.

"Pyralin," a most versatile material, is utilized in manufacturing fountain pens, optical frames, combs, toothbrush handles, teeth plates, buttons, advertising novelties and hundreds of other products. If you require a plastic material in some form or other for any manufacturing need, address a letter to Department 25, Du Pont Viscoloid Company, Inc., 350 Fifth Avenue, New York, and ask for more complete information. Dealers who wish to know where they can obtain the washable bags described on this page are invited to send inquiries to that address.

"The Cavalcade of America" .... *The radio audience comments on the features of the du Pont radio program, heard each Wednesday evening at 8 o'clock E. S. T., over the Columbia network*

STORIES of American history that bring out those traits of character essential to the building of a great nation have always found a large and responsive audience. And it is appropriate that the du Pont Company should sponsor a radio program such as "The Cavalcade of America", in which little-known but authentic incidents from our history are vividly dramatized; for this company, established at Wilmington, Delaware, in 1802, has grown with this country and has contributed many products that have helped to make American life easier and more pleasant.

The authenticity of the details and the realism of the reconstructions of American thought and action are assured by a committee of distinguished historians who help select the source material and check the accuracy of the scripts. They are prepared by authors who are thoroughly trained in the technique of writing for the radio.

Titles of Past Broadcasts of the "CAVALCADE OF AMERICA"

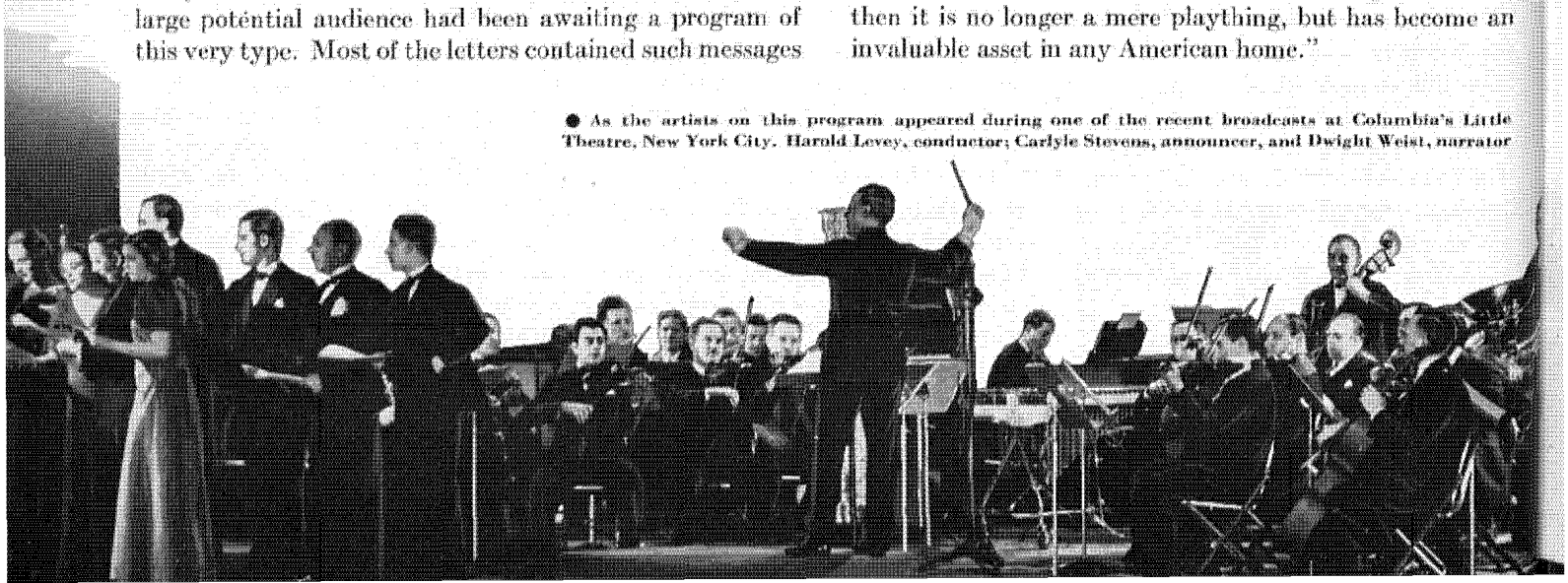
No Turning Back
Conquest of Distance
Spirit of Competition
Will to Rebuild
Faith in Education
Women's Emancipation
Willingness to Share
Community Self Reliance
Heroism in Medical Science
Will to Explore
Defiance of Nature
Humanitarian Urge
Declaration of Independence
Women in Public Service
Building and Architecture
Speed of Words
Enterprise
Loyalty to Family
Abraham Lincoln —A True American
Bridge Builders
Heroes of the Sea

The first program in which were re-enacted two episodes in American history, the departure of the *Mayflower* for England and the repulse of a grasshopper attack in the Mid-West during modern times, was broadcast on October ninth. Since letters are the chief means of informing sponsors how their programs are being received, the first correspondence was awaited with interest.

The very next morning letters began to arrive. Before many of them had been read, it was quite evident that a large potential audience had been awaiting a program of this very type. Most of the letters contained such messages as: "Entertaining and instructive. Keep it up." "My two sons enjoyed it as much as I did." "There is so much sameness on the radio—boop-de-boops, crooners and such—that your rendering stands out." "You are helping to build up a public consciousness of the contribution which organized business, allied with science and invention, is making toward contemporary civilization."

The growing volume of correspondence has indicated that from week to week larger audiences have been attracted to this program. The titles of the series shown on this page give the nature of the ground covered. Such stars of the stage and screen as Walter Hampden, Frank Craven, Franchot Tone and Fay Bainter have played leading roles in single broadcasts.

Large numbers of letters are received from teachers and students to whom the subject matter of this type of program is of particular interest. Here are a couple of comments that express their general reaction: "Many cannot realize how our forefathers strived and worked to help organize our nation. The dramatization is realistic and one can visualize these famous men and women. It is helpful to students and teachers." Again, "When the radio can provide more programs that not only interest, but also educate children, as did the 'Cavalcade of America' last evening, and even inspire them to reporting their new knowledge at school, then it is no longer a mere plaything, but has become an invaluable asset in any American home."



● As the artists on this program appeared during one of the recent broadcasts at Columbia's Little Theatre, New York City. Harold Levey, conductor; Carlyle Stevens, announcer, and Dwight Weist, narrator

Nor was the æsthetic reaction missing in the responses: "Many thanks for a fine program, timely and really charming in its illusion. The voices were so convincing." One writer gave two reasons for liking the program: "1. It presents important events in our history without exaggeration. The truth without a lot of artificial ballyhoo is far more interesting and effective than the usual overdrawn program. 2. The actors speak like human beings, with the natural American accent. If your announcer and actors take on the stage accent, your program interest for us will drop greatly."

Many people interested in history, social science and dramatics have written in for scripts of these realistic dramatic presentations. As a result, the script for *The Declaration of Independence* broadcast, was offered to listeners on January twenty-second. As might have been expected from earlier indications, hundreds of requests for copies were received. Many of the letters have mentioned another phase of the program, the so-called "commercial" announcements, in which brief tales of research and industry show how chemistry has contributed to human needs and comforts. This attempt to make the "commercials" interesting and informative has brought many endorsements, such as the following: "You are to be further commended in presenting this program without marring it by objectionable advertising."

When the du Pont Company received the 1935 Award for Chemical Engineering Achievement made by the *Chemical and Metallurgical Engineering* magazine for the development of the man-made rubber trademarked "DuPrene", and of synthetic camphor and other organic chemicals, it was felt that samples of "DuPrene" made up in the useful form of erasers, while a modest token, might be of interest to the radio audience. This proved to be true, for many thousands of requests resulted from the offer. Many of these were accompanied by inquiries for literature, particularly from business men who also asked for trade samples, and from school teachers and students. One instructor who was caught unprepared wrote in somewhat desperately a few days later: "May I have information to present 'DuPrene' accurately to geography classes? The children report the radio talks and bring in their erasers, so I need the information."

TUNE IN ON THESE STATIONS

Every Wednesday Evening

8:00—8:30 Eastern Standard Time	
WADC	Akron
WOKO	Albany
WCAO	Baltimore
WNAC	Boston
WGR	Buffalo
WKRC	Cincinnati
WHK	Cleveland
WJR	Detroit
WDRC	Hartford
WABC	New York
WCAU	Philadelphia
WJAS	Pittsburgh
WEAN	Providence
WMBG	Richmond
WFBL	Syracuse
WSPD	Toledo
WJSV	Washington
7:00—7:30 Central Standard Time	
WBBM	Chicago
WTOC	Savannah
KRLD	Dallas
KRNT	Des Moines
WFBM	Indianapolis
KMBC	Kansas City
WHAS	Louisville
WCCO	Minneapolis
WLAC	Nashville
WWL	New Orleans
KFAB	Omaha-Lincoln
KMOX	St. Louis
6:00—6:30 Mountain Standard Time	
KLZ	Denver
KSL	Salt Lake City
5:00—5:30 Pacific Standard Time	
KERN	Bakersfield
KMJ	Fresno
KHJ	Los Angeles
KOIN	Portland
KFBK	Sacramento
KGB	San Diego
KFRC	San Francisco
KDB	Santa Barbara
KOL	Seattle
KFPY	Spokane
KWG	Stockton
KVI	Tacoma

The letters contain all sorts of questions. Many are answered by printed material concerning du Pont products, but others require individual replies involving considerable research. Some requests, of course, such as the one asking for "all the literature on du Pont products that might be of interest to a college student of chemistry" are impossible to fill, for full replies would require sizeable libraries. Others call for information that would be difficult to supply under any circumstances. For instance, one man, "deeply interested in the breeding of Iris," wrote of his difficulties in obtaining the proper color effects by breeding and asked for information on the chemistry of this subject.

Listeners have acquired through the program a better understanding of the du Pont Company's diversified products, services and activities. Such comments as "I heard your radio broadcast last week and was impressed by the great amount of work your company carries on" are frequently received. Growing out of this situation, problems for the Company are often suggested. One man wrote: "I have read where a very satisfactory paper can be made out of what we in California call 'elephant ears,' a plant which grows rapidly in this climate. Has your research department given this any consideration? It would be a boon to mankind if some substitute could be found from which to make paper, instead of . . . trees . . . to obtain pulp."

To get back to the "Cavalcade" itself, this letter was particularly gratifying: "The programs sponsored by your company . . . have caught the true local color of realistic, dynamic American History. The accuracy and vigorous spirit of the various broadcasts is to be commended . . . This is one of the finest educational programs on the air and I wish to express my sincere appreciation to your company for using such consideration in sponsoring it."

And here is a letter from a young boy in Michigan that, in a way, summarizes the reactions of many: "I like your program. I think we should all realize even though we are very small, we have a big chance in this world. Even though I am only ten years old, I take a great interest in your program. If it hadn't been for du Pont, many of the inventions wouldn't have been. I hope you will have many new adventures in the 'Cavalcade of America!'"

Taxes and Business

(*Continued from page 2*)

bodies and the public in general will realize this obvious fact before such trends have caused too much damage. Only the effective reversal of these trends, and a re-affirmation of true American traditions and ideals, can create that confidence which is necessary fully to restore normal business activity and expansion with its collateral effect of increasing productive employment."

Chemical and Engineering Research

For many years research in these fields has been a major activity of the du Pont Company, and coördinated work has made possible the development of new and improved processes with substantial savings in manufacturing costs. In his report, Mr. du Pont referred briefly to a few interesting contributions to the development of the chemical industry during the past few years. Since most of the products are well known to readers of this publication, we shall omit the list, mentioning only one that has not been reported previously in these pages:

"Nitrate of Ammonia (C.P.)—The chemically pure grade which is used largely to make nitrous oxide for anesthesia was until recently secured almost wholly from Europe. The du Pont C. P. product meets all specifications for American consumption . . ."

The concluding paragraphs of President du Pont's discussion of this subject appropriately refer to the honorary "Award for Chemical Engineering Achievement" conferred upon the Organic Chemicals Department of the company by the publishers of *Chemical & Metallurgical Engineering* as reported in the Holiday number of THE DU PONT MAGAZINE.

Plant Extension and Modernization

"Approximately $23,400,000 was expended during the year in extending and modernizing the company's manufacturing facilities. Of these expenditures about $13,800,000 provided additional capacity for some of the older processes and for enlargement of facilities for operation of the newer processes, and approximately $9,600,000 provided for renewal and modernization of equipment and facilities.

"Principal among the additional facilities were:

"Ammonia Department: Increases synthesis capacity and new plants for manufacture, respectively, of crystal urea and of new types of solvents at Belle, West Virginia.

"Du Pont Rayon Company: Large expenditures for additions to plants for viscose rayon manufacture at Richmond, Virginia, and Old Hickory, Tennessee, and additions to plant for the manufacture of acetate rayon at Waynesboro, Virginia.

"Du Pont Viscoloid Company: Equipment for making plastic sheeting by a new continuous process for use in laminated safety glass.

"Explosives Department: New plant for the manufacture of ammonium nitrate by a continuous process.

"Fabrics and Finishes Department: New plant at South San Francisco, California, for the manufacture of 'Duco' and 'Dulux' and other types of finishes; new equipment for additional 'Dulux' capacity at several other plants.

"Krebs Pigments Department: Completion of new plant for the manufacture of titanium dioxide pigments at Edge Moor, Delaware, and increased capacity at the plant at Baltimore, Maryland.

"Organic Chemicals Department: New plant at Deepwater Point, New Jersey, for the manufacture of 'DuPrene,' and additional facilities for the manufacture of tetraethyl lead.

"The R. & H. Chemicals Department: Increased plant facilities at Niagara Falls, New York, for the production of trichlorethylene and other solvents.

"At the end of the year there were approximately 41,000 employes on the rolls of the du Pont Company and its wholly owned subsidiaries, compared with 38,000 at the end of the previous year. In addition, there were 5,000 employes in companies controlled but not wholly owned."

Of general interest, too, is a tabulation at the end of the report showing the number of stockholders, by classes, as follows:

	Debenture	Common
December 31, 1931	12,031	42,465
December 31, 1932	12,729	50,778
December 31, 1933	13,235	51,047
December 31, 1934	13,410	51,865
December 31, 1935	13,267	52,831

"The Falling-Pin Seismometer"

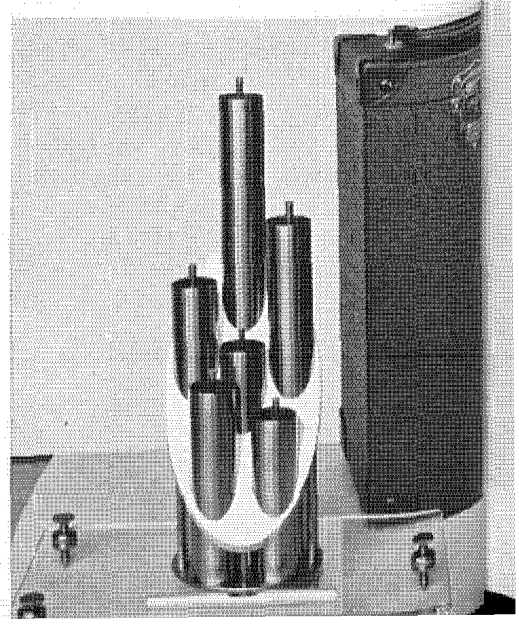
MOST quarrymen and contractors are familiar with the "falling-pin" principle of measuring the intensity of vibrations caused by blasting. A reasonably accurate measurement is possible when this type of seismometer is used in conjunction with the table found in Professor E. H. Rockwell's pamphlet, *Vibrations Caused by Blasting and Their Effect on Structures.*

The picture below shows the Pin Seismometer made by The Michigan Foundation Company, explosive engineers, of Trenton, Michigan.

This set consists of a brass frame with six removable brass windshield tubes finished in du Pont bronze lacquer, the same number of pins, and a level. When in use, the frame rests on a plate-glass base fitted with three set screws for level adjustment.

The pins are made of stainless, rustless steel and can be set up on either end, for both ends are hollow-ground. These pins measure six, eight, ten, twelve, fourteen and sixteen inches in length. The extent and intensity of the vibrations of a blast are determined by noting which of the pins topple over following a shot.

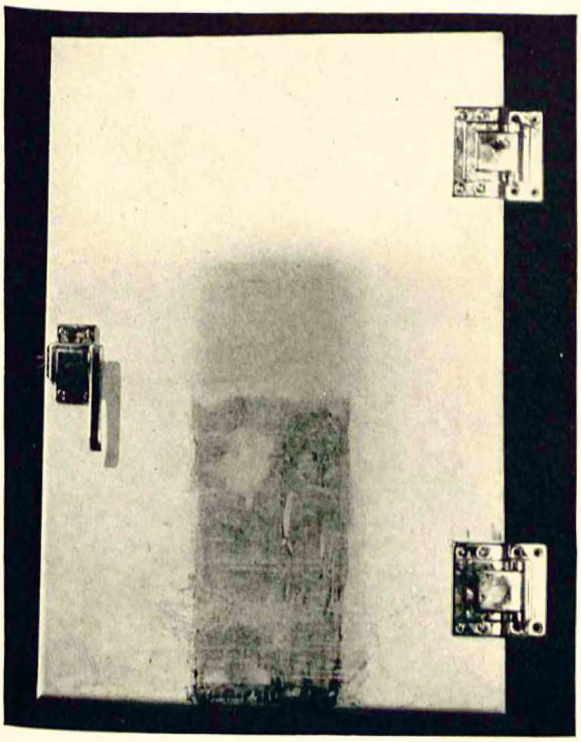
The complete seismometer is carried in a case eight and one-half inches square at the base and seventeen and one-half inches high. The case, equipped with slots for pins, level and plate-glass base, is fitted with a lock and key. It is covered with "Fabrikoid" coated fabric, and the entire outfit weighs a little more than ten pounds.



IT'S BRAND NEW... BUT

GREASY HANDS HAVE OPENED ITS DULUX–FINISHED DOOR

25,000 TIMES



The refrigerator door which proved the resistance of DU PONT DULUX in the great FLORIDA GREASE TEST. Every morning for 13 months an 8-inch wide section (through the middle from top to bottom) was wiped with grease—butter, bacon grease and vegetable fat. The grease stayed on for a week. Upper half of the greased section was cleaned once a week. Lower half not wiped or cleaned at all. After the test, no rusting, cracking or peeling of DULUX finish was evident. The lustrous white DULUX finish was unharmed.

GREASY FINGERS have always been a deadly enemy of finishes used on refrigerators. For years they brought woe to housewives. They sent the manufacturer searching for a finish that would resist the destructive action of household greases, oils and fats—and also retain its original beauty.

Du Pont chemists took the problem for their own. And they finally developed one of the most remarkable of modern finishes —DULUX for Refrigerators. To assure the durability and lasting beauty of DULUX it took years of testing, checking and rechecking in laboratories and on the refrigerators themselves. One of the tests was the equivalent of opening and closing a refrigerator door 25,000 times with greasy hands. Having proved the qualities of this finish to their own satisfaction, they made it available for many uses. In the marine industry it resists the harmful effects of salt spray, salt air and harbor gases. On steel structures it retards rust and corrosion. On other surfaces it withstands changing temperatures, excessive moisture, dust and grime. DULUX gives longer lasting protection and beauty where beauty is needed.

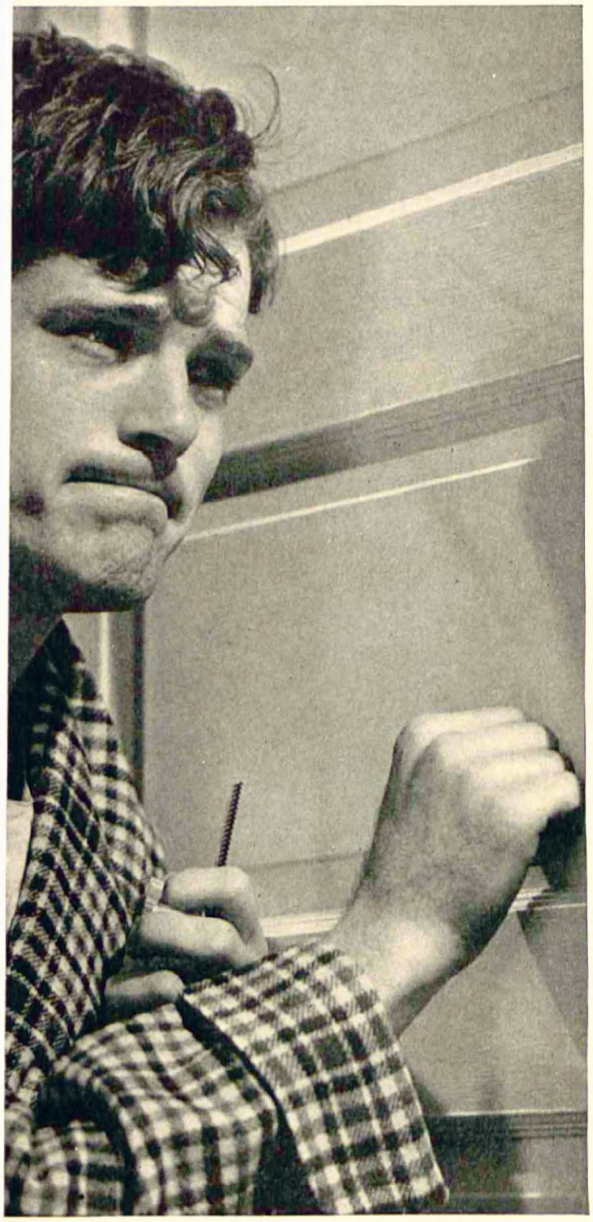
If you have costly plant equipment to protect—if you have a product for which you want another selling advantage, or a home for which you desire lasting beauty and protection, look to DULUX, DUCO or many other du Pont finishes. Use them. Rely on them. E. I. du Pont de Nemours & Co., Inc., Finishes Division, Wilmington, Delaware.

DU PONT
REG. U.S. PAT. OFF.

DULUX
REG. U.S. PAT. OFF.

for industry and home

Just try to hurry your sister!



BETTY is dripping with water—but Brother Joe is dripping with indignation. He has to meet his "date" in twenty minutes, and Betty has been bathing for the last half hour. (That's what Joe says, anyway.)

Inside the shower curtain, Betty is blissfully forgetful of time, lost in the luxury of steaming spray and the creamy suds of her fragrant gardenia soap.

There's no reason, of course, why she should know the part that chemical research plays in this bath-taking. But the soap is scented with a Du Pont aromatic, and the curtain fabric is made of "Acele," Du Pont's acetate yarn.

Even the water that cascades over her smooth shoulders has arrived by way of aqueducts that pierce rocky hills through the constructive power of dynamite.

Such a little incident in the day—*a bath.* Yet it is a good example of the way research chemists constantly add to your enjoyment by means of useful Du Pont products.

BETTER THINGS *for* BETTER LIVING ...THROUGH CHEMISTRY

DU PONT

REG. U.S. PAT. OFF.

Producers of Chemical Products since 1802
Wilmington, Delaware

Listen to "The Cavalcade of America" every Wednesday evening, 8 P. M., E. S. T., over Columbia Broadcasting System

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